



3rd Quarter report on
Natural gas



9th July 2009

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Introduction: Fossil Fuels

Fossil fuels are non-renewable resources that are found in the earth's crust. Coal, oil and natural gas are the main fossil fuels used in the world today for energy production. Of the total primary energy consumption in 2007 and 2008 more than 85% was done through fossil fuels. Generally Natural gas is associated with oil as both are obtained from the same source. At *shallow* depths in the earth's crust where temperature and pressure are less more of oil is found while at *deeper* depths more of Natural gas is found.

Natural Gas

Natural gas had a share of 26-27% in the total world primary energy consumption in 2007 and 2008. (Other Primary energy fuels include Oil, Coal, Nuclear energy and Hydroelectricity)

Typical composition of Natural Gas

Methane	CH ₄	70-90%
Ethane	C ₂ H ₆	} 0-20%
Propane	C ₃ H ₈	
Butane	C ₄ H ₁₀	
Carbon dioxide	CO ₂	0-8%
Oxygen	O ₂	0-0.2%
Nitrogen	N ₂	0-5%
Hydrogen Sulphide	H ₂ S	0-5%
Rare gases	A, He, Ne, Xe	trace

Source: Naturalgas.org

Some of the advantages offered by natural gas when compared with other fossil fuels are:

- a. Low green house gas emission
- b. Energy efficiency
- c. Ease of use

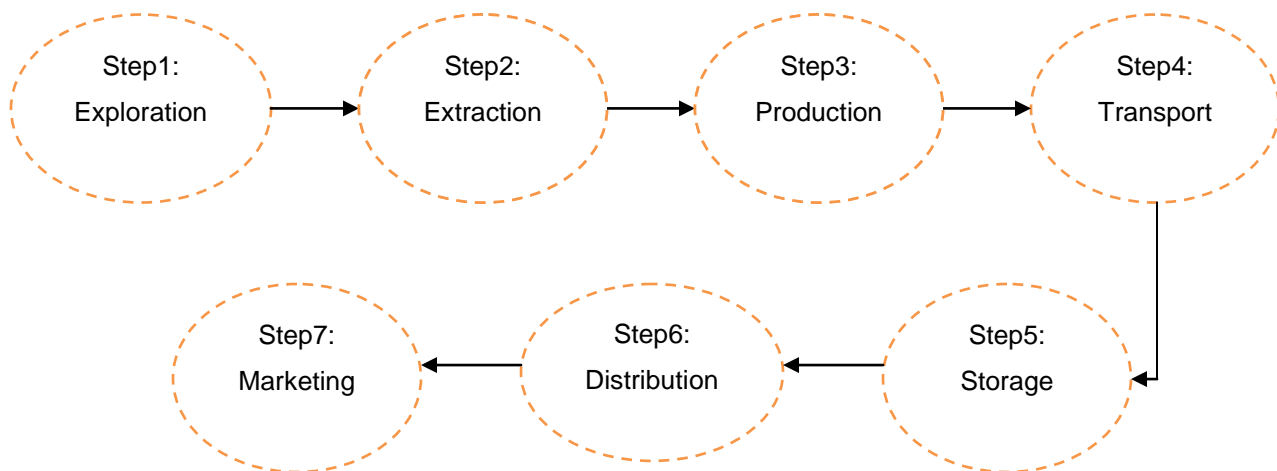
Natural gas is supplied as CNG (Compressed natural gas), LNG (Liquefied natural gas), Dry natural gas.

CNG is made by compressing natural gas to less than 1% of its volume at standard atmospheric pressure. It can be used as a substitute for gasoline and diesel.

LNG is natural gas that has been converted to liquid form for ease of storage or transport.

Dry natural gas consists of predominantly methane after it has been separated from other liquefiable hydrocarbons that co-exist with it in the reserves.

Production-Consumption Cycle



Exploration:This is the first stage in the process and it involves locating the underground deposits.Using technology and an understanding of the properties of underground natural gas deposits, geologists and geophysicists gather data that can be analysed to make intelligent guesses as to where the natural gas deposits exist.

Extraction:Once a Natural gas deposit has been located it is the job of the drilling experts to actually dig down to the location where the deposits exist.If the exploration team was right in its prediction about the existence of natural gas deposits the well is developed and is referred to as a productive well.However if the estimation of the exploration team was incorrect the well is termed dry and production does not proceed.

Production: Once a well has been drilled and the existence of deposits has been verified the next step involves bringing out Natural gas from underground deposits and processing it. Since Natural gas as it exists underground is not the same as the Natural gas that is delivered through pipelines to consumers, processing involves removing these other compounds and gases before it is transported. Most of this processing occurs near the wells.

Transportation: This step involves setting up the transport system. Generally Natural gas produced near wells has to travel a significant distance to reach its point of use. Since there is lag in production and demand, by the time natural gas reaches the consuming regions the demand might have fallen. In such cases Natural gas needs to be stored.

Storage: Since Natural gas has been a seasonal fuel traditionally, when the demand season has gone by the supplies need to be injected into storage facilities and used when the demand is up again.

Distribution: This is the last step in delivering natural gas to end consumers. In case the consumers are large industrial, commercial and electricity generating organizations natural gas is delivered directly from high capacity interstate and intrastate pipelines (usually contracted through natural gas marketing companies). In the case of most other small time users they receive natural gas from a local distribution company (LDC). LDCs are companies involved in the delivery of natural gas to consumers within a specific geographic area

Marketing:

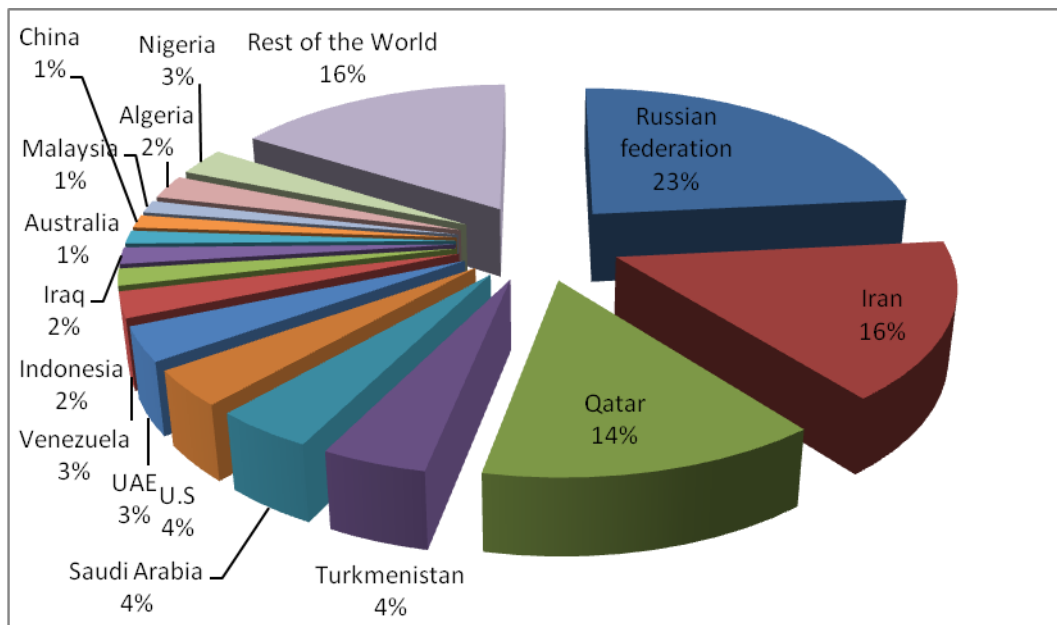
The pricing and trading of Natural gas is done at different locations throughout the country. These “market hubs” or “City gates” exist at the intersection of major pipeline systems. Marketers use their knowledge of financial instruments to hedge against price volatility.

Natural Gas Reserves

The R/P ratio (Reserves to production) of the world was 63.1 yrs at the end of 2008 according to BP statistical review of world energy 2009. It means that if the world continues to consume Natural Gas at the current production rate each year then the reserves (Natural gas that can be economically extracted) will last for another six decades from now provided no new reserves are discovered.

Russia has the largest reserves in the world followed by Iran, Qatar, Turkmenistan and Saudi Arabia.

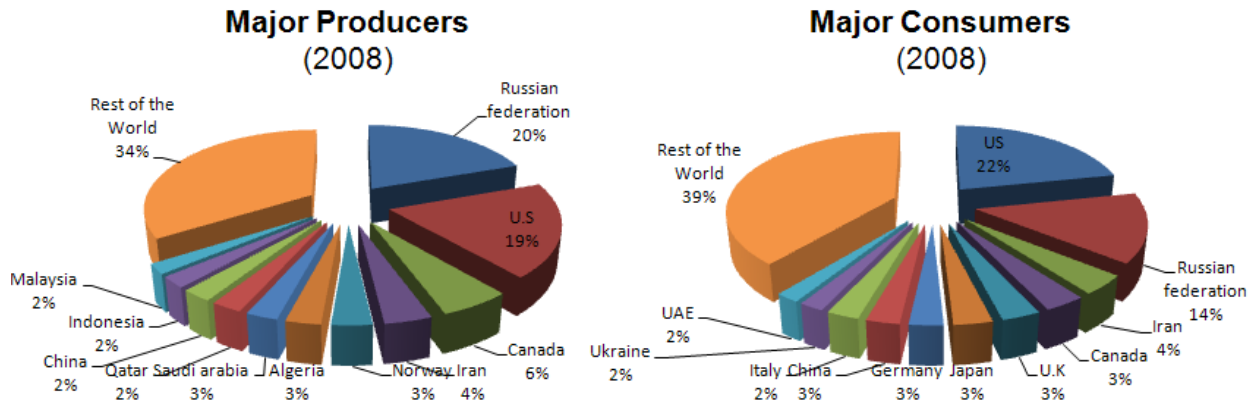
Proved reserves countrywise at the end of 2008



Source:BP Statistical review of world energy 2009

Major producers and consumers:

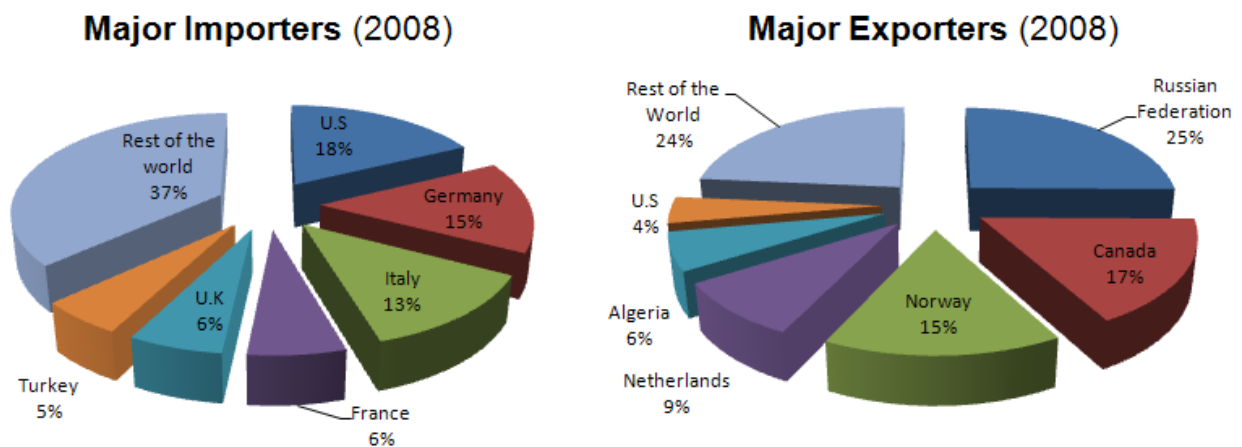
According to 2008 estimates Russia was the largest producer while U.S was the largest consumer. The figure below shows that Russia, U.S and Iran are amongst the top 5 producers and consumers of Natural gas in the world (An aggregate share of more than 40% in the worlds production and consumption).



Source: BP statistical review of world energy 2009

Major Exporters and Importers:

Russia is the largest exporter followed by Canada, Norway, Netherlands and Algeria. On the import side U.S has the largest share followed by Germany, Italy and France.



Source: BP statistical review of world energy 2009

Uses of Natural gas:

- a. Electricity generation(gas turbines, steam turbines)
- b. Domestic use i.e...Cooking, heating/cooling purposes.
- c. Automobile fuel
- d. Production of ammonia (fertilizer), hydrogen (used in chemical industry, oil refineries, fuel source).
- e. Other uses like manufacture of plastics, glass, steel, fabrics, paint and other products

Factors affecting supply:

Short term barriers:

- a. Availability of Skilled Workers, equipment, licenses for drilling and production, Weather (earth quakes, hurricanes) and Delivery disruptions like break in pipe line, worker strikes, social and political events.
- b. The Geo-political conditions of the countries from where the supplies are coming.

