MINISTRY OF ENERGY



NATURAL GAS PRICING

POLICY

MAY 2012

FORWARD

The Ministry of Energy has over the last few months been involved in conducting a study with the assistance of a Gas Pricing Committee supported by World Bank and its consultants and consultations with various energy sector institutions, upstream investors, the Ministry of Agriculture and various other entities to provide the basis for proposing a Gas Pricing Policy for Ghana.

The policy takes due consideration of the government's economic development agenda and energy policy objectives. It provides some guidance on prioritization of gas utilization as well as on supply and demand pricing of natural gas. Given the emerging nature of the gas industry as a whole it is proposed that the policy guidelines be considered as transitional, needing significant review once the market becomes more mature orwhen a substantial change in the supply/demand balance occurs. These guidelines do not seek to fix prices but provide a framework for price negotiations between buyers and sellers taking into consideration gas supply costs and gas demand valuations by alternative uses. The policy framework also provides for contractual adjustments to negotiated prices.

A key part of this policy is how the net revenues arising from the difference between prices paid to producers and prices obtained from purchasers is appropriated and allocated including promoting strategic sectors and energy access objectives.

The challenges with obtaining data promptly from the various agencies has exposed the need for having a well-organized database covering the energy sector that is professionally managed to enable ease of monitoring and continuously assessing the effectiveness of the policies outlined in this document.

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2 Introduction

Ghana has been blessed with the discovery of oil and gas fields in its territorial waters. Several fields have already been discovered offshore, and exploration investments continue with reasonable success. Oil and gas production has started with the commissioning of the Jubilee field. Compared to petroleum products, natural gas is acknowledged as a prime source of cheaper and cleaner energy. Current national gas reserves are estimated at more than 6 TCF.

The Government of Ghana (GoG) is keen to implement policies that will ensure the development of these indigenous natural gas resources and a sustainable natural gas industry to foster economic growth and development. This will entail significant investments throughout the whole value chain. Development of these natural gas resources will feed the demand for increased amounts of energy deriving from the country's rapid economic growth, which will in turn fuel even more rapid economic development.

Pricing of natural gas would have to be at minimum levels that would incentiviseassociated and non-associated gas development taking into consideration future gas demand,and on the demand side,the maximum gas prices that make gas consuming projects economically profitable.

The interplay of thesemaximum and minimum prices provides a basis for estimating the price at which natural gas is efficiently allocated to the market, the price at which the market is cleared and an estimation of economic rent available to the economy. The GoGcan thus take the opportunity totransfer the net revenues arising from the difference between prices paid to producers and prices obtained from purchasersin an optimal manner.

The policyshould also provide pointers to the most valuable uses of the gas resources.

3 Setting the Stage for the Policy Framework

This Gas Pricing Policy is a major plank in present and future energy policy and has been determined based on the following boundary conditions:

- Ghana is at the beginning of the learning curve in the process of developing its gas industry throughout the whole chain. The requirement for large investments to create new markets and the existence of few players in the demand, midstream and upstream segmentsof the industry imply that there will bea high concentration of power in the hands of a few players on both the supply and demand sides[1]. This is expected to remain so for some time, as in most developing gas industries.
- The GoG will thus of necessity be a major player in the energy sector from upstream to downstream, setting up the rules of the game to achieve energy policy objectives. In addition to the traditional government roles of legislation, policy making and regulation,a wholly owned Government entity will control the midstream segment of the gas industry for some time.
- Although, this structure is monopolistic, the industry does not necessarily require domestic market price regulation. There is, however, the need for detailed rules of price determination, its structure and how it would be adjusted through time. The transparency of information on pricing would help reduce potential pricing/tariff conflicts.
- Private capital is willing to participate in this industry development process and the GoG has already set energy policy goals that enable public private partnerships.This is to foster private sector participation allowing investments to continue increasing in a sustainable manner. Thus the rules, regulations and procedures to be issued regarding gas pricing should be consistent with this posture.

[1] This is similar to the experience in Brazil where Petrobras has a dominant role in the production and transportation of gas (and other energy goods and services) and to the Peruvian gas market, which was characterized by few players on the supply side, large investments along the value chain and high demand growth rates. Argentina and Peru prioritized power and large industrial sectors after a large gas discovery in the 1970's-1980's.

