

Report No. 14

**OPTIMISING USE OF
BANGLADESH'S GAS RESOURCES**

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Centre for Policy Dialogue

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The Centre for Policy Dialogue (CPD), established in 1993, is an innovative initiative to promote an ongoing process of dialogue between the principal partners in the decision making and implementing process. The dialogues are designed to address important policy issues and to seek constructive solutions to these problems. The Centre has already organised a series of such major dialogues at local, regional and national levels. These dialogues have brought together ministers, opposition front benchers, MPs, business leaders, NGOs, donors, professionals and other functional groups in civil society within a non-confrontational environment to promote focused discussions. The expectation of the CPD is to create a national policy consciousness where members of civil society will be made aware of critical policy issues affecting their lives and will come together in support of particular policy agendas which they feel are conducive to the well being of the country. The CPD has also organised a number of South Asian bilateral and regional dialogues as well as some international dialogues.

*In support of the dialogue process the Centre is engaged in research programmes which are both serviced by and are intended to serve as inputs for particular dialogues organised by the Centre throughout the year. Some of the major research programmes of CPD include **The Independent Review of Bangladesh's Development (IRBD), Governance and Development, Population and Sustainable Development, Trade Policy Analysis and Multilateral Trading System and Leadership Programme for the Youth.** The CPD also carries out periodic public perception surveys on policy issues and developmental concerns.*

*As part of CPD's publication activities, a CPD Dialogue Report series is brought out in order to widely disseminate the summary of the discussions organised by the Centre. The present report contains the highlights of the dialogue held at CIRDAP Auditorium on September 25, 1999 on the theme of **Optimising Use of Bangladesh's Gas Resources.***

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Dialogue on **Optimising Use of Bangladesh's Gas Resources**

i) The Dialogue

As part of its on-going dialogue programme, the Centre for Policy Dialogue (CPD) organised a dialogue on *Optimising Use of Bangladesh's Gas Resources* on 25th September, 1999. The dialogue was held at the CIRDAP auditorium. A background paper with the title “**Consumption and Option for Development of Natural Gas in Bangladesh**” was circulated amongst the dialogue participants. The paper was prepared by Dr. A.K.M. Abdul Quader, Professor of Chemical Engineering, Bangladesh University of Engineering and Technology (BUET). The dialogue was moderated by Professor Rehman Sobhan, Chairman, CPD. The dialogue was participated by a cross-section of policy makers, experts, political leaders, academics and leaders of various civil society groups (list of participants is annexed). This dialogue report gives a summary of the keynote paper, and also of the subsequent discussion.

ii) Resume of the Keynote Presentation

In his paper, Professor Quader reviewed the activities and performance of the gas sector. He emphasised that exploration, development, production and use of natural gas involves issues which are of critical importance to Bangladesh's national interest, and explored the different options available to Bangladesh in terms of exploitation of the gas resources on the basis of existing consumption pattern and future demand projections.

Professor Quader informed participants that the natural gas had established itself as a major indigenous hydrocarbon resource in Bangladesh since 1960 when it found its use as a fuel input for the Chatak Cement Factory. It is the most important fuel source for cooking in larger metropolitan areas, and was first fed to the ammonia-urea complex (NGFF) at Fenchuganj in 1961 as a raw material. Professor Quader, in his paper, classified gas consumers into five categories such as power, fertilizer, industrial, commercial and domestic. Fertilizer sector, a major consumer, uses gas as raw material as well as fuel. The other four categories use gas as mainly a fuel. Over the years the consumption of natural gas has been on the increase. With the commissioning of ammonia-urea complexes and gas fired electric power plants there has been a tangible surge in demand for the gas in the country. During the period between 1986 to 1994, an additional gas load of 175 MMSCFD was consumed by the fertilizer sector with the commissioning of PUFF, CUFL, JFCL AND KAFCO. The average daily demand of gas by the fertilizer sector for the years 1986, 1989 and 1996 were 103, 154 and 213 MMSCFD respectively as against the contracted loads of 121, 171 and 284 MMSCFD respectively. Similarly, for the power sector, 1079 MW generation capacity was

added during the period 1986-89, whilst 630 MW was added during the period 1996-1999. Professor Quader noted that the contacted gas load was usually 10 percent lower than the actual need. The average demand of gas for power generation for the years 1985, 1986, 1989 and 1996 were 109, 142, 203 and 303 MMSCFD respectively. In May 1999, the peak daily demand for gas was around 915 - 930 MMSCFD, he informed.

