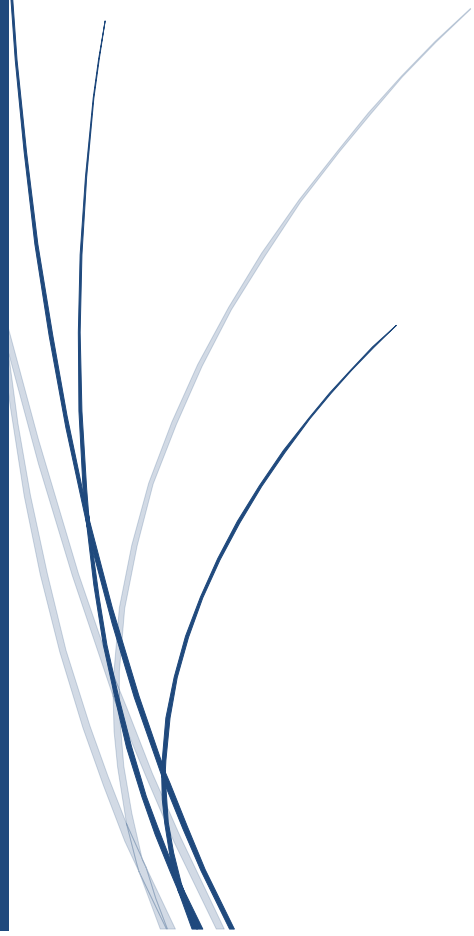
DESFA
Hellenic Gas Transmission System Operator S.A.

April 2021

Annual Gas Balancing Planning for the Year 2022



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) auctioned at the Operator's Balancing Platform 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 serviced 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:

a) maintain the NNGTS within its operational limits, which refer to the minimum and the maximum NNGTS Linepack at 20.5 and 26 million Nm^3, respectively, at the end of a Day; and/or

b) 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 2022

Taking into consideration the NNGS Development Study for the period 2021-2030, the historical data of Natural Gas consumption and the expected completion date of the ongoing or planned expansion projects of the NNGS, it is estimated that the Natural Gas consumption will reach the level of **5,167 mil. Nm^3** in the Year 2022. The estimated Natural Gas demand per consumer category is presented in more detail in Table 1 of the next page.

2022	Power Production (Nm^3)	Other Consumers (Nm^3)	Total Consumption (Nm^3)
January	297,871,699	315,361,994	613,233,693
February	228,558,445	248,955,664	477,514,109
March	192,683,554	239,329,794	432,013,348
April	178,041,338	159,041,193	337,082,531
May	210,428,156	143,319,990	353,748,146
June	238,033,623	136,970,140	375,003,763
July	291,163,441	145,820,803	436,984,244
August	262,053,017	135,593,875	397,646,891
September	216,446,393	140,711,959	357,158,352
October	207,472,934	138,255,659	345,728,593
November	252,444,634	198,018,391	450,463,024
December	292,500,727	297,435,889	589,936,616
Total	**2,867,697,960**	**2,298,815,350**	**5,166,513,310**

Table 1: Forecast of Natural Gas demand per consumer category for the Year 2022

4. Balancing Gas Quantities

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 auctioned at the Operator's Balancing Platform 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 ($\boldsymbol{BG^{P}_{M,2022}}$) and sale ($\boldsymbol{BG^{S}_{M,2022}}$) required for each Month of the Year 2022, the Operator used the historical data of the period 01/2019 – 03/2021[1] and applied the following methodology:

$$\boldsymbol{BG^{P}_{M,2022}} = \boldsymbol{\bar{X}^{P}_{M,2022}} * \boldsymbol{ER_{M,2022}}, \text{ and}$$

$$\boldsymbol{BG^{S}_{M,2022}} = \boldsymbol{\bar{X}^{S}_{M,2022}} * \boldsymbol{ER_{M,2022}},$$

where:

- $\boldsymbol{\bar{X}^{P}_{M,2022}}$: The average participation rates of the Balancing Gas Quantities for purchase

[1] *The Balancing Gas Quantity injected to the NNGTS through Balancing Services on 20.07.2020, was not taken into account in the calculations of Balancing Gas Quantities for purchase, due to that it took place during an Emergency Status 1, on which NNGS was during the period 27-29.07.2020.*

during the Month M of the period 01/2019 - 03/2021 to the Natural Gas Receptions of the same Month (see Appendix 2);

- $\bar{X}^{S}_{M,2022}$: The average participation rates of the Balancing Gas Quantities for sale during the Month M of the period 01/2019 – 03/2021 to the Natural Gas Receptions of the same Month (see Appendix 2);

- $ER_{M,2022}$: Estimated monthly NNGTS Natural Gas Receptions for the Year 2022 (see Table 1 above); and

- M : Month of a Year

For the calculation of the above value $\bar{X}^{P}$ for every Month of the Year 2022, 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 01/2019 – 03/2021; and
ii. the historical data of the purchased Balancing Gas Quantities auctioned through STSPs in the Balancing Platform during the same Months within the period 01/2019 – 03/2021.

