Energy & Geopolitical Risk

Volume 3, No. 9 October 2012

The Arab Spring: Flounder, Or, A New Middle East?

Egyptian Revolution Hits Energy Sector

European Banking Union Heads The Regulatory Agenda

Pricing/Profitability Of Iraq's Southern Gas Deal

Iraq's New Exploration Rounds

Pricing & Profitability In the Gas Deal Of Southern Iraq: Preliminary Evaluation

Ali Merza*

Introduction

After long years of waste, there is now an agreement/deal that could transform mostly zero-value southern Iraqi natural gas into positive domestic benefits and export profits. It was signed in November 2011, between the Iraqi South Gas Company, SGC, and an alliance of subsidiaries of Shell and Mitsubishi, and, subsequently, approved by the Iraqi cabinet. In the light of analyses, figures, and indicators in this article, and given the urgency to utilize a largely wasted resource, we think, on balance, it is an economically reasonable deal for Iraq. Furthermore, besides analyzing pricing, profitability, and other issues, exposition in this article also points at possible improvements on the terms of the deal(through sensitivity analysis).

This could enhance benefits to Iraq (SGC and Ministry of Finance MoF) subject to insuring acceptable rate of return to the foreign partners. However, without looking into the detailed feasibility study, upon which the deal was concluded, analyses and conclusions in this article remain preliminary. In the following, I will refer mainly to a published draft of the deal (through the 'contract').[1] Reference to the so-called Heads of Agreement, HOA (of 2008), and other sources, will also be made.

---

* *Dr. Ali Merza, , has worked for the Iraqi Ministries of Oil and Planning and for the United Nations Department of Economic and Social Affairs in the Middle East and North Africa. E-mail: akmerza@hotmail.com.*

1 On September 29, 2011, Iraq Oil Report, a specialized website on Iraqi oil, reported the following:

'Iraq Oil Report has obtained a copy of the draft contract. In service of transparency and an accurate dialogue, we now publish both the Basrah Gas Development Agreement and the Basrah Gas Company Shareholder's Agreement in full'. The two copies were downloaded by the author from the said website as follows:

Volume 1: Basrah Development Agreement Among South Oil Company and Shell Gas Iraq BV and Diamond Iraq BV, Initialing Draft,12 July 2011 (238 pages),

Volume 2: Basrah Gas Company: Shareholder Agreement Between South Oil Company and Shell Gas Iraq BV and Diamond Iraq BV, Initialing Draft,12 July 2011 (143 pages), http://www.iraqoilreport.com/energy/natural-gas/exclusive-the-shell-gas-deal-contract-6267/, Accessed 16 January 2012.

The joint venture

The agreement under consideration is a production-sharing-type deal that lasts for 25 years (extendable). According to the agreement, a Basrah Gas Company, BGC, is to be set up whereby SGC owns 51% and foreign partners 49% (Shell 44% and Mitsubishi5%). The partners' share profits and contribute to capital and other costs, according to their shareholdings.

Total capital cost of the project is estimated at $17.2 Billion, $4.4 Billion of which is to set up an LNG plant for exports. SGC pays 51% ($8.77 Billion), which includes $1.52 Billion of existing installations. The foreign partners pay 49% ($8.43 Billion) $1.46 Billion, of which is expended in the first three years; the remainder over the next seven years.[2] Apart from the existing installations, SGC spends the rest of its investment starting from the fourth year onward; $3.71 Billion of which to be financed from the central budget and the remainder from its revenues from the project. It could also use a loan of $1 Billion, from the foreign partners. Therefore, even after deducting the value of existing installations, the required spending in foreign exchange is large. Besides needed expertise in gas technology, high foreign exchange costs could explain the need for foreign partners.

Production capacity and required raw gas

The 2008 Heads of Agreement HOA has proposed to offer the project, i.e. BGC, a monopoly (rather a monopsony; single buyer) over the utilization of all associated and non-associated gas, produced in Basrah governorate (and other 'agreed areas'), which has raised many objections since. As a consequence, the new deal limits the access of BGC to associated gas from three ('dedicated') super giant fields; Rumaila, Zubair and West Qurna 1.

Production capacity of the new project is 2 Billion cubic feet daily. Current daily production from the three fields in 2012 (first five months) is about half the proposed capacity. For the project to operate at full capacity, crude oil production in these three fields, therefore, needs to increase from its present level of about 1.72 million barrels daily (mn b/d) to a minimum of 3.64 -3.78 mn b/d during the period 2014-2038; i.e. about 57-59% of their combined Plateau Production Targets of 6.4 mn b/d (according to the oil deals of 2009). The figures are indicated in table (T-1).[3]

Table (T-1) Production of associated-gas from Rumaila, Zubair, and West Qurna 1

	Oil Production *Thousand Barrels Daily*	**Net available gas: Production minus 10% shrinkage & losses** *Million Cubic Feet (MM scf)/Day*
Actual		
2009	1,418	817
2010	1,439	850
2011	1,633	955
January-May 2012	1,718	1,011
Projections		
2014-2017	2,168 - 2550	1,192 – 1,403
2018-2021	3,637	2,000
2022-2038	3,761	2,069

Source: actual figures from Ministry of Oil, http://www.oil.gov.iq/.

2 At the end of the 25-year period, the foreign partners will be paid $1.5 Billion for the remaining value of its assets. In the light of the fact that all capital outlays would have been recovered long before the 25th year, this payment is a double compensation.

3 Tables with (T-number) are placed within the text. Single-numbered tables are placed at the end of the article, before the Appendix.

Realizing the required gas from the three fields is, therefore, possible. However, if oil production from other fields, included in the oil licensing rounds, were added the scale of total oil production in the south becomes so high that pro rata reductions might become a possibility. To safeguard against possible shortages in raw gas supplies from the three fields, the deal stipulates that the balance to be provided from other sources.[4]

Taxation

Benefits from PSA-type deals usually divide into two streams of returns for the host country; first, profits accruing to the national partner. The second accrues to the treasury (MoF) in the form of taxes, royalties, fees, bonuses etc. The present deal mentions only income tax, at 35%.[5] It does not mention royalty, bonuses, and other taxes. Imposing royalty is a recognized prerogative of the state, and has been part of non-service oil agreements in the Middle East, North Africa, and other parts of the world.