Addressing the supply side of the equation Dr. Quader informed the participants that exploration activities for hydrocarbon were first initiated in the areas now which constitute Bangladesh in 1910 when first exploratory well was drilled at Sitakunda. During 1910 and 1999, 61 wells were drilled, and these led to the discovery of 1 oil field and 21 gas fields of which two were off-shore. During the 1972-99 period, *Petrobangla* drilled 19 exploratory wells, and discovered 9 gas fields and one oil field. After the emergence of Bangladesh, the country was divided into 23 blocks for Production Sharing Contracts (PSC) with the International Oil Companies (IOCs). In early seventies, 6 IOCs were awarded 7 blocks under PSC for hydrocarbon. Seven off-shore exploratory wells were drilled during 1976-77 period with one gas field having been discovered at Kutubdia. In 1988, *Shell* and *Schimitar* were awarded 4 blocks; these IOCs drilled three exploratory wells, and one gas field was discovered at Lakatura. In the early nineties, 8 blocks were awarded to 4 IOCs. These IOCs have so far drilled 6 exploratory wells which resulted in the discovery of 2 gas fields, and have suffered one blow-out (Magurchara).

As regards gas reserves, Professor Quader noted that while *Petrobangla's* discovered gas fields account for 2.142 TCF gas in place with recoverable reserves of 1.37 TCF, the discovery of the various IOCs under a wide range of legal and commercial arrangements had been much larger. *Shell* has made five discoveries and these fields account for 15.138 TCF gas in place with recoverable reserves of 8.700 TCF. It is estimated that Sangu (*Cairn*) and Bibiyana (*Occidental*) fields between them have about 4.50 TCF gas in place, while the two gas fields of *Union* and *Schimitar* account for 2.28 TCF with 1.418 TCF being the recoverable reserve. As of December 1998, remaining recoverable gas reserves of gas from 20 gas fields (Bibiyana is under appraisal) is estimated to be 10.406 TCF.

In may 1999, there were 45 production wells capable of producing about 1086 MMSCFD from 12 fields including those operated by the two IOCs. The production from the four wells of Sanghu and Jalalabad fields each can deliver at least 180 and 100 MMSCFD respectively. Even if the production from Bakhrabad were disconnected for reappraisal, Professor Quader thought the production capability of 11 fields would be approximately 1046 MMSCFD. He added that following the implementation of the Gas Infrastructure Development Project (GIDP) and other funded programmes, nine production wells will be available in Rashidpur, Habigonj and Titas. This will result in augmentation of gas production by another 270 MMSCFD. Thus, daily gas production by the end of year 2000 is expected to be 1316 MMSCFD.

In the above connection, Professor Quader expressed his dissatisfaction with the various projections of natural gas demand which were made since the emergence of Bangladesh. He informed the participants that such projections were based on relatively high assumptions about the growth of power and fertiliser sectors and envisaged a 7 to 10 percent increase in gas demand for fertiliser, 10 to 13 percent growth in NG fuelled power generation, industrial growth in excess of 7 percent requiring equal percentage rise NG demand, and on assumptions that the growth of NG demand was to exceed the growth in GDP. He cited projected demands made in all the Five Year Plans, the ADB, NEP and *Petrobangla* as regards gas reserves and pointed out that such projections were always based on the underlying assumption that the gas reserves would be exhausted by the end of a particular year. Such demand was projected as either peak or average demands and had always been above the actual level demands by a wide margin.

According to Professor Quader, these projections had never considered that the reserves are always augmented by continuous exploration and appraisal, and had no bearing on the ability of the country to grow economically. He was of the opinion that a major lapse in the philosophy of the national planning was that too much emphasis had been attached to the growth of GDP through industrialisation. He thought that the growth potentials and productivity of agriculture sector is yet to be exploited fully, and argued that GDP can be raised significantly by making the sector more productive through technological, managerial and financial support.