- Government prioritises gas use in favour of power, industry, petrochemicals such as urea/fertiliser, ammonia and methanol in that order. This is typical of countries at the initial stages of gas industry development.

3.1 Ghana's Development Agenda

The Ghana Shared Growth and Development Agenda (GSDA) provides for the foundation to be laid for the structural transformation of the economy by 2020. This will be done through industrialization, especially manufacturing based on modernized agriculture and sustainable exploitation of Ghana's natural resources.

The oil and gas sector, in this regard, is seen as an anchor for Ghana's economic growth and development in view of its catalytic role in other sectors of the economy; specifically, agriculture, industry and commerce. It will support the needs of a modern industrial society.

Priority projects are currently focussed on harnessing indigenous gas for power generation and the establishment of petrochemical industries. Increased utilization of natural gas at competitive prices in these sectors will accelerate the attainment of the development objectives of the nation.With the impact of oil and gas, Ghana's GDP is expected to grow at more than an average of 10% per annum over the medium term.

3.2 Balancing Natural Gas Demand and Supply

3.2.1 Natural Gas Demand

Current natural gas demand is derived solely from the requirements for power generation from existing thermal power plants. Due to insufficient supply of natural gas from Nigeria however, there is not enough gas available to meet these requirements, and a number of these plants are forced to use liquid fuels at significantly greater costs. In addition to the need for gas for existing power plants, gas will also be required for power plants under construction and those planned for construction to meet the country's growing demand for power.

It must also be noted that although the existing installed power generation capacity of about 1,960 MW is just sufficient to meet the country's peak load, there is insufficient

reserve capacity to deal with maintenance and other downtime of key generation equipment. This means that whenever a major generation unit is down for maintenance, there is often the need to shed load to maintain system integrity. In addition to this, the demand from VALCO (which is the largest individual power consumer in the country) has been curtailed to about 20% of its full operating demand to ensure that there is enough power to meet the needs of the rest of the country. This clearly indicates that there is a large suppressed power demand in the country, and this further translates into an additional suppressed gas demand.

With projected increases in power demand averaging about 7-10% per annum (coming primarily from domestic consumers), there is a strong and increasing demand for gas to meet the needs of the power sector. In addition to this, there is the prospect of providing gas for industrial and commercial heating as well as for some strategicnew industries (such as fertiliser production).

Total Gas Demand (base case) is expected to start at 150mmscfd in 2013 and grow to reach about 400mmscfd in 2020 and about 764mmscfd in 2030. A high case starts at 170mmscfd in 2013 and grows through 565mmscfd in 2020 to 1,200mmscfd by 2030.

The current and prospective uses of gas provide the basis for developing projections for demand for gas for the next twenty years which have been determined for each of these sectors independently as follows:

3.2.1.1 Gas Demand for Power Generation

The main consumer of gas in Ghana will continue to be power generation. Power demand is expected to grow at an annual rate of 7.5% for the period 2012-2021 and 6.3% from 2022 onwards, consistent with expected growth in electricity demand.Gas demand for power generation is expected to start at 150mmscfd in 2013 and grow to reach about 300mmscfd in 2020 and about 600mmscfd in 2030.

There will be power requirements by VALCO for aluminium production. There will also be exports of electricity from plants with a capacity of 320-350 MW, which translates to

demand of about 90mmscfd. The VALCO demand is based on the assumption that two potlines will be operationalized over a ramp up period of 2014 to 2016.

3.2.1.2Non-Power Demand

Non-Power demand includes industrial demand for combustion heating purposes, petrochemicals and alumina.It is expected that industrial demand for heating (through substitution of high cost alternatives) will add an estimated 54mmscfd in 2014 and grow to 134mmscfd by 2030. A high case increases these estimates to 67mmscfd (2014) and 164mmscfd (2030).

The base demand case incorporates demand from the development of a fertiliser industry based on Ammonia and Urea and the setting up of an alumina plant. The fertiliser project can add significant value to Ghana's agricultural sector, which is characterized by very low fertilizer use and high soil nutrient depletion. The alumina plant requires a lot of low pressure steam that favours co- generation, with surplus electricity supplied to the grid. The co-generation plant will have 50 MW to be delivered to the grid.

