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FUTURE PROSPECTS AND OPTIMAL UTILIZATION PLAN FOR NEWLY DISCOVERED SUNETRA GAS FIELD

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Abstract-*Sunetra is a newly discovered gas field of Bangladesh and was discovered by BAPEX. The structure is in highly prospective Surma Basin. The country is facing severe energy crisis. The reserve estimated of Sunetra is two to three TCF. So, Bangladesh finds the reserve as a hope to solve its energy problem. Proper planning and utilization of the reserve can secure the energy sector for the future. Three development wells are going to be drilled in the field. Some points are suggested for the well drilling and planning. Gas of Sunetra is recommended for industrial and domestic use of North Bengal. Transmission of the gas at the place can ensure energy of the area. Supplying gas to power station and fertilizer factory could be effective options for proper utilization of the reserve.*

Keywords: Energy, Sunetra Gas Field, Surma Basin, Development Wells and Utilization

1. INTRODUCTION

Bangladesh is presently fighting against huge energy crisis. Now the country has demand of about 2500 MMSCF per day due to energy, fertilizer, industrial and domestic feed. Bangladesh is currently producing 2000 MMSCF gas per day. Where, Petrobangla and IOCs are producing 960 MMSCFD and 1040 MMSCFD respectively. So, every day the country has lack of 500 MMSCF of gas. Presently natural gas accounts for 73% of commercial energy in the country. The daily use of gas at different sector has given below: [8]

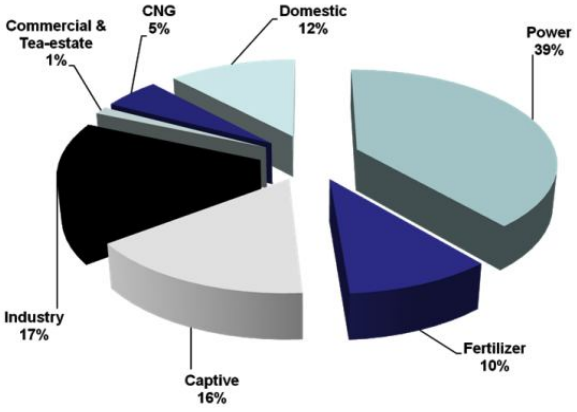

Figure 1: Category wise gas Consumption in Bangladesh

At present Bangladesh have 23 discovered gas fields, where 17 are in production. There are 79 running production wells in these gas fields. The gas initial in place (GIIP) has been estimated as 28.856 TCF for 23 gas fields. Out of which proven recoverable reserve (P1) is estimated at 15.037 TCF. Up to June, 2009 as much as 8.376 TCF gas have been produced leaving only 6.661 TCF recoverable gas. Now, 23 gas fields have reserve of 5.471 TCF under probable (P2) and 7.691 TCF under possible reserve (P3). [8]

Recently, country has found some new gas fields like Sunetra, Sundalpur, Rashidpur, Begumganj etc. Among them Sunetra is the largest discovery done by government oil and gas exploration and production company BAPEX. Proper planning and execution of the plans may secure the energy sector of Bangladesh. [7]

Demand for gas is increasing due to the industrialization and economic growth of Bangladesh.

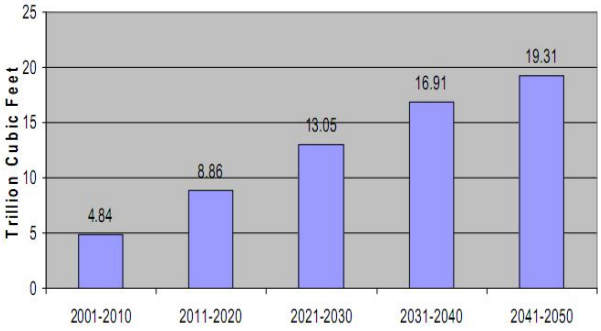

Figure 2: Prediction of Gas Demand of next 50 Years [8]

It is easy to assume, in near future energy sector is going to be more challenging. Bangladesh should ensure proper utilization of its natural resources and also find more reserves of gas.

