Annual Planning of Load Balancing for Year 2011

September 2010

1. Introduction

The present plan is developed in terms of Paragraph 2.c of Article 8 of Act 3428/2005 that assigns liability to the Hellenic Gas Transmission System Operator (DESFA) S.A. for balancing the load of the National Natural Gas System (NNGS) as per the provisions in its Network Code. In terms of Paragraph 1.A of Article 46 of Network Code of NNGS, 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. In terms of Paragraph 1.C of Article 46 of Network Code, the Operator proposes the capacity portion of NNGS to be reserved for load balancing.

With its aforementioned authority, the Operator signs load balancing contracts in accordance with the approved (by RAE) annual load balancing planning, either after a tender or in terms of Paragraph 1, Article 38 of Act 3428/2005.

In terms of Paragraph 2, Article 46 of Network Code of NNGS, the Annual Planning of Load Balancing mainly includes: (i) Forecast of the Operator for the level of demand of Natural Gas per customer category and the declared transfer nominations in relation to the existing Transmission Capacity of the Transmission System, (ii) Forecast for the required quantities of Natural Gas for load balancing, like the total annual quantity of Natural Gas for balancing, the maximum supply and the maximum daily quantity of Natural Gas for balancing and (iii) specification of the required aspects of the load balancing contract, or set of contracts, required to be executed by the Operator.

The Annual Planning of Load Balancing is reviewed by the Operator if, in its view, there is to be significant modification in the way NNGS operates, like new additional transmission and LNG contracts, change in the geographical distribution of the load, significant changes in the availability of NNGS equipment, start of operation of new equipment, substantial change in the demand of Natural Gas, etc.

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. For the time being, the balancing requirements of the National Transmission System are met only by means of the Liquefied Natural Gas (LNG) Terminal on the island of Revythousa.

3. Forecast for Natural Gas Demand in Year 2011

Taking into consideration historical data on consumption of Natural Gas in the National Transmission System, forecast consumption data and expected completion dates of the ongoing and scheduled expansion projects of NNGS, it is estimated that the consumption of Natural Gas in Year 2011 will reach 3,777 million Nm^3. The estimated demand of Natural Gas per consumer category is presented in more detail in Table 1.

Month of Year 2011	Power Production Nm^3	Peak Power Production Nm^3	Other Consumers Nm^3	Total Consumption Nm^3
January	**184,856,570**	**583,333**	**158,439,723**	**343,879,627**
February	**175,216,808**	**583,333**	**148,393,570**	**324,193,711**
March	**172,024,131**	**583,333**	**136,977,980**	**309,585,444**
April	**173,207,813**	**583,333**	**108,385,261**	**282,176,407**
May	**183,853,323**	**583,333**	**108,953,765**	**293,390,422**
June	**188,038,312**	**583,333**	**98,359,312**	**286,980,957**
July	**202,931,120**	**583,333**	**103,708,169**	**307,222,622**
August	**193,898,301**	**583,333**	**83,841,426**	**278,323,061**
September	**180,891,471**	**583,333**	**125,949,902**	**307,424,707**
October	**185,103,134**	**583,333**	**143,694,508**	**329,380,976**
November	**188,014,163**	**583,333**	**166,040,424**	**354,637,920**
December	**193,964,854**	**583,333**	**165,255,960**	**359,804,146**
Total	**2,222,000,000**	**7,000,000**	**1,548,000,000**	**3,777,000,000**

Table 1: Forecast for Natural Gas demand per consumer category in Year 2011

It is forecast that in Year 2011 one new combined cycle power plant fuelled by Natural Gas will be added, in particular the 400 MW unit 'Aliveri V' of Public Power Corporation at Aliveri in Evia.

Additionally, in 2011 industry 'ALOYMINION S.A.' will be supplied with Natural Gas replacing the fuel oil presently used. The annual consumption of this industry is estimated to be 120 million Nm^3. In 2011, the first year of operation with Natural Gas, approximately 70 million Nm^3 Natural Gas is estimated to be consumed.

4. Balancing Natural Gas Quantities

Resolution No 2129/2008 of RAE specifies the calculation method of LNG quantity, which after regasification is utilized by the Operator for load balancing of the National Transmission System.