The Urea andAmmonia plants have assumed capacities of 800,000 tonnes/year and 456,000 tonnes/year respectively, expected to be on stream between 2015 and 2020 and providing a combined estimated gas consumption of 39mmscfd. A more optimistic expectation adds in a Methanol plant with capacity of 800,000tonnes/yearand estimated gas consumption of 56mmscfd to be on stream at least 4 years after achieving stable gas supplies Methanol commands a very low price globally and thus a methanol project needs to be competitive on a global basis. Demand in the whole Sub- Saharan region is small and it is not likely to grow sufficiently to sustain a world-scale plant. Additionally, there exists the possibility of extracting Ethane from the gas stream feeding the Natural Gas Liquids (NGL) Plant.International experience has shown that local polymers production usually has a large impact on an economy through the creation of many small and medium scale enterprises that feed on the new raw material given the security of supply that it provides. An Ethylene/Polyethylene plant with capacity of 270,000 tonnes/year with an estimated gas consumption of 61mmscfd, to be on stream after 2020 has been incorporated in the high case estimate.

Base case demand for non-power sector demand is expected to start at 54mmscfd in 2014 and grow to reach about 121mmscfd in 2020 and about 173mmscfd in 2030. The high case starts at 67mmscfd in 2014, through 175mmscfd in 2020 to 347mmscfd by 2030.

3.2.2 Gas Supply Prospects

The gas pricing policy rests fundamentally on whether there is enough gas to satisfythe identified demand over the long term. It is currently estimated that the country has recoverable reserves of up to 6.4 TCF of natural gas made up of 2.2 TCF of associated gas and 4.2 TCF of non-associated gas. Total supplies to Ghana including indigenous sources (1,150 MMSCFD) and imports (up to 150 MMSCFD) could reach up to 1400 MMSCFD. On the basis of current projects, excluding Liquefied Natural Gas (LNG) imports, the build-up of the Ghana gas supplies until 2018 to 2020 could be in the range of 550 to 850 MMSCFD.This production is expected to come from Jubilee, Tweneboa-Enyenra-Ntomme (TEN) discoveries (expected in the middle of 2018) and the SankofaandGyeNyame discoveries (also expected to come on stream in 2018).

The available gas supply sources are as follows:

- Imported gas – There are serious doubts about the reliability of Nigerian supplies. The policy document anticipates two possible outcomes: continued supply at the historic level (60 MMSCFD) and a gradual increase from 60 (2012) to 120 MMSCFD (2015 -2020) and to 150 MMSCFD (2021 onwards). The price at which this gas will be available in accordance to the West African Gas Pipeline (WAGP) agreements is estimated to range from 8.5 to 10 USD/MMBTU.
- Associated gas from the Jubilee field and other offshore crude oil fields – To process this gas, Ghana National Gas Company (GNGC) is “fast tracking” the construction of a first train of a plant with a capacity of 150 MMSCFD of wet associated gas. A second train with a similar capacity of 150 MMSCFD is envisaged as demand and associated gas supplies from crude oil fields develop.
- Adding associated and non-associated gas production from TEN, Mahogany East, Teak and Akasa (META) discoveries, and other off-shore fields, it is reasonable to assume that Trains 1 and 2 of the processing plant will have enough gas to operate

at full capacity. In addition, there are non-associated gas resources that could be delivered directly to the aggregator, thus bypassing the processing facility. A technical feasibility evaluation needs to be carried out to determine the volumes of gas that could bypass the plant as a function of the market needs and the technical specification of each gas production stream.

- The non-associated gas from the Sankofa and other off-shore gas fields – The gas from these fields will be processed in different facilities, most probably located in the same production platform. There is no final decision from ENI – the operator – on the scope and main characteristics of the project for developing these fields. ENI has indicated that current gas in place reserves are 1.77 TCF, which are expected to increase in the next 3 to 4 months up to 3.69 TCF with the on-going exploration campaign. Assuming an 80% recoverable factor, ENI has presented two possible scenarios:
    - a Minimum Case, in which all gas is dedicated to local markets (achieving net sales of 188 MMMSCFD), and
    - a Hybrid case, including LNG exports after restricting local gas supplies at approximately 100 MMSCFD. Given the priority of supplying the domestic market there is greater likelihood of commercializing the entire gas production from the fields for domestic supply. The economic evaluation of the development of the Sankofa and Gye-Nyame fields shows that the investors' rate of return (ROR) would depend on the volume and price of the condensates to be co-produced and on the price of the gas itself.

