DESFA

Hellenic Gas Transmission System Operator

Annual Planning of Load Balancing for 2014

May 2013

1. Introduction

The present plan is developed in terms of Paragraph 2.c of Article 68 of Act 4001/2011 that assigns liability to the Hellenic Gas Transmission System Operator (DESFA) S.A. for load balancing of the National Natural Gas System (NNGS) and according to the provisions in the Article 46 of the Network Code for the regulation of Natural Gas System (hereafter "Network Code"), referring to the Annual Planning of Load Balancing and the Operational Gas Offsetting.

In terms of Paragraph 1.A, Article 46 of NNGS Network Code, the Operator submits to the Regulatory Authority of Energy (RAE) the Annual Planning of Load Balancing for the following Year (as well as any amendment) that is approved by RAE and published by the Operator.

With its aforementioned authority, the Operator signs load balancing contracts in accordance with the approved (by RAE) Annual Planning of Load Balancing, either after a tender or in terms of Paragraph 2.c, Article 68 of Act 4001/2011.

In terms of Paragraph 2 of Article 46 of Network Code, the Annual Planning of Gas Balancing includes in particular: (a) Forecasts of the Operator for the development of Natural Gas demand per category of Customers and the Stated Transit with regards to the existing Transmission Capacity of the Transmission System, (b) forecast with regards to the necessary Quantities of Natural Gas for Gas Balancing, such as the total annual Quantity of Natural Gas for Balancing, the estimated allocation thereof during the Year, the maximum Supply and the maximum daily Quantity of Natural Gas for Balancing and (c) determination of the required characteristics of the Balancing Agreement or combination of Balancing Agreements that the Operator must enter.

According to the Paragraph 3 of Article 46 of the Network Code, for the development of Planning, the Operator takes into consideration particularly the NNGS Development Plan, the Annual Planning for Gas Balancing, the total demand of Natural Gas served via the NNGTS, the geographic distribution of consumptions, the elimination of technical limitations concerning the operation of the System and, particularly, each event that has lead, or is going to lead, as per his discretion to a congestion, Emergency, access denial or Transit prohibition, the maintenance requirements of the NNGS components, the existing Natural Gas Transmission Agreements, the existing LNG Facility Usage Agreements, as well as the Connected System Agreements entered.

2. Balancing Gas

Balancing Gas is the quantity of Natural Gas injected into the National Transmission System by the Operator during specified time period in order to reach balance between the Deliveries and Off-takes of Natural Gas in that time period and to ensure the reliable, safe and efficient operation of NNGS. In terms of its authority and liability, the Operator secures the balance, taking into consideration the losses and the stored quantities of Natural Gas in the National Transmission System.

3. Forecast for Natural Gas demand in Year 2014

Taking into consideration the historical data of Natural Gas consumption in NNGTS and the expected completion dates of the ongoing and scheduled expansion projects in NNGTS, it is estimated that the Natural Gas consumption will reach at **3,942 mil. Nm^3** in Year 2014. The estimated Natural Gas consumption per consumer category is presented in more detail in Table 1.

Month in 2014	Power Production (Nm^3)	Other Consumers (Nm^3)	Total Consumption (Nm^3)
January	240,445,552	235,925,050	476,370,602
February	225,826,936	205,356,187	431,183,123
March	205,431,209	157,856,405	363,287,614
April	159,312,932	100,992,369	260,305,301
May	190,751,121	84,552,476	275,303,597
June	182,431,611	68,027,749	250,459,360
July	265,274,128	68,841,888	334,116,016
August	219,084,006	62,394,042	281,478,048
September	203,463,193	83,924,510	287,387,703
October	185,427,151	87,014,105	272,441,256
November	175,900,660	110,765,218	286,665,878
December	249,151,507	174,029,138	423,180,645
Total	**2,502,500,006**	**1,439,679,137**	**3,942,179,143**

Table 1: Forecast of Natural Gas consumption per consumer category in Year 2014

For the estimation of Natural Gas consumption in Year 2014 the following assumptions were taken into consideration:

- During 2014 the operation of the 850 MW unit “MEGALOPOLI” of Public Power Corporation at Megalopoli in Arkadia will commence.
- The yearly Natural Gas consumption of the peak unit in the power plant “HERON” will be zero

for the Year 2014.

