

1. Summary

During 2008-2009 total gas production was 656.64Bscf (15.63 Mtoe) compared to 602.02 (14.33 Mtoe) Bscf in previous year (Figure 1). This was 54.62 Bscf i.e. about 9.07% increase in production compare to previous year. Daily average gas production rate for the year was 1799MMscf compared to 1644.87 MMscfd of the previous year.

During this fiscal year, Gas produced from 17 gas fields. From May 2009, commercial production commenced from Shabazpur gas field. However, productions from Meghna gas field remain suspended from September 2007 due to high water production from the completed zone. Production from Sylhet gas field went down to 17 to 20 MMscf /month at the end of the F/Y due to mechanical problem.

During 2008-09 Bibiyana produced the highest gas of 192.73 Bscf at an average 528 MMscfd among the gas fields of Bangladesh. Titas Gas Field produced the second highest 147.82 Bscf gas i.e. 405 MMscfd. Habiganj Gas Field was the third highest producer with a production of 86.08 Bscf i.e 236 MMscfd. Sangu, the only offshore Gas Field, produced 17.20 Bscf (Figure 2) at an average rate of 47.12 MMscfd. During the previous fiscal year Titas gas field the highest producer. Bibiyana the second and Habigoj ranked third highest respectively. For the first Titas gas field lost highest rank as gas producer of the Bangladesh. Production from Habigonj, Saldha, Sangu, Kailashtila, Sylhet etc fields reduced. Production from Sangu reduced drastically from 109 MMscfd 2006/7 to 47.12 MMscfd in 2008/9. Reduction in gas production from Sangu gas field caused a serious constrain in supplying of gas to Chittagong area.

During 2008-09, Chevron contributed the highest gas production of 277 Bscf i.e. 42.31% in the country. Bangladesh Gas Fields Company Limited occupied second position by producing 257.89 Bscf i.e. 40.79%. Sylhet Gas Fields Limited (SGFL) occupied third position with 8.86 %; Cairn's contribution was only 2.62 % of the total production. On the other hand during 2003-04 BGFCL produced 59%; SGFL 16%; Chevron 12.67%; Cairn 11.54% and Bapex 1%. Share of production by BGFCL and Cairn have significantly reduced and Chevron's share increased sharply during last few years (Figure 3 & 4).

In 2008-09; share of gas production of National Companies were 50.3 % of the total and the IOC's share was about 49.7%. Lone JV operation contributed only 0.15%. On the other hand, National Companies contributed 54.46% and IOC's 45.54% of gas produced in the previous fiscal year and during 2003-04 National companies contributed 76% and IOC's 24%. Production of gas by the National Companies are falling sharply compare to IOC's in last couple of years (Figure 5).

In 2008-09 condensate production was 2.45 Million Bbl (0.326 MTOE) at an average of 6714.87 Bbl per day. Bibiyana Gas Field produced highest 1200409.4 Bbl i.e. 49% of total production. Where as Jalalabad was in second position with an annual production of 515829.56 Bbl i.e. 21% of total production. Kailastila contributed 361973.86 Bbl, which is 14.77% of total production and ranked third among the producer. In terms of gas condensate ratio (Bbl per MMscf), Beani Bazar Gas Field was in the top position with a ratio of 15.86 Bbl per MMscf. Kailastila becomes second with a ratio of 10.66 Bbl per MMscf and Jalalabad closely followed with a ratio of 8.81 Bbl per MMscf. In Bibiyana gas gas condensate ratio was 6.25. Field wise annual condensate production ratio in Bbl per MMscf and field wise total annual condensate production is shown as Figure 6 & 7.

The daily average gas production of 2008-09 was 1799 MMscfd. Daily maximum gas production of this FY was in June 2009 with a rate of 1931 MMscfd which was about 7.33% higher than the daily average production of the fiscal year. The minimum production was in the month of December at a rate of 1605 MMscfd and it was about 12% lower than the daily

average (Figure 8). More over during Eid Holidays consumption of gas reduces about 40%. Compare to week days there is a less demand of gas during the week end. For routine production Bottom Hole Pressure survey of the wells, this lean demand period of gas may be used.

At the end of 2008-09 the Gas reserve of the country become as follows:

Total Proved +Probable : 11.8 Tscf National Companies : 8.64 Tscf IOC's : 3.16 Tscf

Total Proved : 6.59 Tscf National Companies : 5.22 Tscf IOC's : 1.37 Tscf

Total Probable : 5.21 Tscf National Companies : 3.43 Tscf IOC's : 1.79 Tscf

From 1998 to June 2009 only two gas fields was discovered (Bibiyana and Bangura). 2p reserve of those two is 2.63 Tscf. On the other hand 5.42 Tscf gas has been produced during that time. Due to very low Petroleum Exploration in the country, reserve base is reducing rapidly. These demands immediate accelerate exploration to balance production and reserve of gas in the country.

Though National Company's own majority of the gas reserve but their production is more or less same as of IOC's production. Reserve versus production was highest (>130) in Sylhet Gas Field and lowest (<4) in Bangura Gas Field. Considering reserve potentiality, the Sylhet Gas Field is producing much lower. All out effort may be taken to augment reasonable production from Sylhet Gas Field. Reserve VS production ratio of Jalalabad and Moulavi Bazar is also low, which are < 5 and <7 respectively (Figure 9)

During this fiscal year gas was distributed by four companies (Figure-10). Titas Gas Transmission and Distribution Company Limited (TGTDC), Bakhrabad Gas Systems Limited (BGSL), Jalalahbad Gas Transmission and Distribution Limited (JGTDC), and Pashchimanchal Gas Company Limited (PGCL) distributed 478.8 Bscf; 102.4 Bscf; 35Bscf and 27.4 Bscf respectively. TGTDC was the highest consumer and PGCL was the lowest consumer. During the previous year Gas consumption by TGDCL, BGSL, JTDCL and PGCL were 447.67 Bscf; 98.99Bscf; 31.58, Bscf and 21.60 Bscf respectively. During FY GTDCL alone consumed about 72.8% gas and consumed 31 Bscf more than previous year. PGCL consumed 4.17% only of the total gas.

Out of the total gas produced in the country 95.8 % were supplied to the Eastern part and 4.2% in the Western part of the country where 45% of the total population lives. To alleviate poverty and regional disparity immediate steps should be taken to augment supply of gas to the Western part of the country. PGCL should expand their distribution net work and remove restriction in connection of gas to the new customers. Additional gas in the country produced should be allocated to the Western part on priority basis.

Power sector was the highest consumer of 351.85 Bscf (256.84 Bscf by PDB and others + 95.01Bscf by Captive generators) gas during 2008-2009. Which was 54.38% of the total production of the fiscal year. The CNG sector had a phenomenal growth. During this financial year this sector has consumed about 32.74 Bscf gas compared to 22.27 Bscf during the previous year. Industry sector had also good growth (22%) in gas consumption over the previous year (Figure 11 & 12). But the fertilizer sector had a negative growth i.e. it consumed 74.83 Bscf this FY compare to 78.67 Bscf.2007-08.

A brief on production from different gas fields, sector wise consumption and reserve is provided in the following pages.

Unaccounted gas (UFG) during this financial year was about 9 Bscf i.e.0.72% of the total gas produced compared to 15 Bscf in the previous fiscal year. There was praise worthy improvement in reduction of UFG. It may be mentioned that the new company has least or no

system loss and on the other hand old company (TGDCL) has highest 1.4% UFG (Figure 13).

2.0 Production

To meet increasing demand of gas production was continuously increased over the year. In July 2008 average production was 1766 MMscfd, which gradually increased to 1931 MMscfd in June 2009. Average gas production of this FY was 1799 Mscfd. It may be noted that Gas System Master Plan predicted a demand of 1616 MMscfd and 1666 MMscfd gas for reference (7% GDP) and high (8% GDP growth) scenario. Four gas fields e.g. Titas, Bibiyana, Habiganj and Jalalabad contributed 73.88 % of total production. Remaining 13 gas fields contributed 26.12%. Bibiyana Gas Field retained its position as highest gas producer with 192.73 Bscf gas. Titas Gas Field occupied second position producing 147.82 Bscf gas. Habiganj gas field occupies third position producing with 86.08 Bscf gas. During last fiscal year Bibiyana and Habiganj gas fields were in second and third highest producer respectively.

During this fiscal year 2.45 Million Bbl condensate was produced of which Bibiyana Gas Field produced 49 % of the total i.e. 1.2 Million Bbl. Followed by Jalalabad 21.0% and Kailastila Gas Field produced 14.77 % of the total production. During the previous fiscal year Bibiyana was also the highest and Jallabad the second highest condensate producer. Field wise annual condensate productions for each company are provided in the following sections. Under each company, name of the gas fields are arranged in alphabetical order.

2.1 National Companies

2.1.1 Bangladesh Petroleum Exploration & Production Co. Ltd. (BAPEX)

Bangladesh Petroleum Exploration Co. Ltd. (BAPEX) continued its production operation from Salda Nadi and Fenchuganj Gas Fields. Development of Shahbazpur Gas Field was completed during this FY and commenced production.

2.1.1.1 Fenchuganj Gas Field

Pakistan Petroleum Ltd (PPL) a subsidiary of Burma Oil Co. (BOC) drilled first exploratory well in this structure during 1960. No commercial gas or oil was discovered in this well. Petrobangla with the assistance of German Technical Assistance conducted multifold digital seismic survey. Based on their studies drilled the second well during 1985-87, which is the deepest well (4977m) of the country. Gas was tested in three sands. Indication of oil was observed during testing of two zones. After successful DST the well was completed as a gas producer.

Production from Fenchuganj Gas Field started in May 2004 from Well No#2. Daily production from Well No#2 was just over 20 MMscf. During 2003-04 BAPEX drilled Well No#3, which started production in January 2005 increasing total production of the field to over 40 MMscfd. In 2008-09 Fenchuganj Gas Field produced 10.03 Bscf gas at an average daily production of 27.47 MMscfd. During the same period 22669 Bbl condensate was produced at an average 62.1 Bbl daily. Condensate production ratio of this field is 2.3 Bbl per MMscf. During this fiscal year the field produced from two wells. Cumulative production of gas the field as on 30 June 2009 was 60.4 Bscf. Based on two wells information estimated 2P reserve of this field was 282.8 Bcf of which 60.4 Bscf was under proven and 223 Bcf was under probable category (HCU-NPD 2003). Remaining 2P reserve as on 30 June 2009 was 222.60Bscf. After drilling Well 3, reserve of the field has not been revised. Immediate steps may be taken to re-estimate reserve of the field.