Long term barriers:

- a. Government policies: An exploration company trying to explore for natural gas in a foreign country needs to get the necessary clearances from the local government.
- b. Political relationships: When the relationship between two countries is hostile it becomes difficult for a supplier in one country to export/import commodities as restrictions might be placed.
- c. When the economy is weak it becomes difficult to dig new wells as funds are needed right from exploration to production to fund the activities.

Factors affecting Demand:

Several factors affect the demand for Natural gas. They are as follows:

Short term factors:

- Seasonality factor/Weather: The demand for gas changes as the year goes by because during winter season gas is needed for heating purposes. While during the summer months the demand is lower. So there is a general build up of gas inventories during the summer months to prepare for the spike in demand during the winter. For instance US demand for natural gas spikes between December to February, and falls between the months of July and October.

However there is a slight deviation from this seasonal trend.

During the summer there is a demand rise in electricity for cooling needs. As natural gas can be used for electricity generation there is an increase in demand during these months.

- Fuel switching/Alternate fuel sources: Switching to some other fuel because of prices can also cause fluctuations in the demand for natural gas. For example low prices of natural gas compared to coal or oil might encourage consumers to substitute gas for the above mentioned fuels in electricity generation or transportation.
- State of World economies in particular the US economy: Depending on the state of the economy the prices are determined by the market forces of supply and demand.

Long term factors:

- GDP growth can be a good indicator for the demand of commodities like gas. As the GDP grows so does the demand for gas due to higher activity in industrial, commercial and power generation sectors.
- Environmental regulations: They can affect the usage of fuels which have higher emission of green house gases than natural gas and there by support higher demand for natural gas.
- Government policies: With each new government the additional duties to be paid might change, thereby the prices and the demand for natural gas.

The demand for natural gas depends upon the changes taking place in the sectors it is catering to.

The sectors it caters to are

- I. Residential and commercial
 - a. Residential heating applications affect how many existing/new homes are built or the commercial space that use natural gas driven appliances for their heating purposes.
 - b. Electricity industry deregulation: Since the major share for electricity generation is natural gas, changes in policies in the electricity industry can affect the demand.

II. Industry sector demand

Industry demand depends upon how well the economy is faring. Main consumers are petro chemical and chemical industries where it is used as feedstock for production of chemicals like ammonia and other chemicals; Iron & steel industry; mining and quarrying industry.

III. Transportation sector demand

Natural gas is used as a vehicle fuel in some countries like Argentina. It emits lesser amount of pollutants compared to other fuels.

- Technology

Technological advancement can increase the efficiency of natural gas as a fuel there by increasing its usage. They can also vary the machine design used in different sectors.

World Estimates:

- Worldwide consumption of natural gas is projected to increase by nearly 66 percent between 2005 and 2030.
- Among the end-use sectors, the industrial sector remains the largest consumer of natural gas worldwide, accounting for 44 percent of the total increase in demand for natural gas between 2005 and 2030.
- Natural gas also is expected to remain an important energy source in the electric power sector, particularly for new generating capacity.
- By the year 2030, total world consumption of natural gas is expected to be 158.0 Tcf.
- The world production and consumption of natural gas has been steadily rising over the years. The world production has increased by 3.8% and consumption increased by 2.5% in 2008. From 1997-2008 production had been increasing at a 10-year compounded annual growth rate (CAGR) of 2.96% while consumption had been rising at 2.77% over the same time period. (BP Statistical review of world energy 2009)
- There was a 27.7% increase in the world reserves from 1997 till 2008. The main regions that contributed to this increase were U.S (42%), Turkmenistan (202%), Iran (28%).

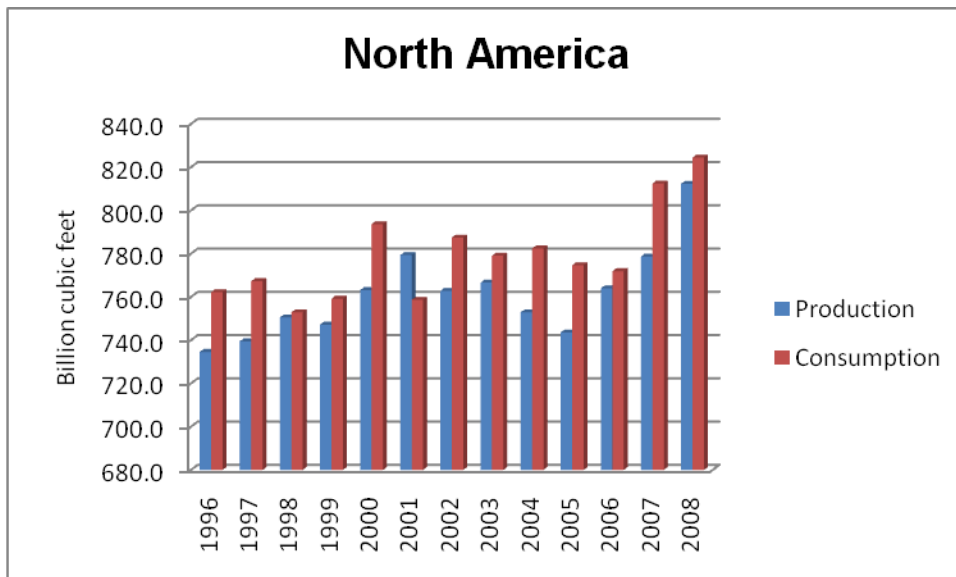
Region wise analysis

A.North America:

The main players in this region are U.S, Canada, and Mexico.U.S is the largest consumer and 2nd largest producer in the world.

Natural gas infrastructure in the United States has grown significantly through development of natural gas pipelines and storage capabilities for huge national operating centers or “hubs.” Almost 95 percent of U.S. natural gas imports come from Canada through pipeline. In Canada Natural gas consumption for electricity generation has increased by more than 300% since 2000.Natural gas is becoming a dominant fuel compared to coal and petroleum when it comes to electricity generation in this region.