Furthermore, for the calculation of the above value $\bar{X}^{S}$ for every Month of the Year 2022, the Operator took into account the historical data of Balancing Gas Quantities sales through STSPs auctioned in the Balancing Platform during the same Months within the period 01/2019 – 03/2021.

In Diagram 1 below the following are presented:

- The Monthly Balancing Gas Quantities for purchase during the period 01/2019 – 03/2021, through STSPs auctioned in the Balancing Platform or via Balancing Services; and
- The Monthly Balancing Gas Quantities for during the period 01/2019 – 03/2021, through STSPs auctioned in the Balancing Platform or via Balancing Services,

as a percentage of the respective Monthly Natural Gas Receptions.

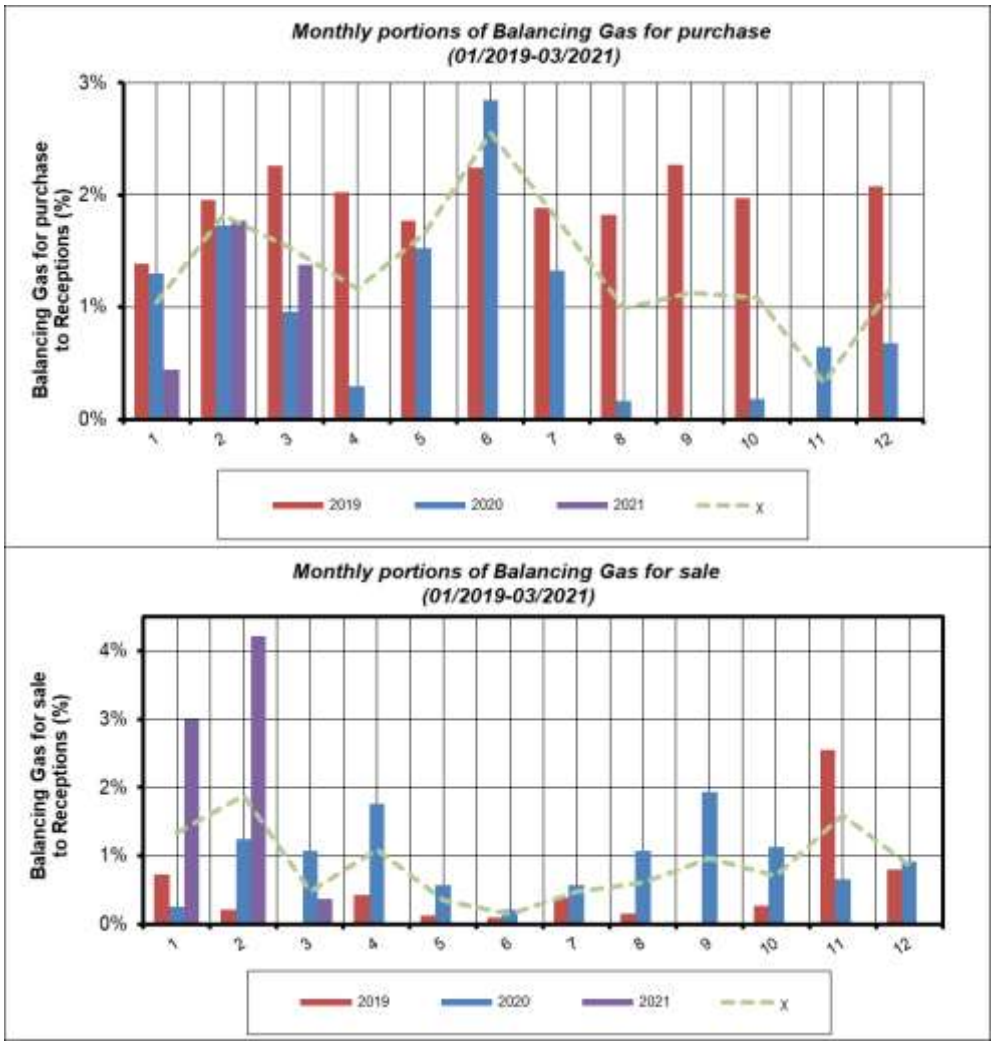


Diagram 1: Monthly portions of Balancing Gas Quantities to Natural Gas Receptions for the period 01/2019 – 03/2021