2.1.1.2 Salda Nadhi Gas Field

Salda Nadhi Gas field was discovered by BAPEX in 1996. The discovery well was completed as a dual producer and field was brought into production in March 1998. In the following year second well was drilled and this well started production in May 2001.

In 2008-09 Salda Nadi Gas Field produced 3.84 Bscf gas and 2128 Bbl of condensate at an average gas production rate of 10.52 MMscfd and production of condensate was 5.8 Bbl per day. Condensate production ratio was 0.55 Bbl per MMscf.

Gas reserve of this field was estimated as: Proved 58.75 Bscf and Probable 63 Bscf (HCU-NPD 2003). Cumulative gas production logged 58.75Bscf as on 30 June 2009. Remaining 2P reserve 59.85 Bscf as on 30 June 2009. This is the only field where gas is being shared by both Bangladesh and India. About two dozen wells have already drilled by India in the same field compared to two wells by Bangladesh. Carry out seismic survey is difficult in Bangladesh part of the field due to close vicinity of international boundary. As such, potentiality of the field could not be assessed fully with confidence. However, based on available production and geological information it may be clearly stated that its potentiality of the field is much higher than estimated earlier. It would be wise to drill at least two wells in the field even with relatively less probability of success.

2.1.2 Bangladesh Gas Fields Co Ltd (BGFCL)

Pakistan Shell Oil Company (PSOC) started exploration in the then east Pakistan and they were quite successful in discovering five gas fields during sixties, which are the major gas fields of the country. PSOC started production from Titas in 1968 and from Habiganj in the following year. They did not develop Kailastila, Bakhrabad and Rashidpur Gas Fields. After independence of Bangladesh, the company sold their asset to the Bangladesh government in August 1975 and left the country subsequently. The company was named as Bangladesh Gas Fields Co. Ltd. (BGFCL) and commenced production as operator from Titas and Habiganj gas fields. Later, through administrative order of Petrobala/GOB gave BGFCL right to produce Petroleum from Kamta, Feni, Bakhrabad, Narshingdi and Meghna Gas Fields. Out of those Kamta and Feni gas fields were depleted and abandoned. In terms of gas reserve and production it is the biggest Gas Company of the country. The company produced cumulatively about 5.47 Tscf gas from inception to July 2009. But after the departure of PSOC, the company never invested in exploration.

2.1.2.1 Bakhrabad Gas Field.

Pakistan Shell Oil Company (PSOC) discovered Bakhrabad Gas Field in 1969. Bakhrabad Gas System Ltd (BGSL) in 1981-82, drilled four more wells. All the wells were completed at same time as producer. In 1989 Petrobangla reorganized BGSL's operational and production function o and transferred production operation of the field to BGFCL leaving gas transmission and distribution to BGSL.

Production from this field started on 22 May 1984. In 1989 three more wells were drilled and all were completed in 'J' Sand. These three wells started production in 1991. In 1997 production from Well#5 was suspended due to high water production. By 1999 production from Well # 2, 4, and 6 were also suspended for the same reason. But the well # 2 & 5 resumed production after recompletion. Currently Well # 1, #2, # 3, #5,# 7 and # 8 are producing from J and G Sands only.

In 2008-09 Bakhrabad produced 11.97 Bscf gas at an average rate 32.79 MMscfd. Production rate of the field remained fairly uniform since 2000. During this financial year 9065 Bbl condensate was also produced from this field. Average condensate production rate was 24.83 Bbl per day at the ratio of 1.07 Bbl per MMscf of gas.

Cumulative production of gas of the field as on 30 June 2009 was 691.49 Bcf. Gas Reserve estimate of the field was done by HCU in 2003 as: Proved 790 Bcf and Probable 259 Bcf. Remaining 2P reserve of the field became 357.5 Bscf. The field has a better production potentiality than its present production.

2.1.2.2 Habiganj Gas Field

Habiganj Gas Field was discovered by PSOC in 1963. Production started in June 1968 from two wells (Well # 1 & 2). About 17 years later Petrobangla drilled two more wells (Well # 3 & 4) and both started production in 1985. Another well (Well # 5) started production in 1992 while Well # 6 was added to production in 1995. By 2000 another four wells (Well # 7, 8, 9 & 10) were added which brought the number of producing wells to ten. Daily gas production rate was gradually increased and in May 2004 it was over 300 MMscfd. This rate continued till October 2004.

In July 2004 production from Well # 8 was suspended due to excessive water production. However, this did not effect on total gas production immediately. From November 2004 the production rate gradually fell down to below 300 MMscfd. The well 9 stopped productions from 22 April 2008. Well # 11 was drilled and brought into production from 7 January 2008. For the first time production was taken from lower gas sand of the field.

During 2008-09 total gas production was 86 Bscf at an average production of 235.83 MMscfd from 9 wells. During the same period 5136 Bbl condensate was recovered at an average production rate of 14 Bbl per day. The condensate/gas ratio of the field was 0.059 Bbl per MMscf.

Habiganj Gas field has two gas zones, namely Upper and Lower. HCU in 2003 estimated total gas reserve of Habiganj Field as: Proved 3825 Bcf, Probable 27 Bcf. They have assigned lower gas zone in Probable category and the Upper zone to Proved.

As on 30 June 2009 cumulative gas production logged 1628 Bcf. Remaining 2 P reserve as on end June 2009 was 2224 Bscf.

2.1.2.3 Meghna Gas Field

Meghna structure is the northern culmination of greater Bakhrabad anticline. Petrobangla discovered Meghna Gas Field in 1990. To satisfy the condition of loan covenant, the well was drilled as Bakhrabad Well # 9. After discovery, the gas field was named as Marichakandi and subsequently renamed as Meghna.

In June 1997 Meghna Gas field went into production. At the beginning daily production rate was ranging between 18–19 MMscfd. This was gradually reduced to about 17 MMscfd by 2000. In 2001 water production rate registered a sharp decrease to 8.9 MMscfd. However this did not reduce the water production rate rather it continued to increase. During 2007-08 practically there was no production from this field (produced only 16 MMscfd). Production of the field suspended due to very high water cut and awaiting work over.

Estimated Proved Reserve (P1) of Meghna Gas field was about 72 Bcf of which 'C' sand contains about 51.8 Bcf ["C" (Lower-45.9) and (C Upper 5.9)]. So far C lower sand of the field produced 36.41 Bcf. Remaining Proved reserve of this zone is 35.59 Bcf. Besides, the field has 48 Bcf 2P reserve in other zones

2.1.2.4 Narshingdi Gas Field

Narshingdi Structure was delineated as northernmost culmination of greater Bakhrabad structure by PSOC. In 1990 Petrobangla drilled an exploratory well in this culmination naming as Bakhrabad Well # 10 to comply with World Bank's covenant. After discovery of gas, the field was named as Belabo and later as Narshingdi.

The Narsingdhi field went into production in 1996. Initially production rate was about 25 MMscfd from single well, which was reduced gradually to about 15 MMscfd in 2002. In 2005-06 production rate was raised to 19.47 MMscfd. The second well of the field was drilled and brought in to production in 16 February 2007. In 2008-2009 total gas production was 12.05 Bscf at an average rate of 33 MMscfd and condensate 27878 Bbl with an average rate of 76.4 Bbl per day. The condensate gas production ratio of the field is 2.32 Bbl per MMscf.

Estimated 2P reserve of the field was 215.1Bcf. Cumulative production was 98.82 Bscf as on 30 June 2009. Remaining 2P reserve as on end 2009 was 116 Bcf. After drilling well 2, reserve of the field has not yet been re-estimated.

2.1.2.5 Titas Gas Field

Titas was discovered by PSOC in 1962. This is the largest gas field of the country. The field went into production in 1968 with 2 wells. One year later third well was added. During the initial four years, production increased to 21.97 MMscfd from meager 0.38 MMscfd in 1968. In 1972 Titas contributed over 60 percent of total supply of gas. This trend continued till 1983. From 1984 share of Titas in total production started to decrease and in 2002-03 it was about 30 percent. However during this period daily production continuously increased and Titas always remained the major supplier of gas. To meet increasing gas demand Titas field was developed in several phases. So far 16 wells have been drilled in this field and all the wells became producer. Production from Well#14 was suspended from December 2006 due to some problem and Well 3 plugged back due to leakage in casing and tubing in January 2008. Throughout the year the field was producing at a rate of about 388.7 MMscfd from 14 wells Out of 15 producing wells 12 are producing from A Sand and remaining 3 wells are producing from B and C Sands. During the fiscal year 2008-09 total production 147.8 Bscf at daily average production rate of 405 MMscfd. In the previous fiscal year total production was 142.24 Bscf at daily average production rate of 388.7 MMscf.

During 2008-09 fiscal year 149845 Bbl condensates was produced at the ratio of 1.08 Bbl per MMscf with daily condensate production rate of 410.5 Bbl. Titas accounts for 29.3% gas production and 6.12% condensate production in 2008-09.

In Titas Gas Field reservoirs are divided into three main groups. These are known as "A", "B" and "C" Sands. 'A' group of sands contain 4270 Bcf gas and remaining 857.5 Bcf is in "B" and "C" Sands 2P (5127.5Bcf) reserve of gas. Cumulative gas production of this field logged 2995 Bscf as on 30 June 2009. Remaining reserve as on end June 2009 became 2132Bcf.

2.1.3 Sylhet Gas Field Ltd. (SGFL)

Pakistan Petroleum Ltd (PPL), a subsidiary of Burmah Oil Company started exploration activity in the then East Pakistan during fifties. PPL discovered Chatak and Sylhet Gas Fields and started production in 1961 from both the fields. After independence, PPL left the country and Government took over the field. The company was first known as Bangladesh Petroleum Ltd (BPL). Later the name was changed to Sylhet Gas Fields Ltd. (SGFL). The company operates Beani Bazar, Kailastila, Rashidpur and Sylhet Gas Fields.