Professor Quader demonstrated that the consumption of electric power in the agriculture sector ranges from 1.5 to 2 percent of the total consumption, and this level had remained static as a percentage of the total consumption. He argued that electricity demand for agriculture was a managed load, did not clash with the peak demand, and the demand for gas in the industrial sector had little correspondence with the demand for electricity.

Industrial sector requires gas only for raising steam or for some very specific purposes; not all industries require steam or require to use gas. Chemical process plants in Bangladesh normally generate their own electric power because of reliability and economy. Based on per unit total capital investment electric power requirement for manufacturing sectors such as textile, jute and garments is even less compared to process industries. Approximately 41 percent of the total electricity is consumed by the industrial sector which accounts for 950 MW of generation capacity at 60 percent plant factor and 62 percent overall system efficiency. Taking into consideration the past trend and pace of industrialisation in Bangladesh, an additional 1000 MW of generation capacity requiring an additional demand of 150 MMSCFD of natural gas will be more than adequate for the industry sector, Professor Quader informed the participants. He asserted that industrial demand for gas for steam generation, captive power and miscellaneous uses is not expected to be significant, and that direct demand for gas will make no dent on the total gas demand even if the sector grows by 100 percent in terms of electricity consumption.

Analysing current pace of development in the power and fertiliser sectors, Professor Quader suggested that by year 2005, 1000 MW of electric power and one 500,000 ton per year urea plant will be added to the existing capacity. This would require an additional 150 MMSCFD gas for power and 50 MMSCFD for urea. By 2010, addition to electricity generation capacity based on gas and coal would be 1500 and 300 MW respectively, totalling 1800 MW, he projected. According to Professor Quader, other users are not expected to experience any mentionable growth in demand which would mean that any sudden growth in gas demand was unlikely. He expected an increase in the consumption of gas for purposes of domestic use, but he thought that the rate of increase will not be exceptional so as to affect the gas demand drastically since the number of large population centres such as Dhaka and Chittagong was not many in the country.

Making the projection that the gas reserves of Bangladesh would be depleted by about 3.745 TCF by year 2010, Professor Quader was of the opinion that the reserve should be continuously augmented, at least by the same amount. As regards this, he highlighted the distinct advantages of the IOCs in conducting the exploration programs and thought that the IOCs could play a vital role in gas exploration in Bangladesh. He insisted that *Petrobangla* through its subsidiary company BAPEX is more suited to drilling of development / appraisal wells in the discovered fields where risk was minimal, and should have a program which would include exploration (independently and in conjunction with IOCs), appraisal of producing wells and fields, routine workover of the producing wells, rationalisation of the abandoned pressure of the wells, and reservoir management and carry out demand analysis in order to augment the gas reserves of Bangladesh.

Exploration, appraisal and workover involve huge expenses including substantial foreign exchange. Professor Quader informed participants that external funding agencies like WB, ADB or IMF were no longer interested to fund such programmes; moreover, in the past Bangladesh had never been able to mobilise its own resources for *Petrobangla* even for much warranted programs like gas development and pipeline construction. Questioning why the revenue generated by this sector is not ploughed back into this sector for much needed development and expansion, Dr Quader brought the issue of ‘pricing of gas’ and ‘export of gas’ in order to make *Petrobangla* (or for that matter the sector itself) self-sustaining.

The pricing of gas or of any naturally occurring resource had always been a debatable issue, informed Dr. Quader in his presentation. He told the participants that in most cases actual cost of production had no bearing on the sale price, and in Bangladesh, concepts such as ‘economic price’, ‘opportunity cost’ etc. had been taken recourse to whilst fixing the price of gas without taking into consideration the actual cost of production. He argued that if gas price is raised, that will lead to increase in production cost but for many sectors these would be insignificant. For power and fertiliser sectors, in case of 100 percent increase in gas price, the resultant increase in the cost of production would be in the range of 26 per cent to 29 per

cent, while that for the jute or textile it would be less than 2 percent. For the domestic consumers of gas, the increase will be proportional to the rise in price, but it would not have a significant effect on total household expense, and it would be of the order of 3 per cent to 6 per cent for a family spending Tk. 5000/- per month. In addition, if the gas price is raised, the industries would make an effort to be more energy efficient and productive. The fertiliser and power sectors have a lot of opportunity to reduce cost of production by improving plant-on-stream factor, better maintenance and efficiency in use of gas.