3.2.3 Supply/Demand Imbalance

Under the base case demand forecast, there is a period of a gas supply deficit from the present until about 2018.A similar, but larger, deficit also occurs for the high demand case.This deficitperiod increases further if imports from Nigeria do not increase and Sankofa and Gye-Nyame fields are delivering at minimum potential. On the other hand, if Sankofa and Gye-Nyame reserves potential is proved and developed, and imports from Nigeria gradually increase, a smaller deficit would remain for the period 2014 to2018. Thereafter, all demand projections would be covered until the mid-2020s when it is expected that other

associated and non-associated gas fields would be developed, including the possible building up of a third train in the processing plant.

The identified deficit could be partly addressed by bringing forward the development of the TEN field and the second train of the processing plant. This would, however, only shorten the deficit period, and would still mean that expensive liquid fuels would have to be used during the period. A possible solution would be to introduce LNG into the market by investing in an LNG regasification facility. Compared with petroleum products, LNG is significantly cheaper than the liquid fuels currently used, butis more expensive than the gas currently importedthrough the WAGP. Currently, countries importing LNG are paying about16 to 19 USD/MMBTUfor re-gasified LNG compared with 8.5 to 10 USD/MMBTUfor gas from WAGP.

3.3 Natural Gas Pricing

3.3.1 Demand Valuation for Natural Gas

Whereas the power sector is ready to pay a high price for gas, because its opportunity costs relate to the price of imported diesel or Light Crude Oil (currently in the order of 22 USD/MMBTU), industrial consumers, in particular the petrochemical projects, will require a price of gas that allows them to compete with other similar projects in the region or worldwide. It is estimated that the maximum price each of these plants would be ready to pay is as follows:

- Ammonia – Urea: 11.0 US$/MMBTU
- Ethylene: 7.0 US$/MMBTU
- Methanol: 5.0 US$/MMBTU

3.3.2 Average Supply Cost of Natural Gas

The economic evaluation of the Jubilee field and the TEN and META projects shows the negligible impact of gas sales on the investors' (ROR). Consequently, the associated gas from Jubilee and other fields could be obtained in sufficient amounts and at a small cost. It is assumed that this cost will stay at about 1 USD/MMBTU, comprising the separation, metering and pipeline costs to deliver the wet gas at the processing plant in-let. Adding

other sources, domestic average gas cost is expected to oscillate between 1 and 3 US$/MMBTU.

3.3.3 Determining Gas Commodity Prices

Differing cost estimates for the various supply sources as well as valuations of gas for its alternative uses provide important information for pricing policy. First, for various alternative uses, end-users may be willing to pay prices that exceed a minimum supply cost, meaning significant value can be added to the economy from moving resources into that sector. Secondly, gas availability depends on the negotiated price, and higher prices tend to encourage more costly development to cover increasing demand. Very high prices will not encourage gas penetration and utilization and may in fact discourage certain strategic uses of gas. At any given time,some consumers and producers would benefit from a price higher than the minimum prices that producers would accept to develop supply; this is economic rent. The GoGcan therefore use pricing and taxation instruments to foster efficient gas penetration and utilization and development of gas resources.

3.4 Natural Gas Institutional Arrangements

Ghana is implementing infrastructure to bring gas from producers to consumers. The infrastructure incorporates an Early Phase Gas Infrastructure Project with supply initially from the Jubilee field and ultimately from fields via a submarine pipeline. Gas coming from other offshore fields will connect to this pipelinethrough a riser platform or Tees, and all the gas transported will enter a Processing Plant (PP) at Atuabo. NGLs will be stripped from the wet gas stream and the dry residue gas will be transported to large consumers by an on-shore gas pipeline comprising a trunk line and secondary lines. The main pipeline delivery points are at Esiama with a branch line to Prestea and at Takoradi, where the pipeline will connect to the WAGP.

The current policy is for producers (consortiums in which GNPC is a partner) to deliver the gas to GNGC, which will act as gas aggregator; processing and selling NGLs to the domestic and export markets and selling the remaining lean gas to the domestic market (large users: VRA Power plants, IPPs, Petrochemicals, mining, industry, others). GNGC is expected to

further develop a third train after the year 2020 in the same location of the Processing Plant with a capacity of 200 MMSCFD.