2.1.3.1 Beani Bazar Gas Field

Petrobangla discovered Beani Bazar Gas Field in 1981. The well was completed as selective dual producer. Production from Lower Gas Sand started in May 1999. There were many interruptions in production. During the later half of 2000 there was hardly any production. Production suspended for some time. Well # 2 was brought into production in January 2002.

During 2008-2009, the field produced 5.47 Bscf gas and 88868 Bbl condensate. Average daily gas and condensate production rate was 15 MMscf and 243 Bbl per day respectively. Condensate gas ration was 16 Bbl per MMscf.

Total estimated reserve of the field was 169.8 Bcf of which 130.4 Bcf in Upper sand and 39.4 Bcf in lower sand. Cumulative gas production of this field logged 57.10 Bscf as on 30 June 2009. Remaining reserve as on end June 2009 became was 112.9 Bcf.

2.1.3.2 Kailas Tila Gas Field

This gas field was discovered by PSOC in 1962. During early eighties Petrobangla decided to develop this field. Well # 1 was completed as a dual producer. Production started on 28 June 1983. Two zones started production and combined flow was recorded. About a year later well # 2 and Well # 3 were drilled and both started production in February 1995. In 1996-97 well # 4 was drilled and started producing in March 1997. Well # 5 was drilled in 2006 and started producing from September 2006. At the same time work-over of well # 4 started and production resumed production in 5 December 2006. Well 6 was drilled and brought into production in August 2007

During 2008-2009 fiscal year field production logged 33.94 Bscf at daily average production rate of 93 MMscf and 361973.86 condensate was produced at an average daily rate of 991.7 Bbl with the ratio of 10.66 Bbl per MMscf compared to 659.53 Bbl per day during 2007-08. Kailastila produced 5.17 % gas and 14.77 % condensate of the total Production of the country during 2008-09.

Cumulative production as on 30 June 2009 was 463.02 Bscf and remained 2P reserve of 1440 Bcf.

2.1.3.3 Rashidpur Gas Field

Rashidpur Gas Field was discovered in 1960 by PSOC. Until 1987 Rashidpur Well # 1 was the deepest well drilled in the country. After the discovery, PPL drilled well # 2, located only 30 m away from Well # 1.

In 1989 under Second Gas Development Project of Asian Development Bank (ADB) this field was developed. Two new wells were drilled and including well # 1 and 2 all the wells were completed as producers. Production started from well # 1 in 1993 and by 1994 remaining three wells started production. Second phase development was taken up in 1998-2000 and three new wells were drilled and completed as producer.

During 2008-2009 fiscal years Rashidpur produced 18.15 Bscf gas at an average rate of 50 MMscfd. During the same FY 18490 Bbl condensate was produced at an average recovery rate of 50.6 Bbl per day with a ratio of about 1.01 Bbl per MMscf.

Cumulative gas production of this field logged 448.53 Bscf as on 30 June 2009 and remained 953.47 Bscf 2P reserve.

2.1.3.4 Sylhet Gas Field

Sylhet Gas Field was discovered by PPL. Sylhet Well # 1 was drilled in 1955 and gas were identified in two group of sand at about 1200m and another group at about 1915m depth. After cementation of 10¾ inch casing at 2325 m pressure developed between annulus and casing string and eventually the well blew out.

Well # 2 was drilled in 1956 but the well was plugged and abandoned after encountering abnormally pressured sand. Well # 3 was completed as a producer and production started in 1960 from this well. Well # 4 blew out after encountering charged sand at shallow depth. Well # 5 was drilled to observe the behavior of the charged sand. Well # 6 was drilled in 1964 and it started production from September of the same year.

Sylhet Well # 7 (**Only Oil Well of the Country**) was drilled in 1986 as a gas development well. This well encountered oil below the known gas horizons. After Drill Stem Testing (DST), Production test was carried out. This test merged into production and the well flowed 637 Bbl Oil before suspending in 1994.

In April 2005 Well # 7 was re-completed in the Lower Boka Bil Gas Sand and it started producing gas since 31 March 2005 increasing daily production rate of the field to about 20 MMscfd. From July 2006 to January 2007 production rate was around 10 MMscfd. From February 2007 this rate was gradually reduced and in June 2007 it was just over 8 MMscfd. Decrease of gas production also resulted in reducing condensate production, which was 1950

Bbl in July 2006 and in December 2006 it was 1562 Bbl. In 2008-2009 Sylhet Gas Field produced 0.56 Bscf gas i.e. at an average rate of 1.53 MMscfd and condensate production was 674 Bbl. .

Cumulative gas production of this field logged 187.68 Bscf as on 30 June 2009 and 2P reserve remains 291.2 as on end June 2009.

This field has a greater production potential. Two wells (7 and Surma A) may be taken up for work over an earliest.

2.2 International Oil Companies

2.2.1 Cairn Energy

Cairn Energy was awarded two offshore blocks (15 & 16) in 1994. Holland Sea Search, Dutch Company was a partner in the venture. Cairn Energy discovered Sangu Gas Field, second offshore gas field of the country in 1996. The field was developed and production started in June 1998 from two wells. Halliburton Brown and Root became a partner during field development period. Later Shell bought Holland Sea Search and became a partner in the joint venture. By October 1998 two more wells were added as producing wells. The field showed some indication of production decline. New wells were drilled to augment production in 2005. Shell sold their share to Cairn Energy and left the country. Santosh joined hand with Cairn Energy in production of gas from Sangu.

2.2.1.1 Sangu Gas Field

Production from seven wells (i.e. Well # 1, 2, 3z, 4, 7, 8 and 9) continued throughout the June 2006. In July 2006 average daily production was 133 MMscf and this rate was gradually decreased to 115 MMscfd in December 06. Afterwards the rate continued gradually going down and in June 07 it was only 90 MMscfd. During 2008- 2009 total production was 17.20 Bscf and average daily production rate was 47.12 MMscf. During the same FY 460 Bbl condensate was produced at an average rate of 1.26 Bbl per day.

Initial Estimated 2P reserve was 455 Bscf. Cumulative gas production of this field logged 458 Bscf as on end June 2009. By using compressor Sangu is making enhanced recovery.

2.2.2 Chevron (Former Unocal) Bangladesh

Scimitar Oil discovered Jalalabad Gas Field in 1989. However after discovery the company had to leave the country following an arbitration ruling. The area along with the gas field was awarded to Occidental in 1995. During 1998 Occidental drilled four additional wells and brought Jalalabd gas field into production in 1999.

Occidental drilled the first exploratory well in Moulavi Bazar which blew out in 1997. In 1999 Well # 2 was drilled and tested gas.

In 1999 Unocal took over Occidental's interest in Bangladesh. During 2004-05 two more wells were drilled and production from this field started in March 2005. Two more wells were completed in this year and both started producing gas in early 2005-06. During this period Unocal was bought by Chevron Corporation.

Occidental discovered Bibiyana Gas Field in 1998.

2.2.2.1 Jalalabad Gas Field

During 2008-2009 this field produced 58.54 Bscf gas at an average rate of 160 MMscfd. During the same period 515829.5 Bbl condensate was also produced. Condensate production rate was 1413 Bbl per day at the ratio of 8.8 Bbl per MMscf. Jalalabad is the 4th largest gas producer and contributed 8.92 % of total annual production .Cumulative production of

Jalalabad field logged 514 Bscf as on June 2009 and Remained 322 Bscf 2P reserve as on June 2009.

2.2.2.2 Maulavi Bazar Gas Field

Occidental drilled Moulavi Bazar structure in 1997 and the well blew out at 840m depth. . In 1999 Well # 2 was drilled and it was a gas discovery. A third well was drilled and that also was a gas well.

Unocal took up Field Development program and Well # 2 and 3 were brought into production in March 2005. By the end of June 2005 three more wells (Well # 4,5 and 6) were drilled. In July 2005 both Well # 4 and 6 started production. In 2008-09, total production from this field was 26.57Bscf i.e. at an average daily production rate was 73 MMscf i.e. total. During the year total condensate production logged 9561 Bbl at an average daily rate of 26.19 Bbl with gas condensate ratio of 0.35 Bbl per MMscf.

By the end of June 2009 cumulative gas production logged 140.78 Bscf and Remained 206.22 Bscf 2P reserve as on June 2009.

2.2.2.3 Bibiyana

Occidental of Bangladesh delineated Bibiyana structure during 1997-98. The structure is located on the eastern part of Block 12. In the following year first well was drilled to a depth of 4014m (TVD 3825m). A fish with top at 3618m (MD) was left in the hole. A total of six DST were conducted and discovered gas.

Bibiyana # 2 was drilled also by Occidental in 1998. The well was a directional one and total depth was 4276m (3790m TVD). Only lowermost gas sand was tested in this well. Distance between bottom hole location of these two wells is about 2 Km. During the winter of 1998-99, 3D seismic data was carried out over the structure. In 1999 Unocal acquired Occidental's interest in Blocks 12, 13 and 14 and became the operator.

Again, in 2006 Chevron Bangladesh acquired Unocal's interest in the same Blocks and became the operator. From March 2007 Chevron started its production from this field and at the beginning the daily production was around 138 MMscfd and rapidly doubled 284 MMscfd in June 2007. During 2008-09 gas production was 192.73 Bscf at a rate of 528 MMscfd. Condensate productions for the same period logged 1.2 Million Bbl and average daily rate 3288.8 Bbl per day and gas condensate ratio was 6.22 Bbl per MMscf.

Cumulative production of this field as of end June 2009 logged 361.72 Bscf and remained 2039 Bscf .