4. Natural Gas Balancing Quantities

During the current Year, as in previous Years, the calculation of the Balancing Gas is Daily performed, taking into consideration the total Natural Gas Quantity that is measured at the Entry Point 'Agia Triada' of the National Transmission System during that Day and the total LNG quantity declared to be injected into the National Transmission System during the same Day for all the Users that have a contract with the Operator for the utilization of the LNG facility. Hence, the quantity of Balancing Gas generally depends on the daily declared nominations of Natural Gas Deliveries and Off-takes that are submitted by the Transmission Users to the Operator every day and the real daily needs of the consumers.

In the Diagram 1 below, the Monthly of Balancing Gas Quantities that were injected into the NNGTS is shown, as a percentage of the relative Monthly Natural Gas Off-Takes for the period of 04/2010 to 03/2013.

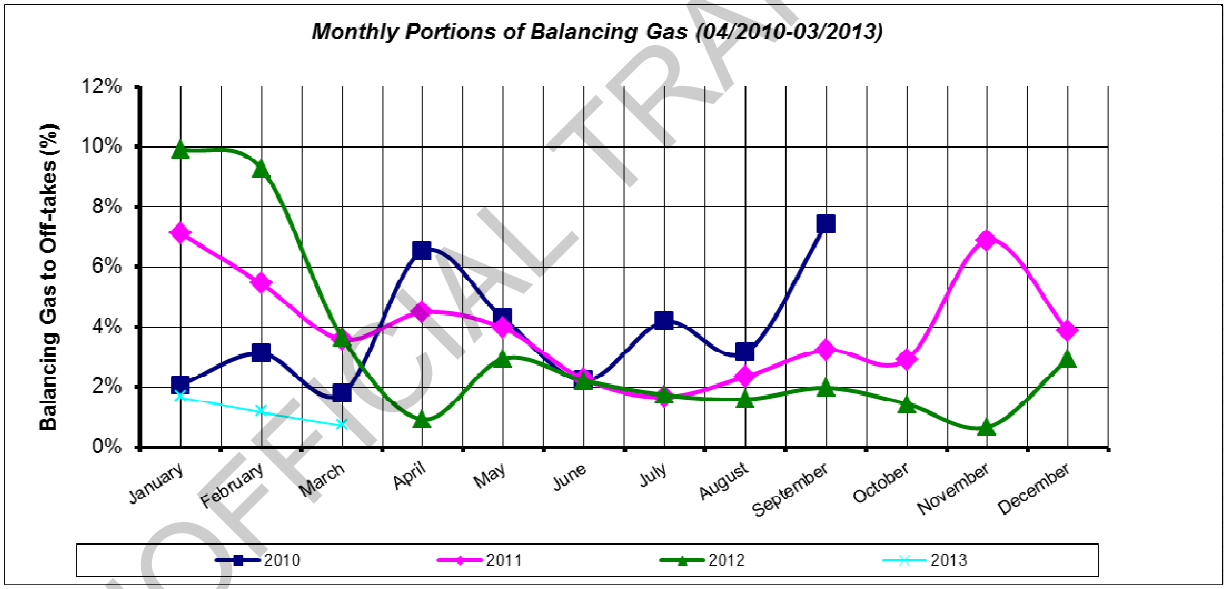

Diagram 1: Monthly Portions of Balancing Gas to Total Natural Gas Off-takes in Time Period 04/2010 – 03/2013

Taking the above into consideration, so as DESFA will extract as possible a reliable assessment concerning the Balancing Gas Quantity that will be demanded during the Year 2014, the methodology described below was followed:

- Calculation of mean value ($\overline{x\%}$) for the sample of the fifty-one (36) values of the Balancing Gas during the period of 04/2010-03/2013 (see Annex 2) for each Month according to the Table 2 below:

Month	$(\bar{x})\%$
January	6.24
February	5.30
March	2.66
April	2.50
May	3.34
June	2.09
July	3.31
August	2.74
September	2.48
October	2.85
November	3.57
December	4.74

Table 2

- Calculation of the estimated Balancing Gas for each Month of the Year 2014 by multiplying the average participation rate of the Balancing Gas and the relative Monthly Natural Gas Off-Takes during the period of 04/2010-03/2013 (see Table 2 above) to the Operator's estimations related to the Monthly Natural Gas Off-Takes in the NNGTS during the Year 2014 (see Table 1 above).