The power (29%) and the industrial sectors (33%) have the largest share in natural gas consumption while residential demand (23%) comes third. Canada is the largest exporter in this region. (Over 3.5 Tcf since 2003)

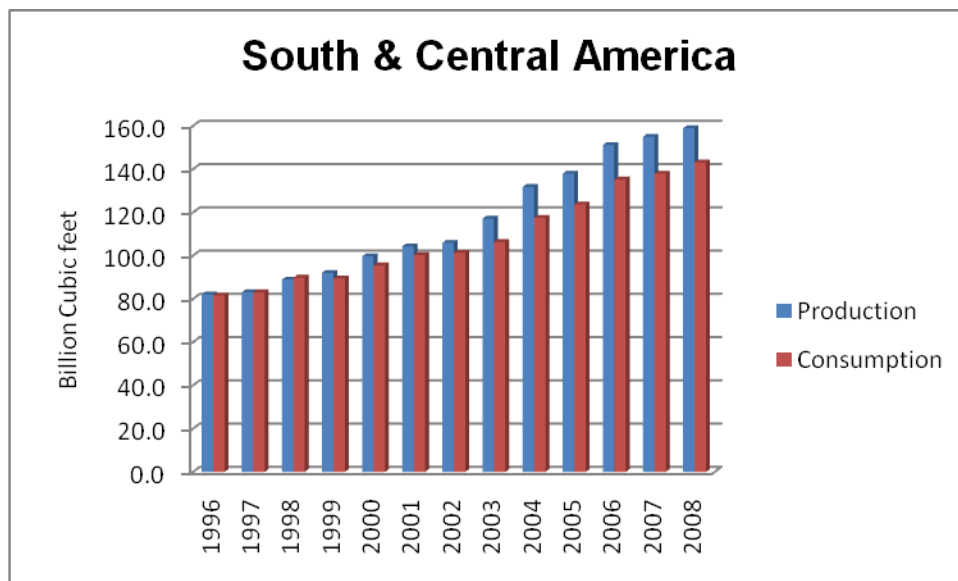


Estimates:

- a. The R/P ratio for North America as a whole at the end of 2008 was 10.9 yrs. This might imply that by 2018 Natural Gas has to be obtained from other sources unless new reserves are found.
- b. There was a **45.5** percent fall in the number natural gas rigs (drilling machines) operating in the US since the beginning of 2009.
- c. Seasonality plays a crucial role when it comes to natural gas. The residential demand tends to peak during January when the winter season intensifies while the electric power sector demand for space cooling need is high during July period when summer season peaks.
- d. According to the EIA, net imports from Canada equaled 3.49 Tcf, and this level is expected to decrease at an annual rate of 1.4 percent to a level of 2.56 Tcf per year in 2025.
- e. LNG imports are expected to increase at an average annual rate of 15.8 percent, to levels of 4.80 Tcf of natural gas by 2025.

B.South & Central America:

Trinidad and Tobago is the largest exporter in the region exporting more than 50% of its production and has an R/P ratio of 12.2 yrs as of 2008. Exports from Argentina had fallen more than 50% (due to the energy crisis) since 2004 while exports from Bolivia had increased by more than 130%. Brazil is the largest importer in the region while Chile (used to import from Argentina) has shown a fall in its imports. Hydro electricity had a 26-27% share in 2007 and 2008 in this region. More vehicles run on natural gas in Argentina than anywhere else in the world. The production and consumption in this region have increased by 91% and 72% respectively since 1997 till 2008.

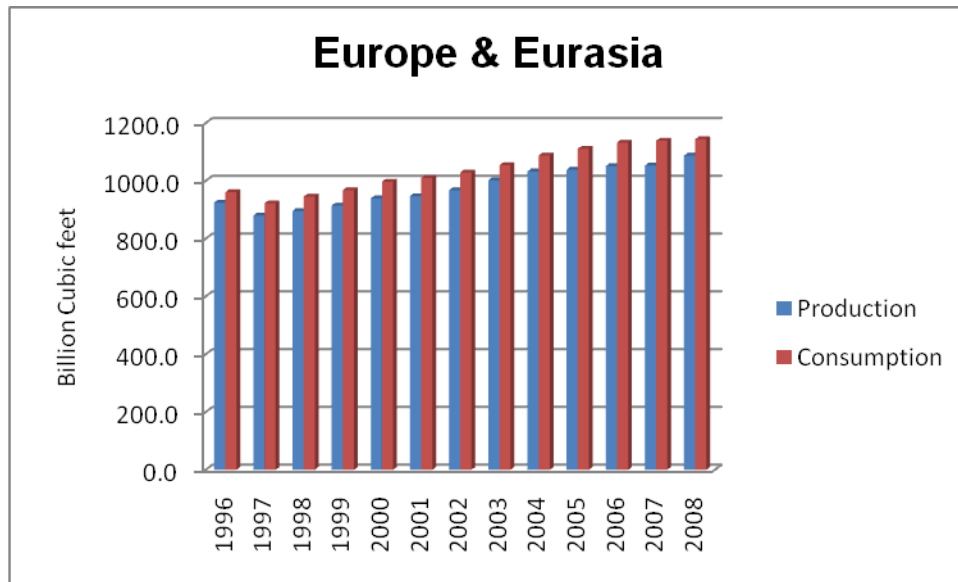


Estimates:

- The region accounts for 4% of the world reserves and has an R/P ratio of around 46 years as of 2008. Venezuela tops the R/P ratio with over 100yrs of reserves to cater to its needs.
- Venezuela as part of its Natural gas revolution plans to reduce consumption of gasoline and diesel fuels inside the country and change over to natural gas as a cheaper and cleaner fuel source.
- Argentina is heading for a period of energy dependency due to lack of investments where import prices set the domestic prices.

C.Europe and Eurasia:

The region holds the largest share in production (35.4%) and consumption (37.8%) of Natural gas in the world. Natural gas had a share of 34-35% in this regions primary energy usage closely followed by coal. Close to 80% of the exports from Eurasia come from Russia. Production and consumption in the Russian federation increased by 16.4% and 23.6% from 1997 till 2008.