Coming to the issue of ‘export of gas’ Professor Quader thought this to be a political sensitive issue, not so as much as a commodity, but because of who were to be the potential buyers, and also because of fear of exhausting the gas reserves. He emphasised that commercial terms along of considerations for sustainable growth and exploration should be the appropriate criteria for deciding ‘export of gas’ at any given time. He also opined that exploration should be handled by the Government of Bangladesh alone if this would become a real option some day. This issue has become all the more important in the context of the purchase of gas by *Petrobangla* from IOCs in foreign exchange. Professor Quader insisted that petrobangla must find its own source of dollars without depleting the national reserves of foreign currency. Arguing in favour of ‘export of gas’, he told the participants that IOCs will have a more vibrant exploration program if they were convinced that they could recover their investment and earn profit out of their operations. However, according to Professor Quader, the considerations for the export of gas were:

- specific new found gas reserves are to be selected after augmenting the reserves being depleted currently and the pipeline for exporting gas shall be separate and delinked from the national grid.
- small reserves, as long as they pay out, shall be developed.
- income after meeting expenses shall be used only for exploration and development of this sector at least for the first 10 years by *Petrobangla*.
- Income from this sector shall be used for specifically identified projects considering their strategic importance in relation to the national economy.
- IOC’s payment is to be made out of gas export thereby reducing pressure on the foreign exchange reserves of the economy.

In addition to these, Professor Quader estimated that the gas sector could raise in excess of 250 crore Taka (50 m US\$) if one paisa was charged per thousand BTU of heating value as development tax. Professor Quader insisted that the government must clearly state a policy to ensure fixed revenue in the form of tax per unit of gas or electricity, and not on the basis of each Taka earned by selling gas or power. He warned that if this was not ensured, the objective of raising price to make the gas sector self-sustainable will be lost. This sector has been a milking cow without a proper feeding schedule. He emphasised that this attitude must go, and government should look into all the issues including price, export and tax thoroughly and weigh their possible implications. He considered that this was high time to examine the

present and future needs of hydrocarbon resources, natural gas in particular, for sustainable development of this sector and the economy of Bangladesh in general. Quoting Nelson Mandela, he warned political leaders and *pundits* to think carefully before they make statements regarding the use and exploration of natural gas and not to create false hope among the people which cannot be achieved. Dr. Quader concluded by saying “the political leaders and the people at large must examine everything related to it pragmatically, and choose the options based on commercial, economic and national strategies”.

iii) Discussion

Initiating the discussion Professor Rehman Sobhan put a set of issues on the table on which he invited the participants to give their thoughtful comments. These were: (a) Demand projections on gas; (b) Supply situation of gas reserves; (c) Pricing of gas; (d) Use of gas including its export; (e) Allocation of resources and institutional modalities for the development of gas sector. The discussion centred around some of these issues and also spilled over to other cross cutting issues.

Projection of Gas Demand

The discussion focused on the issue of estimate of consumption, demand and future projection of natural gas. In terms of demand projection, Engineer Golam Mohiuddin of BUET disputed Professor Quader’s demand estimated for the power sector. Quoting from the newspapers he told discussants that Professor Quader’s demand projection for the next ten years was very low, and the projection of consumption of gas by 2010 was an inflated one. Question was raised about the lower trend scenario on which Professor Quader analysed present consumption and projected future demand. He stressed that the basis of trend can not be taken as indicator of growth because if that be accepted the poor will always be poor in their lifetime.

Professor Nurul Islam from BUET agreed with Mr. Golam Mohiuddin, and informed the discussants that in the past people of Bangladesh had to live with suppressed demand, and low economic growth of the country due to short supply of gas and electricity. Therefore, it was not correct to project future demand of natural gas based on estimates which were based on suppressed demand (consumption) of gas seen in previous years and then consider future energy development programme on the basis of such data.

