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Pricing the purchase of gas losses on regional gas transport networks

Memo:
Extra analysis for part-year costs

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Contents

1 Background

The Dutch Office of Energy Regulation of the Authority for Consumers and Markets (ACM) has determined that from 2014, regional gas network operators in the Netherlands will be responsible for the gas losses on their networks. Redpoint Energy Limited (Redpoint) and KYOS Energy Consulting (KYOS) have conducted a study to calculate a benchmark cost estimate for the 2010-2012 period ("the study"). The study provides an analysis of costs on a calendar year basis. However, there is a possibility that the start of the new arrangements will be part way through 2014, rather than from 1 January. For that reason, ACM has asked Redpoint and KYOS to analyse the costs for purchasing gas losses for a part-year, where the part-year could start on the first day of any month (after January), and would end on 31 December. The results of the extra analysis are presented in this memo.

2 Monthly costs of gas losses

2.1 Introduction

The total gas losses over a period shorter than a year will obviously be lower than over a complete year, as will the total costs for covering those losses. However, the costs do not decrease in proportion to the duration. This is mainly because the gas loss volume profile assumed in the study follows the total gas infeed, with higher volumes in winter than in summer. There are also other reasons why the costs in a specific month are not 1/12 of the costs for a year:

- Short-term gas prices tend to vary in line with demand over the year, and are typically higher in winter than in summer.
- Under our assumptions, imbalance volumes follow the pattern in the gas losses, with the costs for balancing those volumes also higher in winter than in summer.
- Transportation capacity is proportionally cheaper for a complete year than for part of the year. This is reflected in the tariff setting by Gasunie Transport Services (GTS).

2.2 Commodity cost

In order to estimate the commodity costs of gas losses, the study considered three purchasing strategies that a network operator could have followed[1]:

1) Spot:
   - Every day, buy the gas losses for the following day in the day-ahead spot market.
2) Month-ahead:
   - Every month, make a forecast of the required gas volume for the next month.
   - Buy this volume as a baseload product in the forward market at a price equal to the average M+1 forward price in the month preceding delivery.
   - Every day, buy or sell the residual demand in the spot market.
3) Year-ahead:
   - Every year, make a forecast of the required gas volume for the next year.
   - Buy this volume as a baseload product in the forward market at a price equal to the average Y+1 forward price in the year preceding delivery.
   - Every day, buy or sell the residual demand in the spot market.

The third purchasing strategy, based on a year-ahead volume forecast, is not applicable if the period covered is less than a year. This is because gas purchased by a front-year (Y+1) contract will be delivered throughout the complete year, not in a sub-period only. Therefore, in this memo, the third strategy is not considered.

The first two strategies can also be applied if gas is bought for some months only. We analysed the purchasing costs for each month historically, i.e. for each of the 36 months in the period January 2010 to

[1] The network operators could have carried out any of the purchasing strategies themselves, or have bought on a similar cost basis from a supplier. This is not relevant for the costing analysis.

December 2012. Then an average was calculated for each of the months across the three years (i.e. an average is calculated for January by averaging the results from January 2010, January 2011 and January 2012, etc). Note that, per MWh, the costs for December are highest and for January lowest, because the time period was characterized by a generally increasing gas market price level. The first half of 2010 in particular exhibited considerably lower prices than the other two-and-a-half years.

Table 1: Purchasing costs for the different pricing mechanisms, per month

Month	Cost in €/MWh		
	Spot	M+1	Average
Jan	19.30	19.02	19.16
Feb	21.18	19.85	20.51
Mar	19.49	19.23	19.36
Apr	20.37	20.09	20.23
May	20.59	19.87	20.23
Jun	21.89	21.15	21.52
Jul	21.88	21.71	21.79
Aug	21.28	21.68	21.48
Sep	22.54	21.60	22.07
Oct	22.64	23.46	23.05
Nov	23.53	23.80	23.66
Dec	24.75	24.06	24.40

Month	Volume		Cost in €		
	MWh/month	MWh/day	Spot	M+1	Average
Jan	179,572	5,793	3,465,193	3,416,013	3,440,603
Feb	167,462	5,910	3,547,306	3,323,635	3,435,471
Mar	120,010	3,871	2,338,792	2,307,428	2,323,110
Apr	76,458	2,549	1,557,304	1,535,750	1,546,527
May	56,124	1,810	1,155,445	1,115,349	1,135,397
Jun	38,134	1,271	834,790	806,487	820,639
Jul	32,639	1,053	714,037	708,515	711,276
Aug	33,070	1,067	703,700	717,069	710,385
Sep	45,434	1,514	1,024,200	981,365	1,002,783
Oct	80,059	2,583	1,812,239	1,878,567	1,845,403
Nov	118,598	3,953	2,790,029	2,822,842	2,806,436
Dec	167,177	5,393	4,136,989	4,022,292	4,079,640

2.3 Imbalance cost

The different purchasing strategies imply that the expected volume for the following day is bought in the market. This is a baseload volume for the day, i.e. the same volume for each hour. The actual gas losses differ per hour. The study analysed the costs of balancing those hourly volumes based on an estimate of the costs of gas storage needed to meet the within-day variation. The costs were divided into a fixed part, for renting the storage space, and a variable part, for the storage injection and withdrawal costs.

It is hard to determine a fixed cost for gas storage if it is rented for a period shorter than a year. Storage facilities are generally rented for a twelve-month period, most commonly for a period starting on 1 April. In this memo it is therefore assumed that the fixed storage costs per month are 1/12 of the costs for a complete year. In the study we estimate the annual costs at €50,792 and therefore we assume a monthly cost of €4,233 per month.