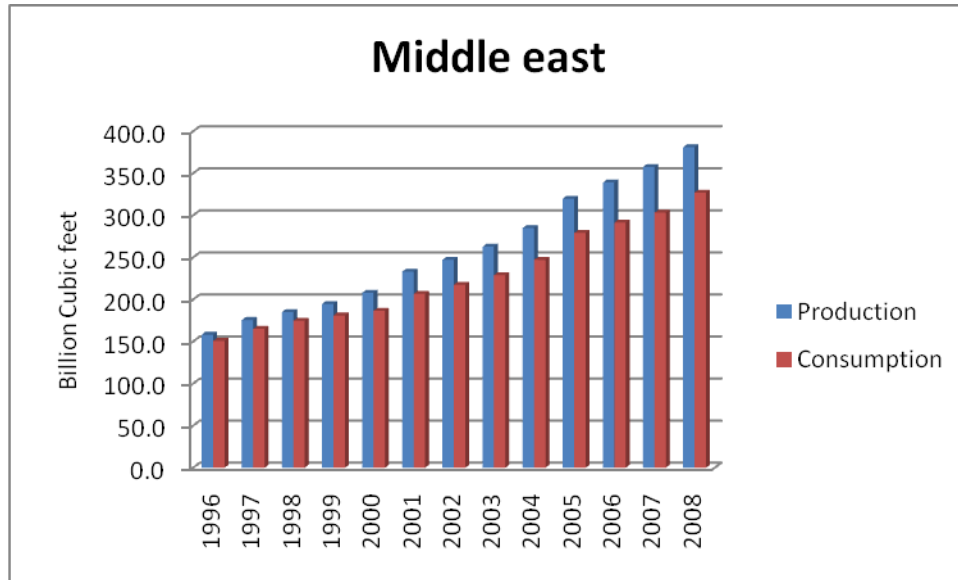


Estimates:

- a. The share of this region in the world’s reserves was 34% with an R/P ratio of 57.8 years according to BP statistical review of world energy June 2009.
- b. Gazprom’s (Worlds largest gas company) natural gas production forecast calls for modest growth of 1-2 percent per year by 2010.
- c. Russia will continue to play a prominent role in the World natural gas market.
- d. Despite having enough reserves, production has grown slowly due to lack of transportation capacity and low domestic prices.

D.Middle East:

Oil and natural gas have a share of over 97% in this region primary energy consumption. The production and consumption in the region have increased by 117% and 98% respectively since 1997 till 2008. Iran's production has increased by more than 138% and consumption of Natural gas has more than doubled since 1997. The overall production in this region has doubled since 1997.

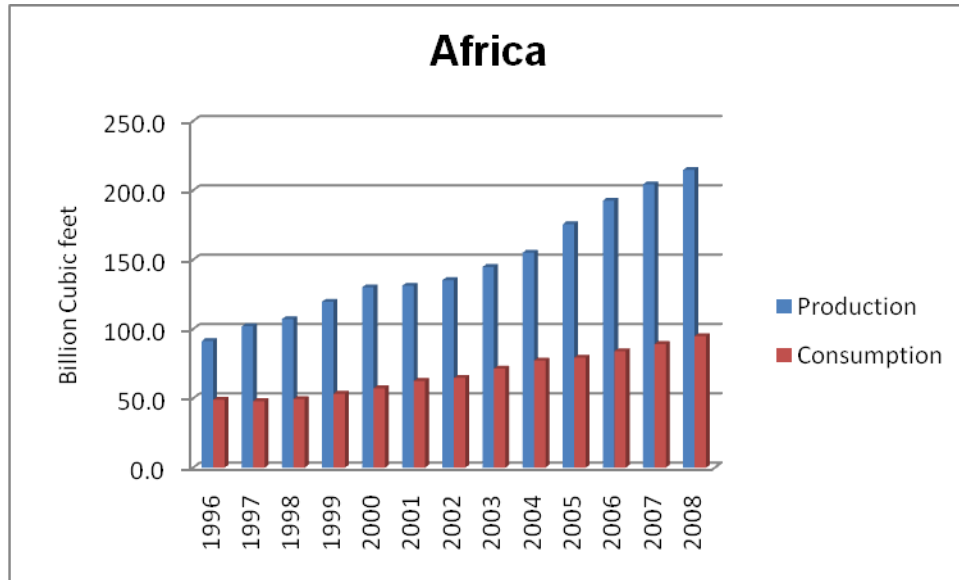


Estimates:

- Around 41% of the worlds reserves are located in this region and the region has an R/P ratio of over 200 yrs as of June 2009 BP statistical review of world energy.
- According to Saudi Aramco forecasts, natural gas demand in the kingdom is expected to nearly double to 14.5 billion cubic feet per day (Bcf/d) by 2030, up from an estimated 7.1 Bcf/d in 2007.
- Iran is expected to continue the rise in both production and consumption followed by Qatar.

E.Africa:

The region holds a share of 3% in the total natural gas consumption in the world. Algeria accounts for more than 80% of the exports from this region. Egypt's natural gas sector is expanding rapidly with production having increased over 300 percent between 1997 and 2008. Tunisia is the largest importer of natural gas in the region.

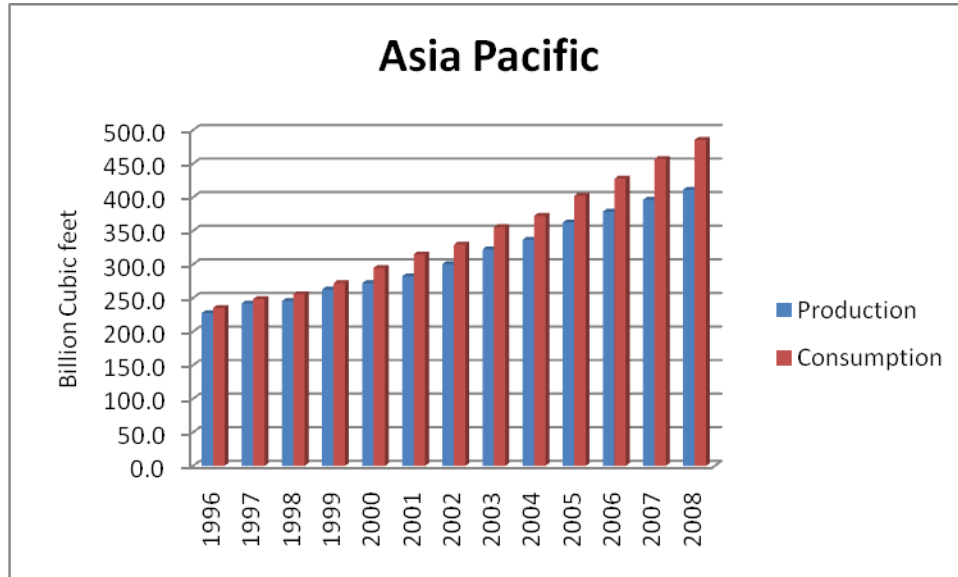


Estimates:

- a. Egypt is on its way to becoming a leading supplier of natural gas throughout the Mediterranean region. Due to major recent discoveries, natural gas is likely to be the primary growth engine of Egypt's energy sector for the foreseeable future.
- b. The reserves for region as a whole stand at 14.65 bcm with an R/P ratio of 68.2 yrs as of June 2009 BP statistical review of world energy.