2.2.3. Tullow Oil

2.2.3.1 Bangora

Tullow started exploration activity in Block 9 and drilled exploratory wells at Rasulpur and Lamai structures. Both were dry holes. The company tested gas in their third exploratory well at Bangora. After DST, Tullow went for long-term test and from 14 May 2006, gas produced during this test is flowed into the transmission system. Average flow rate was 50 MMscfd. During this period about 2.63 Bcf gas was flowed into gas transmission system. Condensate production rate was about 0.97 Bbl/MMscf and 2596 Bbl condensate was recovered during the same period. In July 2006 the average daily production was 50.13 MMscf and this went up to 70.10 MMscfd in June 2007. In 2008-09 the production was 30.62 Bscf and the daily average production was 83.8 MMscf. In the same period total condensate production was 34533 Bbl and average 94.6 daily Bbl. The gas condensate ratio was 1.12 Bbl per MMscf.

By the end of the FY cumulative production logged 77.95 Bcf. Remaining reserve as on end June 2009 was 156 Bcf.

2.3 Joint Venture

2.3.1 NIKO-BAPEX:

Niko Resources of Calgary, Canada was awarded Chatak and Feni gas fields under a joint venture agreement with BAPEX. NIKO started its operation in Feni. The Joint Venture recorded 3D seismic over Feni and Chatak. Niko's first attempt to drill a well in Chatak resulted in blow out. Niko's attempt to drill a relief well also resulted in another blow out. After completing remedial work further work suspended.

2.3.1.1 Feni Gas Field

NIKO-BAPEX Joint Venture drilled 3 wells and completed these wells in new gas sands. Feni Gas field was re-developed and production from this field resumed in November 2005. During 2006-07 fiscal year production decline was observed from the producing sands. In July 2006 daily production rate was 19 MMscf and this gradually went down to 6 MMscfd in June 2007. During 2008-09 gas produced from the field was 0.99 Bscf at a rate of 2.77MMscf. Condensate produced during the same time 972 Bbl at a rate of 2.66 Bbl. Gas Condensate ratios was 0.96 Bbl per MMscf. Cumulative production of gas was 62.40 Bscf as on 30 June 2009 and remains 76.20 Bscf 2P reserve as on end June 2009.

3. Sector Wise Gas Supply

- 3.1 Power:** During 2008-09, the Power Sector was the highest consumer of gas which consumed 351.85 Bscf i.e. about 53.63 % of the total gas produced. Out of which Captive Generation consumed about 95.01 Bcf. The Power Sector consumed about 37.35 Bscf more this year compared to previous year i.e. about 12% more the previous FY. This sector becoming more and depended on gas. It is consuming much more gas than it was allocated in the national Energy Policy 1995. The sector should immediately look for alternate source for primary energy to produce bulk electricity.
- 3.2 Industry:** Industry Sector consumed 104.60% Bscf gas i.e. 15.05% of the total produced gas. During the previous financial year this sector consumed about 92 Bscf gas i.e. the sector's consumption growth was 13.3 %. In terms of gas consumption the sector stood 2nd though it was 3rd in the previous year.
- 3.3 Fertilizer:** Fertilizer Sector consumed 74.83 Bscf gas during 2008-09 which was about 16.05 % of the total production of gas. During 2007-08 the sector consumed about 78.66 Bscf of gas. Gas is being supplied much less compared to allocation in the National Energy Policy.
- 3.4 Domestic:** Consumption in the Domestic Sector was 75.46 Bscf during the 2008-09 compared to 69.01 Bscf during the previous year. Consumption growth was about 9.34% compared to previous year.
- 3.5 CNG:** In CNG Sector consumption of gas was phenomenal though in terms of total consumption it is small. During 2008-09 consumption by this sector was 32.74 Bscf compare to 22.28 Bscf in previous year. Consumption growth in the sector was about 47%.
- 3.6 Commercial:** Consumption in Commercial 7.49 Bscf this fiscal year compared to 6.59 Bscf during the previous year.
- 3.7 Tea:** Tea Sector consumed only 0.75% during this financial year and growth was insignificant due to its limited extend.

3.8 Brick Field: No gas was supplied to seasonal Brick Field since 2004-05.

4. Company Wise Gas Consumption

During 2008-09 gas was distributed by four companies (Figure-10). Titas Gas Transmission & Distribution Company Limited (TGTDC), Bakhrabad Gas Systems Limited (BGS), Jalalabad Gas Transmission and Distribution limited (JGTDC), and Paschimanchal Gas Company Limited) PGCL distributed 478.8 Bcf, 102.4 Bscf; 35 Bscf and 27.4 Bscf respectively. TGTDC was the highest and PGCL was the lowest consumer. During the previous year Gas consumption by TGDCL, BGSL, JTDCL and PGCL were 447.67 Bscf; 98.99 Bscf; 31.58 Bscf and 21.63 Bscf respectively. During 2008-09 TGTDC alone consumed about 73.39% of the total gas produced. During this year TGTDC consumed 31.13 Bscf i.e.7% more than previous year. PGCL consumed 4.2% only of the total gas produce in the country where 45% of the total population lives. To achieve the present Government's target of equitable distribution of wealth and to alleviate poverty, PGCL should be encouraged to expand their distribution net work expeditious and freely. Additional gas produced in the country should be allocated to Western area on priority basis.

5. Unaccounted for Gas (UFG):

The difference between metered gas entering in to a company's pipeline system and metered gas sold by the company in a given period is known as UFG. In Bangladesh, this difference includes both technical loss and system loss. UFG is accounted for "Other" category of customers only. The "Other" category of customers includes Industry, Household, Commercial, Captive power, Tea and CNG.

There is a remarkable and praise worthy at improvement in terms of reducing UFG the last two years in the country. Unaccounted gas (UFG) during 2008-09 was about 9.6 Bscf compared to 15.29 Bscf in the previous fiscal year. There was praise worthy improvement in reduction of UFG. It may be mentioned that the new company has least or no system loss and on the other hand oldest company (TGTDC) has highest 1.4% UFG. UFG recorded highest in the months of December/January and lowest in the months of May/June. During the previous year also highest and lowest UFG recorded during the same time.

6. Reserve

At the end of 2008-09, 2P (Proved 6.59 Tscf + Probable 5.21 Tscf) reserve of gas has come down to 11.80 Tscf (Table-1) compare to 12.9 Tscf of the previous year. Out of the present total reserve National Company's own 8.64 Tscf and IOC's own 3.16 Tscf. Total Proved reserve of gas stood to 6.51 Tscf at first day of July 2009. No new gas field was discovered during that fiscal year. Bangura was the last gas field discovered in 2006 having Proved reserve of 158 Bcf and 2P reserve of 233 Bcf. On the other hand from July 2004 to June 2009 about 3.283 Tscf Gas has been consumed. Practically there was no significant discovery after Bibiyana in 1998. Reserve (2P) of Bibiyana gas field was 2.4 Tcf and almost half of which was proved reserve. From 2003 to June 2009 the country has discovered only 2.558 Tscf of 2P reserve and consumed 3.283 Tscf gas. Though National Company's own the majority gas reserve but their production is more and less same as of IOC's.

7. Reserve and Production Ratio

Reserve versus production was highest (>130.) in Sylhet Gas Field and lowest in Bangura Gas Field <5.0. From the reserve potentiality it may be clearly stated that the Sylhet Gas Field

is producing much lower than its potentiality. All out effort may be taken to augment reasonable production from Sylhet Gas Field. Reserve VS production ratio of Jalalabad and Moulavi Bazar is also low, which are <7 and <8 respectively (Figure 9).

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Figure-1: Fieldwise Annual Gas Production in Bscf