According to the roadmap of Petrobangla, the demand for gas at present is 2500MMSCFD while the demand

will rise to 3043MMSCFD in 2012, 3341 MMSCFD in 2013, 3591MMSCFD in 2014 and 3746MMSCFD in 2015. That's why long term program has taken by Petrobangla and International Oil Companies working in Bangladesh that 1580 MMSCFD gas will be added by 2015 in the national grid. Then the total production will be 3580 MMSCF per day. So, to achieve the target proper utilization of gas reserves are necessary.

2. SUNETRA GAS FIELD

Sunetra structure is located under Barhatta and Dharmapasa upazilas of Netrokona and Sunamganj districts respectively. It is under the gas Block 11 and Block 12. The field was discovered at August, 2010 by state run oil and gas exploration company BAPEX. It is the biggest discovery by them contains two to three TCF of gas. Over the years BAPEX discovered 10 small to medium fields. The biggest field discovered by the company before Sunetra was in Shahbazpur in Bhola that has around 600 BCF reserve. The Sunetra structure was discovered through a seismic survey covering a line of 260 kilometers conducted 2009 -2010. The interpretation of the survey data was completed in July, 2010 and has ensured about the presence of gas. The survey has cost Tk 3.5 crore. The structure has been given the name "Sunetra" combining the names of Sunamganj and Netrokona as the structure spreads across both the districts. The estimated gas reserve of over 2.5 trillion cubic feet (TCF) is enough to meet the present gas demand for about three years or the present supply shortage of 500 mmcfd for about 15 years.

3. GEOLOGY & FUTURE PROSPECTS

It is located in the Surma basin. This is a high prospect zone for gas. The Bibiyana field is located in the eastern part of this basin while this zone is located in the western part. This zone has all the geological characteristics required for oil or gas deposit. The size of this structure can accommodate two to three TCF gas. [1]

3.1 Surma Basin Assessment Unit

The Surma Basin Assessment Unit is a geophysically and geologically defined area in the northeastern Bangladesh that contains a great thickness of Tertiary sedimentary strata. This AU is classified as a frontier area, with nine discovered gas fields that exceed the minimum assessed size of 42 BCF of gas. The Surma Basin occurs to the south of the Precambrian Shillong Plateau, a crystalline massif that has been thrust up to the south along a footwall of Tertiary sedimentary strata. In general, the natural gas produced from this AU contains a greater amount of liquid hydrocarbons than do the gas produced elsewhere in Bangladesh. The strata that comprise the explored part of the assessment unit in the Surma Basin rang in thickness from about 3,000 to 5,000 m. In general, their lithologies consist of deltaic, estuarine, and shallow marine sandstones, siltstones, and shales that contain abundant plant-derived organic matter. Potential source rocks include the shales and carbonaceous shales of Eocene, Oligocene, and Miocene age. These strata generally contain about 0.5 to 3 percent total organic carbon (TOC), although in places the content of organic matter may range up to 10.5 percent. Thermal maturation is sufficient to generate natural gas and natural gas liquids throughout much of the area. Gas and condensates were generated at maturities equivalent to 1.1 to 1.3% vitrinite reflectance (Ro) and at depths that range from about 6 to 7.5 km. Little oil has been discovered in a few of the Surma Basin wells. Migration is generally vertical along fractures and through porous strata. Hydrocarbon generation commenced a few tens of millions of years ago and has continued during the formation of the major anticlinal traps, which began forming only several million years ago. Reservoir rocks in the Surma Basin are chiefly Tertiary-age sandstones of the Boka Bil and Bhuban Formations (Miocene) that were deposited in fluvial, deltaic and estuarine environments. Porosity ranges generally from 10 to 20 percent. Reservoir sands range from thick channel-fill and littoral or marine bar deposits to sandstones thinly interlaminated with shale and siltstone that were deposited in tidally influenced environments. At the top of the Surma Group, a widespread unit, generally known as the upper marine shale (ums), serves as a regional hydrocarbon seal in the Surma Basin and elsewhere in Bangladesh. The major shale source beds may also serve as regional seals. In addition to the regionally distributed shale beds, there are several more locally distributed shale beds and shale-filled channels in the middle and lower parts of the Surma Group that support stacked reservoirs in several of the known fields. Structural and combination traps of Miocene age occur along stratigraphic boundaries, in sandstone-filled channel deposits, and in sandstone beds sealed laterally by shale-filled channels.