F.Asia Pacific:

Oil (30%),Gas (10%), coal (51%) are the main fuels consumed for primary energy in 2007 and 2008. Indonesia and Malaysia account for around 60% of the exports from this region. The production in this region has increased by almost 69% and consumption has increased by more than 95% since 1997 to 2008.India (increase of 85% since 1997) and China (increase of 312% since 1997) had been the largest consumers followed by Japan.



Expanding gas use will reduce troublesome oil dependency, especially high import dependency on the Middle East, because Asia has its own natural gas supplies, and it will alleviate the pollution currently produced by coal burning and carbon dioxide emissions.

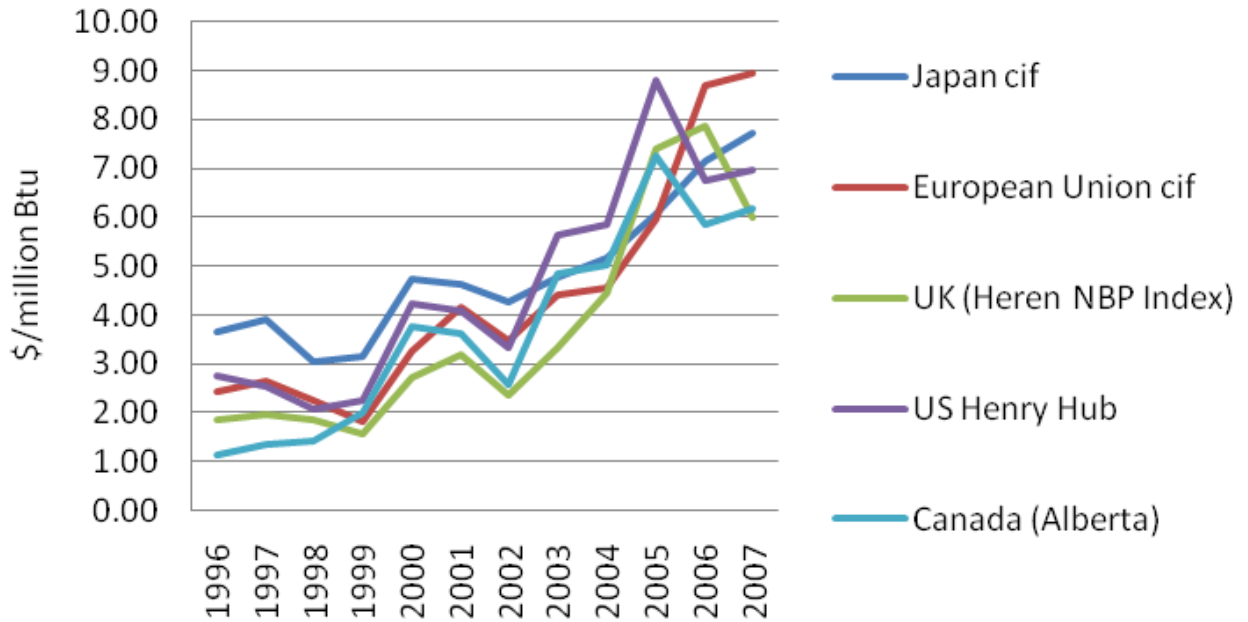
The main obstacle to increasing the use of natural gas today is the lack of sufficient terminals, long-distance pipelines, and local network systems for its transport.

Estimates:

- a. 90% of the regions oil imports are from the Middle East which raises concerns for the Government. Though the oil reserves are limited the gas reserves are encouraging. So there is a scope for improvement in natural gas industry.
- b. Gas trade in the Asia Pacific region is predominantly in the form of LNG, and in fact Asia dominates the world LNG market (A share of 69% of the total world LNG imports).

- c. Many new pipelines and projects are being initiated to fully utilize the advantages that natural gas offers over other fuels including geo political advantages to reduction in pollution levels.

Historical Price movements



Source:BP Statistical review of world energy 2009

NBP stands for “National balancing point” ; Similar to Henry hub in U.S.

Natural Gas (Cubic meters) ; Source:www.energy.eu	
Total World reserves Jan 1 st 2009	174436171550404
World usage per second	92653
Estimated date of Exhaustion	07:19 Sep 12,2068

Review of Quarter 2

In here we will be focussing on the U.S gas market which acts as the benchmark for the prices of Natural gas around the world. Moreover U.S being the largest consumer and ranking second in terms of production has a considerable say in the natural gas market in the world.

Regional gas market vs Global oil market

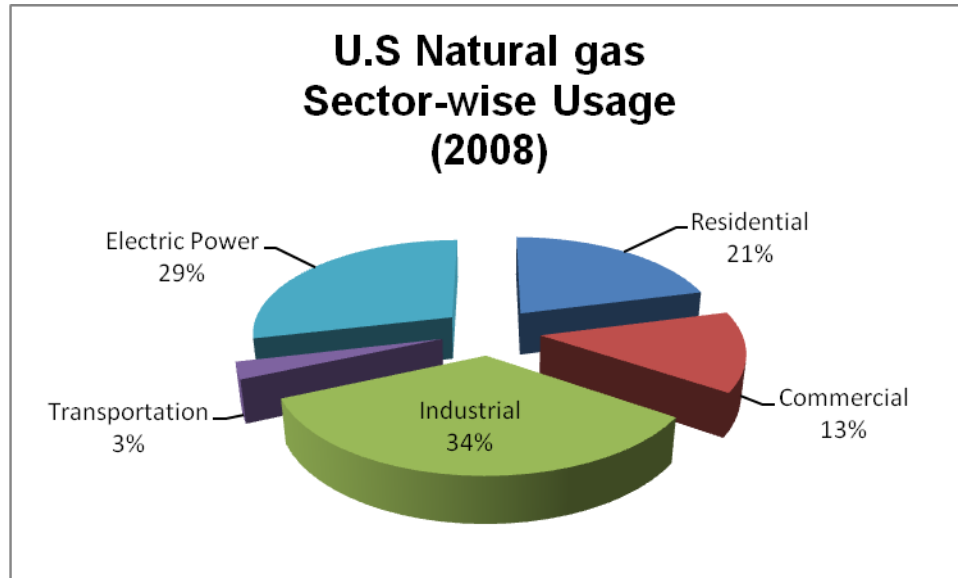
Prices of oil being used around the world are set on a global platform where as Natural gas prices had been confined regionally rather than globally. We will discuss the reason on why such an inconsistency exists between oil and gas.