The pricing scheme

According to the agreement, SGC supplies raw gas to BGC and buy back processed gas consumed domestically (dry gas, LPG, and condensates). LNG and exportable LPG and condensates are not sold to SGC; rather to the State Oil Marketing Organization, SOMO, which handles exports. However, unlike the HOA, another reference mentions that domestic users of dry gas (power stations, and industries,) will continue to pay a price of about $1.0/mn Btu whatever the price of dry gas paid by SGC to BGC.[6] Domestic consumers of LPG, presumably, also continue to pay official prices. According to the same reference, SGC will subsidize the difference between the price it pays to BGC and what it gets from domestic users. Accordingly, the pricing, as formulated in the contract, and described below, does not affect prices to domestic users. It only pertains to the distribution of costs, taxes, and profits among the shareholders in BGC. On the other hand, without the LNG plant, the paying back of costs (including investments) largely depends on domestic resources. Only when LNG exports commence, then foreign markets will contribute tangibly to the payback.

---

4 Paragraph (5.2.1), Volume 1, P. 29.

5 In addition to income tax, the deal also includes a moderate amount of 'fees' for SOMO. Export tax of 1% is also reported in "Dow Jones Deutschland", 15 November 2011.

6 This is mentioned in a document, in Arabic, circulated online, through the Internet, in August 2011, titled 'Basrah Gas Company, BGC', 5 pages. It bears no author name or date.

While largely related to world prices, the pricing of raw gas, dry gas, LPG, and condensates, is formulated in the contract, in elaborate set of definitions, rules, formulae, time intervals, and price quotation sources. LNG, by contrast, which is wholly geared to foreign markets, is directly related to world prices.

According to Exhibit 5, Volume 1, of the contract, during the lifespan of the project, and except for LNG, two periods are distinguished in pricing; an interim and subsequent periods. The interim is defined as number of years/quarters during which the foreign partners spend in 'capitalizable' expenditures a sum equivalent to 96% of the 'initial' value of the existing installations in the dedicated fields ($1.52 Billion). The subsequent period starts at the date when such equality materializes, which is assumed in this article to be the beginning of 2016 (see table 1).

'Contract' price of each of raw gas, dry gas, LPG and condensates in the interim period, is calculated as a weighted average of 'initial' price and 'reference' price. In the subsequent period the contract price is equal to the reference price only. The initial price itself increases, annually, in the interim by an 'inflation' rate of 2%. The initial price of raw gas is specified at $1695/mn scf, of dry gas at $1.04/mn Btu, of LPG at $85/Ton, and of condensates at $6.74/Barrel. The reference price of dry gas is equal to 33.6% of the world price of equivalent BTUs of high sulfur fuel oil (HSFO). The reference price of LPG is a weighted average of world prices of propane and butane. The reference price of condensate is equal to the price of Dubai crude oil. World prices in the Asian/Gulf region.

The reference price of raw gas is determined in more elaborate way which, it seems, intended to tie the cost of raw gas to the value of final sales. The reference price formula is composed of two weighted terms divided by the quantity of supplied raw gas. The first term is equal to the sum of domestic sales, non-income taxes, fees, and other related domestic receipts. This term is weighted (i.e. multiplied) by a parameter/fraction, X (initially specified at 0.1). The second term is called 'windfall adjustment', which is related to a difference between world price of HSFO and
baseline value of Brent crude'. The second term is weighted by the difference between one and the parameter/fraction. Furthermore, through escalation clauses, the price of raw gas is also influenced by investment expenditures and total sales (domestic and exports). With such set of determining/ influencing variables, therefore, variation and even fluctuation in the price of raw gas can exceed those of outputs. As a matter of fact, fluctuation in the price of raw gas occurs even if the prices of outputs remain constant; see note 2 of table (1). It is worth noting that if SGC uses the option of borrowing from the foreign partners ($1 Billion), then from year 2020 onward the initial value of X falls from 0.1 to 0.02 (Volume 2, P. 23). We assume that SGC will not use this option. However, its consequences are touched upon in the last section.

According to Exhibit 14, Volume 1 (P. 225), LNG price is 'to be based on market prices', FOB loading terminal. As LNG output is planned to come online during the 'subsequent' period (assumed 2018 in this article), only a 'reference' price is used. We will take it to equal LNG price in Japan, netted back to the loading terminal at the Gulf. See the Appendix for precise formulation of the price formulae.

Escalation clauses

The parameter/fraction (X), in the reference price equation of raw gas, is initially specified at (0.1). However, it is made to vary according to escalation clauses set in the contract (pages 129-131, Volume 1). For each year, the after-tax internal rate of
return (AIRR) of the project (BGC), up to the previous year, is calculated (starting from year 0; taken to be 2013 in this article). If it turns out that AIRR is less than 17.5%, then the fraction stays as it is. If AIRR is more than 27.5% then the
fraction becomes (0.6). If AIRR is between 17.5 and 27.5% then the fraction (0.1) is increased by the difference times a factor of 5. For instance, if AIRR is 20.5%, then the difference is 3%, which is multiplied by 5 and added to 0.1. The fraction becomes
0.25, (0.1 + 5×0.03). That is to say the reference price of raw gas becomes 0.25 times the first term plus 0.75 times, the second term (both terms divided by the quantity of supplied raw gas), as described in the previous section. See equations (6) in the Appendix and table (1).

In a production sharing agreement, like BGC, the escalation scheme could have been applied to such other parameters as the income tax rate and SGC shareholding in
BGC. However, keeping the escalation scheme as it is, we will explore, inter alia, through sensitivity analysis below, consequences of possible changes in some of these parameters on net income distribution between Iraq (SGC and MoF) and foreign partners. It suffices to say here that variations in the tax rate and production sharing affect net income distribution between Iraq and the foreign partners, whereas changes in

world prices affect the level of net income and its distribution. Furthermore, because of the entanglement of the influencing factors on the price of raw gas, the consequences could be disproportionate among the partners. For instance, a rise in tax rate leads to lower AIRRs for BGC, SGC, and foreign partners. However, unlike the foreign partners, the consequences for SGC are twofold. First, its income falls by the additional tax. Secondly, lower AIRR for BGC could lead to lower escalation parameter (X) and possibly lower price for raw gas, hence reducing the net income of SGC further.