In general, these sedimentary strata have been folded into several large-scale anticlines that are unfaulted or slightly to moderately faulted in the western and central parts of the basin. Folding and faulting is more intense toward the east within the Chittagong-Tripura foldbelt, and becomes progressively less intense to the west, where the folds are more broad and gentle. Major field discoveries in this AU include Jalalabad, Beanibazar, Chhatak, Sylhet, Moulavibazar, Rashidpur, Fenchuganj, Bibiyana, Kailashtila, and Habiganj. [9]

3.2 Future Prospects

Natural Gas Assessments of Undiscovered, Conventional Resources of Bangladesh says gas in the Surma Basin region where Sunetra is situated could range from 1.8 to 8.14 TCF. The analysis proves that the reserve of the Sunetra Gas Field could be increased. The characteristics of the basin are highly prospective for gas.

If the reserve increases, the energy crisis of Bangladesh could be minimized.

4. DEVELOPMENT OF PHASE II

BAPEX has given top priority in this structure. The implementation period divides into two phases. The main objective of phase-I is to drill an exploratory well (Sunetra#1) in the Sunamgonj-Netrakona Structure approximately to the depth of 3700 (±300) meter and conduct well testing & completion. Phase-II contains, if the well strikes gas, the proposal keeps the provision of

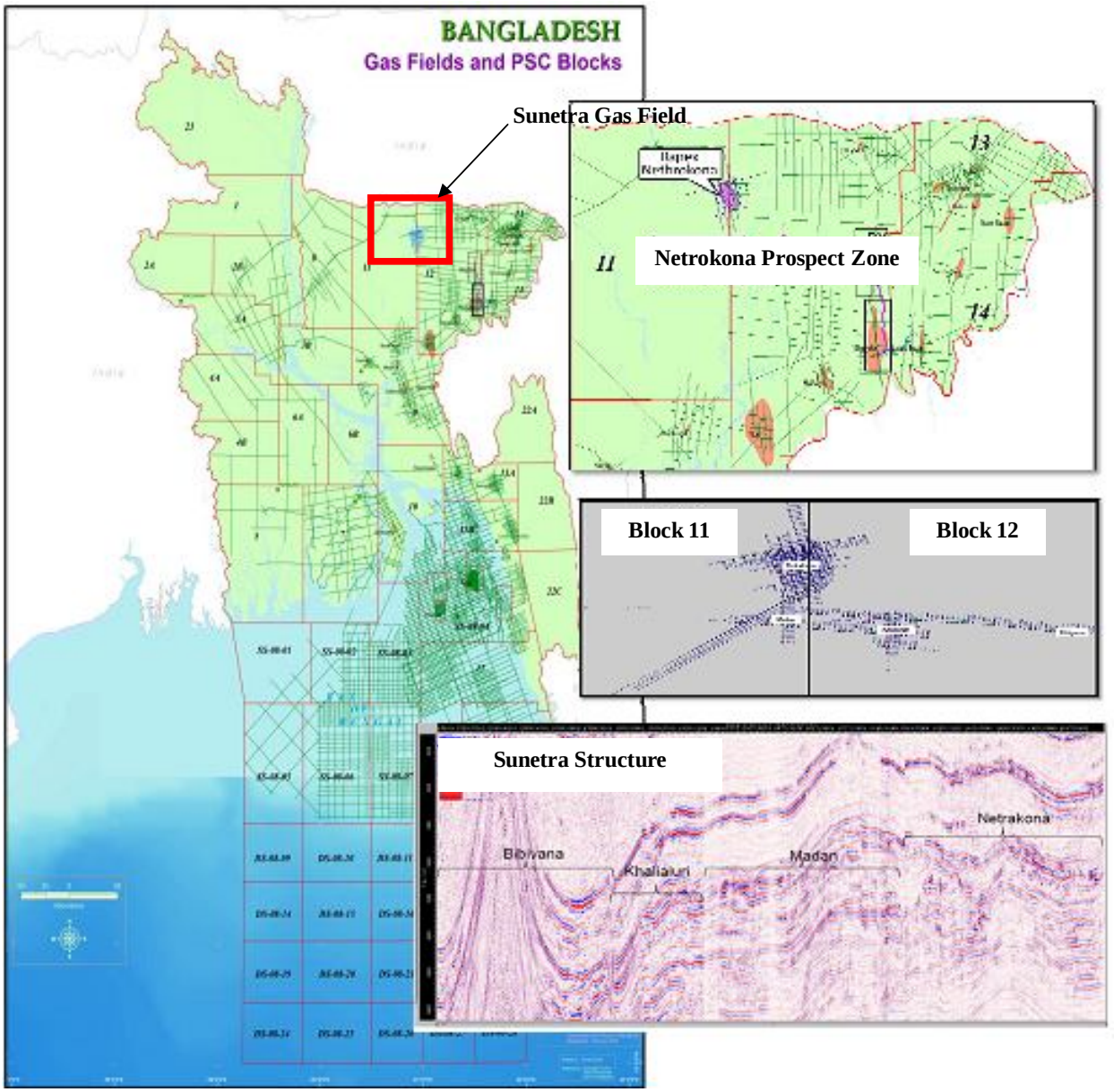

Figure 3: Bangladesh PSC Blocks, Location of Sunetra Gas Field, Block 11 & 12 and Sunetra Structure [5]

drilling three development wells and installing a gas processing plant. After successful completion of Phase-I and commercial discovery of oil/gas from Sunetra # 1, 3 (Three) development wells will be drilled in Sunamgonj-Netrakona Structure and process plant, pipe line will be set at a cost of Tk.277.32 crores. The total project implementation duration is from 2010 to 2014. The DPP is sent to Power, Energy and Mineral Resources Ministry for approval. [6, 10]

Drilling the development wells, some parameters should be considered:

1. Dupitila formation is soft and loose, so cementation is necessary. Without cementation blowout, sea page, coning could be occurring like Magurchora, Tengratila and Titas.
2. Production pipe diameter should be 4.5 inch or 5 inch for better production and performance of the well.[4]
3. Locations of the wells are very important to ensure the maximum recovery of the reservoir. Accurate position of wells increase production rate.
4. Horizontal well or directional well could maximize the production rate. Horizontal well is more effective than vertical well because it consumes more area.[2]
5. After drilling of the development well, performing logging is necessary for getting a clear map of rock strata.[3]
6. BAPEX should be the operating company of the field, because the company could perform the operation in less cost than any other IOCs. BAPEX needs Tk. 75-80 crores to drill each well, where as an IOC needs Tk. 130-140 crores.

5. UTILIZATION PLAN

Preparation for short, mid and long term is necessary. Proper utilization of the field can help to secure energy sector. Few suggestions are given below:

5.1 Transmission

Gas from this field can be made available to Netrokona or Mymensingh within a couple of years. The energy ministry is already working on a pipeline project on priority basis to transmit the new find. The gas can be quickly delivered up to Netrokona by installing a 25 kilometers pipeline. North West of Bangladesh is facing huge energy crisis, because there are no gas fields there. So, a transmission line could be build from Sunetra towards North-West. Titas Gas Transmission and Distribution Company Ltd have a high pressure gas pipeline up to Netrokona. Although this pipeline does not have large capacity to transmit huge new gas, it could certainly handle gas from at least one well of the Sunetra field. This could be worked out immediately after the discovery. By adding a reciprocating compressor gas of this field could be transmitted to North Bengal.