The Energy Commission Act 1997, Act 541 (EC Act 541), calls for an unbundled natural gas service comprising transmission, wholesaling and distribution of gas. In fulfilment of the requirements of this Act, the Government in 2009 appointed the Bulk Oil Storage and Transportation Company (BOST) to develop and operate a national interconnected natural gas transmission infrastructure to connect all gas supply sources in the country including WAGP. The Energy Commission as per the Natural Gas Transmission Utility (NGTU) (Standards of Performance) Regulations, 2008, LI 1936 will henceempower BOST as an NGTU to install and operate a non-discriminatory open access national natural gas transmission pipeline system that transports natural gas to natural gas distribution centres, storage facilities and bulk customers in accordance with EC Act 541.

The aggregation and transportation functions should be the subject of regulation consistent with best practice with fees/tariffs calculated to earn an acceptable ROR. For, a small transportation network using a postage stamp tariffmay be advisable unless there is an interest in encouraging gas intensive industries near the pipeline gas injection points. This can, however, be achieved through a rent allocation mechanism. At 10% ROR, postage stamp tariffs incorporating all costs, from well-head to city-gate (including Essiama-Prestea), are expected to range from US$1.20 to US$1.40/MMBTU. The well-head to the processing plant component (aggregation fee/tariff) ranges between US$0.36 to US$0.42/MMBTU. Transportation variable charges should receive a full pass through into variable energy costs and into end-user tariffs. Transportation capacity charges should be part of the power capacity pricing.

It is noted that processing of natural gas is a viable standalone business organized around the shrinkage of gas purchased and the change in the input – output gas heat calorific values. It will produce valuable Liquefied Petroleum Gas (LPG) and condensates whose domestic prices are already market determined. Ghanaian consumers already pay relatively high prices for LPG to justify the economics of the processing business. For the present

range of oil prices (Brent at 90-110 USD/bbl.), the project can pay around 6 to 9 USD/MMBTU for the gas retained in the plant including losses and fuel gas used in the plant and still achieve a ROR of at least 15%.

4 Gas Pricing Policy

4.1 Vision

It is an accepted fact that placing value on gas is much more complex than oil. This is because oil is traded as a global commodity and can be monetized easily. In addition to this complexity, the domestic market for natural gas is emerging and requires significant infrastructural investments. Supplies from associated gas fields are interruptible. Developing gas markets are largely based on long-term contracts in order to facilitate field development as well as for dimensioning the transportation infrastructure. There is no regional or domestic market trading platform yet.As such, pricing of gas is problematic.

There is abundant evidence, however, that the utilization of gas has enabled stronger linkages to be secured between petroleum and the rest of the economiesof several gas rich countries. Gas is cleaner and cheaper and can provide the feedstock for several industries. The use of gas as fuel and feedstock in industry, transportation and, indeed, agriculture provides a catalytic role for economic growth and development.

B As an agricultural country, the potential for using natural gas in Ghana to produce fertilizers for increased agricultural production is a clear priority. Sustained availability of natural gas for power generation will also enable the reduction of the cost of power generation by substituting the use of expensive light crude oil. LPG extraction will enhance supply of the product to meet the huge increase in national demand for the product.

The natural gas pricing policy will bridge the gap between the need for sustained availability of energy at a competitive price and Ghana's aspiration to become a vibrant energy processing hub that anchors Ghana's accelerated growth agenda. It will make the development of indigenous gas resources an important part of the future energy mix,

enabling the monetisation of gas reserves and maintaining the momentum for investments in the upstream, gas transportation and power infrastructure sectors.

4.2 Policy Objectives

Ghana's Energy policy has amongst its key objectives the following that are directly relevant to the pricing policy:

- to increase and diversify the fuel mix in power generation by supporting the strategic exploitation of domestic natural gas discoveries;
- to create a favourable environment;
- to encourage public-private partnership financing of natural gas infrastructure;
- to achieve universal access to electricity by extending the reach of electricity infrastructure to all communities by 2020;
- to reduce the cost of energy; and
- to ensure that energy pricing is efficient and competitive, while providing rates that are affordable.