Taking into consideration the above method and the demand of Natural Gas in Year 2014 (see Table 1 above), the Operator's estimation for the monthly distribution of Balancing Gas in Year 2014 is calculated and listed in Table 3 - overall Table with the Operator's forecast for the monthly demand of Natural Gas per consumption category and estimation for the balancing gas in Year 2014 is given in Annex 1.

Finally, taking into consideration the consumption historical data and the expected penetration of Natural Gas in the home, commercial, industrial and power production section (new units), it is estimated **that the maximum daily consumption in Year 2014 will reach at 223,300 MWh**.

Month in 2014	Balancing Natural Gas (Nm^3)[1]	Balancing Natural Gas (MWh)
January	29,725,526	339,168
February	22,852,706	260,749
March	9,663,451	110,260
April	6,507,633	74,252
May	9,195,140	104,917
June	5,234,601	59,727
July	11,059,240	126,186
August	7,712,499	88,000
September	7,127,215	81,322
October	7,764,576	88,594
November	10,233,972	116,770
December	20,058,763	228,870
Total	**147,135,322**	**1,678,815**

Table 3: Estimation of the Balancing Gas quantities allocation in Year 2014

5. Capacity Reservation in LNG Facility for Load Balancing in 2014

For the Current Year (as also for the previous Years), the NNGTS balancing need are covered by the Entry Point "AGIA TRIADA". For the Year 2014 the Operator, taking into account:

i. The topology and the construction characteristics of the NNGTS,

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

iii. The geographic allocation of the Users Natural Gas Off-takes in the NNGTS,

iv. The evolution of the NNGS expansion and upgrade works,

v. The connection of new consumers in the south part of the NNGTS, and

vi. The availability of Balancing Gas procurement from more than one Suppliers,

suggests the continuation of the Balancing Gas injection via the same Entry Point (i.e. "AGIA TRIADA").

The Operator, taking into account (i) the approved Pricing Regulation, which is active since 01.02.2013 and (ii) the strong variation of the required Daily Natural Gas quantities during a Year, proposes the methodology of determining the portion of the NNGS Capacity that should be booked for Balancing Gas during the Year 2014, considering the NNGS efficient

[1] *For the reduction of volume units (Nm^3) to energy units (MWh) the average (relative to flow) Gross Calorific Value for the Year 2013 was, i.e. 11,41 MWh / 1000 Nm^3.*

and economic operation and improve the level of provided Transmission services and LNG Facility Use to the User. Below, the estimated maximum Daily quantity of Balancing Gas per Month for the Year 2014 is presented, considering the seasonal variations shown, the historical data, that size and accordingly determines the LNG Regasification Capacity and the Deliveries Transmission Capacity that should be booked in the Entry Point "AGIA TRIADA" for Balancing purposes per Month in the Year 2014. In this way the portion of NNGS that needs to be booked for Balancing Gas purposes during that year is estimated with the utmost precision and the available, for the Users, Transmission and Regasification Capacity is maximized.

The Operator, taking into account the historical data of thirty-six (36) Months (see Appendix) of the period from 04/2010 to 03/2013 and correlating the Daily Balancing Gas Quantity per Month with the corresponding sum of the Users Booked Transmission Capacity, recommends the application of the following methodology for the calculation of the Monthly Booked LNG Regasification Capacity and the Delivery Transmission Capacity in the Entry Point "AGIA TRIADA" for Balancing Gas During the Year 2014:

$$\Delta E_{M,2014} = OA_{M,2014} * E\Delta M_{M,2014}$$ [2]

where:

- $OA_{M,2014} = \dfrac{\dfrac{AQ_{E\Xi(\max)_{M,2013}}}{\Delta M_{M,2013}} + \dfrac{AQ_{E\Xi(\max)_{M,2012}}}{\Delta M_{M,2012}} + \dfrac{AQ_{E\Xi(\max)_{M,2011}}}{\Delta M_{M,2011}}}{3}$
- $AQ_{E\Xi(\max)_{M,Y}}$: the maximum Daily Balancing Gas Quantity (MWh/Day) used by the Operator during the Month M of the Year Y,
- $\Delta M_{M,Y}$: the sum of the Booked Transmission Capacity (MWh/Day) that was booked by all Users, according to the Transmission Contracts that were signed with the Operator, during the Day of the maximum Daily Balancing Gas Quantity during the Month M of the Year Y, and

