Towards a rational, objective natural gas utilization policy

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Abstract

There has been a significant increase in the country's natural gas supply in the recent past, with the total gas supply likely to double in the near future. Effective utilization of this gas is of critical importance to the country as it can have a tremendous impact on the country's energy and food security. A gas utilization policy must therefore include inputs from all stakeholders of the gas sector including potential gas users, gas producers, gas transmission and distribution companies, the PNGRB, Bureau of Energy Efficiency, electricity regulators, other relevant organizations, and people at large. Moreover, the policy should explicitly state its objectives and present the different trade-offs in choosing between alternative uses of gas. However, the current gas utilization policy does not meet these criteria, and seems to have been drafted in a non-transparent and non-inclusive manner without a clear statement of objectives. This paper recommends a participative process of policy formulation and aims to initiate a process of desirable policy objectives by presenting some objectives from the energy sector's perspective. Based on these objectives, it demonstrates that some uses of gas that are either not mentioned at all or do not have high enough priority currently, may yield significant benefits. We also take the position that, in the larger interests of the country's food and energy security, the verdict of the on-going legal dispute about gas should only be limited to the ownership of the gas and not its usage.

1 Introduction

Natural gas found by Reliance Industries Ltd. (RIL) in the D-6 field of the Krishna-Godavari (KG) basin has begun flowing in April 2009. This is a significant event for the energy constrained Indian economy, not only because it is the first gas to flow out of fields auctioned under NELP (New Exploration and Licensing Policy), but also because of the large quantities of gas involved. The total value of the gas in D-6 fields is over Rs. 200 thousand crores (nearly $40 billion) at the currently agreed price of $4.2/mmbtu, and at its peak flow of about 80 mmscmd (million cu m per day) expected by the end of 2009, it would roughly double the domestic gas supply[1], be energy equivalent to over a fifth of our petroleum imports and can help generate about 20,000 MW[2] of power. In addition, ONGC and GSPC have also found approximately similar quantity of gas, which will come on-stream in a few years and more gas is likely to be found in other fields being explored.

Hence, the gas utilization policy governing the usage of this gas holds enormous importance. The Ministry of Petroleum and Natural Gas (MoPNG) issued a press release in June 2008 about the decision made by an empowered group of ministers (EGoM) about the priority order of different sectors and the quantity of gas each sector could use out of the first 40 mmscmd of gas[3] [MoPNG

[1] Hope floats on KG basin gas, Business Standard, September 7, 2008.
[2] Assuming about 80% PLF and that the gas is used in a centralized CCGT plant.
[3] Government sets norms for sale of gas from Reliance, GSPC fields, Financial Express, July 18, 2008

2008a]. The respective ministries (Minisry of Power) and departments (Department of Fertilizers) were then supposed to allocate the gas among the claimants within the sector.

Natural gas is a relatively clean energy source with low greenhouse gas (GHG) impact and is seen as a transition fuel to the renewable energy future. Hence, the imminent availability of such a large quantity of gas should be a time to rejoice for the energy constrained economy of India. However, in reality there is a lot of confusion over how the gas would be used, at what price it would be available.

Most of the discussion in the media has tended to focus on issues such as the court dispute between the Ambani brothers[4], and to a lesser extent on the attempts by different sectors to get access to more gas, and concerns about the gas sale and purchase agreement[5]. Practically all the public discourse on gas utilization is centered on *who* gets *how much* gas and at *what* price. The question of *how* to use gas to maximize public interest has received a scant attention. This is very unfortunate, considering that proper use of such a large quantity of gas can play a critical role in India's ability to meet its developmental and environmental challenges. This note attempts to bring the focus back to the basic issues in the gas sector, namely maximizing public interest through utilization of this natural resource.

2 Current gas utilization regime

2.1 Current gas allocations

One of the first studies on gas allocation was done by a committee appointed by the Planning Commission and chaired by the then Advisor, Energy, Mr. Satishchandran. Subsequently, a committee chaired by Mr. Varadarajan re-examined the issue and presented the idea of *imputed economic value* of gas in different sectors based on the opportunity cost of using different fuels, as a basis to decide gas allocation. Before NELP, a Gas Linkage Committee (GLC) was responsible for allocating gas to different users. Further, the Supreme Court has also given directions in its verdict on the M.C. Mehta v/s Government of India case regarding gas allocations to small scale industries in environmentally sensitive areas near the Taj Mahal. However, there was a need for a fresh natural gas utilization policy due to large finds of natural gas, and as provided in the NELP production sharing contracts.