Within the Energy Policy framework, the Pricing Policy objectives are:

4.2.1 To secure the commercialization of Ghana's gas reserves

The primary requirement of this pricing policy is to promote, encourage and provide the basis for the commercialization of Ghana's offshore gas reserves. The policy must therefore provide a favourable economic regime to attract investment. Specifically, the pricing policy must preserve (secure) adequate incentives to produce, process, aggregate, ship, transport, and process gas while retaining a burner tip price that is competitive with other fuel sources.

4.2.2 To ensure sustained and secure availability of Gas

The objective of ensuring a sustained availability of natural gas in the Ghanaian market is critical to ensuring security of power supply in the country. Currently the lack of reliable power has been identified as a binding constraint on the development of Ghana. Sustained and secure supply of gas (and power) is also a key requirement for the petrochemical industry that is envisaged to develop as a result of the oil and gas discoveries. A sustained and secure supply of natural gas is therefore a critical and essential requirement.

In order to secure and sustain the supply of gas, a stable and predictable commercial framework is needed to ensure that investors have the confidence to make the necessary investments. Another critical requirement is the need for a clear framework for introduction of LNG into the Ghanaian market to cater for long enough periods when demand for gas outstrips supply.

4.2.3 To insulate Government from the adverse effects of providing subsidies

As a developing country, the government of Ghana is often put under severe pressure to provide a subsidy to consumers in various sectors of the economy. Whilst the benefits to citizens of such subsidies are obvious, the inability of Government to sustain these subsidies is also clear and amply demonstrated by the financial stress in which key public energy institutions find themselves.Clearly, one of the sure ways of undermining the long term sustainability of the gas industry would be the introduction of some form of permanent Government subsidy to cushion consumers against price increases without sufficient safeguards on other areas of the economy. It is therefore imperative that the pricing policy developed insulates Government from any pressure to intervene in the actual price paid by users of gas.

4.2.4 To promote environmental responsibility

The policy should wherever possible ensure that more environmentally benign actions are always favoured, by providing suitable incentives where required. The pricing policy should thus discourage actions such as flaring of gas or the use of more carbon-intensive liquid fuels.

4.2.5 To provide a source of funding to support Energy Policy Commitments

It is expected that there will be a gap between the maximum gas price that would still encourage utilization of natural gas as a competitive fuel and the minimum gas price needed to incentivise investment in production, transportation, and processing of associated and non-associated gas. This gap provides a potential source of funding for items in the energy sector to which the government is already committed but for which it may not have sufficient funds. The policy should therefore provide guidance for obtaining or maximizing rent and how it can be effectively directed to these areas.

4.2.6 To facilitate the development of strategic sectors

It is envisaged that a fertilizer industry could be developed in Ghana based on the production of Ammonia from local gas. The price at which gas would have to be supplied to such a plant to ensure its viability could however be below the average gas price. The policy should therefore provide the pricing framework that would enable some form of differential pricing in the market to make such a plant viable, without severely distorting the market for gas. The pricing policy should however as far as possible work with the market rather than against it. Severe market distortions and pricing mechanisms that require significant policing/enforcement effort should be avoided, and the price-differentiation scheme would need to be simple and require a minimum of policing or enforcement effort to be successful.

4.3 Challenges of Pricing Natural Gas

Taking into account the role of natural gas as a key component of energy supply, the following pricing challenges have been identified:

- Economic pricing to ensure sustained supply of natural gas;
- The need to ensure affordability for final end-users of gas-fired power plants and other products that use gas as feedstock and the ability to fully pass-through gas costs to regulated consumers;
- Maintaining economic/import parity prices to avoiding inefficient utilisation of gas;
- Achieving automatic pricing to minimize regulatory interventions.

4.3.1 Economic pricing to ensure sustained supply of natural gas

Lack of reliable power is one of the key binding constraints on the rapid economic development of Ghana. Reliable power depends on reliable fuel including natural gas supply.Sustained and secure supply of natural gas for power generation is a critical and essential requirement for addressing poor power quality-related issues. It is also a key requirement for the petrochemical industry. In order to ensurethat there is sustained supply gas must be economically pricedensuring full cost recovery of all investments put in place to deliver such gas to end users and consumers.It is however challenging to pass-through fully such economic prices to end-users who are limited by the extent of their purchasing power.