Imbalance volumes, positive or negative, are larger in winter than in summer. This is in line with the seasonal volume profile of the total gas consumption. For the purpose of the calculation, we assume that positive imbalances need to be injected into gas storage, and negative imbalances withdrawn. As in the study, costs for injection are assumed to be 0.40 €/MWh, and for withdrawal 0.03 €/MWh. As for the calculation of commodity costs, first a calculation is made for all the 36 months, and then the average is calculated for each of the months.

Table 2: Imbalance costs (€) derived from variable and fixed gas storage costs, per month

Month	Variable costs		Fixed costs	Total costs
	Injection	Withdrawal	Storage	
Jan	8,027	602	4,233	12,861
Feb	7,204	540	4,233	11,977
Mar	5,720	429	4,233	10,382
Apr	3,754	282	4,233	8,268
May	2,734	205	4,233	7,171
Jun	2,148	161	4,233	6,542
Jul	1,967	148	4,233	6,347
Aug	1,986	149	4,233	6,368
Sep	2,492	187	4,233	6,912
Oct	4,359	327	4,233	8,919
Nov	6,106	458	4,233	10,797
Dec	7,895	592	4,233	12,719

2.4 Transportation cost

In addition to the price paid per MWh of gas loss for commodity and imbalance, the network operators will be exposed to gas transportation costs. The costs are incurred for the connection at the gas exit points (Gas Ontvangst Stations, GOS) of the GTS main transportation network.

Capacity can be booked for a complete year or a shorter period. In case of a shorter period booking, GTS applies correction factors to its tariff. The corrected tariff is a percentage of the tariff paid for a complete year. For the monthly analysis it is relevant to know the percentage for a booking period starting in February, March and so on, and ending in December. With the calculator ("rekenvoorbeeld") on the GTS website[2] these correction factors have been derived and are shown in Table 3. For example, if a capacity of 100 MW is booked for December only, the gas consumer pays 30% of the annual tariff for 100 MW.

The amount of booked capacity for a part-year may, however, be lower than for a complete year. The largest consumption, and hence the gas losses, can be expected in January and February. Those months drop out if the booking starts in March or later. The month with the third highest gas losses is December. So, any booking starting in March or later will take the maximum expected offtake in December as the basis for the booking. This maximum of December was on average 83% of the maximum gas loss in February, in the period 2010-2012. The total correction factor to the monthly transportation costs is the multiplication of the GTS tariff correction factor and the correction to the booking. This is displayed in the third column of Table 3. For individual network operators the factors can be multiplied with their annual transportation costs. To determine a total overall part-year cost, we have taken the sum of the annual network operator costs from the study, averaged across the 2010-2012 period, of €977,199 and applied the correction percentage to this, with the results shown in the last column.

[2] http://www.gasunietransportservices.nl/producten-diensten/transportinformatie-en-facturering/boekingsperiode-en-tarieven

Table 3: Transportation correction factors, for booking periods starting in different months

Start	Correction factors relative to the total annual costs			Implied cost
Month	GTS tariff	Booking	Total correction	€
Jan	100.0%	100.0%	100.0%	977,199
Feb	97.0%	100.0%	97.0%	947,883
Mar	94.0%	83.0%	78.0%	762,410
Apr	92.5%	83.0%	76.8%	750,244
May	91.0%	83.0%	75.5%	738,078
Jun	90.0%	83.0%	74.7%	729,967
Jul	82.5%	83.0%	68.5%	669,137
Aug	75.0%	83.0%	62.3%	608,306
Sep	67.5%	83.0%	56.0%	547,476
Oct	60.0%	83.0%	49.8%	486,645
Nov	45.0%	83.0%	37.4%	364,984
Dec	30.0%	83.0%	24.9%	243,322

3 Summary

In this memo the applicable costs for purchasing gas losses are split out per month. The transportation cost analysis resulted in correction factors if the booking starts in February, March and so on, until December of the same year.

To summarise this, we have converted these results into a set of percentages that can be applied to a calculated full-year cost to determine an appropriate allocation to a part-year beginning on the first of a particular month during the year, shown in the final column in Table 4.

To do this we have:

- summed the monthly commodity and balancing costs to create an aggregate cost for the part-years starting on the first of each month,
- taken the correction factors for transporation costs, and applied these to the average of the total transportation costs calculated in the study across the 2010-2012 period (€977,199) for part-years starting on the first of each month,
- summed the part-year costs for commodity, balancing and transportation to create a total for the part-year starting each month, and
- calculated the ratio of this part-year total to the full annual total, and presented this as a percentage.

Those monthly percentage factors can be applied to the full-year costs in the first year if the regulatory period were to start in any of the given months.

Table 4: Costs for gas losses, for periods starting in different months and ending in December

Start	Commodity	Balancing	Transport	Total	Total
Month	€	€	€	€	% of year
Jan	23,857,669	109,264	977,199	24,944,131	**100.0%**
Feb	20,417,066	96,402	947,883	21,461,351	**86.0%**
Mar	16,981,595	84,425	762,410	17,828,430	**71.5%**
Apr	14,658,485	74,043	750,244	15,482,772	**62.1%**
May	13,111,958	65,775	738,078	13,915,811	**55.8%**
Jun	11,976,561	58,603	729,967	12,765,131	**51.2%**
Jul	11,155,922	52,062	669,137	11,877,121	**47.6%**
Aug	10,444,646	45,714	608,306	11,098,667	**44.5%**
Sep	9,734,262	39,347	547,476	10,321,084	**41.4%**
Oct	8,731,479	32,435	486,645	9,250,559	**37.1%**
Nov	6,886,076	23,516	364,984	7,274,576	**29.2%**
Dec	4,079,640	12,719	243,322	4,335,682	**17.4%**