In this context, MoPNG prepared a draft paper on utilization of natural gas in December 2007 [MoPNG 2007]. This paper surveyed the Indian gas scenario including unmet demand from various sectors, and presented a priority ordering of sectors to receive natural gas. Based on this report, the EGoM on Natural Gas approved the priority ordering of different sectors to receive the initial 40 mmscmd of gas in a meeting on 28th May 2008 [MoPNG 2008a]. The allocation it decided was as follows:

1. Existing gas-based urea plants that are not receiving gas to run at full capacity (14 mmscmd).
2. Existing gas based LPG plants (up to 3 mmscmd)
3. Existing gas based power plants (up to 18 mmscmd).
4. City gas distribution (up to 5 mmscmd) and

[4] After MTN, battle lines drawn over gas, The Telegraph, July 21, 2008;
RIL sees $1 billion loss in gas sales to RNRL, Business Standard, August 1, 2008 and many more.

[5] RIL to sign pact with fertilizer units, Business Standard, March 11, 2009;
No takers for RIL's revised GSPA for KG D6 gas, Indian Express, March 23, 2009.

5. Any additional left over gas to be used by power plants as their requirement is more than 18 mmscmd.

Since then, further EGoM meetings have further tweaked the priority ordering. The EGoM meeting of October 2008 passed an order setting aside a fixed quantity of gas to RGPPL (formerly Dabhol Power Company) going up to 8.5 mmscmd by September 2009[6]. The EGoM meeting of February 2009 changed allocations slightly to adjust for the lower calorific value of the KG basin gas. Then, its April 2009 meeting moved RGPPL on par with fertilizers in the priority order[7,] and the power sector was moved above LPG[8] and earmarked to get 4 mmscmd of gas that the CGD sector is unlikely to use[9]. Latest reports indicate that a meeting in May 2009 may also allot some gas to the steel sector[10]!

2.2 Critique of process followed thus far

MoPNG must have consulted the concerned ministries during formulation of the draft paper [MoPNG 2007]. There have also been media reports that MoPNG heard the key players in the gas business during this process. But to the best of our knowledge, there was no public discussion of the draft policy, nor were inputs sought from all stakeholders. The only publicly available document is a two-page press release on the MoPNG website [MoPNG 2008a]. Minutes of the various EGoM meetings that decided and modified the priority ordering of the different sectors is only accessible through media reports[2,7,8]. Other than that, some private databases[11] contain minutes of some EGoM meetings and some draft papers on gas utilization such as [MoPNG 2007]. Moreover, the process also appears to have been ad-hoc, with frequent changes to the published allocations and priority ordering, often with sketchy justification. So, the entire process of evolving the gas utilization policy appears rather opaque, and the final policy document (if it exists) is not publicly available. This is unfortunate, considering that it deals with a key natural resource of the country.

The contrast is striking when one compares it with the relatively transparent, participatory and responsive process adopted by another central ministry, the Ministry of Power (MoP), while developing the National Tariff Policy. The MoP placed the first draft of the tariff policy in the public domain and actively sought feedback from various stakeholders such as producers, utilities, industries, consumer associations, regulatory bodies etc. by inviting them to give suggestions [Prayas 2005]. Then, MoP incorporated the suggestions it deemed suitable into a second draft of the policy, and finalized the policy after another round of public feedback. In general, it also justified why it adopted certain features.

2.3 Critique of utilization policy

In addition to process limitations, the said utilization policy also suffers from some substantive shortcomings. These have to be seen on the context of the price of gas being 'discovered' independent of the utilization policy and fixed by the EGoM at $4.2/mmbtu for five years for all consumers. This

[6] Ratnagiri to get Reliance's D6 gas, Financial Express, November 7, 2008
[7] Ratnagiri Gas may ink pact with RIL soon, Hindu Business Line, April 6, 2009.
[8] Power plants to get more KG gas than LPG plants, Business Standard, April 20, 2009.
[9] Panel confirms allocation of RIL's D6 gas to power cos, Hindu Business Line, April 10, 2009.
[10] Steel cos may get a share of KG gas, Economic Times, 28th April 2009.
[11] www.infraline.com

implies that MoPNG has taken on the responsibility to optimize the usage of gas across sectors through the instrument of the utilization policy. The major shortcomings of the policy are:

- All documents – either publicly available, through private databases, or through media reports – only present an *allocation* of gas to different sectors and do not really constitute a *utilization policy.*
- None of these documents clearly articulate the national objectives that gas utilization ought to fulfill and how the said policy fulfills it.
- They do not present sufficient analysis of different trade-offs in possible usage.
- Some important gas uses, such as distributed heat and power production (industrial co-generation or tri-generation) find no mention at all.
- There are some discrepancies between the draft policy paper created by MoPNG in 2007 and the press release about the actual gas allocation. For example, the draft paper says that gas should be first made available to PSU power plants and then to private/independent power plants (page 37), but the press release is silent about this.
- Gas utilization cannot really be separated from gas price. However, since the price of gas from the KG basin has been fixed at $4.2/mmbtu for *all* sectors and since different user sectors have different market structures and regulatory regimes (for example, fertilizers and LPG are fully controlled, while power prices are partly regulated while CNG prices are unregulated), the utilization policy should have explicitly considered this aspect[12]. For example, the allocation priority could have said that only the power plants that pass on the full benefit of gas use to electricity consumers should be given priority allocations, in effect reducing priority to the captive and merchant power plants.

  Instead, the available document(s) only present demand projections for different sectors and the priority ordering of sectors, with limited justification for the chosen order. Hence, there is insufficient basis to argue that the present gas allocation maximizes public interest.

3 Way forward

The present allocation covers about 40 mmscmd of gas. Production from KG basin will increase to 80 mmscmd over the next few months. Over the next few years another 40 to 80 mmscmd gas is expected to come on-stream[13]. Proper utilization of this gas can have enormous implications on Indian energy policy and its GHG emissions. For example, using 40 mmscmd of gas in industrial Combined Heating and Power (CHP) plants for co-generation, as opposed to using it in centralized CCGT (Combined Cycle Gas Turbine) plants can provide about 60% extra energy service. Similarly, using 40 mmscmd as Compressed Natural Gas (CNG) for vehicles can replace about 10 million tons of petrol and diesel, which in turn can reduce petroleum imports by 10%. Given such importance of the utilization policy (and the lacunae in the process and content of the current policy), there is an urgent need to re-define the gas utilization policy through the following steps:

[12] Pricing of gas is a very important issue by itself, but since the focus of our paper is the broad directions of utilization policy, and since the price of NELP gas is fixed for the near future, we do not address the issue of pricing in this paper.
[13] India prepares for shift to gas-based economy, Business Standard, April 27, 2009

1. In consultation with the Planning Commission, the MoPNG should clearly lay down the expected objectives of the utilization policy.
2. MoPNG should frame a draft gas utilization policy to meet the stated objectives. The draft policy should articulate how the policy meets the objectives and the trade-offs it considered.
3. It should then invite feedback from stakeholders including, potential gas users, gas producers, gas transmission and distribution companies, the PNGRB, Bureau of Energy Efficiency, electricity regulators, other relevant organizations, and people at large.
4. The stakeholder feedback should be made public. Based on this feedback, the utilization policy should be revised and published along with a justification for the suggestions that were accepted.

A policy formulated in such a transparent and inclusive manner is likely to substantially increase its acceptability to all stakeholders. Moreover, it will also help MoPNG regain its credibility, which has been eroded during the recent controversies and ill handling of several issues in the natural gas sector.

Another important issue to be considered is the on-going court cases between RIL and RNRL, and RIL and NTPC. The court's decision in these cases should be deemed to be a decision on the *ownership* of the gas and not its utilization. Utilization is a prerogative and responsibility of the Government in order to maximize public interest. Since national interests such as food and energy security ought to be the overriding considerations for such a major national resource, any legal issues of ownership that may act as a barrier to efficient gas utilization need to be remedied. For example, if the contract between the different private parties mentions how the gas would be used (perhaps in an inefficient manner), it should be deemed illegal since Article 21.1 of the Production Sharing Contract of NELP clearly states that "*any proposal by the contractor relating to discovery and production of natural gas from the contract area shall be made in the context of the Government's policy for utilization of natural gas and shall take into account the objectives of the Government to develop its resource in the most efficient manner and to promote conservation measures*" [MoPNG 2000].

