June 2022

Annual Gas Balancing Planning for the Year 2023

1. Introduction

The present plan is developed in terms of Paragraph 2,γ of Article 68 of the Law 4001/2011 according to which the Operator of National Natural Gas System (DESFA S,A,) (hereinafter 'Operator') is responsible for balancing of the National Natural Gas System (NNGS) as defined in the NNGS Network Code (hereinafter 'Code') and the provisions of Article 46 regarding the Annual Gas Balancing Planning

In terms of paragraph 1 of Article 46 of the Code, the Operator submits to the Regulatory Authority for Energy (RAE) the Annual Gas Balancing Planning for the next Year, which, as well as each modification thereof shall be approved by RAE and published at the Operator's responsibility.

Within the framework of its above-mentioned competence and in accordance with the provisions of Chapter 8 of the Code, the Operator shall undertake Balancing Actions through (a) the purchase and sale of Balancing Gas in the form of Short Term Standardized Products (hereinafter STSPs) carried out on the Operator's Trading Platform, either through continuous negotiations or through auctions; and/or (b) use of Balancing Services through Balancing Services Agreements that may be concluded by the Operator, either following a relevant tender, either in accordance with the provision of paragraph 1 of Article 91 of the Law 4001/2011, with Users or third parties concerning the supply and delivery of Balancing Gas Quantities to the NNGS, following the approval of the Annual Gas Balancing Planning by RAE.

According to paragraph 2 of Article 46 of the Code, the Annual Gas Balancing Planning includes in particular: (a) The Operator's forecast for the evolution of the demand in Natural Gas per category of Customers in relation to the existing Transmission Capacity of the Transmission System, (b) a forecast regarding the necessary Quantities of Balancing Gas, such as the total annual Quantity of Balancing Gas for purchase and/or sale, its estimated allocation during the Year, as well as an estimation for the part of said Quantity that is expected to be covered through the use of Balancing Services, (c) a determination of the necessary characteristics of the agreement or combination of agreements that the Operator must conclude, at its discretion, to procure Balancing Services and (d) an estimate regarding the part of the NNGS Capacity which may be used by the Operator for Gas Balancing.

In accordance with paragraph 3 of Article 46 of the Code, for the development of the Annual Gas Balancing Planning the Operator takes into consideration particularly the NNGS Development Plan, the total demand for Natural Gas served via the National Natural Gas Transmission System (NNGTS), the geographical distribution of consumption, the elimination of technical limitations affecting the operation of the System and, especially, each event that has led to, or may lead to, in its estimation, congestion or Emergency Level Crises, the maintenance requirements of the NNGS

sections, the existing Gasification Capacity and Transmission Capacity at Entry and Exit Points, relevant historical data, as well as the criteria of the provision of paragraph 2 of Article 8 of Regulation (EU) No 312/2014.

2. Gas Balancing

Balancing Gas is considered to be the Natural Gas required for the gas balancing of the NNGTS. The Balancing Gas Quantity is injected to / received from the NNGTS over a specific period of time in order to balance the Natural Gas Deliveries with Receptions (during the same period of time) in order to ensure in each case the reliable, safe and efficient operation of the NNGS.

The Operator undertakes Balancing Actions to achieve the NNGTS Linepack within the range of [22,3 – 24,3] million Nm^3 at the end of a Day, in order to ensure the cost-effective and efficient operation of the NNGTS during the Day.

When performing Balancing Actions, the Operator considers at least the following:

1. its estimations about the Natural Gas demand;
2. the most recent data on Confirmed Natural Gas Delivery and Reception Quantities of the Transmission Users at the NNGTS Entry and Exit Points, respectively;
3. the most recent measurement data;
4. the prevailing NNGTS pressure at any given time; and
5. the possibility of storing Natural Gas in the NNGTS.

3. Estimation of Natural Gas demand for the Year 2023

According to the updated Demand Forecast Study for the period 2022-2031, the Natural Gas consumption will reach the level of **6,704 mil. Nm^3** in the Year 2023. The estimated Natural Gas demand per consumer category is presented in more detail in Table 1 on the next page.