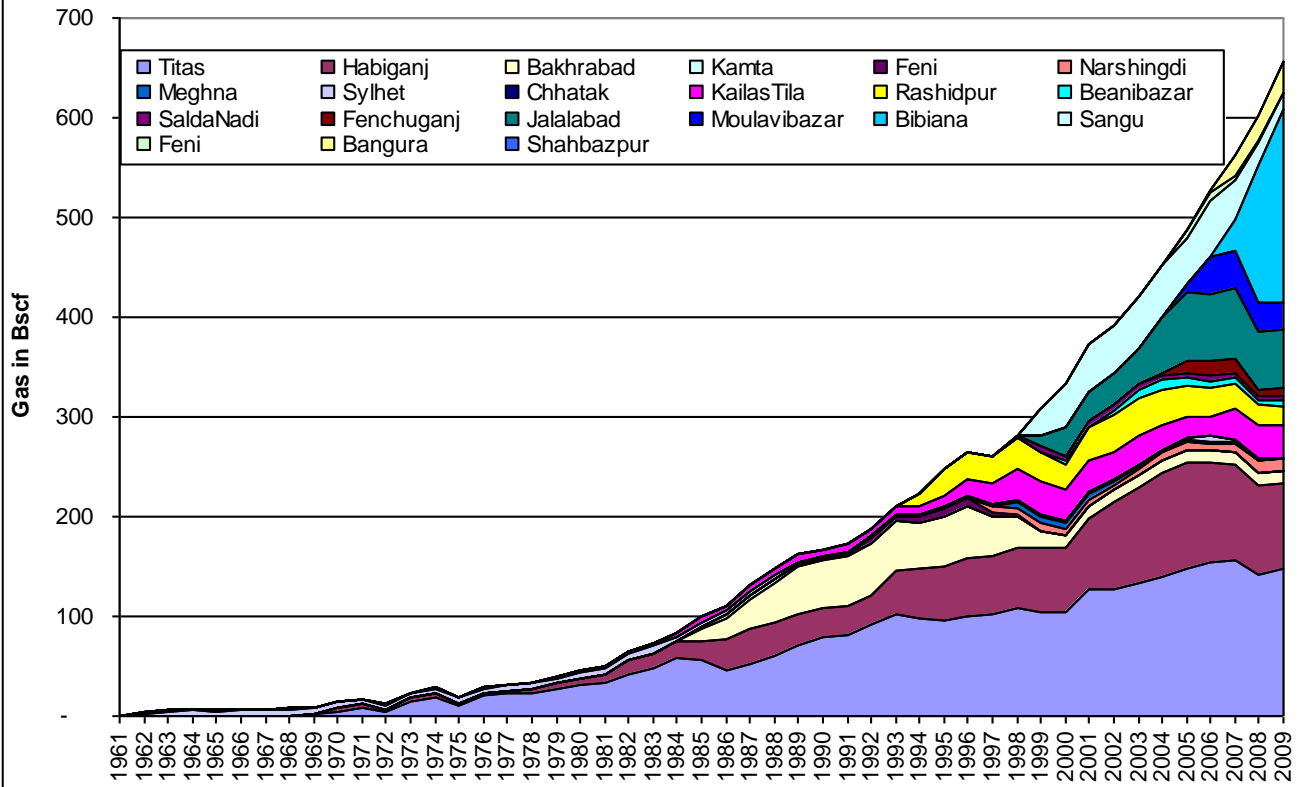


Figure- 2: Fieldwise Monthly Gas Production in Bcf, 2008-09

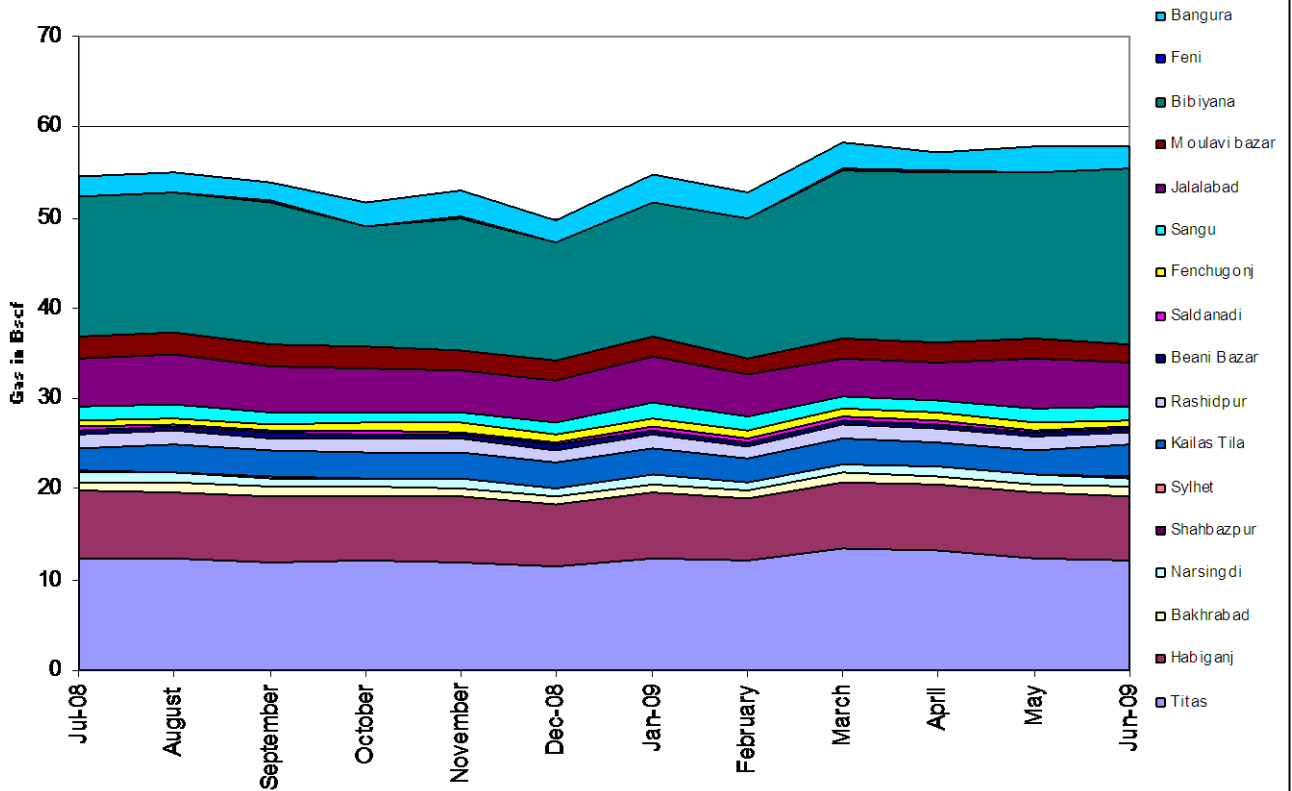


Figure-3: Companywise Contribution in Gas Production, 2008-09

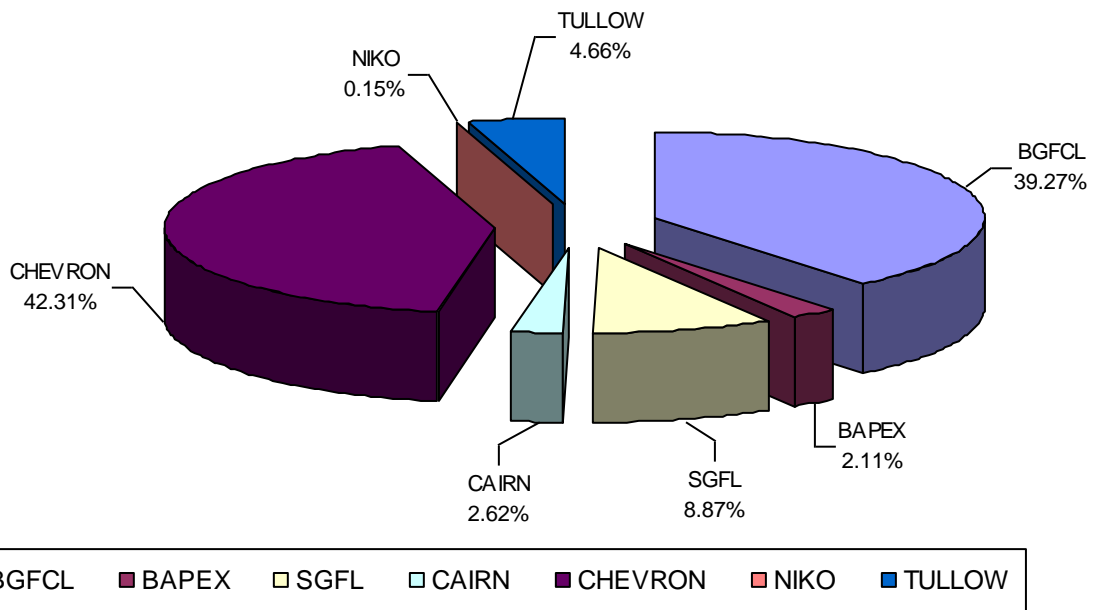


Figure-4: Fieldwise Contribution in Gas Production, 2008-09

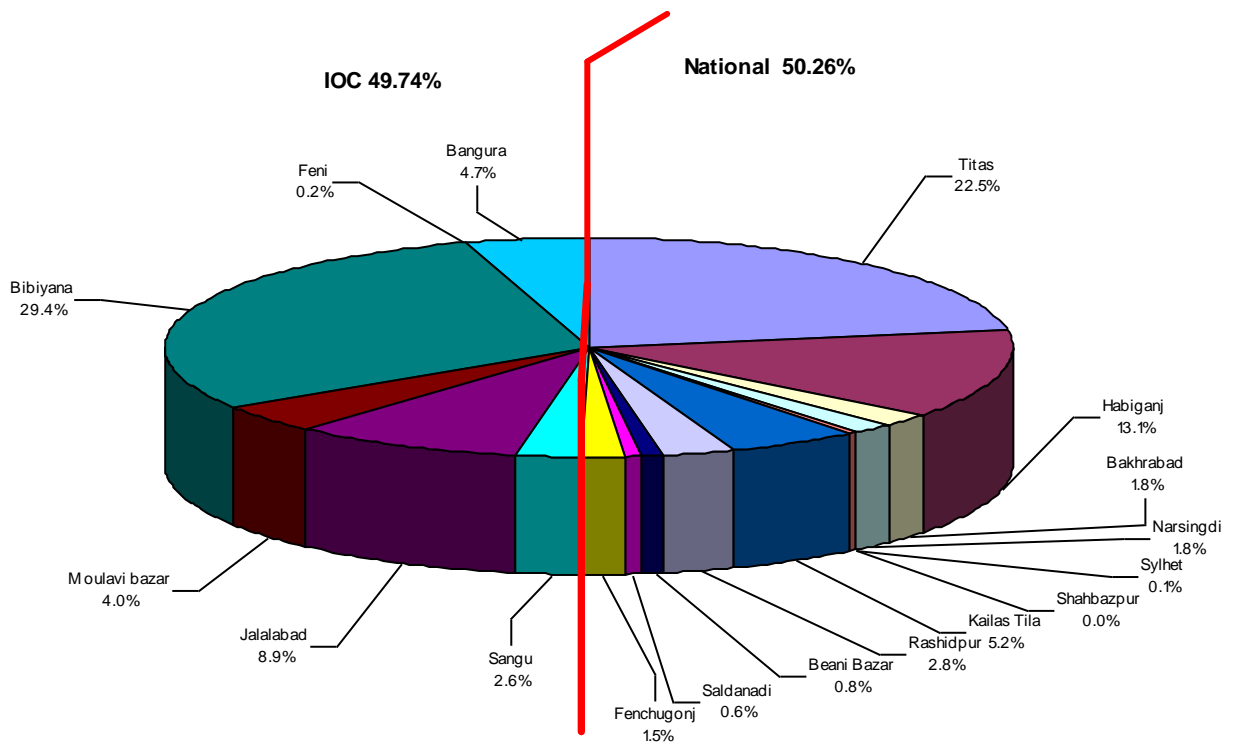


Figure-5: Gas production by National and International Companies in Bangladesh

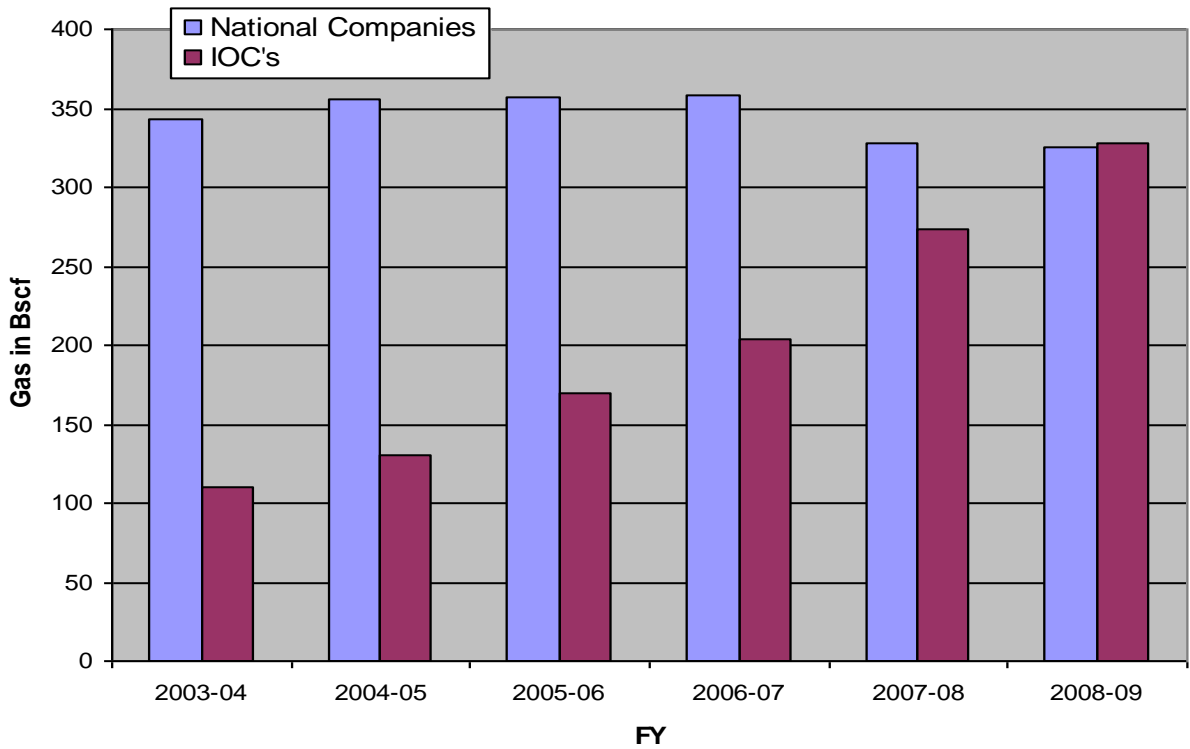


Figure-6: Fieldwise Annual Condensate Production in bbl, 2008-09

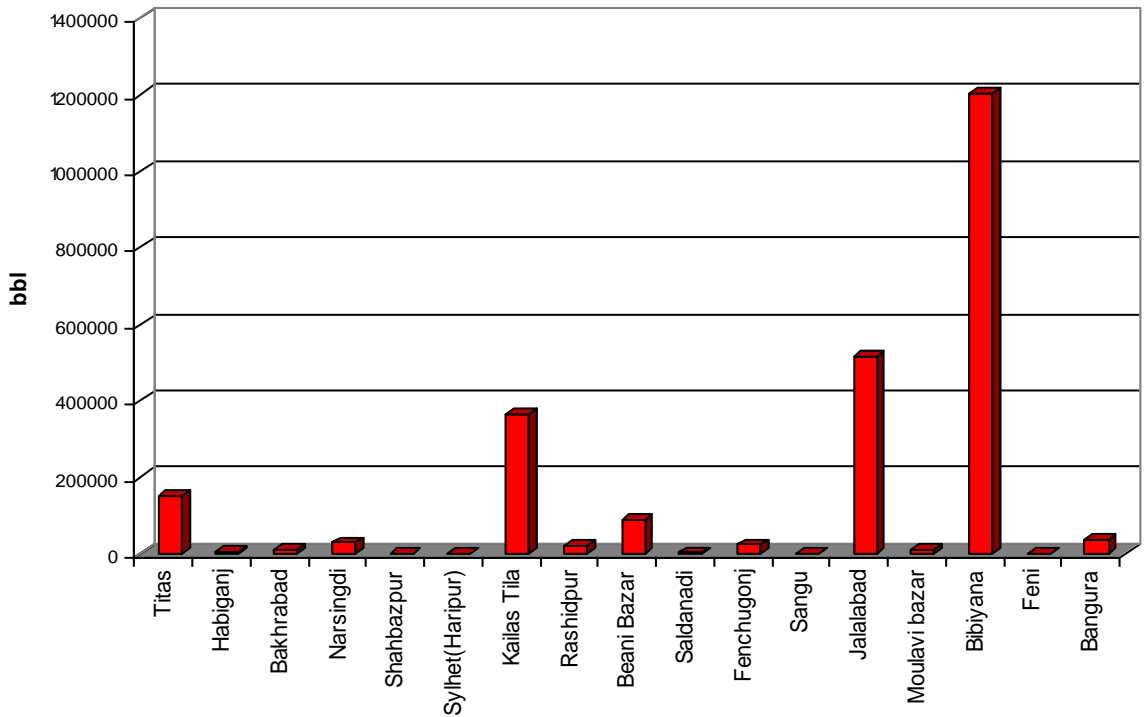


Figure-7: Fieldwise Average Condensate Production Rate in bbl/MMscf, 2008-09

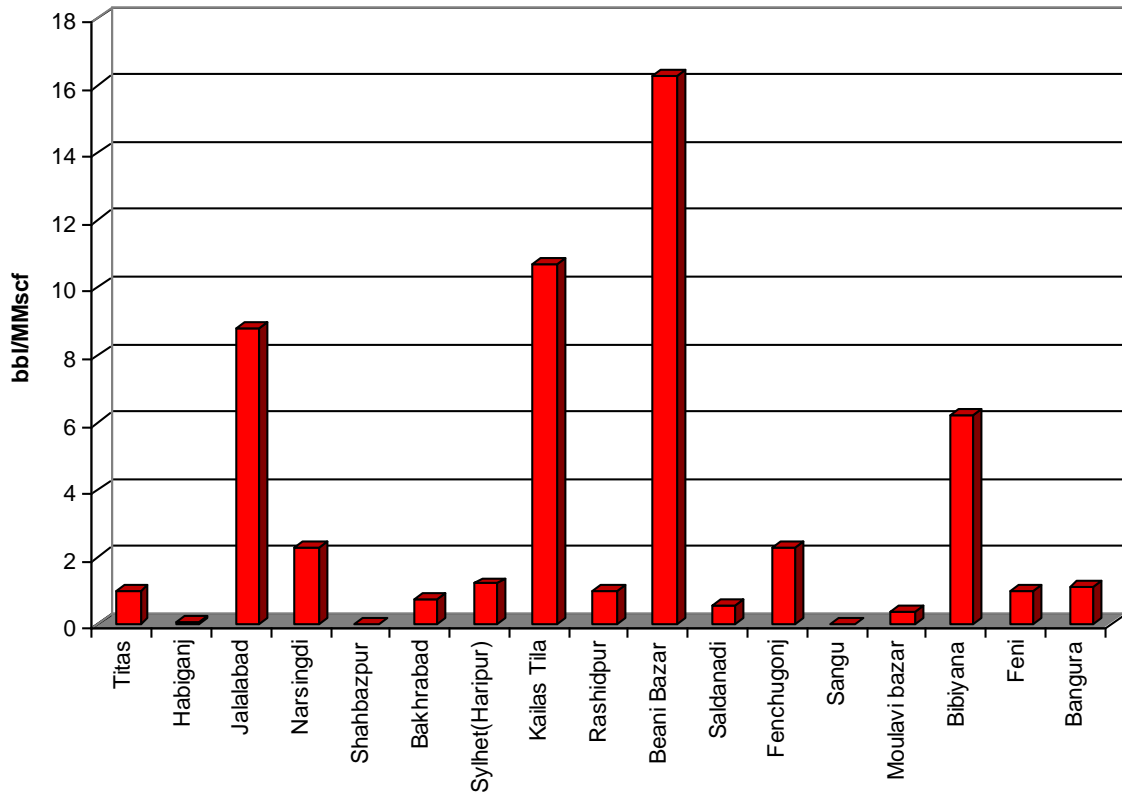


Figure-8: Monthly Gas Production in MMscf, 2008-09

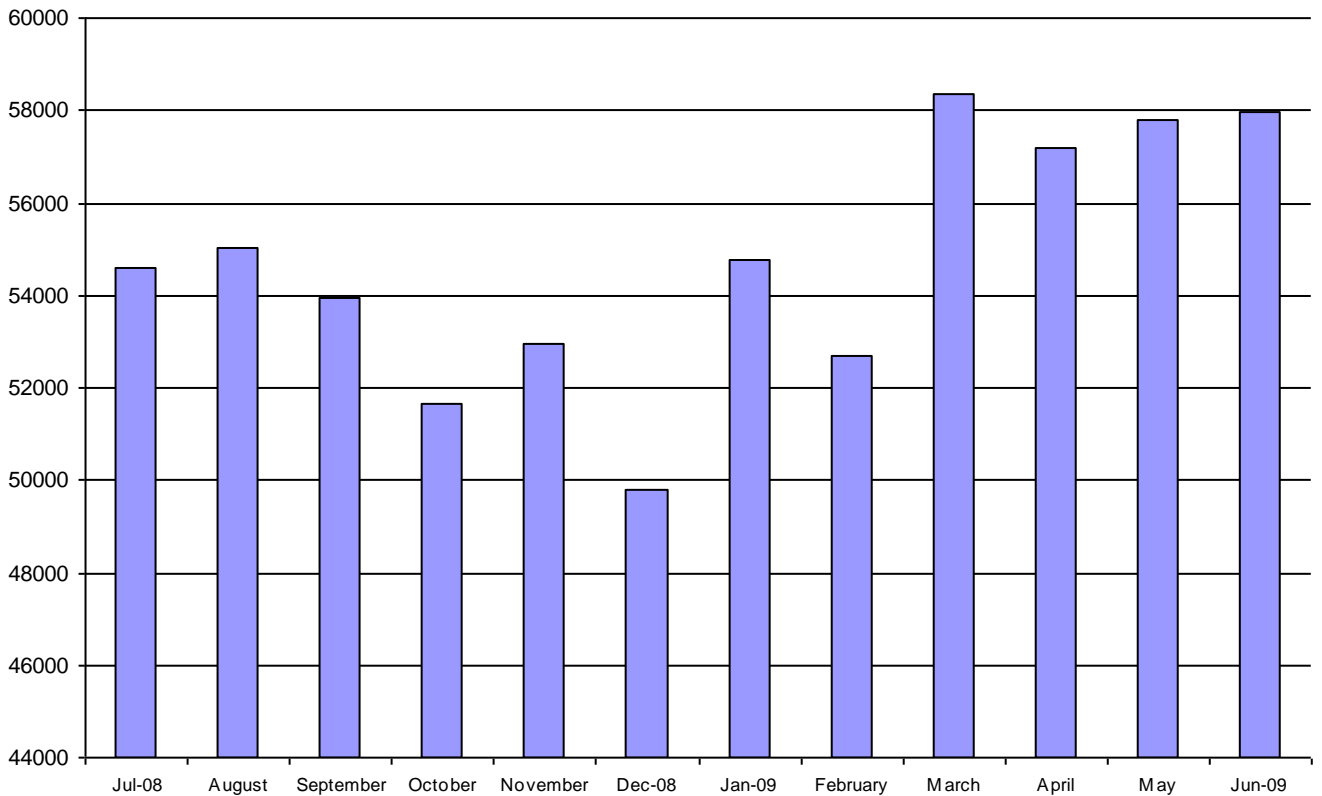


Figure-9: Reserve (2P) vs Production (R/P) Ratio of 2008-09

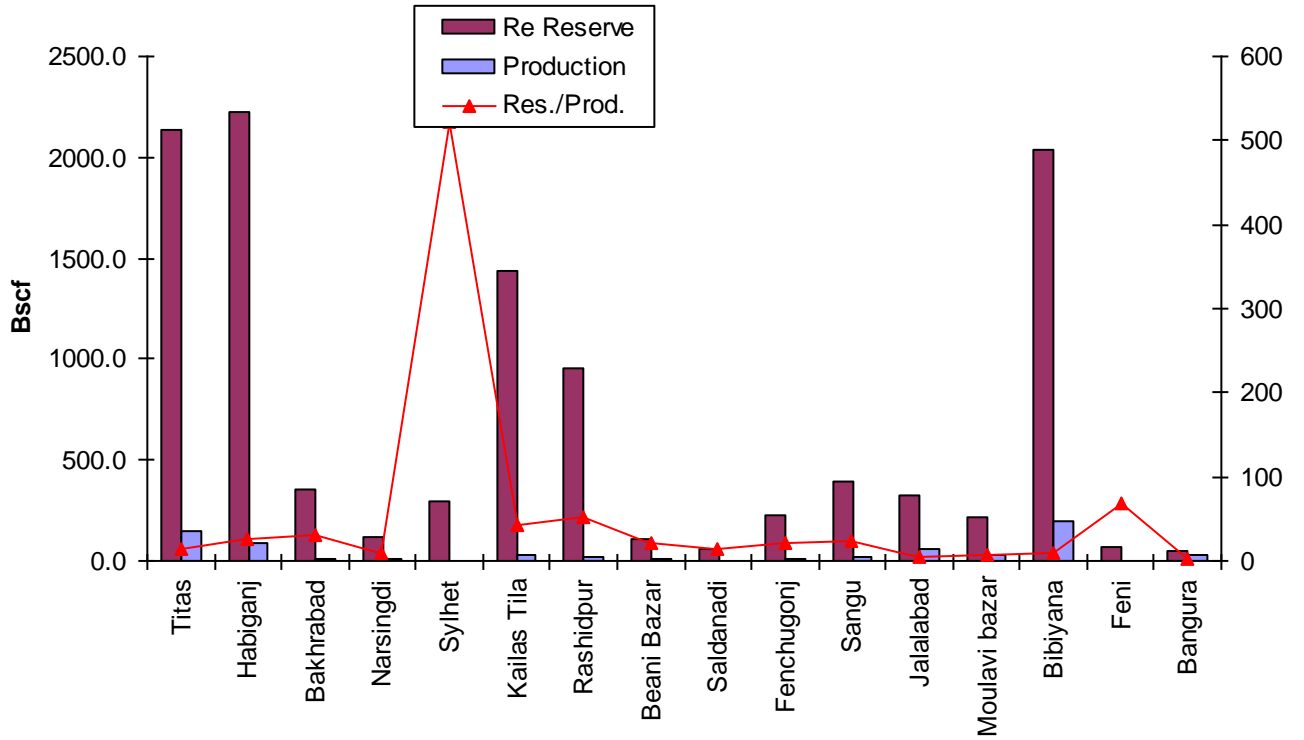


Figure-10: Share of Gas by Distribution Companies, 2008-09

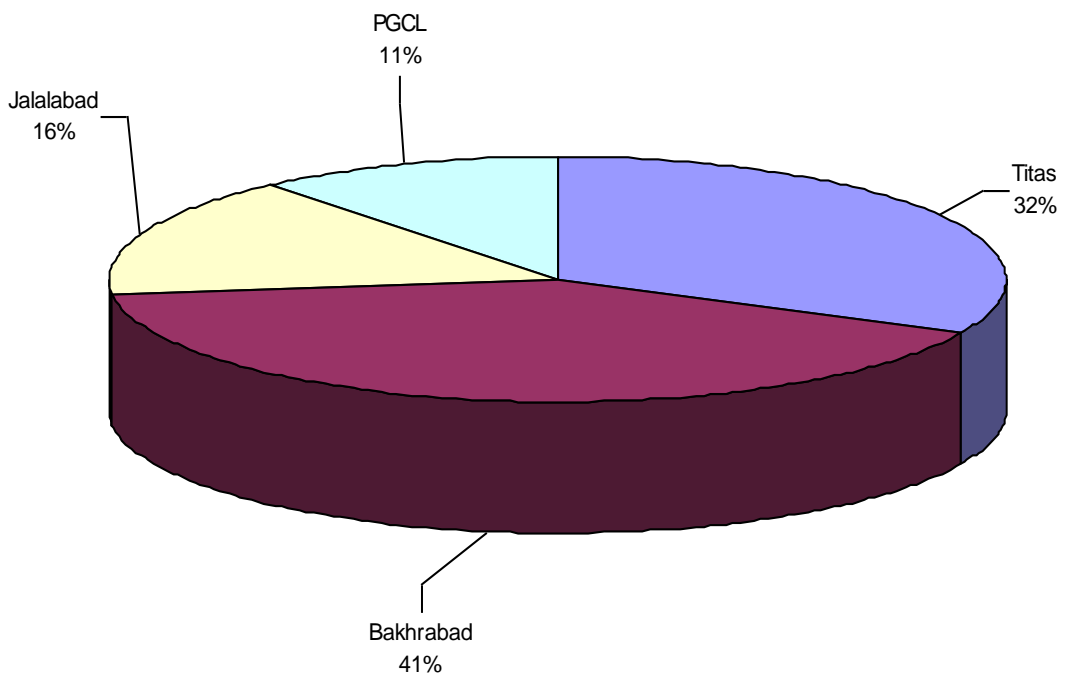


Figure-11: Annual Sectorwise Gas Consumption, 2008-09

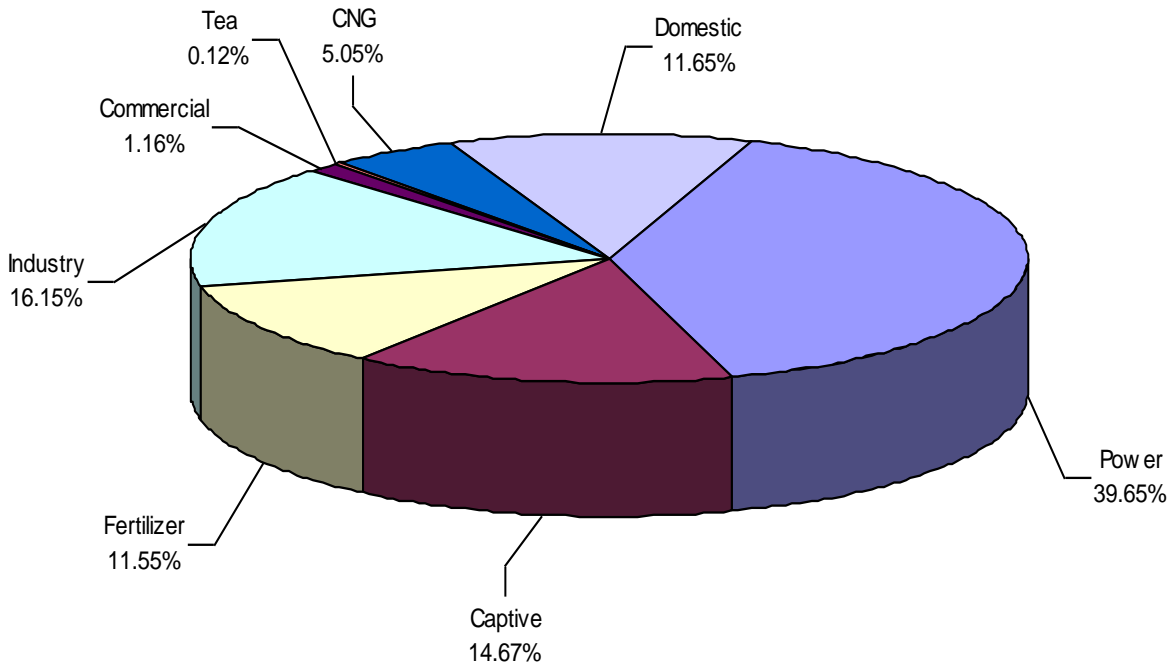


Figure-12: Sectorwise Monthly Gas Consumption in MMscf, 2008-09