4 Objectives of the gas utilization policy

Broadly, the natural gas resource of the country should be used to enhance the country's food security and energy security. The use of natural gas as feedstock in the fertilizer industry has an impact on the nation's food security through increased domestic fertilizer production. However, one school of thought argues that usage of domestic gas for fertilizers is inefficient. It argues that siting fertilizer plants overseas, where gas is cheaply available (on the lines of the Iffco-Kribhco plant in Oman[14]) and transporting the fertilizer is more efficient. It is argued that transporting solid fertilizer is much cheaper than importing gas through pipeline or as LNG. Hence, this school argues that it is better to use gas for energy security. Such arguments and their counter arguments related to gas usage in the fertilizer industry, and other industries such as steel and petrochemicals should be considered while formulating the utilization policy.

To help start a debate on these lines, we present a set of tentative objectives for the gas utilization and present policy options that can further these objectives. We limit our discussion only to the energy

[14] Iffco JV's Oman fertilizer unit to kick off July next, Financial Express, October 7th, 2004

sector to elaborate the point. The vision stated in the Integrated Energy Policy prepared by the Government of India [Planning Commission 2006] reads:

The broad vision behind the energy policy is to reliably meet the demand for energy services of all sectors including the lifeline energy needs of vulnerable households in all parts of the country with safe, clean and convenient energy at the least-cost. This must be done in a technically efficient, economically viable and environmentally sustainable manner using different fuels and forms of energy, both conventional and non-conventional, as well as new and emerging energy sources to ensure supply at all times with a prescribed confidence level considering that shocks and disruption can be reasonably expected. In other words, the goal of the energy policy is to provide energy security to all.

We interpret that the above vision translates into the following objectives of the gas utilization policy:

- India's fast-growing economy is critically dependent on energy security. Therefore, minimizing import dependence of hydro-carbons should be a critical first objective.
- Maximizing energy efficiency and minimizing GHG emissions should be the second objective. Despite India's low GHG emissions, it is clear that minimizing GHG emissions will allow India to keep the necessary room for its development in the carbon constrained future.
- Spreading the benefits from the use of gas to the maximum number of people.

5 Inputs into the gas utilization policy

Based on the objectives listed above, we evaluate three alternative uses of gas that may help to achieve these objectives better. For each use, we examine the effects of using the as yet unallocated 40 mmscmd of gas in the stated manner rather than in CCGT power plants (which is the default way of using gas in the power sector). The impact of said use on the objectives listed above is also discussed. It is worth noting for the comparisons to follow that at the current price of $4.2 per mmbtu, 40 mmscmd of gas is worth about Rs. 10 thousand crores per year.

5.1 Combined Heating and Power (Distributed Generation)

CHP solutions can be deployed both for industries with thermal intensive processes such as paper and pulp, cement, iron and steel, petrochemicals as well as for commercial establishments such as hotels, hospitals, multiplexes, malls, and IT complexes.

These industries can efficiently use the heat by-product of CHP. If the 40 mmscmd gas was used for industrial co-generation installations, it would provide about 60% more energy service and support 5800 MWe of the 9000 MWe of industrial CHP potential identified by BEE [IGEN 2007]. This has several benefits:

(a) Using CHP in industry will reduce oil imports, since it would displace the use of furnace oil currently used for heating. This would avoid consumption of about 6 million tons of furnace oil, thus saving over Rs. 13 thousand crores in import bills at 2007-08 prices. However, CHP installations would produce less electricity than the displaced CCGT plants. Assuming this fall in electricity production is made up through coal-fired plants necessitating coal imports, the net annual import bill saving is still likely to be in the region of Rs. 11 thousand crores.

(b) The CHP solution would also reduce the need for capital expenditure in centralized power generation by about 38 thousand crores!
(c) The above gains can be achieved with no significant change in total GHG emissions – an increase of about 2 million tons, or 0.1% of our national emissions, in spite of replacing the CCGT power plants by (smaller) coal-fired plants.

Similarly, CHP can also be used in large commercial buildings such as malls and IT complexes that have space cooling and / or water heating needs. If 40 mmscmd gas were to be used for commercial CHP installations of this kind, they can support some extra installations with the same amount of gas and help save about Rs. 32 thousand crores investment in centralized electricity generation.

Additionally, the CHP route would promote the distributed generation and open access paradigm embodied in the Electricity Act of 2003, where the required investments would be done by commercial or industrial users, reducing the burden of investment on the power utilities. However, it must be noted that while promoting CHP one precaution is essential. With the prevailing power shortages and high prices of electricity in the spot market, it is possible that gas could be used inefficiently as CHP users would benefit by generating power for selling on the spot market even at times when their heat-to-electricity ratio is not optimum. This may result in inefficient production of electricity rather than being a true co-generation mode of operation. Therefore, it is necessary to put in appropriate mechanisms and processes to prevent such an occurrence.