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

Month of the Year 2022	Balancing Gas Purchase $(\overline{X}^P)$ %	Balancing Gas Sale $(\overline{X}^S)$ %
January	1.04	1.33
February	1.82	1.88
March	1.53	0.48
April	1.16	1.09
May	1.65	0.35
June	2.55	0.15
July	1.60	0.47
August	0.99	0.61
September	1.13	0.96
October	1.08	0.70
November	0.32	1.60
December	1.38	0.86

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 2022 are presented in Table 3[2] below – 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 2022 is presented in Annex 1.

Month of the Year 2022	Balancing Gas Purchase (kWh)	Balancing Gas Sale (kWh)
January	73,534,028	93,821,593
February	99,791,293	103,561,813
March	76,235,196	23,677,198
April	45,022,019	42,231,565
May	67,231,152	14,060,486
June	109,892,268	6,529,460
July	80,557,553	23,804,278
August	45,460,931	27,967,752
September	46,647,617	39,631,367
October	42,793,035	27,873,758
November	16,595,921	83,008,032
December	93,483,739	58,252,569
Total	**797,244,753**	**544,419,871**

Table 3: Estimation of the Monthly distribution of Balancing Gas purchase and sale for the Year 2022

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) through auctions in the Balancing Platform; 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 15 Months, i.e. 01/2020 - 03/2021,

[2]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 2020 was used, i.e.11.51 kWh / Nm^3. The NNGTS Entry Point 'NEA MESIMVRIA' was not included, due to that its operation started on 31.12.2020.

where there is a maturity in the operation of STPSs in the Balancing 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 2022, 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 01/2020 – 03/2021;

- $\sum_{j=1}^{k} BG^{P}$: The sum of Balancing Gas Quantities purchased through STSPs auctioned in the Balancing Platform and/or via usage of Balancing Services for each Day (j) for the period 01/2020 – 03/2021;

- n : The amount of Days of the period 01/2020 – 03/2021 during which Balancing Gas Quantities were injected into the NNGTS via usage of Balancing Services; and

- k : The amount of Days of the period 01/2020 – 03/2021 during which the Operator purchased Balancing Gas Quantities through STSPs auctioned in the Balancing Platform and/or via usage of Balancing Services.

Based on the above, it appears that during the period 01/2020 - 03/2021, 22% 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 2022, 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 2022, 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 01.01.2022 07:00 – 01.01.2023 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 2022, 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 2022

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 2022, 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 01/2019-03/2021 (see Annex 3), the above mentioned in Section 4 herein, according to which 22% 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 2022:

$$\boldsymbol{\Delta E_{M,2022} = 0,22 * (OA_{M,2022} * E\Delta M_{M,2022})},$$

where:

- $\boldsymbol{OA_{M,2022} = \frac{\frac{AQ_{E\Xi(max)M,2021}}{\Delta M_{M,2021}} + \frac{AQ_{E\Xi(max)M,2020}}{\Delta M_{M,2020}} + \frac{AQ_{E\Xi(max)M,2019}}{\Delta M_{M,2019}}}{3}}$, [3]

- $AQ_{E\Xi(max)_{M,Y}}$: the maximum Daily Balancing Gas Quantity (kWh/Day) of the Month M of the Year Y, that was purchased either through the STSPs that were auctioned in the Balancing Platform or 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

- $\boldsymbol{E\Delta M_{M,2022} = \frac{(\Delta M_{M,2021} + \Delta M_{M,2020} + \Delta M_{M,2019})}{3}}$

Based on the above methodology, the Operator's Monthly estimation of the NNGS Capacity

[3] *For the calculation of the Monthly Capacity of the NNGS, for the Year 2021 only historical data for the first quarter of Year 2021 were used*

that will be required for Gas Balancing is shown in Table 4.