2023	Power Production (Nm^3)	Other Consumers (Nm^3)	Total Consumption (Nm^3)
January	395,333,324	394,587,821	789,921,145
February	319,041,010	301,257,671	620,298,681
March	310,128,554	284,516,329	594,644,883
April	219,812,009	195,166,170	414,978,178
May	269,638,512	183,539,658	453,178,170
June	304,886,401	189,907,936	494,794,338
July	408,202,037	198,616,925	606,818,962
August	310,190,054	191,773,902	501,963,956
September	299,770,045	188,451,455	488,221,500
October	266,333,961	201,690,256	468,024,218
November	279,834,510	256,732,771	536,567,282
December	372,771,379	361,866,973	734,638,352
Total	**3,755,941,797**	**2,948,107,867**	**6,704,049,664**

Table 1: Forecast of Natural Gas demand per consumer category for the Year 2023

4. Balancing Gas Quantities

On 21th.03.2022 the operation of the Trading Platform came into force, with the participation of the Operator in the supply of STSP for balancing purposes.

In accordance of paragraph 2, article 44A of the NNGS Code, the Operator executes Balancing Actions through (a) the purchase and sale of Balancing Gas in the form of STSPs and/or (b) the use of Balancing Services.

Considering the above, and in order for the Operator to extract as reliably as possible an estimation of the necessary Balancing Gas Quantities for purchase ($\boldsymbol{BG^{P}_{M,2023}}$) and sale ($\boldsymbol{BG^{S}_{M,2023}}$) required for each Month of the Year 2023, the Operator used the historical data of the period 01/2021 – 04/2022 and applied the following methodology:

$$\boldsymbol{BG^{P}_{M,2023}} = \boldsymbol{\bar{X}^{P}}_{\boldsymbol{M,2023}} * \boldsymbol{ER_{M,2023}}, \text{ and}$$

$$\boldsymbol{BG^{S}_{M,2023}} = \boldsymbol{\bar{X}^{S}_{M,2023}} * \boldsymbol{ER_{M,2023}},$$

where:

- $\boldsymbol{\bar{X}^{P}}_{\boldsymbol{M,2023}}$: The average participation rates of the Balancing Gas Quantities for purchase during the Month M of the period 01/2021 - 04/2022 to the Natural Gas Receptions of the same Month (see Annex 2);

- $\bar{X}^{S}_{M,2023}$: The average participation rates of the Balancing Gas Quantities for sale during the Month M of the period 01/2021 – 04/2022 to the Natural Gas Receptions of the same Month (see Annex 2);

- $ER_{M,2023}$: Estimated monthly NNGTS Natural Gas Receptions for the Year 2023 (see Table 1 above); and

- M : Month of a Year

For the calculation of the above value $\overline{X}^{P}$ for every Month of the Year 2023, the Operator took into account:

i. the Balancing Gas Quantities injected to the NNGTS through the Entry Point 'Agia Triada' during the same Months within the period 01/2021 – 04/2022; and
ii. the historical data of the purchased Balancing Gas Quantities through STSPs in the Balancing Platform and then in the Trading Platform, for the same Months within the period 01/2021 – 04/2022,

Furthermore, for the calculation of the above value $\overline{X}^{S}$ for every Month of the Year 2023, the Operator took into account the historical data of Balancing Gas Quantities sales through STSPs in the Balancing Platform and then in the Trading Platform, for the same Months within the period 01/2021 – 04/2022.

In Diagram 1 below the following are presented:

- The Monthly Balancing Gas Quantities for purchase during the period 01/2021 – 04/2022, through STSPs or via Balancing Services; and
- The Monthly Balancing Gas Quantities for sale during the period 01/2021 – 04/2022, through STSPs,

as a percentage of the respective Monthly Natural Gas Receptions.