World price of natural gas

As evident from the above, the price of the main output of the project, dry gas, is tied to the world price of fuel oil, that of condensates to the price of Dubai crude. LNG and LPG prices are related to their world prices. The assumed association between crude oil/fuel oil and gas prices raises three questions. First, the accuracy of this association. Second, if accurate, what is the future prospect of crude oil prices? Third, if not, what is the future prospect of gas prices? In this article we are mainly concerned with the first question.[7]

Association between gas and oil prices was quite strong before 2005 in all regions of the world. Gas pricing was tied in long-term contracts to crude oil or oil products. Since then, the relationship has undergone varying transformations in the different regions. In the USA, spot pricing together with increasing shale gas supplies have led to wide divergence. In 2003 the prices of WTI crude and natural gas were almost the same (at $5.4/mn BTU). In the first half of 2012, natural gas price ($2.4/mn BTU) was only 14% of that of WTI; graph 1 below. In Europe, oil-based pricing in long-term contracts is still widespread, but clauses have been introduced to limit the variation of gas prices in response to changes in oil prices (S-curve arrangement).[8] Furthermore, spot pricing in north Europe is widening. That is why divergence is increasing in this region too. In 2001 prices of Brent crude and natural gas were very close at $4.1/mn BTU. In the first half of 2012 price of natural gas ($11.5/mn BTU) was 59% of that of Brent; graph 2. In Asia, oil-related pricing of gas is still prevailing but S-curve arrangement is also applied and spot pricing of LNG is increasing. However, although ˙Japan/Korea is the largest and most concentrated spot market for LNG in

---

7 In spite of their recent decline, long-term crude oil prices, in many available projections, are expected to exceed $100/Barrel in nominal and real terms. See the following projections:

OPEC (2011) World Oil Outlook 2011, November.

International Energy Agency (2011) World Energy Outlook 2011, Executive Summary, November.

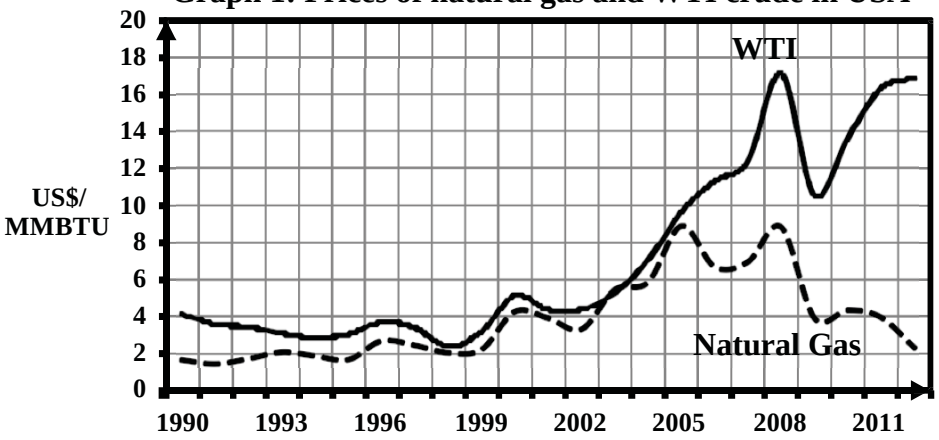
Energy Information Agency, EIA (2012), Annual Energy Outlook 2012, with Projections to 2035, 25 June.

For instance, in reference case scenario, EIA estimates that natural gas price in USA (Henry Hub spot) will increase from $4.4/MMBTU in 2010 gradually to $7.7 in 2035. As for WTI crude, price will rise from $79/Barrel in 2010 to $145 in 2035 (all in 2010 Dollar).

8 In S-curve arrangement, a floor and a ceiling for oil price are established within which the slope of the relationship between gas and oil prices is adjusted.

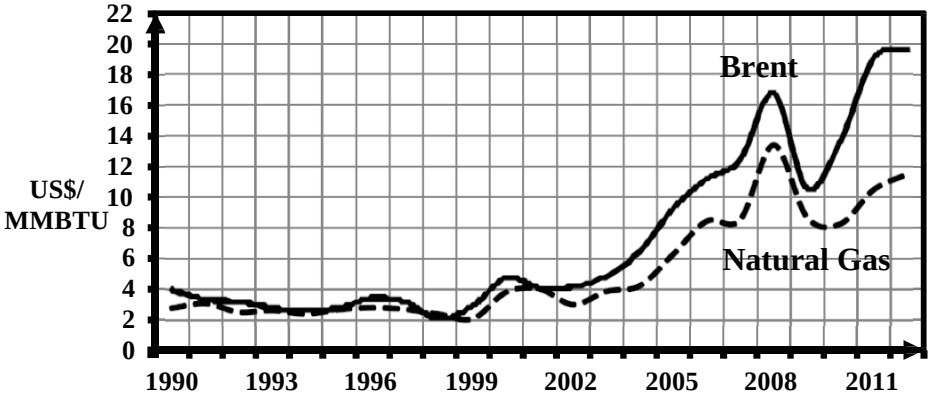
the world', according to Platts,[9] the relationship between LNG and crude oil pricing is still strong. Before 2004, LNG price exceeded that of Dubai crude. In the first half of 2012, it averaged about 87% of the price of that crude; graph 3.[10]