Projecting a different view Mr. Andrew Vaughan of *Shell*, Bangladesh Exploration and Development, insisted that in absence of reliable data the projection of the trends was not a bad way to work, and thought that Professor Quader’s projected growth figure of around 3 to 4 percent was a realistic one. Considering the fact that a high proportion of actual demand for gas was in effect a suppressed demand owing to a malfunctioning industrial sector which did not grow at any rate close to its full potential, and also the fact that power sector

generated much lower demand for gas than might otherwise have been because of the interruption in power supply originating from the operational problems of the power sector, Professor Rehman Sobhan invited comments from Mr. Nuruddin M Kamal, Former Chairman, Power Development Board.

Backtracking the power demand projection of year 2050 to year 2005, Mr. Nuruddin M. Kamal, informed the discussants that by the year 2005 the power demand will be 4,600 MW. Looking at future demand for gas, he estimated that in the course of 20 years about 4 Trillion CFT gas (in cumulative number) out of the total reserve of gas of between 4 to 4.5 Trillion CFT, will have to be committed to the generation of electricity alone.

Mr. Abdul Aziz Khan, DGM, *Petrobangla* viewed the demand projection of Dr. Quader as suppressed and informed the participants that during 1993/94 and 1998/99 power sector had seen an annual growth of 6.7 per cent, and the growth in the fertiliser, industrial, commercial and domestic sectors had experienced annual growth of 2.3 per cent, 12.5 per cent, 10.1 per cent and 11.9 per cent respectively. Taking account of the growth of these sectors, he informed discussants that the demand would rise significantly. In addition, in view of the gas network having crossed the Jamuna River, there was also a plan to extend gas connection in the western and southern parts of the country.

Professor Anu Mohammad of Jahangirnagar University also argued that there was large scale suppressed demand in Bangladesh. If present Bangladesh scenario was taken as a static one then the demand projection made by Professor Quader might be acceptable, but he insisted that if we visualised Bangladesh as being a country which was at the take-off stage then demand projection would be radically different. He informed dialogue participants that only 3 to 4 percent people of Bangladesh used gas and 15 percent people used electricity, and pointed out that if Bangladesh with 120 Million people was considered a potential market, then the demand for gas would be considerable.

According to Mr. Jamaluddin Ahmed, Former Deputy Prime Minister, GOB talking about demand alone is meaningless, rather the focus should be on availability. Whatever gas was available was being sold either to industry, or for generation of energy or to other sectors. Currently significant part of the real domestic demand is being ignored. In this context he referred to frequent power failures in the county, and thought that the word suppressed demand is very relevant at this point of time - if Bangladesh had more energy available, the country's demand would have gone up substantially.

Mr. Mir Raziuddin Haroon, Director, System & Planning, BPDB, did not agree with the contention of previous speaker that the actual demand would be enormous. He informed the discussants on the basis of observed evidence that even after extensive rural electrification effective demand remained low since there was lack of real purchasing power. People were unable to pay, even the minimum amount of Tk. 45. It was thought that small

rural industries which were presumed to be the major beneficiaries of rural electrification would expand at an accelerated rate in rural areas and along with it productive manpower would also grow, leading eventually to accelerated industrial growth in the country. This was what happened in Taiwan and some other countries in early 1950s and 1960s. However, in reality this was not taking place as predicted. Dr. Ijaz Hussain from BUET supported this opinion and thought that participants were getting mixed up with the word demand and desire. He argued that we certainly had desire for energy in this country, but demand was always backed up by purchasing power.

Gas Reserve and Supply Projection

The issues relating to gas reserve and supply projection also came under discussion during the dialogue. A number of participants including Professor Islam were of the opinion that reliable estimates of total recoverable reserve of natural gas was a critically important factor in deciding the modalities of future use of gas in Bangladesh.

Citing relevant information Mr. Aziz Khan of *Petrobangla* informed the participants that production activities in a number of operating gas fields (e.g. Chatak, Feni, Kamta) had to be abandoned at a cumulative production level which was lower than their respective recoverable reserve estimated at the initial stage. At present there were 44 wells in 12 gas fields where total production capability was 1077MMSCFD; this would increase to about 1300 MMSCFD by the year 2001 or 2002 after completion of on-going drilling program under WB and ADB assistance. After this period *Petrobangla* did not have any particular program yet to increase the supply of gas to cope with the increasing demand. Unlike power sector which had some surplus capacity in 1990, the gas sector did not have any surplus capacity for many years. Only few months ago when Unocal started production from the Jalalabad gas field, Bangladesh had a reasonable size of surplus production as standby capacity to provide uninterrupted supply of gas to the country.