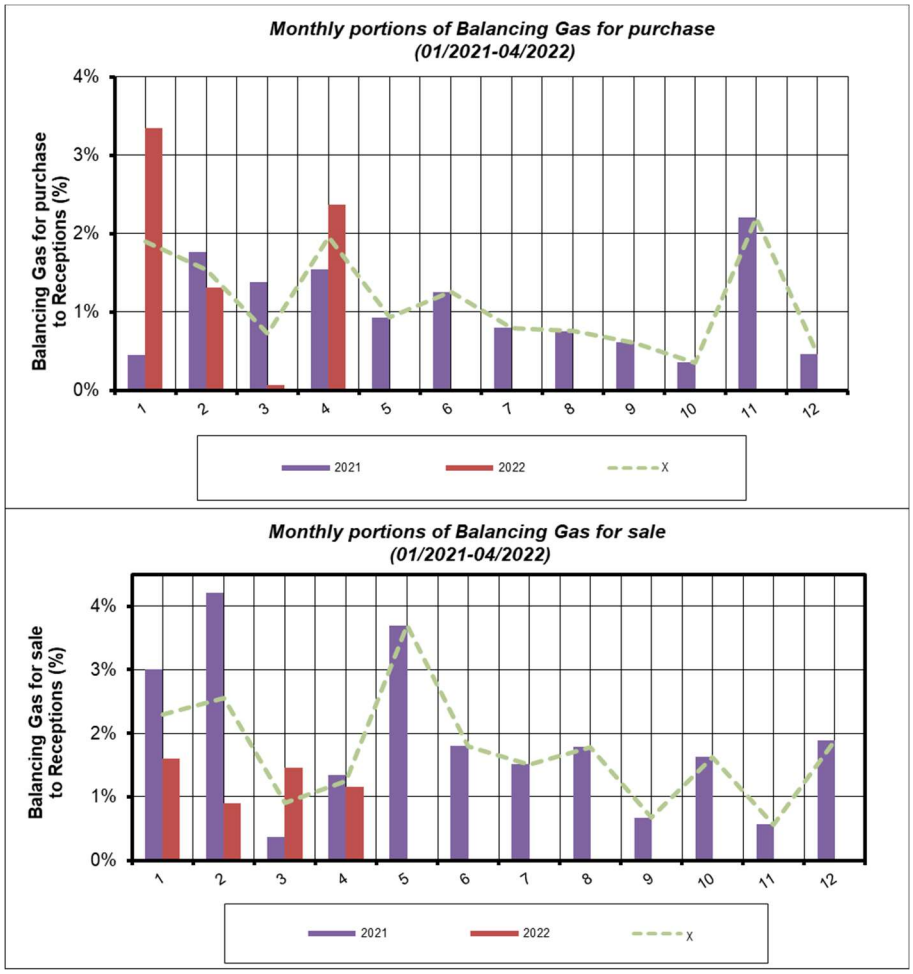

Diagram 1: Monthly portions of Balancing Gas Quantities to Natural Gas Receptions for the period 01/2021 – 04/2022

The results of the calculations in case of Balancing Gas purchase and sale are presented separately in Table 2 below.

Month of the Year 2023	Balancing Gas Purchase $(\overline{X}^{P})$ %	Balancing Gas Sale $(\overline{X}^{S})$ %
January	1.89	2.30
February	1.54	2.55
March	0.72	0.91
April	1.96	1.25
May	0.93	3.70
June	1.26	1.80
July	0.79	1.51
August	0.76	1.78
September	0.61	0.67
October	0.35	1.62
November	2.21	0.56
December	0.47	1.88

Table 2

Taking into consideration the above methodology, the Operator's estimations for the Monthly distribution of Balancing Gas purchase and sale for the Year 2023 are presented in Table 3[1] below

[1] *For the conversion of the volume units (Nm^3) to energy units (kWh), the weighted (flow) average of the Gross Calorific Value of the Entry Points of the NNGTS for Year 2021 was used, i.e.11.510 kWh / Nm^3.*

– an overall Table with the Operator's estimation of the Monthly Natural Gas demand per consumption category and the estimation of the Balancing Gas purchase and sale for the Year 2023 is presented in Annex 1.