5.2 Power Station

To meet the shortfall of energy, the government is reported to have signed a deal with Qatar to import 5.5 billion cubic meter (194 billion CFT) of liquefied natural gas at an estimated cost of $1-1.5 billion (Tk 7,000-10,500 crore) per year. The cost of LNG will thus come to Tk 358-537 per thousand CFT. Current prices of local natural gas per 1,000 CFT vary from Tk 2.82 for power production to Tk 16.75 for CNG. Compared to the prices of local gas, the cost of imported LNG will indeed be a quantum jump.[11] To overcome a shortfall of 500 MMSCF of gas per day and 2000 MW of electricity, the development of Sunetra gas field should receive a much higher priority than any other project like that of importing LNG.

5.3 Fertilizer

Gas from this field could be sent to the present fertilizer company, where natural gas is used as raw material. Specially Jomuna Fertilizer Company could be a good option. The North part of Bangladesh is a highly prospective and potential zone for agriculture. Transportation of fertilizer from different part increases its price. So, if government could decide to supply the gas in the nearest Jomuna Fertilizer.

5.4 Industrialization

Maximum of the industrial areas of Bangladesh are Dhaka oriented. So, it impacts the environment of the capital and nearby inhabitants. Industries should be spread at whole over the Bangladesh. Then environmental management could be easier. North Bengal is a better option to set up industries. At present, there are few industries there due to lack of natural gas. So, the gas of Sunetra Gas Field could be sent there and it will help to build up industrial zone there. And it will also helpful to remove poverty from that area.

Many other utilization is possible with the reserve of Sunetra. But, the decisions should be well planned and considering all the parameters of Bangladesh. Awarding to IOCs will be not a good idea about this gas field. On the other hand export of gas would be not a good choice.

6. CONCLUSION

Bangladesh is a densely populated country and it has a very limited natural resources. Thus, Bangladesh can find Sunetra as a hope to solve the present problems and secure the energy. Due to globalization, the whole world is changing; industrialization is a key to development. Large reserve of the field can help Bangladeshi people to change their socio-economic conditions.

7. REFERENCES

[1] I. Badrul 'BAPEX sees new hopes in the gas horizon' Energy & Power Magazine, 2010.

[2] J.Economides, Hill and E.Economides: *Petroleum Production Systems*, Prentice Hall, NJ, 1994.

[3] Bassiouni, Z.: Theory, *Measurement and Interpretation of Well Log*, Society of Petroleum Engineers, 1994.

[4] Text Book: *Production Technology – Volume 1 & 2*, Institute of Petroleum Engineering, Heriot-Watt University, UK, 1999.

[5] Round table presentation of BAPEX MD 'Gas Sector Challenge and Role of BAPEX', Energy and Power in cooperation with GTZ, November, 2010.

[6] MIS Report, BAPEX, August, 2011.

[7] BAPEX Annual Report, 2009-2010.

[8] Petrobangla Annual Report, 2009.

[9] U.S. Geological Survey-Petrobangla Cooperative Assessment of Undiscovered Natural Gas Resources of Bangladesh, 2001.

[10] http://bapex.com.bd/more3.html. (18.10.2010)

[11] http://newagebd.com/newspaper1/op-ed/7579.html. (18.10.2010)

8. NOMENCLATURE

Symbol	Meaning	Unit
DPP	Development Project Proposal	-
MMSCF	Million Standard Cubic Feet	-
IOC	International Oil Company	-
TCF	Trillion Cubic Feet	-
BCF	Billion Cubic Feet	-
P1	Proved Reserve	-
P2	Probable Reserve	-
P3	Possible Reserve	-
BAPEX	Bangladesh Petroleum Exploration Company	-
MW	Mega Watt	-
AU	Assessment Unit	-
CNG	Compressed Natural Gas	-
LNG	Liquefied Natural Gas	-