Graph 1: Prices of natural gas and WTI crude in USA



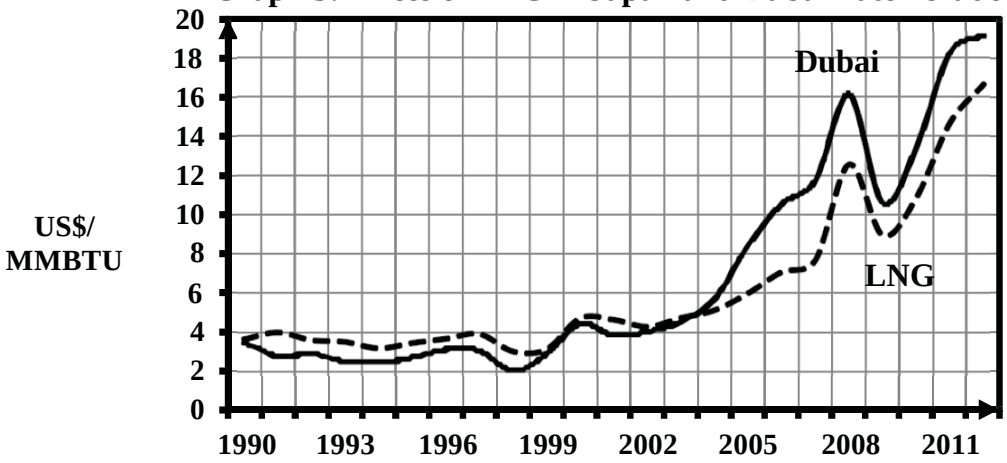
Note: natural gas spot price at Henry Hub, Louisiana.

Graph 2: Prices of natural gas in Europe and Brent crude



Note: natural gas average import border price, including UK. As of April 2010 includes a spot price component.

Graph 3: Prices of LNG in Japan and Dubai Fateh crude



Note: LNG import price, cif.

---

9 Platts (2011) 'Platts Daily Spot LNG Price Assessments', http://www.platts.com/IM.Platts.Content/downloads/faqs/lngfaq.pdf.
10 In drawing the three graphs, for the period 1990-June 2012, data are obtained from: World Bank (2012) Commodity Price Data (Pink Sheet), 5 July. http://go.worldbank.org/4ROCCIEQ50.

The association between the prices of gas and crude oil in the Asian market, although weakened in the last eight years, is still stronger than in other regions. Whether this continues into the future is an open question. Let us, however, test further the accuracy of the association by calculating the 'world' price of dry gas on the basis of equivalent BTUs of fuel oil and compare it to actual world prices during the last four years, in table (T-2).

Table (T-2) Calculated and actual world price of gas

	Price of Fuel Oil (180 cst 2% S) Singapore		**Actual World Price** ***$/MMBTU***		
			USA	**Europe**	**Japan**
	$/Ton	***Fuel-oil-based 'world' price of dry gas $/MMBTU***	*Natural Gas*	*Natural Gas*	*LNG*
	(1)	*(2) =(1)/37.661*	*(3)*	*(4)*	*(5)*
2009	377	10.0	4.0	8.7	8.9
2010	484	12.9	4.4	8.3	10.9
2011	677	18.0	4.0	10.5	14.7
January - June 2012	726	19.3	2.4	11.5	16.6

Sources: Fuel oil (180 cst 2.0% S) Singapore: OPEC: *Monthly Oil Market Reports*: March 2009 – July 2012. In this source prices are quoted in $/Barrel. They are multiplied by 6.6 to convert them into $/Ton.
Actual gas prices: World Bank (2012) World Bank *Commodity Price Data* (Pink Sheet), 5 July, http://go.worldbank.org/4ROCCIEQ50.

Hence, fuel-oil-based prices for gas in column 2 are much higher than actual prices in USA, higher than those in Europe, and higher but closer to those in Japan. The conclusion is that in light of the levels of actual gas prices in the last four years, using fuel oil price to determine 'world' price for dry gas overstates the latter. Nevertheless, in the absence of a 'world' price for dry gas in the Gulf, using fuel oil as a yardstick to derive its value could be justifiable.[11] For such exports from the project as LNG, LPG, and condensates, however, the possibility of lower world (i.e. Asian) gas prices, should be taken into consideration as one scenario in calculating future profits for the Basrah Gas Company, BGC (see last section below).

World Prices, Domestic Subsidy, And World Trade Organization

There are two kinds of outputs in this agreement, dry gas and liquids. They are separately used, the first is exclusively for the domestic market while the second, mainly LNG, is exclusively for exports. Whereas it is practical to relate the pricing of LNG, LPG, and condensates, to world prices, such association for dry gas could raise objections in WTO negotiations for Iraq's membership. The consent of the WTO, in 2005, for Saudi Arabia to subsidize domestic consumption of dry gas, hinged on the argument that dry gas had no world market price in the Gulf.[12] Stipulating that price of dry gas sold to SGC to be 33.6% of the world price of equivalent heating value of fuel oil could be used to make the case for domestic subsidy hard to defend. The Saudi precedent, however, could still be applied to the Iraqi case. First, all dry gas from the project is consumed domestically. Second, the fuel oil-based pricing of dry gas is an accounting price; it is not a quotation of actual dry gas price in the Gulf. Thus, the argument that dry gas has no world market price in the Gulf is also valid for the Iraqi case.

11 As mentioned in the previous section, the reference price of dry gas in Iraq's gas deal is 33.6% of fuel-oil-based dry gas price.
12 '[T]he representative of Saudi Arabia [in WTO negotiations] noted that pricing of natural gas (including methane and ethane) was quite different from the pricing of natural gas liquids (butane, propane, and natural gasoline). Natural [i.e. dry] gas was not sold for export due to the high costs of liquefying, transporting and re-gasifying such gas, and therefore had no international reference price in the Gulf region', WTO (2005), Report of the Working Party on the Accession of the Kingdom of Saudi Arabia to the World Trade Organization, Document WT/ACC/SAU/61, 1 November, Paragraphs 29, 30.

Appraising Project's Profitability: Simulation

In the absence of the detailed feasibility study of the project, we need to construct an approximate system of evaluation that preserves the pricing scheme and other relevant features of the contract. Such system needs to analyze profitability by performing the following tasks:

Task I: determine the profitability of the project and its distribution between the stakeholders (SGC, foreign partners, and MoF).

Task II: test the sensitivity of the project to possible changes in such indicators as world prices, tax rate, and shareholding in BGC.

Task III: consider a possible service contract arrangement.