Month of the Year 2023	Balancing Gas Purchase (kWh)	Balancing Gas Sale (kWh)
January	172,078,782	209,268,010
February	109,892,369	182,359,363
March	49,461,948	62,480,705
April	93,488,706	59,546,623
May	48,548,409	192,755,521
June	71,623,569	102,560,065
July	55,418,326	105,395,086
August	43,736,785	102,924,080
September	34,204,658	37,674,696
October	19,062,002	87,484,557
November	136,231,529	34,791,819
December	39,413,505	159,304,876
Total	**873,160,587**	**1,336,545,400**

Table 3: Estimation of the Monthly distribution of Balancing Gas purchase and sale for the Year 2023

In accordance with the provisions of Article 44A of the Network Code, the Operator undertakes Balancing Actions through:

1. The purchase and sale of Balancing Gas in the form of Short-term Standardized Products (STPSs) carried out on the Operator's Trading Platform, either through continuous negotiations or through auctions; and/or
2. The use of Balancing Services when the following reasons are met:
    - it was not possible to purchase/sell the required Balancing Gas Quantity through Short-term Standardized Products; and/or
    - in its estimation, it is unlikely to purchase/sell the required Balancing Gas Quantity through Short-term Standardized Products; and/or
    - in its estimation, the use of these products is not, or is not likely to provide, the necessary response to maintain the Transmission System within its operational limits; and/or
    - due to the urgent need for safe, cost-efficient and effective operation of the NNGS, an auction cannot be conducted.

Based on the above and taking into account the period of the last 16 Months, i,e, 01/2021 - 04/2022, where there is a maturity in the usage of STPSs in the Balancing and Trading Platform by the Users, the Operator calculated the percentage $Z\%$ of the estimated Balancing Gas Quantities expected to be covered through the use of Balancing Services, for the Year 2023, on the basis of the following methodology:

$$Z\% = \frac{\sum_{i=1}^{n} BG^{service}}{\sum_{j=1}^{k} BG^{P}} * 100$$

where:

- $\sum_{i=1}^{n} BG^{service}$: The sum of Balancing Gas Quantities injected into the NNGTS through the Entry Point 'Agia Triada', via usage of Balancing Services for each Day (i) for the period 01/2021 – 04/2022;

- $\sum_{j=1}^{k} BG^{P}$: The sum of Balancing Gas Quantities purchased through STSPs in the Balancing Platform (the period 01.01.2021 – 20.03.2022) and then in the Trading Platform (the period 21.03.2022 – 30.04.2022) and/or via usage of Balancing Services for each Day (j) for the period 01/2021 – 04/2022;

- n : The amount of Days of the period 01/2021 – 04/2022 during which Balancing Gas Quantities were injected into the NNGTS via usage of Balancing Services; and

- k : The amount of Days of the period 01/2021 – 04/2022 during which the Operator purchased Balancing Gas Quantities through STSPs in the Balancing Platform (the period 01.01.2021 – 20.03.2022) and then in the Trading Platform (the period 21.03.2022 – 30.04.2022) and/or via usage of Balancing Services.

Based on the above, it appears that during the period 01/2021 - 04/2022, 8% of the Balancing Gas Quantities for purchase was covered through the use of Balancing Services, which is also adopted as an estimate of the percentage of the Balancing Gas Quantities for purchase that will be covered through the use of Balancing Services by the Operator for the Year 2023, in relation to the total estimated Balancing Gas Quantities for purchase for the same Year.

5. Balancing Services Agreement

Taking into consideration the provision of Article 47 of the Code, aiming firstly at the proper, cost-efficient and effective operation of the NNGS during the Year 2023, the Operator will enter into Balancing Services framework agreement with Natural Gas suppliers, which will be chosen

after an international bid, according to paragraph 2,c of Article 68 of the Law 4001/2011, for the supply of Balancing Gas during the period 01.01.2023 07:00 – 01.01.2024 07:00.