Full pass through of gas fuel costs would also assist in ensuring the continuing financial health of electric utility service providers.

4.3.2 Ensuring affordability of gas to strategic sectors

Although the impact of gas prices will be relatively moderate and can easily be absorbed by a significant number of consumers, there will still be the issue of affordability for some strategic end uses. This would require some form of subsidisation. As a developing country, there will be pressure on Government to provide subsidies for such end-uses. While the benefits of such subsidies are obvious, the ability of Government to sustain them has been called into question, since the policy continues to impose financial stress both on Government and key public energy institutions. An additional challenge is maintaining the same levels of prices across the country which sometimes implies cross-subsidies for poorer classes of consumers. There will be the need to strike a fine balance between economic pricing and affordability.

4.3.3 Maintaining economic prices to avoiding inefficient gas utilization

The need to avoid price induced inefficient utilization of natural gas resources and the ability to price discriminate in favour of priority areas are important in achieving pricing objectives. Gas must be priced to ensure a sustainable balance between demand and supply and direct resources to its most efficient and beneficial uses.

4.4 Policy Direction

The principles adopted for this pricing policy are in consonance with the policy objectives and guided by best practice as follows:

- Policy shouldenable hydrocarbon producers to sustain and develop indigenous resources,direct gas resources to its most valuable uses and foster long term contracts with users;
- Pricing mechanisms should be transparent;
- Pricing subsidies to gas users should be explicit and restricted to specific consumers;
- Negotiated prices in Gas Sales and Gas Purchase Agreements with hydrocarbon producers and consumers should be published;
- Subsidies directed to specific uses, should come from the fund and to the extent possible be controlled by the national budget

- The principles adopted for this gas pricing policy includes -

4.4.1 Cross Cutting Measures

4.4.1.1 Prioritization of Gas Use

- All gas when available shall be supplied in priority to satisfy domestic[2] requirements before export
- Priority for the supply of gas to the domestic market shall be in the following order:
    - Power Plants
    - Fertilizer
    - Industrial Heating
    - Other Petrochemicals
    - Others
- For the purposes of pricing, customers shall be classified into the following sectors:
    - Strategic Sector
        - Fertilizer Producers
    - Commercial Sector
        - Power Plants
        - Industrial Heating
        - Other Petrochemical Producers
        - Other (Including Household, CNG or any others that may be identified from time to time by the Minister on the advice of the EC).
- The GoG may use price differentiation in favour of the strategic sector[3].
- Agents in the market shall be allowed to negotiate arm's length contracts on mutually agreed terms for spot or term contracts.
- There shall be no restrictions on the importation of natural gas.
- There shall be open access on all gas pipeline and processing systems.

[2] Prioritization for the purpose of this policy are transitional and will be superseded by the Gas Master Plan

[3]The term strategic is used to denote sectors that can have significant multiplier effects on the growth of the economy and are also able to stimulate development, but may not be able to bear the maximum economic prices.

4.4.2 Gas Commodity Purchase Price

- Associated gas shall be purchased at no more than US$1 per mmbtu plus the "aggregation tariff"to the Government nominated aggregator at the onshore landing point.
- The actual associated gas purchase price shall be at the level that ensures that cost of producing oil and gas is recovered with an acceptable rate of return on capital invested[4]. The Public Utilities Regulatory Commission (PURC) shall advice on this level.
- Non-Associated Gas for domestic utilization shall be purchased at no more than the weighted average import parity cost to the Government nominated aggregator.
- The actual non-associated gas purchase price shall be at a level that compensates upstream producers for costs of producing gas for sale to all markets (domestic and export) with an acceptable rate of return on capital invested.
- LNG shall be purchased at a $/MMBTU price as close as possible to the WAGP landed price. The payment of a "capacity charge" shall be considered as a means of reducing the $/MMBTU price.

4.4.3 Gas Commodity Sales Price

- Gas sales from the aggregator shall at least pay for its gas purchases and aggregator fees.
- All natural gas shall be sold by the aggregator at no less than import parity prices to all users.
- The import parity price shall be determined by the GoG on the advice of PURC. This price shall be the minimum price payable by all customers.
- Gas customers shall be free to negotiate with GNGC, a price for available gas that shall be equal to or greater than the import parity price determined above.