Accordingly, we have constructed an evaluation system through hypothetical cash-flows for the 25-year period (2013-2038) of the project, based on terms, pricing formulae, and other stipulations included in the contract (Volumes 1 and 2). Some general notes on price subsidy, presented in a previously cited reference, are also taken into consideration. Secondary information and assumptions are used whenever primary information is missing. The exercise is described in tables (1) and (2), below. In these tables, we assume that BGC processes a feedstock of raw gas that rises, gradually, from 757 mn scf /day in 2014 to 1,400 in 2017. In 2018, LNG starts production, using additional 600 mn scf /day. From 2018 onward, therefore, processed raw gas totals 2,000 mn scf/day. We assume further that 2011's world prices to prevail during the projection period. Price formulae of the Appendix are calculated accordingly.[13]

Needless to say that this is a hypothetical exercise which leads to results and conclusions that could change when more accurate information in the unpublished feasibility study of the project is made available.

Let us now perform the above mentioned tasks, noting that task I can be read directly from tables (1) and (2). Tasks II and III are performed through a set of sensitivity analyses on these tables, but the numerical details are not shown in this article. Task I will be referred to, below, as the reference case. The following is a summary:

I. Profitability: The Reference Case

After-tax IRR, AIRR, of the project (BGC) is 22% and that of foreign partners 23%. The after-tax, after-subsidy IRR of SGC is 14%. Note that the AIRR of BGC does not average the shareholders' rates. The reason is that SGC's rate is calculated after including the raw gas value as inflows, and subsidies as outflows. These flows do not enter, as such, in the calculation of BGC's AIRR.[14] If these two flows are excluded, SGC's AIRR becomes 21%. The distribution of total net income throughout the project life (2014-2038) divides as follows: Iraq 69.4% (SGC 31.9%, and income
taxes 37.5%) and foreign partners 30.6%.

II. Sensitivity Analysis

From the following cases it is clear that foreign partners' AIRR, remains high (i.e. equals or higher than 15%) even if the following values of tax rate, SGC shareholding, or world price decline rate materialize (one at a time and in comparison with the reference case). Note that in the first two cases BGC's AIRR does not change.

- If income tax rate increases from 35 to 50%, then foreign partners' AIRR falls from 23 (in the reference case) to 20% and that of SGC from 15 to 7%. Iraq's (SGC & MoF) share of total net income increases from 69 to 77%.
- If the share of SGC in BGC increases from 51% to 65%, then foreign partners' AIRR falls from 23 to 21%. That of SGC increases from 14 to 16%. Iraq's share of total net income increases to 78%.
- If SGC elects to borrow from the foreign partners, then, through lower initial value of the fraction (X) from 2020 onward, lower raw gas costs lead to slightly higher AIRRs for the project (BGC) and for the foreign partners. SGC's, however, undergoes small decline. The fall in SGC's raw gas receipts is not compensated for by the rise in its net income and fall in its share of raw gas cost. Compared to the reference case, Iraq's

---

13 According to the contract, prices of outputs (including LNG) are to be calculated quarterly, using data from the previous quarter. But as we are dealing with the future we calculate prices annually for raw gas and outputs.

14 Raw gas value enters as outflow in BGC's and proportionally in SGC's and foreign partners' calculation of AIRRs. In addition, however, SGC receives all the value of raw gas as inflow.

share of total net income remains at 69%.
• If world prices decline by 17%, then BGC's AIRR falls from 22% (in the reference case) to 15% and the foreign partners' AIRR from 23 to 15%. In this case, SGC's AIRR increases slightly from 14% to 15%. That is because the fall in subsidies outweighs, slightly, the fall in raw gas receipts to SGC. Iraq's share of total net income increases slightly from 69 to 70%.

III. Service contract

Now let us use tables (1) and (2), to consider the case of assuming a service contract, instead of production-sharing agreement, by posing the following question: what is the gross (before-tax) fee per MMscf of processed raw gas that insures an AIRR between 15 and 25% for the foreign partner? Before answering, let us assume that the foreign partner agrees to lend the project $8.43 Billion (49% of $17.2 Billion) in instalments equal to the foreign partners' annual capital outlays shown in Table (2).We assume further that these instalments are repaid back at the end of each year starting from an accumulation at the third year of production. Moreover, the tax rate is 35%. Then our background calculations show that the foreign partner would realize an AIRR between 15 and 25% only if it is offered a gross (before tax) fee much higher than those offered (for an equivalent barrel of crude oil) in the oil deals in the first and second rounds (2009/2010).

Author's details
Mr. Ali Merza, Ph.D., has worked for the Iraqi Ministries of Oil and Planning and for the United Nations Department of Economic and Social Affairs in the Middle East and North Africa.
E-mail: ~~akmerza@hotmail.com~~. July, 2012.
merza.ali@gmail.com

Table (1) Iraq's Southern Gas Agreement: Production and Revenues

	Oil Production from Rumaila, Zubair, W. Qurna 1	Raw Gas: Million Cubic Feet/Day MMscf/Day			Cash Inflow (Sales), $Million													
			Utilized		Dry gas			LPG			Condensates			Sales of Dry Gas, LPG, and Cond.	LNG			Total Sales
		Total Production	Used in Non-LNG Production	Mainly used in LNG Production	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price	Value		Quantity	Price	Value	
	Thousand Barrel/Day		*G1*	*G2*	*Million MMBtu/Year* *DV* 82.5%G1×0.36525	*$/MMBtu* CP_{DG}	*$Million*	*Thousand Ton/Year* (12.5%G1 + 10%G2) × 0.36525 × 18.91	*$/Ton* CP_{LPG}	*$Million*	*Thousand Barrel/Year* 5%(G1+G2) × 0.36525 × 172.3	*$/Barrel* $CP_{condensats}$	*$Million*	*$Million* *R*	*Million MMBtu/Year* 85%G2 × 0.36525	*$/MMBtu* P_{LNG}	*$Million*	*$Million*
2010	1,439	**850**																
2011	1,633	**955**																
Jan-May 2012	1,718	**1,011**																
2013																		
2014	2,168	**1,214**	757	0	234	2.7	621	654	302	197	2,382	39	92	**911**	0	13.3	0	**911**
2015	2,295	**1,262**	1029	0	318	4.3	1,354	889	518	461	3,239	70	228	**2,043**	0	13.3	0	**2,043**
2016	2,423	**1,332**	1201	0	371	5.8	2,169	1,036	733	760	3,778	102	386	**3,315**	0	13.3	0	**3,315**
2017	2,550	**1,403**	1400	0	432	6.0	2,613	1,209	760	918	4,405	106	467	**3,998**	0	13.3	0	**3,998**
2018	3,637	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2019	3,637	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2020	3,637	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2021	3,637	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2022	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2023	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2024	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2025	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2026	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2027	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2028	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2029	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2030	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2031	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2032	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2033	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2034	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2035	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2036	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2037	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
2038	3,761	**2,000**	1400	600	432	6.0	2,613	1,623	760	1,233	6,293	106	667	**4,513**	191	13.3	2,546	**7,059**
Total																		**158,514**
IRR																		