The calculation of the balancing gas is performed at the end of each day according to Annex 1, Article 2 of Resolution No 2129/2008 of RAE, taking into consideration the total quantity of Natural Gas that is measured at the Entry Point 'Agia Triada' of the National Transmission System during that Day and the total quantity of LNG 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 making use of the LNG facility. Hence, the quantity of balancing gas generally depends on the daily declared nominations of deliveries and off-takes of Natural Gas that are submitted by the Transmission Users to the Operator every day and the real daily needs of the consumers.

From Table 2 and Diagram 1 it is concluded that any assumed correlation of monthly off-takes of Natural Gas with the estimated quantity of balancing gas based on historical data is precarious due to the lack of periodic recurrence.

Historical Data of Balancing Gas in Time Period 01/2008 – 07/2010				
Year	***Month***	***Balancing Gas (BG) (MWh)***	***Total Natural Gas Off-takes (NGO) (MWh)***	$\frac{BG}{NGO} \bullet 100\%$
2008	January	306,337.95[1]	4,500,972.59	6.81%
2008	February	80,916.51[1]	4,231,473.47	1.91%
2008	March	140,589.28[1]	4,176,917.83	3.37%
2008	April	185,696.29[1]	3,164,356.38	5.87%
2008	May	96,295.32[1]	3,592,414.49	2.68%
2008	June	241,146.81[1]	3,991,693.86	6.04%

[1] ***For Year 2008 the assumption of applying the balancing procedures from the beginning of the year is introduced in order to calculate the balancing gas for the months of 2008, in which there was no contract of natural gas sale from DEPA to DESFA for balancing purposes.***

2008	July	184,741.79[1]	4,472,372.12	4.13%
2008	August	137,181.87[1]	3,850,221.56	3.56%
2008	September	61,759.13	3,801,935.80	1.62%
2008	October	88,533.81	3,124,133.19	2.83%
2008	November	66,880.04	2,945,020.44	2.27%
2008	December	142,696.77	3,295,346.25	4.33%
2009	***January***	***1,506,613.07[2]***	***3,231,725.60***	***46.62%***
2009	February	196,341.04	2,740,043.39	7.17%
2009	March	113,386.66	2,367,662.27	4.79%
2009	April	241,152.40	2,249,339.40	10.72%
2009	May	77,528.88	2,977,330.49	2.60%
2009	June	54,486.59	2,929,149.60	1.86%
2009	July	89,210.23	3,463,468.50	2.58%
2009	August	226,917.86	3,040,362.18	7.46%
2009	September	123,864.07	3,288,252.36	3.77%
2009	October	113,013.27	3,792,675.94	2.98%
2009	November	182,950.93	3,870,229.17	4.73%
2009	December	155,648.33	3,993,177.62	3.90%
2010	January	269,670.85	3,944,192.61	6.84%
2010	February	51,321.25	3,540,047.71	1.45%
2010	March	53,208.93	3,409,219.38	1.56%
2010	April	60,663.09	2,911,372.26	2.08%
2010	May	99,018.47	3,178,857.66	3.11%
2010	June	50,595.86	2,827,402.89	1.79%
2010	July	242,961.47	3,720,294.65	6.53%

Table 2: Historical data of balancing gas in time period 01/2008 – 07/2010

[2] ***The contribution of balancing gas in January 2009, during the dispute between Russia and Ukraine, is not included in any calculation.***