[4] Acceptable rates of return for gas purchase purposes shall be determined by the PURC using the services of independent technical advisors and shall be commensurate with the level of risk and the nature of the industry or industry segment. Until the rates of return are determined, the rate shall be 15%. The gas price should reflect the incremental cost of producing associated gas.

- Once fixed, contracts shall provide for a review of the price on a bi-annual basis to reflect only inflation and for prices that are denominated in cedis, US$/cedi exchange rate movements.
- Commodity prices and transportation variable charges stemming from contracts complying with the GPP shall receive a full pass-through into variable energy costs and into end-user tariffs.
- Transportation capacity charges shall be part of power capacity pricing.

4.4.4 Rent Allocation

- Government incentives shall not be applied directly through administered prices and price discrimination.
- Government shall provide incentives through various fiscal measures targeted at allocating the rent obtained through the bidding/negotiations process to Strategic customers.
- There shall be a 'charge' on all upstream gas sold by the aggregator equal to the difference between the upstream gas purchase price and the negotiated gas sales price.
- This 'charge' shall be transferred by GNGC, net of the aggregation tariff/fee into a fund to be called the 'Gas Rent Fund (GRF)'.
- A portion of the charge shall be used as a "rebate" (amount to be ceded) for specific strategic sector end users.
- The PURC shall advise GoG on the minimumrebateto specific Strategic Sector consumerstaking into consideration netback prices for the specific industriesand the average cost of supply from all sources.
- The effective price for the strategic sector shall not be less than the average cost of gas supply from all sources.
- The rent accruing from payments for gas made by power generating companies shall be allocated in its entirety to the electricity sector and used to fund and incentivise improvements in reliability and quality of service in the transmission and distribution networks.

- Any excess amounts in the fund shall be transferred to the Petroleum Holding Account in accordance with the Petroleum Revenue Management Act.
- There shall be no gas processing charge to cover gas processing costs on the fund or on Gas Purchase Prices.
- A specified percentage of the economic rent may be allocated through the national budget for the extension of natural gas infrastructure to communities where there are no existing market incentives to do so.

4.4.5 Transportation and Aggregation Tariffs

- Natural Gas Transportation and distributiontariffs shall be regulated by the PURC and shall be at a level that enables both operational and capital cost recovery and a utility rate of return to be achieved.
- Consideration shall be given to a recovery of a portion of the costs of making LNG available in the country (e.g. costs of providing jetty for FSRU) through a charge within the transportation tariff. This would reduce the $/MMBTU price of the available LNG, and thus make LNG available to all gas users at the same price (for a pre-determined period) in the event of an interruption of gas supply from other sources.
- Transportation tariffs shall be uniform across the country and for all use(r)s.

4.4.6 Transparency

- Gas Commodity and Transportation Contracts shall be negotiated separately.
- All contracts shall be published (lodged with the PURC) including price clauses and their adjustment mechanisms.
- Subsidies/rebates directed to specific strategic uses, shall be determined as part of the national budgeting process.

4.4.7 Implementation

- GNGC shall be the aggregator and shall be responsible for negotiating all long-term sale and purchase contracts with upstream producers and all end-users.
- GNGC (the aggregator) shall establish accounting separation between its aggregation and trading, processing and transportation pipeline ownership and maintenance business units, in alignment with existing regulations.

- BOST shall be the sole Natural Gas Transmission Utility (NGTU) responsible for operating a national interconnected natural gas transmission infrastructure to connect all gas supply sources in the country including WAGP.
- To facilitate smooth operation, in these initial stages, there shall be a joint operatorship arrangement between BOST (as a licensed NGTU) and GNGC (as the owner of the transmission assets), covering a defined period, until BOST assumes full operatorship.
- The aggregation and transportation service shall be regulated.
- PURC shall approve the tariff for BOST as the operator of the transmission pipeline.
- GNGC and BOST shall present theiraggregation and transportation service models for approval by PURC.
- The unbundling of the industry in respect of Gas Purchase and Gas Sale (aggregation) shall be after at least 10 years.
- The natural gas pricing unit within PURC shall be charged with monitoring the evolution of the market to determine whether alternative pricing approaches will be needed.
- The unit shall also be focused on advising on overall base selling prices (benchmark) and netback prices for the strategic sector.