Citing recoverable reserve and production ratio, Mr. Aziz insisted that the remaining reserve of 9TCF will sustain production up to only 2008; and if Bangladesh would have 5.5 per cent growth rate from now onward adding an additional 4TCF of gas to the reserves, the production would sustain up to the year 2020; and if 7.5 per cent growth rate similar to last five years was achieved then an additional 6.8 TCF of gas will be required.

Projecting a somewhat opposing view Mr. A.K.M. Shamsuddin, President, FICCI, informed the participants from personal experience that even today at the end of 1999 he was hearing the same view he used to hear in the late 1960s when it used to be said that the gas reserves would last for another thirty years. Referring to this projection he told the participants that in analysing demand and supply one must take account of the future discoveries and the possibilities of addition to the present reserves.

Taking part in the discussion Mr. Andrew Vaughan, MD, *Shell Co. Ltd.*, expressed his opinion that the figures for gas reserves drawn in the keynote presentation were extremely pessimistic. He informed the participants that the Sanghu Gas Field had already produced 202 million CFT from 3 wells, whereas in the paper the output figures for the field was shown to be 130 million CFT per day. The field had significant additional capacity which were not currently being used. He considered Bangladesh to be in a significantly oversupply situation, and thought that with fields which were discovered by *Shell* and *Unocal*, and the reserves those fields are projected to have, there would be significant over supply of gas in the country in foreseeable future.

Supporting this view Terry Budden, from *Unocal Bangladesh Ltd.* also thought that Dr. Quader's figures on gas reserve were underestimates. He argued that *Unocal Corporation* would not come to Bangladesh if it did not think there were large reserves here. Citing preliminary result from the Bibiyana Gas Field, he opined that it was a world class field and this field alone had minimum of a 3 TCF recoverable reserve. He was of the opinion that reserves to present production ratio in Bangladesh today was about 37, which meant that there was 37 years of supply at flat demand (without considering growth and current level exploration). He emphasised that there was already enough supply of gas to last probably well over 50 years. He felt sure that this reserve would grow, and made the proposition that unless drilling took place it would never be possible to find out the actual reserve of gas in Bangladesh.

Commenting on the state of the debate on gas reserve estimation and future projection further, Professor Rehaman Sobhan made the observation that the whole discussion in Bangladesh seemed to have got caught into a completely static scenario where people were looking at supply and demand from the perspective of a closed market within Bangladesh. The presumption was that Bangladesh had a given amount of supply and that if that particular supply level was exhausted we would find ourselves in a gas-starved situation since there would be no energy available. Judging from the size of the oil bills in the balance of payments which Bangladesh had been paying for a long period of time, the fact of the matter appeared to be that Bangladesh had been an energy deficient country for quite a some time. Obviously, under such circumstances supply and demand scenario of Bangladesh should be analysed within a global context and within a regional environment where energy like every other commodity was a to be treated a traded good. He expected that some intelligent forecast of the supply scenario in the subcontinent including the hydro-electric potential of Nepal, including prospective gas and oil which may be bought in from Western and Central Asia to built an integrated energy grid, should be made.

In response to this observation, Mr. Hasanul Haque Inu, Secretary General of JSD referred to a research conducted by *Shell* and informed participants that 123 TCF of gas will be required globally after year 2020. In addition, he cited the estimate of *International Atomic Energy Association*, which mentions that up to year 2040 natural gas will be the

prime source of energy in the world and only after year 2060 the solar energy and other renewable energy would start competing with gas. Thus use of gas resources should be treated as a long-term agenda.

Export of gas

As regards the issue of export of gas, dialogue participants explored the various options and choices open to Bangladesh. According to Mr. Abu Ahmed Abdullah, Director General, BIDS, the choices were simply to use it domestically, export it or leave it underground. He pointed out that leaving significant amount of gas underground, if the domestic market is indeed not large enough to absorb the entire production, amounted to betting against the scientific technological community and believing that no innovation in energy production will come along which will make the gas reserve worthless. There was talk of a likelihood of some innovation coming along in the next 10 to 15 years, and the implications of such a possibility can not be ignored and this will obviously have a bearing on the policy that should be adopted towards gas reserve. If alternative forms of energy was a likely option then we should try to sell the gas reserve as fast and as much as we can; if not we should hold on to it, betting on the hope that the price of gas will go up in the world market and we will make more out of holding on to it rather than selling it now.