The supply of Balancing Gas will take place in the context of fulfillment of requests for supply of Balancing Gas issued by the Operator to the selected Suppliers, The choice of the supplier will be based on criteria that will be specified in the framework agreement and relate, among others, with the lower supply price offered and the fulfillment of the Operator's request in terms of the Balancing Gas quantity and the delivery date.

Furthermore, taking into consideration:

i. The NNGTS topology and construction features;

ii. The NNGTS Technical, Booked and Available Capacity at the Entry Points;

iii. The NNGTS geographical Natural Gas Receptions allocations; and

iv. The current framework regulating the Greek Natural Gas market;

the supplied Balancing Gas Quantities will relate solely to Liquefied Natural Gas (LNG) delivered to the Operator at Revithoussa LNG Facility.

Also, taking into consideration:

- the Revithoussa LNG Facility Storage;
- the requirements of the Code and particularly Chapter 11 regarding the terms of access to the Revithoussa LNG Facility (Temporary LNG Storage Period, Minimum Re-gasification Capacity); and
- the size of LNG vessels that are available in the Liquefied Natural Gas market;

the Balancing Services framework agreement will provide the authority to the Operator to specify, in each request to suppliers, the LNG quantity and the delivery date, so that the smooth operation of the greek Natural Gas market is not upset, in accordance with the requirements of the Code.

Given the impossibility to confirm the Operator's estimations regarding the required Natural Gas Quantities for balancing purposes for the Year 2023, the abovementioned framework agreement will not contain imposing restrictions such as minimum supply quantity or payment clauses, irrespective of LNG deliveries.

6. Part of the NNGS Capacity for Gas Balancing for the Year 2023

The Operator, taking into account the significant variation of the required Daily Balancing Gas Quantity during a Year, proposes the methodology of determining the part of the NNGS

capacity - which according to Section 5 above refers to part of the LNG Facility Re-Gasification Capacity and the Transmission Capacity for Delivery at the NNGTS Entry Point 'Agia Triada' - which can be used for Balancing Actions through the use of Balancing Services by the Operator during the Year 2023, aiming to the effective and cost-efficient operation of the NNGS and to improving the level of Transmission and LNG Facility services to Users.

The Operator, taking into account the historical data from the period 01/2021-04/2022 (see Annex 3), the above mentioned in Section 4 herein, according to which 8% of the estimated Balancing Gas Quantities will be covered through the use of Balancing Services, and correlating the maximum Daily Balancing Gas Quantity that was injected in the NNGTS per Month with the corresponding sum of the Users' Booked Transmission Capacity for Reception, proposes the application of the following methodology for the calculation of the Monthly NNGS Capacity estimated to be required for Balancing Services by the Operator during the Year 2023:

$$\boldsymbol{\Delta E_{M,2023} = 0.08 * (OA_{M,2023} * E\Delta M_{M,2023})},$$

where:

- $\boldsymbol{OA_{M,2023} = \frac{\frac{AQ_{E\Xi(max)M,2022}}{\Delta M_{M,2022}} + \frac{AQ_{E\Xi(max)M,2021}}{\Delta M_{M,2021}}}{2}}$, [2]

- $AQ_{E\Xi(max)_{M,Y}}$: the maximum Daily Balancing Gas Quantity (kWh/Day) of the Month M of the Year Y, that was purchased through Balancing Services;

- $\Delta M_{M,Y}$: the sum of the Booked Transmission Capacity for Reception (kWh/Day) that was booked by all Users, during the Day of the injection to the NNGTS of the maximum Daily Balancing Gas Quantity of the Month M of the Year Y; and

- $\boldsymbol{E\Delta M_{M,2023} = \frac{(\Delta M_{M,2022} + \Delta M_{M,2021})}{2}}$

Based on the above methodology, the Operator's Monthly estimation of the NNGS Capacity that will be required for Gas Balancing is shown in Table 4 on the next page.