[2] *For the calculation of the Monthly Booked Regasification Capacity of the LNG Facility for the Months April to December of the Year 2014 the historical data of the Years 2010, 2011 and 2012 was taken into account due to lack of past data for the corresponding Months of the Year 2013.*

- $E\Delta M_{M,2014} = \frac{(\Delta M_{M,2013} + \Delta M_{M,2012} + \Delta M_{M,2011})}{3}$.

Based on the above methodology, the Operator proposes the Monthly Regasification Capacity Booking at the LNG Facility ($\Delta E_{M,2014}$) and equal Transmission Capacity at the relevant Entry Point "AGIA TRIADA", for Balancing Gas purposes during the Year 2014, according to the following Table 4:

Month of the Year 2014	Monthly Regasification Capacity Booking at the LNG Facility and equal Transmission Capacity at the relevant Entry Point "AGIA TRIADA" ($\Delta E_{M,2014}$) (MWh/Day)
January	43,180.999
February	27,568.403
March	22,980.715
April	19,578.675
May	20,662.197
June	17,473.002
July	26,602.621
August	28,735.567
September	16,834.307
October	19,247.305
November	19,128.926
December	35,157.277

Table 4

6. Balancing Gas Contract

Aiming at the orderly, economical and efficient operation of the NNGS, during the Year 2014, the Operator will sign a contract with a N.G. supplier, who will be chosen after an international bid, as it is defined in article 68 of the Law 4001/2011 and in paragraph 2 in the article 47 of the Natural Code, for the supply of Balancing Gas during the time period 01.01.2014 08:00 – 01.01.2015 08:00.

The supply of Balancing Gas will take place in the context of a request fulfillment of the Operator to supply Balancing Gas issued by the relative Operator to the prequalified Shippers. The choice of Shipper will be based on criteria that will be specified in the contract-framework and relate, among others, with the lower supply price offered and the fulfillment of the Operator's request in terms of the LNG quantity and the delivery date.

Furthermore, taking into consideration:

- the restricted Storage Area of LNG Facility,
- the ever increasing demand (from Users' sides) for access to the LNG Facility,
- the requirements in the Network Code of NNGS and particularly in Chapter 11 for the terms of access to the LNG Facility (Temporary LNG Storage Period. Minimum Regasification Capacity),
- the size of LNG vessels that are available in the LNG Market,

in the LNG supply Contract-Framework for Balancing Gas, the authority of the Operator to specify the LNG quantity and the time delivery for balancing purposes will be established, so that the smooth operation of the Greek Natural Gas market is not upset, in accordance with the requirement of the Network Code of NNGS. Given the lack of confirmation of the Operator's estimations relating to the Natural Gas Quantities demanded for the Year 2014 for Balancing and the procedure of choosing the final Shipper, the abovementioned contract will not contain imposing restrictions such as minimum supply quantity or payment clauses irrespective of LNG off-takes.

ANNEX 1

Operator's forecast for Monthly Demand of Natural Gas per Consumption Category and Estimation of Balancing Gas in Year 2014

Month in 2014	Power Generation	Other Consumers	Total Consumption		Balancing Gas	
	Nm^3	Nm^3	Nm^3	MWh	Nm^3	MWh
January	240,445,552	235,925,050	476,370,602	5,435,389	29,725,526	339,168
February	225,826,936	205,356,187	431,183,123	4,919,799	22,852,706	260,749
March	205,431,209	157,856,405	363,287,614	4,145,112	9,663,451	110,260
April	159,312,932	100,992,369	260,305,301	2,970,083	6,507,633	74,252
May	190,751,121	84,552,476	275,303,597	3,141,214	9,195,140	104,917
June	182,431,611	68,027,749	250,459,360	2,857,741	5,234,601	59,727
July	265,274,128	68,841,888	334,116,016	3,812,264	11,059,240	126,186
August	219,084,006	62,394,042	281,478,048	3,211,665	7,712,499	88,000
September	203,463,193	83,924,510	287,387,703	3,279,094	7,127,215	81,322
October	185,427,151	87,014,105	272,441,256	3,108,555	7,764,576	88,594
November	175,900,660	110,765,218	286,665,878	3,270,858	10,233,972	116,770
December	249,151,507	174,029,138	423,180,645	4,828,491	20,058,763	228,870
Total	**2,502,500,006**	**1,439,679,137**	**3,942,179,143**	**44,980,265**	**147,135,322**	**1,678,815**