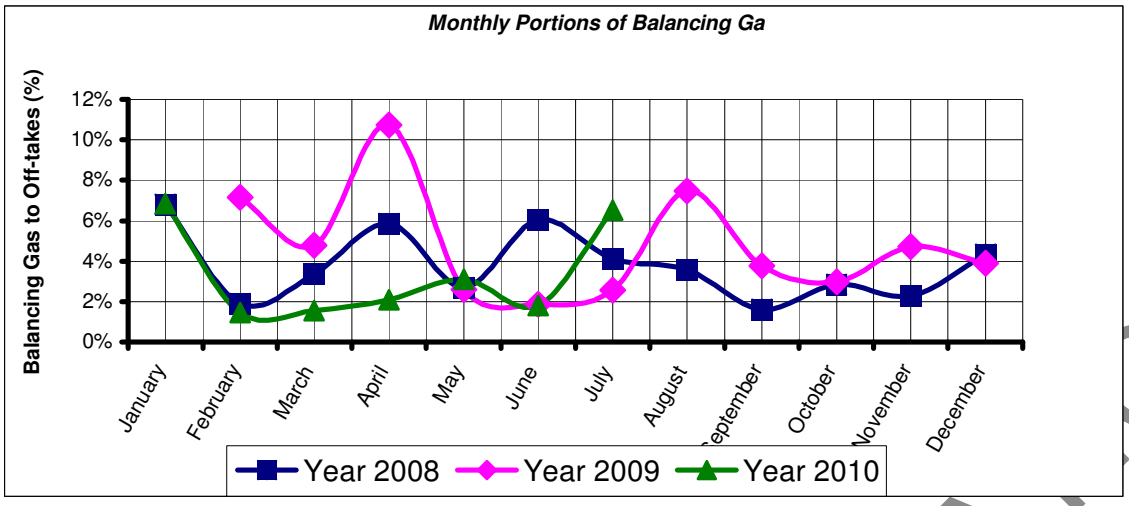

Diagram 1: Monthly Portions of Balancing Gas to Total Natural Gas Off-takes in Time Period 01/2008 – 07/2010 (01/2009 is not included)

Taking the above into consideration, DESFA adopted the following method in order to reach a more reliable estimate for the required balancing gas in Year 2011:

1. Computation each month (from 01/2008 to 07/2010) of "$\frac{BG}{NGO} \bullet 100\%$" - percentage of monthly quantity of balancing gas (BG) to respective monthly quantity of Natural Gas off-take (NGO) at all Exit Points of the National Transmission System.

2. Computation of mean value ($\overline{x\%} = 4.04\%$) and of standard error of the mean ($\sigma_{\overline{x\%}} = 0.41\%$) for the sample of the 30 previously computed values (January 2009 is not included in the samples).

3. Because of the uncertainly introduced by the lack of historical data on the actions of new Users and their Suppliers, it is selected to use the maximum estimated probability for the balancing gas, i.e. $BG = (\overline{x\%} + \sigma_{\overline{x\%}}) \bullet NGO = 4.46\% \bullet NGO$, where NGO refers to the Operator's estimate for Natural Gas off-takes at all the Exit Points of the National Transmission System in Year 2011, as presented in Table 1. It is noted that the above increase of the balancing gas with respect to the overall consumption is justified by the introduction of new consumers in the south part of the National Transmission System that results in more unequal distribution of Natural Gas loads between north and south.

Taking into consideration the above method and the demand of Natural Gas in Year 2011 (see Table 1), the Operator's estimate for the monthly distribution of balancing gas in Year 2011 is computed and listed in Table 3. An overall Table with the Operator's forecast for the monthly demand of Natural Gas per consumption category and estimate for the balancing gas in Year 2011 is given in Annex 1.

Month in Year 2011	Natural Gas for Balancing purposes (MWh)
January	171,775
February	161,941
March	154,644
April	140,953
May	146,554
June	143,353
July	153,464
August	139,028
September	153,565
October	164,532
November	177,149
December	179,729
Total	**1,886,687**

Table 3: Estimate for distribution of balancing quantity of Natural Gas in Year 2011

Finally, taking into consideration historical consumption data and the expected penetration of Natural Gas in the domestic, commercial, industrial and power generation (new units) sectors, it is estimated that the **maximum daily consumption in Year 2011 will reach 218,400 Mwh** (approximately 19,500,000 Nm^3).

5. Capacity Reservation in LNG Facility for Load Balancing

Annex 1 of Resolution No 2129/2008 of RAE specifies the calculation method of capacity reservation in LNG facility by the Operator for load balancing of Users.

As all the values for calculating the OA_y parameter are not available, the Operator, based on historical data, **proposes the reservation of 43,752 MWh as Gasification Capacity (GC) of LNG for balancing purposes in Year 2011**. This value corresponds to 10% increase in LNG capacity reservation for load balancing in relation to the respective reservation in Year 2010, due to the uncertainty about the actions of new consumers that are already connected or will soon be connected in the south part of the National Transmission System.

6. Balancing Contract

To date, DESFA S.A. is supplied the necessary quantities of Natural Gas for load balancing in terms of the gas sale contract with DEPA S.A. signed on 1 September 2008. The duration of the contract was from 01.09.2008 to 01.01.2009 and extended ipso jure (according to contract term) for two Years, thus covering the supply of balancing gas for the time period 01.01.2010 – 01.01.2011.