Sources: *Actual figures 2009-2012* : Ministry of Oil, http://www.oil.gov.iq/.

Projections 2013-2038: pricing, production, capital expenditures, taxation, domestic consumption, exports, escalation scheme, matching level, etc, are based on articles of the 'contract' of the gas deal. Prices for the projection period are calculated on the basis of price formulae in the contact (see Appendix of this article), using world prices of 2011. Other figures and coefficients for the projection period include explanations in Doc 1 and Doc 2, other secondary information and technical coefficients, and assumptions. See footnote 1, page 1, for the cited sources.

Notes:

(1) Operating costs (apart from raw gas) make 19% of total revenues.

(2) Fluctuations in the price of raw gas. Between 2014 and 2017, in this table, raw gas price increases due to increasing domestic sales and related receipts. In 2018 it falls sharply because of addition of the quantity of LNG's feedstock of raw gas to the denominator (equation 5 in Appendix) without adding returns from LNG sales to the numerator. Between 2019 and 2026, it falls slightly because of growth, by 2 percent annually, of the so-called windfall adjustment (equation, 5) at the time when output prices remain constant. After 2026, raw gas price increases continually because the effect of escalation scheme outweighs growth in windfall adjustment.

(3) *Raw Gas Composition by volume* : output from raw gas, earmarked mainly to domestic consumption, is divided as follows: 82.5% dry gas, 12.5% LPG, and 5% condensates. Output from raw gas, earmarked to the LNG plant, is divided as follows: 85% LNG, 10% LPG and, 5% condensates.

Table, Continued

Continued, Table (1) Iraq's Southern Gas Agreement: Costs, Escalation Parameter, and Profitability Indicators

	Total Cash Inflow (Sales), $Million	Cash Outflow, $Million							Net Revenues minus Costs, $Million		Matching Level	Income Tax	After-Tax Internal Rate of Return	Escalation Parameter
		Raw Gas Cost			Operating Costs	Capital Costs		Total Costs	Before Income Tax	After Income Tax				
		Quantity *Thousand MMscf* *V* (G1+G2)×0.36525	Price *$/MMscf* CP_{RG}	Value *$Million*		Capital Cost by SGC	Capital Cost by Shell/M				*ML*	35%	*AIRR*	*X*
2010														
2011														
Jan-May 2012														
2013						1,524	488	**2,012**	**-2,012**	**-2,012**	**0.3203**	0	0%	0.10
2014	**911**	277	1,616	447	173		488	**1,108**	**-197**	**-197**	**0.6405**	0	0%	0.10
2015	**2,043**	376	2,320	873	388		488	**1,749**	**294**	**191**	**0.9608**	103	0%	0.10
2016	**3,315**	438	3,804	1,668	630	1,035	995	**4,328**	**-1,013**	**-1,013**	**1**	0	0%	0.10
2017	**3,998**	511	4,036	2,064	760	1,035	995	**4,853**	**-855**	**-855**	**1**	0	0%	0.10
2018	**7,059**	731	2,892	2,113	1,341	1,035	995	**5,484**	**1,575**	**1,024**	**1**	551	0%	0.10
2019	**7,059**	731	2,889	2,110	1,341	1,035	995	**5,482**	**1,577**	**1,025**	**1**	552	0%	0.10
2020	**7,059**	731	2,886	2,108	1,341	1,035	995	**5,480**	**1,580**	**1,027**	**1**	553	0%	0.10
2021	**7,059**	731	2,882	2,106	1,341	1,035	995	**5,477**	**1,582**	**1,029**	**1**	554	1%	0.10
2022	**7,059**	731	2,879	2,103	1,341	1,035	995	**5,475**	**1,585**	**1,030**	**1**	555	5%	0.10
2023	**7,059**	731	2,875	2,100	1,341	0.0		**3,442**	**3,618**	**2,351**	**1**	1,266	11%	0.10
2024	**7,059**	731	2,872	2,098	1,341	0.0		**3,439**	**3,620**	**2,353**	**1**	1,267	14%	0.10
2025	**7,059**	731	2,868	2,095	1,341	0.0		**3,437**	**3,623**	**2,355**	**1**	1,268	16%	0.10
2026	**7,059**	731	2,865	2,093	1,341	0.0		**3,434**	**3,626**	**2,357**	**1**	1,269	18%	0.12
2027	**7,059**	731	2,938	2,146	1,341	0.0		**3,487**	**3,572**	**2,322**	**1**	1,250	19%	0.17
2028	**7,059**	731	3,130	2,286	1,341	0.0		**3,627**	**3,432**	**2,231**	**1**	1,201	20%	0.21
2029	**7,059**	731	3,265	2,385	1,341	0.0		**3,726**	**3,333**	**2,166**	**1**	1,167	20%	0.24
2030	**7,059**	731	3,364	2,457	1,341	0.0		**3,798**	**3,261**	**2,120**	**1**	1,141	21%	0.26
2031	**7,059**	731	3,437	2,511	1,341	0.0		**3,852**	**3,207**	**2,085**	**1**	1,123	21%	0.28
2032	**7,059**	731	3,492	2,551	1,341	0.0		**3,892**	**3,167**	**2,059**	**1**	1,109	21%	0.29
2033	**7,059**	731	3,534	2,581	1,341	0.0		**3,923**	**3,137**	**2,039**	**1**	1,098	21%	0.30
2034	**7,059**	731	3,566	2,605	1,341	0.0		**3,946**	**3,113**	**2,024**	**1**	1,090	22%	0.30
2035	**7,059**	731	3,590	2,623	1,341	0.0		**3,964**	**3,096**	**2,012**	**1**	1,083	22%	0.31
2036	**7,059**	731	3,609	2,636	1,341	0.0		**3,977**	**3,082**	**2,003**	**1**	1,079	22%	0.32
2037	**7,059**	731	3,623	2,646	1,341	0.0		**3,988**	**3,072**	**1,997**	**1**	1,075	22%	0.32
2038	**7,059**	731	3,633	2,654	1,341	0.0		**3,995**	**3,064**	**1,992**	**1**	1,072	22%	0.32
Total				**54,058**	**30,118**	**17,200**		**101,376**	**57,138**	**35,713**		**21,426**		
IRR									**28%**	**22%**				