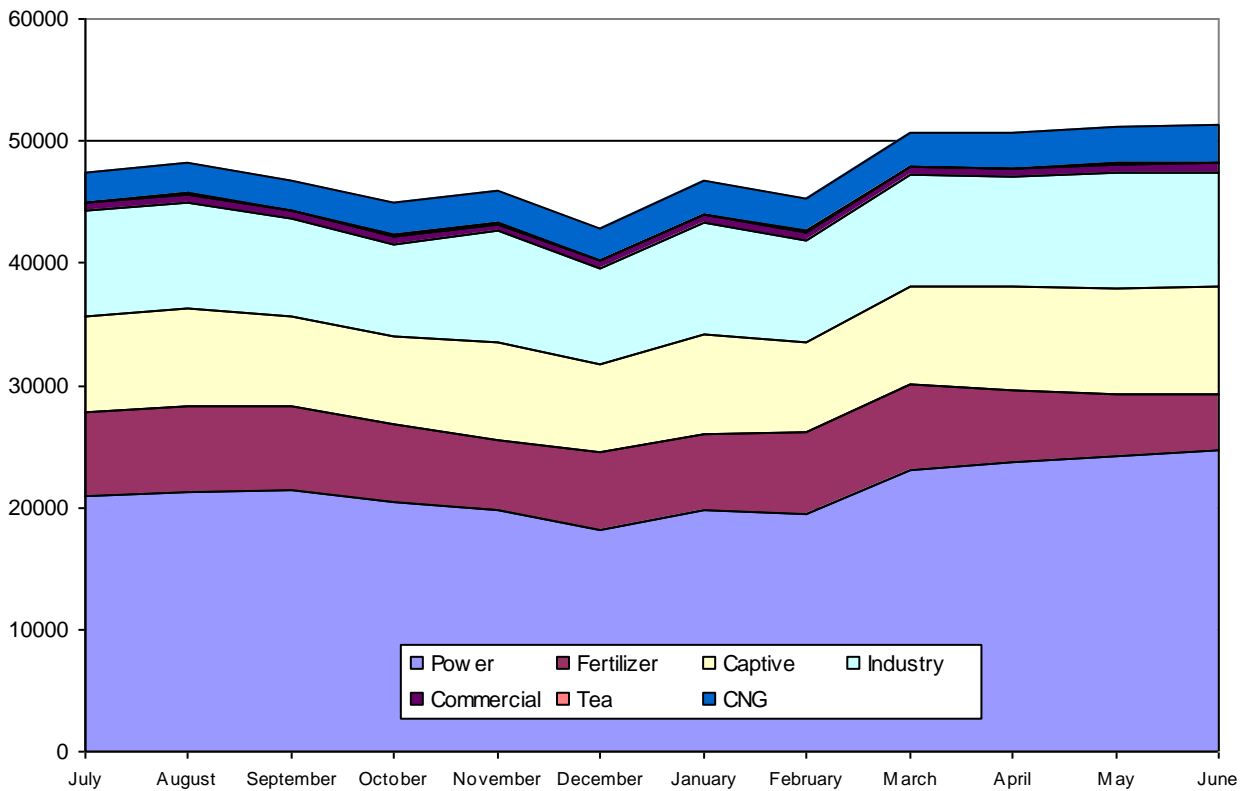


Figure-13: Annual System Loss of Gas (in %)

FY:2001-02 to 2008-09

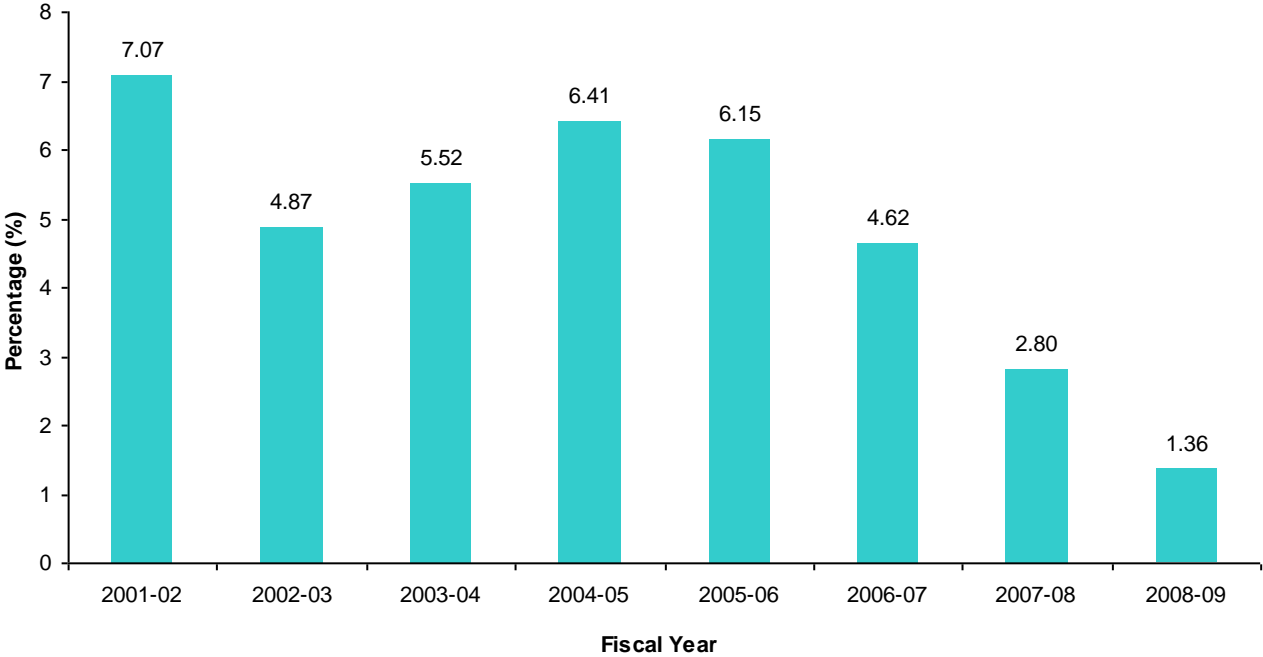


Table: 1
Summary of Gas Reserve and Production
(As of June, 2009)

Sl. No	Field Name	Operator	Gas Initially In Place (GIIP)		Reserve (Initial) P ₁	Cum. Gas Produced	Present Reserve		Cum. Condensate Produced
			Proven (P ₁)	Probable (P ₂)			P ₁	P ₂	
1	Begumganj	Bapex	14.00	33.70	10.00		10.00	23.00	
2	Shahbazpur	Bapex	366.00	300.00	256.00	0.12	255.88	210.00	0.00
3	Semutang	Bapex	174.00		121.80		121.80		
4	Fenchuganj	Bapex	85.00	319.00	60.40	60.40	0.00	222.60	41.48
5	Saldanadi	Bapex	75.50	90.50	58.75	58.75	0.00	59.85	45.98
	Operator Total		714.50	743.20	506.95	119.27	387.68	515.45	87.46
6	Meghna	BGFCL	102.00	68.60	72.00	35.88	36.12	48.00	54.17
7	Narshingdi	BGFCL	235.50	71.50	165.00	98.82	66.18	50.00	224.04
8	Kamta**	BGFCL	27.43	45.00	21.14	21.14	0.00	24.96	4.05
9	Habiganj	BGFCL	5100.00	39.00	3825.30	1628.10	2197.20	27.00	87.17
10	Bakhrabad	BGFCL	1129.00	370.00	790.00	691.49	98.51	259.00	967.68
11	Titas	BGFCL	5714.00	1611.00	4000.00	2995.34	1004.66	1128.00	3855.49