Note

1. For the conversion from volume units (Nm3) to energy units (MWh), the weighted average (regarding the flow rate) of the Gross Heating Value for the Year 2012, 11.41 MWh /1000 Nm^3 , is used.

ANNEX 2

Historical Data of Balancing Gas in time period 04/2010-03/2013

Year	Month	Balancing Gas (MWh)	Total Natural Gas Off-takes (MWh)
2010	April	60,663	2,911,372
2010	May	99,018	3,178,858
2010	June	50,596	2,827,403
2010	July	242,961	3,720,295
2010	August	174,982	4,083,913
2010	September	67,279	3,019,067
2010	October	153,451	3,669,285
2010	November	100,476	3,180,865
2010	December	300,736	4,062,802
2011	January	320,769	4,505,776
2011	February	229,455	4,208,617
2011	March	177,744	4,955,267
2011	April	178,887	3,984,368
2011	May	153,446	3,868,713
2011	June	89,051	3,922,048
2011	July	79,691	4,769,537
2011	August	87,502	3,724,042
2011	September	128,011	3,959,608
2011	October	113,459	3,878,824
2011	November	327,457	4,752,485
2011	December	182,212	4,703,444
2012	January	571,458	5,751,140
2012	February	513,634	5,542,416
2012	March	169,225	4,618,416
2012	April	28,012	2,987,063
2012	May	94,858	3,221,059
2012	June	65,280	2,939,329
2012	July	68,602	3,931,588
2012	August	51,433	3,216,331
2012	September	67,153	3,392,642
2012	October	47,074	3,256,661
2012	November	22,637	3,370,714
2012	December	143,331	4,859,392
2013	January	72,030	4,338,906
2013	February	43,303	3,699,633
2013	March	23,036	3,174,782

ANNEX 3

Historical Data of the Maximum Balancing Gas Quantity and the Booked Capacity of Users

Month	Year	Maximum Balancing Gas Quantity (MWh/Day)	Sum of Booked Capacity of all Users during the Day of the Maximum Balancing Gas Quantity (MWh/Day)
January	2011	38,150.627	306,689.363
	2012	68,488.174	321,898.073
	2013	21,359.393	345,420.059
February	2011	29,867.576	315,189.363
	2012	47,412.710[3]	321,898.073
	2013	11,063.306	224,425.170
March	2011	36,860.353	315,189.363
	2012	26,285.920	328,057.237
	2013	9,317.808	207,891.000
April	2010	9,312.623	282,689.363
	2011	42,489.075	280,689.363
	2012	7,525.117	263,889.237
May	2010	22,880.766	285,831.673
	2011	21,105.546	280,689.363
	2012	18,105.618	306,529.529
June	2010	8,569.442	282,774.193
	2011	30,639.622	280,587.603
	2012	12,737.126	282,106.059
July	2010	33,373.607	282,774.193
	2011	26,087.127	280,587.603
	2012	18,356.632	343,545.755
August	2010	28,228.927	293,274.193
	2011	36,060.938	280,587.603
	2012	19,662.496	343,230.755
September	2010	15,405.932	293,274.193
	2011	15,415.263	280,587.603
	2012	19,835.461	327,976.059
October	2010	37,966.397	293,189.363
	2011	12,376.002	299,897.073
	2012	7,383.802	281,791.059
November	2010	19,955.466	293,189.363
	2011	30,910.846	307,893.100
	2012	7,396.172	281,791.059
December	2010	52,251.056	293,189.363
	2011	25,482.058	329,897.073
	2012	25,959.609	302,105.059

[3] *Note that the Balancing Gas quantity on 03.02.2012, i.e. 66.590,310 MWh was not taken into account due to assessment of Emergency in the NNGS during that Day and the next Balancing Gas value of 47,412.710 MWh, held on 07.02.2012 was used for the calculations.*