Continued, Notes

(4) Contract Prices: 'initial' and 'reference' prices for the projection period:

		Initial price	Reference Price
Dry Gas	$/MMBtu	1.04	6.0
LPG	$/Ton	85.0	760
Condensates	$/Barrel	6.7	106
Raw Gas	$/MMscf	1,695	
LNG	$/MMBtu		14.7

Refer to formulae in the Appendix and world prices for 2011 in point (5), on the right

(5) World Prices in 2011 (Asian Market):

P_D: Fuel Oil 180 HSFO	$/Ton	677
LPG	$/Ton	833
Freight from Japan to Arab Gulf	$/Ton	73
Dubai Crude	$/Barrel	106
LNG	$/MMBtu	14.7

(6) Conversion Factors:

MMscf =	18.91	Ton Liquids,
=	1025	MMBtu,
=	172.3	Barrels of crude oil equivalent (condensates).
Ton of LNG =	55.25	MMBtu
Ton of Fuel Oil =	37.66	MMBtu

MMscf: one million cubic feet.

Table (2) Iraq's Southern Gas Agreement: Partners' Cash Flows and profitability, US$ Million

	Foreign Partners						Iraq's South Gas Company, SGC									
	Outflow		Inflow	Net Before tax	Income Tax 35.0%	Net after Tax	Outflow					Inflow		Net Before tax	Income Tax 35.0%	Net after Tax
							Capital Costs		Raw Gas & Operating Costs	Subsidy on Domestic Sales		Revenues from sales of Raw Gas	Revenues from Sales of Outputs			
	Capital Costs	Raw Gas & Operating Costs	Sales Revenues				Capital Costs: Initial & from Central Budget	Capital Costs Paid for by Sales Revenues		Dry Gas	LPG					
2010																
2011																
2012																
2013	488			**-488**		**-488**	1,524							**-1,524**		-1,524
2014	488	304	446	**-346**	0	**-346**			316	378	0	447	464	**217**	0	217
2015	488	618	1,001	**-105**	50	**-155**			643	1,024	44	873	1,042	**204**	53	151
2016	995	1,126	1,624	**-497**	0	**-497**	530	505	1,172	1,783	126	1,668	1,691	**-758**	0	-758
2017	995	1,383	1,959	**-419**	0	**-419**	530	505	1,440	2,163	160	2,064	2,039	**-696**	0	-696
2018	995	1,692	3,459	**772**	270	**502**	530	505	1,762	2,163	186	2,113	3,600	**567**	281	286
2019	995	1,691	3,459	**773**	271	**502**	530	505	1,760	2,163	213	2,110	3,600	**539**	282	257
2020	995	1,690	3,459	**774**	271	**503**	530	505	1,759	2,163	240	2,108	3,600	**510**	282	228
2021	995	1,689	3,459	**775**	271	**504**	530	505	1,758	2,163	269	2,106	3,600	**481**	282	198
2022	995	1,688	3,459	**777**	272	**505**	530	505	1,757	2,163	293	2,103	3,600	**455**	283	172
2023		1,686	3,459	**1,773**	620	**1,152**			1,755	2,163	318	2,100	3,600	**1,464**	646	819
2024		1,685	3,459	**1,774**	621	**1,153**			1,754	2,163	344	2,098	3,600	**1,437**	646	791
2025		1,684	3,459	**1,775**	621	**1,154**			1,753	2,163	370	2,095	3,600	**1,410**	647	763
2026		1,683	3,459	**1,777**	622	**1,155**			1,751	2,163	397	2,093	3,600	**1,382**	647	734
2027		1,709	3,459	**1,750**	613	**1,138**			1,778	2,163	424	2,146	3,600	**1,380**	638	742
2028		1,777	3,459	**1,682**	589	**1,093**			1,850	2,163	453	2,286	3,600	**1,421**	613	808
2029		1,826	3,459	**1,633**	572	**1,062**			1,900	2,163	482	2,385	3,600	**1,440**	595	845
2030		1,861	3,459	**1,598**	559	**1,039**			1,937	2,163	511	2,457	3,600	**1,446**	582	864
2031		1,887	3,459	**1,572**	550	**1,022**			1,964	2,163	536	2,511	3,600	**1,447**	573	875
2032		1,907	3,459	**1,552**	543	**1,009**			1,985	2,163	561	2,551	3,600	**1,442**	565	877
2033		1,922	3,459	**1,537**	538	**999**			2,001	2,163	586	2,581	3,600	**1,432**	560	872
2034		1,934	3,459	**1,526**	534	**992**			2,012	2,163	612	2,605	3,600	**1,418**	556	862
2035		1,942	3,459	**1,517**	531	**986**			2,022	2,163	638	2,623	3,600	**1,400**	553	847
2036		1,949	3,459	**1,510**	529	**982**			2,028	2,163	665	2,636	3,600	**1,380**	550	830
2037		1,954	3,459	**1,505**	527	**978**			2,034	2,163	692	2,646	3,600	**1,357**	548	809
2038		1,958	3,459	**1,501**	525	**976**			2,038	2,163	720	2,654	3,600	**1,333**	547	786
Total	**8,428**	**41,246**	**77,672**	**27,998**	**10,499**	**17,499**	**5,236**	**3,536**	**42,930**	**50,778**	**9,837**	**54,058**	**80,842**	**22,584**	**10,927**	**11,657**
IRR				**30%**		**23%**								**20%**		**14%**

Sources and Notes: same as those of Table (1).