For the period 01.01.2011 – 01.01.2012, taking into consideration:

i. the topology and the construction properties of the National Natural Gas Transmission System;

ii. the technical, reserved and available capacity of the Entry Points of the National Natural Gas Transmission System;

iii. the geographical distribution of consumption in the National Natural Gas System;

iv. the progress in the expansion and upgrade projects of the National Natural Gas System and mainly of the compressor station at Nea Messimvria, where construction is expected to be completed after the middle of year 2011; and

v. the connection of new consumers in the south part of the National Natural Gas System;

it is considered appropriate for the safe, smooth and efficient operation of the National Natural Gas System, the injection of balancing gas through the Entry Point 'Agia Triada'.

Aiming at the orderly, cost-effective and efficient operation of NNGS, the Operator in Year 2011 is going to:

A. sign a contract with DEPA S.A., in accordance with the requirements in Paragraph 1, Article 38 of Act 3428/2005, for the supply of balancing gas for the period 01.01.2011 08:00 – 01.04.2011 08:00 with the option of extending this contract by one month; and

B. sign a contract with a Supplier of Natural Gas, to be selected after international tender, in accordance with the requirements in Paragraph 2c, Article 8 of Act

3428/2005, for the supply of balancing gas for the period 01.04.2011 08:00 – 01.01.2012 08:00.

Due to:

- the restricted storage capacity of the LNG Terminal;
- the ever increasing demand for access to the LNG Terminal by the Suppliers;
- the requirements in the Network Code of NNGS and particularly in Chapter 11 for the terms of access to the LNG Terminal (temporary storage period, minimum regasification capacity); and
- the size of the LNG container ships that are available in the LNG market;

in the LNG supply contract, among others, the authority of the Operator to specify the LNG quantity and its time delivery for balancing purposes will be established such that the smooth operation of the Greek Natural Gas market is not upset, in accordance with the requirements of the Network Code of NNGS, without imposing restrictions such as minimum supply quantity or payment clauses irrespective of LNG off-takes.

ANNEX 1

Operatorr's Forecast for Monthly Demand of Natural Gas per Consumption Category and Estimate for Balancing Gas in Year 2011

Month in 2011	Power Generation	Peak Power Generation	Other Consumers	Total Consumption		Balancing Gas
	Nm^3	Nm^3	Nm^3	Nm^3	MWh	MWh
January	*184,856,570*	*583,333*	*158,439,723*	*343,879,627*	*3,851,452*	*171,775*
February	*175,216,808*	*583,333*	*148,393,570*	*324,193,711*	*3,630,970*	*161,941*
March	*172,024,131*	*583,333*	*136,977,980*	*309,585,444*	*3,467,357*	*154,644*
April	*173,207,813*	*583,333*	*108,385,261*	*282,176,407*	*3,160,376*	*140,953*
May	*183,853,323*	*583,333*	*108,953,765*	*293,390,422*	*3,285,973*	*146,554*
June	*188,038,312*	*583,333*	*98,359,312*	*286,980,957*	*3,214,187*	*143,353*
July	*202,931,120*	*583,333*	*103,708,169*	*307,222,622*	*3,440,893*	*153,464*
August	*193,898,301*	*583,333*	*83,841,426*	*278,323,061*	*3,117,218*	*139,028*
September	*180,891,471*	*583,333*	*125,949,902*	*307,424,707*	*3,443,157*	*153,565*
October	*185,103,134*	*583,333*	*143,694,508*	*329,380,976*	*3,689,067*	*164,532*
November	*188,014,163*	*583,333*	*166,040,424*	*354,637,920*	*3,971,945*	*177,149*
December	*193,964,854*	*583,333*	*165,255,960*	*359,804,146*	*4,029,806*	*179,729*
Total	***2,222,000,000***	***7,000,000***	***1,548,000,000***	***3,777,000,000***	***42,302,400***	***1,886,687***

Notes

1. The forecast for the monthly demand of Natural Gas (Nm^3) in Year 2011 is derived from the Operator's estimates because the Transmission Users DEPA S.A. and ALOYMINION S.A. have not responded (up to the date of the issue of this document) to the written requests of the Operator for their estimate for Natural Gas demand in Year 2011.

2. For the conversion from volume units (Nm^3) to energy units (MWh), the assumption that 1,000 normal cubic meters of Natural Gas are thermally equivalent with 11.2 MWh is made.

3. For the time being, the only peak power generator of NNGTS is HERON and its consumption is directly related to the needs of the Electric Power System, therefore consumption estimate for peak power generation may only be provided on annual basis without distributing it monthly.

4. The monthly quantity of balancing gas is assumed to be equal to 4.46% of the respective total monthly consumption.