In choosing the future uses of natural gas, Mr. Shamsuddin, President, FICCI, raised the point regarding the composition of available gas. Referring to Dr. Quader's keynote presentation he told participants that the recoverable natural gas was good for fuel but not for petrochemical. Over 90 per cent of available gas is methane, which is mainly used as fuel and as input for fertiliser; if there was higher hydrocarbon such as butane and propane in the gas, it could be bottled and some other uses could have been found.

Mr. Waliur Rahman, from BILIA, was of the view that the technology of producing energy was progressing in a direction where there was a real possibility that the natural gas reserve will become redundant in ten years or so. Mr. Abdul Awal Mintoo, President, FBCCI, strongly backed the idea of exporting gas, and informed the participants that our PSC already allowed the IOCs to export gas in the form of energy. Mr. Azimuddin Ahmed, Former Secretary, Ministry of Energy and Mineral Resources, GOB, said under the PSC, Bangladesh had no option but to allow the export of gas in case *Petrobangla* was in a position to buy all the gas from the IOCs.

Professor Anu Mohammad emphasised on selling products which used gas as an input rather than selling the raw material itself, and warned that without this, the country will in reality turn into the once termed 'bottomless basket'. A number of participants mentioned that Bangladesh could decide on the export of gas after discoveries of new fields were made but this should not be a precondition of the IOCs for their exploration activities. Mr. Hasanul Haque Inu added that *Petrobangla* officials negotiating with IOCs should be barred from

joining IOCs at least for five years. There was a moral hazard there. Professor Nurul Islam mentioned that it was not advisable to consider export of gas without assessing the marketable surplus of gas taking a long term view of at least 25 years. Mr. S.K.M Abdullah, Former Chairman, Petrobangla, said that instead of raising political controversies over the issue of export, there should be an assessment of the actual reserve and future demand.

Allocation for the development of the gas sector

Focusing on the issue of investment in the gas sector, designated discussant Professor Nurul Islam thought that it would have been appropriate if Professor Quader analysed the performance of the energy sector in its totality with special emphasis on the development and performance of the gas sector. He agreed with Professor Quader's contention that in comparison to its contribution in the development programmes, the allocations which had been made for the development of the gas sector was insufficient. It was true that since independence the Bangladesh government had given priority attention to the development of the energy sector, and over the years more than 20 percent of total public sector investment had been allocated for the development of the sector. Within the energy sector comparatively more attention has been given to the development of the power sub-sector compared to the natural gas sub-sector. Out of the total public sector investment in energy sector, the government allocated, on an average, 75 per cent of the resources to the power sub-sector and only 25 per cent to the oil, gas and natural resources (OGNR) sub-sector. In recent years, the contribution of gas sector to Government exchequer had been more than Tk. 10,000 million per year; in contrast the overall performance of the power sub-sector was not satisfactory.

In response to the suggestion made by the keynote speaker to the effect that in order to make the gas sector self-sustaining, the issue of export of part of the gas from newly discovered fields needed to be seriously considered, Professor Nurul Islam felt that there was a need for serious discussion to assess the prospects and problems of export of gas. As per PSC agreement, during the cost recovery period the IOCs will be able to claim up to 55 per cent of gas produced on account of cost recovery until such time when all the cost was recovered. Out of the rest 45 per cent of gas, considered as profit gas, IOCs would receive 30 per cent; Bangladesh Government's share would be the rest 70 per cent. If the gas from the newly discovered gas field was exported during the initial years, Government will get a share of 31.5 per cent of the total export. If government allows IOCs to export their share of gas, Professor Islam contended, there was a need to seriously analyse what implications this may have on future supply-demand situation in the country.