Month of the Year 2022	NNGS Capacity for Gas Balancing (kWh/Day)
January	2,537,335
February	4,663,700
March	945,290
April	3,521,171
May	1,516,622
June	2,772,120
July	3,505,287
August	713,271
September	2,949,765
October	1,897,899
November	0
December	1,991,332

Table 4

ANNEX 1

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

2022	Power Production	Other Consumers	Total Consumptions		Balancing Gas (kWh)	
	Nm³	Nm³	Nm³	kWh	Purchase	Sale
January	297,871,699	315,361,994	613,233,693	7,058,319,806	73,534,028	93,821,593
February	228,558,445	248,955,664	477,514,109	5,496,187,395	99,791,293	103,561,813
March	192,683,554	239,329,794	432,013,348	4,972,473,635	76,235,196	23,677,198
April	178,041,338	159,041,193	337,082,531	3,879,819,932	45,022,019	42,231,565
May	210,428,156	143,319,990	353,748,146	4,071,641,160	67,231,152	14,060,486
June	238,033,623	136,970,140	375,003,763	4,316,293,312	109,892,268	6,529,460
July	291,163,441	145,820,803	436,984,244	5,029,688,648	80,557,553	23,804,278
August	262,053,017	135,593,875	397,646,891	4,576,915,715	45,460,931	27,967,752
September	216,446,393	140,711,959	357,158,352	4,110,892,632	46,647,617	39,631,367
October	207,472,934	138,255,659	345,728,593	3,979,336,105	42,793,035	27,873,758
November	252,444,634	198,018,391	450,463,024	5,184,829,406	16,595,921	83,008,032
December	292,500,727	297,435,889	589,936,616	6,790,170,450	93,483,739	58,252,569
Total	**2,867,697,960**	**2,298,815,350**	**5,166,513,310**	**59,466,568,198**	**797,244,753**	**544,419,871**

ANNEX 2

Historical data of Balancing Gas Quantities for the period 01/2019 – 03/2021

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)
2019	January	39,833,971	63,300,000	54,470,000	7,462,186,360
2019	February	57,900,079	48,070,000	11,000,000	5,413,394,923
2019	March	8,131,680	86,530,000	0	4,184,429,465
2019	April	30,436,999	48,350,000	16,400,000	3,890,585,683
2019	May	20,362,676	43,160,000	4,600,000	3,582,834,854
2019	June	65,259,542	31,890,000	4,300,000	4,331,393,663
2019	July	55,602,269	45,350,000	20,440,000	5,371,406,832
2019	August	16,067,887	73,550,000	7,150,000	4,908,829,257
2019	September	37,218,934	70,300,000	0	4,737,635,261
2019	October	39,036,838	50,050,000	12,250,000	4,518,050,140
2019	November	0	0	109,300,000	4,283,440,311
2019	December	48,395,298	53,350,000	39,420,000	4,899,116,591
2020	January	43,411,455	43,210,000	17,220,000	6,673,061,563
2020	February	51,880,453	38,750,000	65,010,000	5,259,719,736
2020	March	3,610,796	43,710,000	52,640,000	4,946,915,433
2020	April	1,614,663	10,420,000	71,430,000	4,069,029,420
2020	May	0	62,400,000	22,940,000	4,079,930,013
2020	June	29,105,979	108,950,000	9,850,000	4,845,671,791
2020	July	15,527,200	63,480,000	33,780,000	5,968,015,432
2020	August	0	8,930,000	59,750,000	5,550,568,559
2020	September	0	0	98,480,000	5,107,579,425
2020	October	0	8,500,000	53,660,000	4,749,553,626
2020	November	0	35,500,000	36,060,000	5,545,381,885
2020	December	28,799,390	15,620,000	59,810,000	6,564,187,214
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

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	2021	0	
	2020	12,066,391	263,048,518
	2019	11,011,665	254,036,785
February	2021	0	
	2020	14,132,596	219,939,476
	2019	28,104,572	215,116,524
March	2021	3,748,679	273,241,570
	2020	2,215,827	268,791,994
	2019	5,949,745	195,071,448
April	2020	1,614,663	201,152,848
	2019	30,436,999	201,727,119
May	2020	0	
	2019	6,893,735	233,802,846
June	2020	8,296,624	202,205,026
	2019	17,066,721	210,292,066
July	2020	7,190,410	221,726,390
	2019	22,879,145	182,936,426
August	2020	0	
	2019	3,242,141	187,953,396
September	2020	0	
	2019	13,408,022	226,369,338
October	2020	0	
	2019	8,626,815	239,056,866
November	2020	0	
	2019	0	
December	2020	5,996,522	265,133,724
	2019	12,065,798	261,669,302