[2] *For the calculation of the Monthly Capacity of the NNGS, for the Year 2022 only historical data for the first quarter of Year 2022 were used*

Month of the Year 2023	NNGS Capacity for gas balancing (kWh/Day)
January	563,134
February	0
March	299,894
April	283,274
May	0
June	1,210,819
July	0
August	199,380
September	0
October	0
November	563,911
December	268,641

Table 4

ANNEX 1

Monthly Estimation of Natural Gas Demand per Consumption Category and Estimation of Balancing Gas Quantities

2023	Power Production	Other Consumers	Total Consumptions		Balancing Gas (kWh)	
	Nm^3	Nm^3	Nm^3	kWh	Purchase	Sale
January	395,333,324	394,587,821	789,921,145	9,091,992,379	172,078,782	209,268,010
February	319,041,010	301,257,671	620,298,681	7,139,637,818	109,892,369	182,359,363
March	310,128,554	284,516,329	594,644,883	6,844,362,603	49,461,948	62,480,705
April	219,812,009	195,166,170	414,978,178	4,776,398,829	93,488,706	59,546,623
May	269,638,512	183,539,658	453,178,170	5,216,080,737	48,548,409	192,755,521
June	304,886,401	189,907,936	494,794,338	5,695,082,830	71,623,569	102,560,065
July	408,202,037	198,616,925	606,818,962	6,984,486,253	55,418,326	105,395,086
August	310,190,054	191,773,902	501,963,956	5,777,605,134	43,736,785	102,924,080
September	299,770,045	188,451,455	488,221,500	5,619,429,465	34,204,658	37,674,696
October	266,333,961	201,690,256	468,024,218	5,386,958,749	19,062,002	87,484,557
November	279,834,510	256,732,771	536,567,282	6,175,889,416	136,231,529	34,791,819
December	372,771,379	361,866,973	734,638,352	8,455,687,432	39,413,505	159,304,876
Total	**3,755,941,797**	**2,948,107,867**	**6,704,049,664**	**77,163,611,644**	**873,160,587**	**1,336,545,400**

ANNEX 2

Historical data of Balancing Gas Quantities for the period 01/2021 – 04/2022

Year	Month	Injected Balancing Gas Quantity (kWh)	Balancing Gas Quantity for purchase via STPSs (kWh)	Balancing Gas Quantity for sale via STPSs (kWh)	Total Natural Gas Reception (kWh)
2021	January	0	30,500,000	205,480,000	6,850,011,769
2021	February	0	86,500,000	206,350,000	4,897,298,442
2021	March	3,748,679	77,710,000	21,500,000	5,900,131,094
2021	April	3,540,930	88,500,000	79,500,000	5,947,938,466
2021	May	0	40,510,000	160,840,000	4,352,427,469
2021	June	24,172,752	51,180,000	107,900,000	5,991,605,396
2021	July	0	53,060,000	100,910,000	6,687,261,580
2021	August	2,492,256	45,250,000	112,350,000	6,306,725,660
2021	September	0	34,500,000	38,000,000	5,667,950,745
2021	October	0	19,000,000	87,200,000	5,369,436,837
2021	November	12,585,392	110,600,000	31,460,000	5,584,458,803
2021	December	8,098,958	22,560,000	123,920,000	6,577,506,074
2022	January	29,352,825	186,110,000	103,450,000	6,450,929,815
2022	February	0	71,850,000	49,000,000	5,475,980,346
2022	March	0	4,490,000	101,400,000	6,938,751,288
2022	April	0	77,250,000	37,750,000	3,263,393,217

ANNEX 3

Historical data of Maximum Balancing Gas Quantity and Booked Transmission Capacity for Reception by Users

Month	Year	Maximum Balancing Gas Quantity (kWh/Day)	Sum of all Users' Booked Transmission Capacity for Reception on the Day of the Maximum Balancing Gas Quantity (kWh/Day)
January	2022	7,214,305	276,471,917
	2021		
February	2022		
	2021		
March	2022		
	2021	3,748,679	273,241,570
April	2022		
	2021	3,540,930	279,144,684
May	2021		
June	2021	15,135,237	241,319,201
July	2021		
August	2021	2,492,256	247,935,471
September	2021		
October	2021		
November	2021	7,048,892	251,960,024
December	2021	3,358,015	366,898,952