Notes on subsidy calculations:

1. Subsidies on domestic sales of dry gas and LPG, in this table, are calculated as the difference between Contract Price and official domestic price multiplied by SGC's domestic sales of the respective product.

2. Official domestic price of dry gas is $1.04/MMBtu. Therefore, the subsidy on dry gas is equal to price paid by SGC to BGC, as shown in Table (1), minus official domestic price times domestic delivery of dry gas.

3. In the beginning of 2012, production capacity of LPG stood at 1.75 Million tons. According to the 'Oil Products Distribution Company', Iraq (excluding Kurdistan) consumed about 1.6 Million tons in 2011. Proportionately, if Kurdistan is taken into consideration, Iraq would have consumed 1.85 Million tons in 2011. To meet total Iraq's need of LPG and a percentage for contingency, from 2014 onward, we assume that 1.2 times the growing**additional** consumption of LPG will be met by BGC. In 2011, official domestic price for LPG was ID5,000/cylinder; equivalent to $356/Ton. The difference between Contract Price of LPG (Table 1) and official price constitutes subsidy. Multiplying this price difference by the 'additional' consumption (background calculations) makes up total subsidy on the 'additional' domestic consumption.
Quoted figures for capacity (2012) and consumption (2011) of LPG are from the following , respectively:
Mubashir (2012) "Reaching Complete Coverage of Domestic Consumption of Gas", 19 February,

Appendix
Simplified Price Formulae

Each of the prices of raw gas, dry gas, LPG, and condensates is described in Exhibit 5, Volume 1, of the contract, by a set of equations. We have carried out substitutions in each set to reduce it to one equation for each price; which is reported in this appendix. The resulting price from each single equation coincides with that determined by the corresponding set of equations. In Exhibit 14, Volume 1, it is stipulated that LNG price 'to be based on market prices', FOB loading terminal. We, therefore, take it to equal LNG price in Japan, netted back to the loading terminal in the Gulf.

Contract price of dry gas

$$(1)\ CP_{DG} = (1\text{-}ML) \times 1.04 \times 1.02^{n} + ML \times 0.00892 P_D,$$

Where,

CP_{DG}: Contract price of dry gas, US$/MMBTU.

1.02^{n}: inflation factor, $n=0$ in the first year of implementation, taken to be 2013 in this article.

P_D: $/Ton, price of high sulfur fuel oil (HSFO) 180 FOB Arab Gulf, quoted under the heading *Asia Products* in the *Asia Pacific/Arab Gulf Market Scan* (Platts).

ML: Matching Level, which is a situation (date) when cumulative expenses by foreign partners become equivalent to (96%) the value of initial (and additional) installations transferred from SGC to BGC. It is defined as follows:

$$(2)\ ML = \begin{cases} \frac{A}{1{,}463} & If\ \frac{A}{1{,}463} \leq 1, \\ 1, & If\ \frac{A}{1{,}463} > 1. \end{cases}$$

Where:

A: sum of capitalisable cost incurred and cash calls paid by foreign partners up to the calculation date in US$.

$1,463 million: 96% of the value of initial (and additional) installations transferred from SGC to BGC.

If investment starts in 2013 the matching date is taken in this article to be beginning of 2016.

Contract price of LPG

$$(3)\ CP_{LPG} = (1\text{-}ML) \times 85 \times 1.02^{n} + ML\ [s_1 P_{propane} + s_2 P_{butane}] - B_{LPG}$$

Where,

CP_{LPG}: Contract price of LPG, US$/Ton.

s_1, s_2: respectively, shares of propane and butane, by weight, in LPG.

$P_{propane}$, P_{butane}: respectively, averages of daily quotations ($/Ton) for propane and butane under the heading "*Asia Far East Index*" under "*Asia Pacific Refrigerated Cargos*" as published in *Argus International*.

B_{LPG}: average of the Baltic Exchange titled "*LPG freight rate one*" [used in netting-back prices of propane and butane to Arab Gulf].

Contract price of condensates

$$(4)\ CP_{cond} = (1\text{-}ML) \times 6.74 \times 1.02^{n} + ML \times P_{Dubai}$$

Where,

CP_{cond}: Contract price of condensates, US$/Barrel.

P_{Dubai}: the average (in $/barrel) of the high and low quotations of Dubai crude price at the close of Singapore trading (as published by Platts).

Contract price of raw gas

$$(5)\ CP_{RG} = (1\text{-}ML)1.02^{n}1695 + ML\ \frac{X\ R + (1\text{-}X)\ ML\ 0.00669\ \ DV\ \{P_D\text{-}1.02^{n}0.82BB+6\}}{V}$$

$$(6)\quad X = \begin{cases} 0.1 & \text{If after-tax-IRR (AIRR)} \leq 0.175, \\ 0.1 + 5\,(AIRR - 0.175) & \text{if} \quad 0.175 < AIRR \leq 0.275, \\ 0.6 & \text{If} \quad AIRR > 0.275. \end{cases}$$

Where,

CP_{RG}: Contract price of raw gas, $/MMscf.

R: sales from dry gas, LPG, condensates, non-income taxes, fees, and other related domestic receipts (excluding LNG sales), in $Million.

DV: volume of dry gas, in million MMBtu.

V: volume supplied of raw gas, in million MMscf.

BB: a 'constant with value (50) reflecting baseline value of Brent crude'.

X: parameter/fraction through which the escalation scheme is applied.

After year 2015, ML becomes equal to one. Therefore, after year 2015 the price of raw gas equation simplifies to:

$$(5')\quad CP_{RG} = \frac{X\ \ R + (1\text{-}X)\ 0.00669\ DV\ \{P_D\text{-}1.02^{n}0.82BB+6\}}{V}$$