	Operator Total		12307.93	2205.10	8873.44	5470.77	3402.67	1536.96	5192.60
12	Kailas Tila	SGFL	1524.00	1196.10	1067.00	463.02	603.98	837.00	5453.04
13	Sylhet	SGFL	524.00	160.00	367.00	187.68	179.32	112.00	599.33
14	Rashidpur	SGFL	1398.00	604.00	979.00	448.53	530.47	423.00	611.47
15	Beani Bazar	SGFL	243.00		170.00	57.10	112.90		948.99
	Operator Total		3689.00	1960.10	2583.00	1156.34	1426.66	1372.00	7612.83
16	Sangu*	Cairn	639.00		458.12	458.12	0.00		
17	Kutubdia***	Cairn		65.00				46.00	
	Operator Total		639.00	65.00	458.12	458.12	0.00	46.00	
18	Bibiyana	Chevron	1584.00	1560.50	1209.00	361.72	847.28	1192.00	2328.45
19	Moulavi Bazar	Chevron	448.90		347.00	140.78	206.22		88.50
20	Jalalabad	Chevron	730.00	465.00	514.04	514.04	0.00	322.96	5189.71
	Operator Total		2762.90	2025.50	2070.04	1016.54	1053.50	1514.96	7606.66
21	Bangura#	Tullow	263.00	178.00	158.00	77.95	80.05	75.60	88.52
	Operator Total		263.00	178.00	158.00	77.95	80.05	75.60	88.52
22	Chattak	Niko	379.00	298.00	265.00	25.83	239.17	77.00	1.58
23	Feni***	Niko	80.08	146.00	62.40	62.40	0.00	76.20	109.07
	Operator Total		459.08	444.00	327.40	88.24	239.17	153.20	110.65
	Total		20835.41	7620.90	14976.96	8387.23	6589.73	5214.16	20698.71
	Total in tcf		20.84	7.62	14.98	8.39	6.59	5.21	

* Based on Sangu Technical Review, Presented by CAIRN on 13.08.2008, Initial Reserve was 455 Bscf. Due to use of Compressor the field making Enhance Recovery.

**Feni and Kamta's P₁ have been modified after HCU as its production already surpassed P₁

***Since P₁ and P₂ were not mentioned separately and there is no scope to go for production in near future, the reserve has been considered as P₂ category

#Instead of variable recovery factor considered same for all category to keep symmetry

P1- Probability 90%+; P2- Probability 50%+

HCU-Hydrocarbon Unit, NP-Non Producing, PB-Petrobangla

Further Information

Questions on data

HCU regrets it is unable to deal with enquiries about the data in *Gas Production and Consumption (2008-09), December 2009*.

Internet

The data in this report is also available at

www.hcu.org.bd

In addition to viewing, data can be downloaded and charted using the chatting tools.

Acknowledgement

This report is prepared from the *Monthly Gas Reserve and Production* Report of HCU and *Monthly Information System (MIS)* of Petrobangla.