1 barrel of crude oil releases the same amount of energy as 5.8 MMBtu of gas.

According to this principle Crude price (per barrel) should be ideally placed at 5.8 times the price of gas (per MMBtu). But in reality this transition from oil to gas poses a major hurdle. The market for Natural gas is more regional than global because of one major reason. Natural gas is mostly transported through pipelines. The expansion of pipelines adds to geographical, political and financial complications. However LNG (Liquefied Natural gas) can be a solution to this problem. It occupies 1/600th the volume of natural gas and gives a choice beyond pipelines when transported over large distances. In 2008 LNG trade amounted to 7.995 Trillion cubic feet. That's less than 10 percent of the total Natural gas Production /Consumption of over 100 Trillion cubic feet in 2008. Infrastructure costs have stood in the way from LNG becoming the alternate solution to Oil.

Natural gas highlights during Q2 2009 (April 2009-June 2009)

- Natural gas reserves up by 35 percent in U.S between 2006 and 2008.
- Natural gas consumption by industry in U.S falls.
- Natural gas prices reach 6 year lows on NYMEX.
- Excess supplies and weak demand keep prices low.
- Natural gas gets cheaper compared to oil as price gap with Crude widens.
- U.S Natural Gas rig (drilling machines) count for Q2 averaged around 729 down 324 from previous value.
- Natural gas inventory level in U.S. at the end of Q2 stood at 2721Bcf up 1067Bcf from Q1 end.
- Europe looks to diversify its Natural gas needs to reduce its dependence on Russia.



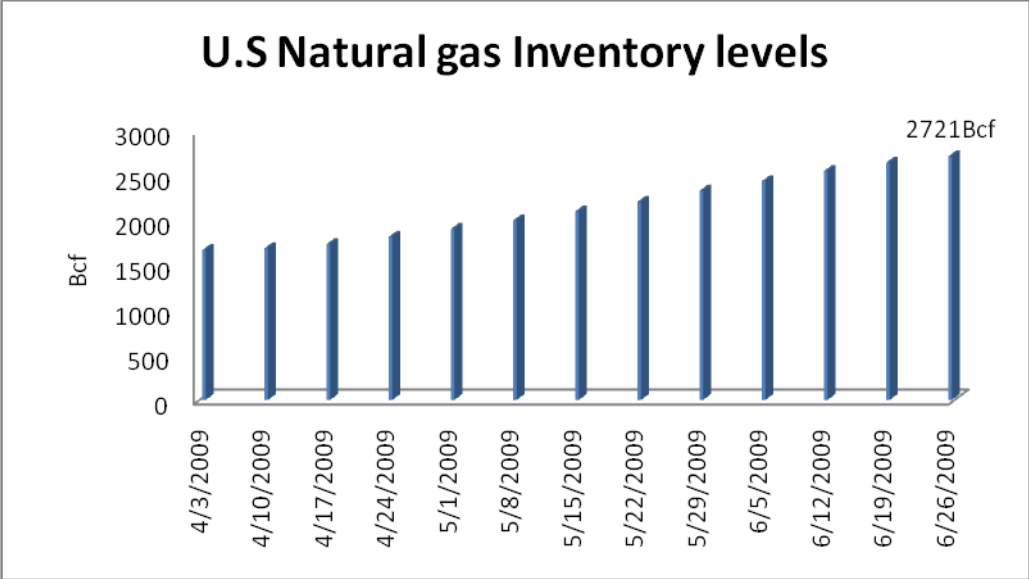
Fundamental Point of view:

Production:

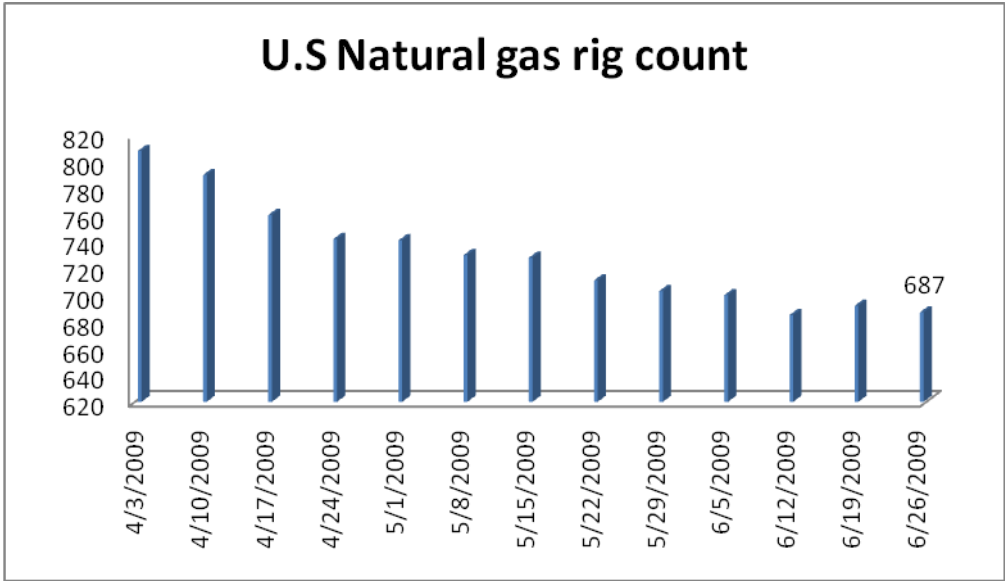
The inventory level generally rises at this time of the year and this time the look remained unchanged. Since we are in the middle of the worst economic slump since World War II, the demand for gas has dropped further due to weak industrial demand and as a result inventory levels are 20.7 percent higher than the 5-yr (2004-2008) average at this time of the year. The graphs below elaborate on the rig count as well as the inventory levels in Q2.