Pricing of Gas

In response to the policy recommendation made by the keynote presenter in this respect, Abu Abdullah argued that if the Government of Bangladesh was committed to eliminate subsidies on sales of gas then the desubsidised prices were likely to discourage future demand, and this may lead to lower levels of domestic consumption than the author of the keynote paper had projected. On the other hand, if the government wants to ensure a high use of gas then this might involve a substantial subsidies which may result in possibly unsustainable level of fiscal deficit.

One participant informed that during 1991 to 1995 there was rise in gas price but there was no price rise in the electricity. Eventually the power sector suffered in terms of earning of revenue. If there was a substantial increase in the gas price there should be a commensurate increase in electricity price to protect the sector.

Relative contribution of agricultural and industrial sectors in future

Professor Nurul Islam opined that Professor Quader's paper had undermined the importance of industrialisation, and overemphasised the possible contribution of agriculture sector in GDP. Referring to the analysis of historical changes in structure and composition of GDP of the industrialised and newly industrialised countries, he indicated that as the per capita GDP increased the relative share or contribution of agriculture sector in GDP would continue to decrease and the shares of industrial, transport and service sectors in the GDP would rise. Absolute volume of GDP from agriculture might increase, but its relative share in the GDP would decrease. He told the participants that increase in agricultural production would also require high energy input.

Referring to Professor Quader's view that Bangladesh had more emphasis on industrialisation than agriculture Professor Anu Mohammad opined that Bangladesh was in fact passing through a phase of de-industrialisation. Taking up this issue, Mr. Shamsuddin wished that Dr. Quader's assumption that the agricultural growth should be the engine of growth in Bangladesh was correct and sustainable. To the contrary the only country in the world which developed with agriculture as the mainstay was Newzealand. He stressed that behind such development there was a definite contribution of the industrial sector because it could develop a nation wide coal chain in order to maximise the agricultural output. According to Mr. Shamsuddin, agriculture could make substantial contribution to our GDP but the sector can not be the engine for the growth. The engine of Bangladesh's growth must be industry.

Past experiences of gas sector development

Several discussants including the keynote speaker pointed out that there was significant difference between the projected demand for gas and its actual consumptions, as

reported by different studies. Professor Nurul Islam was of the opinion that the gap between the planned targets and actual achievements was the result of the implementation of capital and technology intensive infrastructure projects. Gas sector development in Bangladesh had been planned with the hope of getting donor funds. Actual targets achieved in terms of developing the requisite infrastructure at the end of plan period depended on the availability of donor funds.

In this connection, a query was raised by Dr. M. Tamim from BUET as to why all the sets of assumptions made in all the plans failed to come at realistic growth projections for the gas sector. Responding to this Professor Rehman Sobhan said that during the last twenty five years all projections were made on the assumptions that we will be able to improve the quality of our administration and governance. The failure was not of the predictions, but the failure was of the development praxis. He insisted that obviously if those predictions which were made on the basis of our desire to improve our governance were not made realised on the ground, we may have to commit a national suicide. He was of opinion that the prospect of going for another twenty five years at the same level of governance and development was too depressing to contemplate. He thought that the idea of compensating bad governance through export of gas will not result in Bangladesh becoming a developed country; rather it may turn into an yet another Nigeria.

In concluding the dialogue, Professor Rehman Sobhan remarked that the debate remained an ongoing one, and that what the actual levels of demand would be critically depended on the assumptions made, on how sectors performed, and on how the policy making establishment performed over the course of time. Everyone's agenda presumed that future performance will improve and so will policy. If neither happens we will be in a much greater difficulty and the ensuing problems emanating from such a situation will not be limited to the energy sector alone. Obviously whatever growth rates were predicted, their realisation was dependent on a number of endogenous as well as exogenous factors. Resource availability, quality of policy interventions, good governance and global market situation will critically impact on how the sector develops in the coming years.

List of Participants

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Mr. A.K. Azad	Chief Engineer, BPDB
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Mr. P. Kemp	Canadian High Commission
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List of Journalists

Mr. Faroque Ahmed	The Independent
Mr. S.M. Ashrafuzzaman	The Muktakantha
Mr. Shahid Aziz	The Daily Ittefaq
Mr. Jahnnabi Das	The Bangladesh Observer
Mr. Akhter Ahmed Farouk	Free Lance Reporter
Mr. Rejoanul Haq	Janakantha
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Mr. Monjur Mahmud	The Daily Star
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