5.2 Compressed Natural Gas (CNG)

India imports about 80% of its petroleum demand – either as crude or as a refined product. Net imports of petroleum and petroleum products were about 105 million tons in 2007-08, valued at Rs. 242 thousand crores [MoPNG 2008b]. Transport fuels – High Speed Diesel (HSD) and Motor Spirit (MS) – account for 50 million tons of total consumption.

If the 40 mmscmd of gas were used for CNG, it would displace about 10 million tons of HSD and MS consumption, in turn, reducing the annual petroleum import bill by over Rs. 24 thousand crores at 2007-08 prices. However, this gas would have been diverted from CCGT plants which would presumably be replaced by coal-fired plants for which coal may have to be imported. Even accounting for the imported coal, net import savings would be to the tune of Rs. 16 thousand crores. Since CNG vehicles would have a lower cost of operation at current gas prices, converting vehicles from HSD or MS to CNG is a economical option[15]. Additionally, CNG would also contribute to a reduction in local air pollution since CNG vehicles emit about 70% less CO than HSD and MS.

CNG vehicles emit about 20% less GHGs for equivalent operation[16]. So, using 40 mmscmd of gas for CNG would result in a reduction of 14.3 million tons of GHG emissions from the transport sector. However, emissions would increase due to coal fired plants replacing the CCGT plants leading to a net

[15] http://www.team-bhp.com/forum/technical-stuff/40440-cng-vs-petrol.html and http://dnr.louisiana.gov/sec/execdiv/techasmt/alternative_fuels/cng.htm, as of 23rd March 2009
CNG run engines on the cards, Economic Times, 25th May 2009
[16] http://www.ngvc.org/about_ngv/ngv_environ.html as of 23rd March 2009

increase inGHG emissions of about 24 million tons per year. But at a carbon cost of $20/ton, this amounts to only Rs. 2.4 thousand crores – much less than the saved import bill.

5.3 Domestic water heating

Domestic water heating contributes significantly to the morning peak load of power utilities. Encouraging the use of gas-based domestic water heating can shave off the morning peak significantly. This would conserve water in the peaking hydro plants and thus increase their availability to meet the evening peak load. Moreover, this will require only a small quantity of gas – only 0.5 mmscmd of gas can replace roughly 25% of the 8.8 million electric water heaters installed in the country. Therefore, it is not meaningful to compare the substitution of 40 mmscmd of gas from CCGT usage to domestic water heating. However, it must be noted that gas-based water heating would be an economical option for utilities as well as consumers. Gas water heating would cost only a third of the electric water heating for the consumers, while the utilities would gain due to reduced purchase of expensive power, which currently costs between Rs 6 to 8 per kWh. Additionally, it can also reduce the GHG emissions compared to electricity produced in a CCGT plant. The extra gas required for this application would need to be supplied through CGD networks. Therefore, this use is dependent on the availability of CGD networks in all urban areas, which is not the case today. As a first step, existing CGD networks could be allocated the extra gas required to allow its consumers to use gas-based water heaters.

Uses of natural gas such as those listed above deserve to be included in the options being considered by the gas utilization policy, as they can improve energy security and energy efficiency. Lack of such considerations underline the need for a re-look at the formulation of the gas utilization policy.

6 Conclusions

Currently, the country has neither articulated the objectives of a gas utilization policy, nor has it articulated a utilization policy. Moreover, how gas would be allocated to specific users (within a sector such as power sector) has also been left unarticulated. Lastly, the actual allocation of gas has been changed by EGoM in an apparently ad-hoc manner. The paper demonstrates that use of gas for CHP, for transport or for water heating can substantially increase the national benefit by saving thousands of crores of rupees in import bills and improving energy efficiency.

Hence in the face of large availability of gas in the near future from fields on the eastern sea-board, India needs to re-articulate its gas utilization policy. Developing this policy in a transparent, inclusive and objective manner can tremendously benefit Indian economy and maximize public interest. MoPNG should follow the good practices of the power sector on how such policies should be developed in a transparent and inclusive manner. To begin with, it should clearly articulate the objectives of the policy and then proceed with a transparent and inclusive policy formulation process.

Moreover, since the gas belongs to the nation and its usage is directed by the utilization policy, the verdict of the ongoing court cases about gas from KG basin fields should only be limited to gas ownership and not its utilization. Utilization should be determined by the Government to maximize public interest.

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