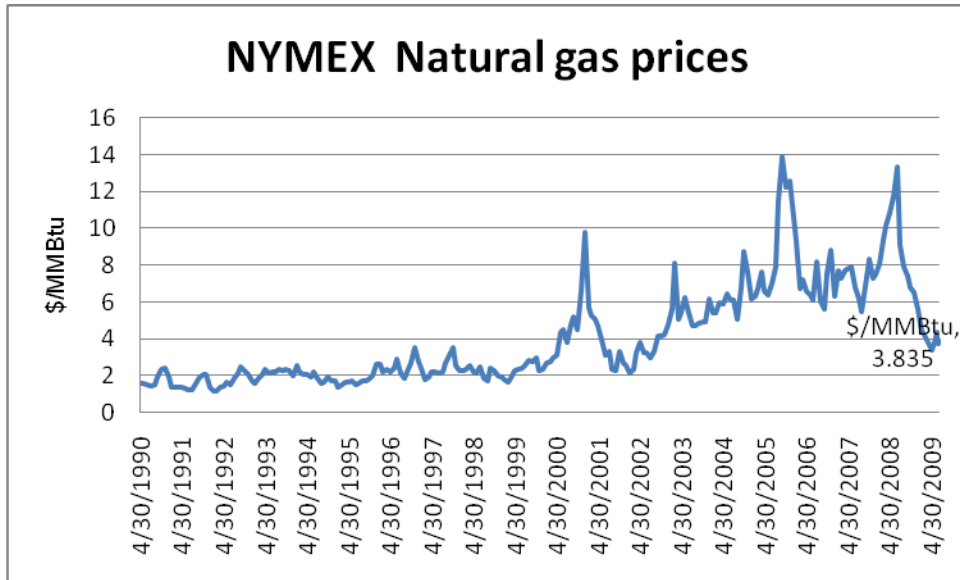
The number of rigs operating has also fallen dramatically in the U.S showing the lack of demand and low prices. With supplies still entering a weak market this count is expected to fall down further to make the necessary adjustments to price according to EIA.

According to EIA total U.S. marketed natural gas production is expected to decline by 1.1 percent in 2009 and by 2.6 percent in 2010.



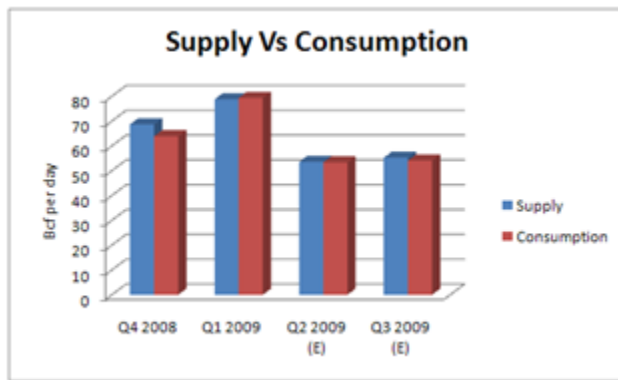
The figure below shows the Natural gas rig count in U.S.





Consumption:

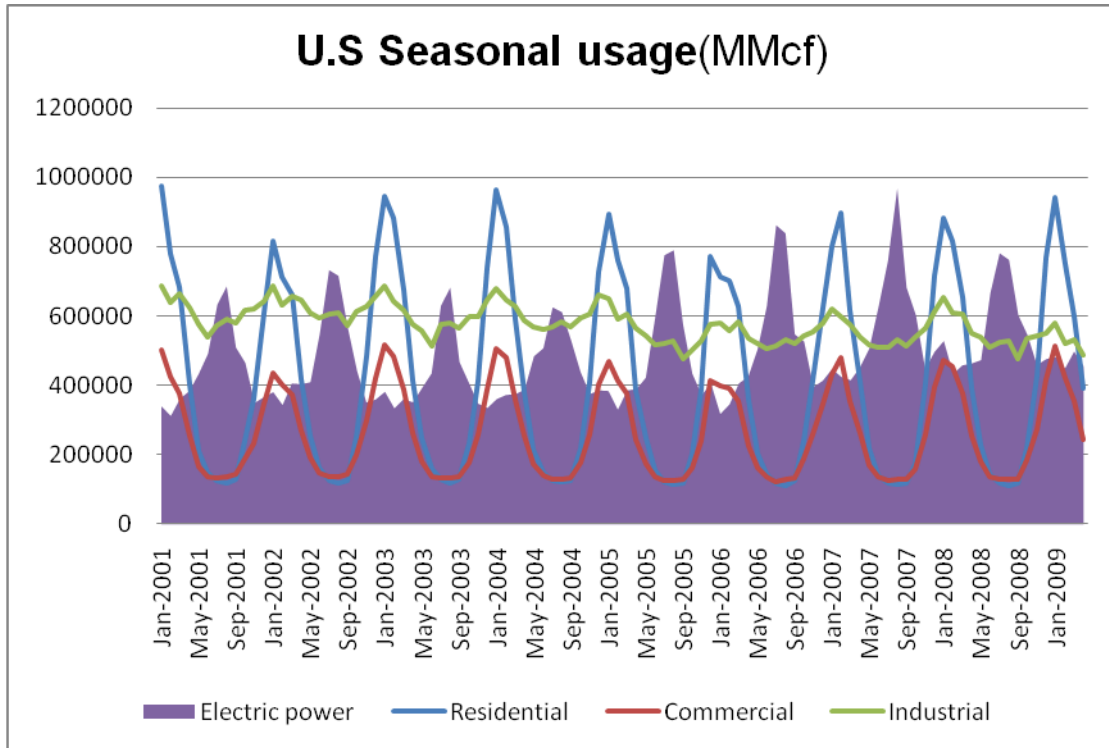
This year consumption is expected to decline due to declines in industrial, residential and commercial demand. However low prices are expected to cause an increase in electric power sector consumption towards the end of the year according to EIA. Mild temperatures have lowered the prices of electricity and thereby the prices of natural gas needed to produce electricity during Q2. EIA projects that Natural gas consumption to decline for the first time, by 2.2 percent in 2009 and then increase slightly in 2010. Prices for Q2 averaged \$3.81/MMBtu (Average of closing prices quoted on NYMEX).



Source: EIA

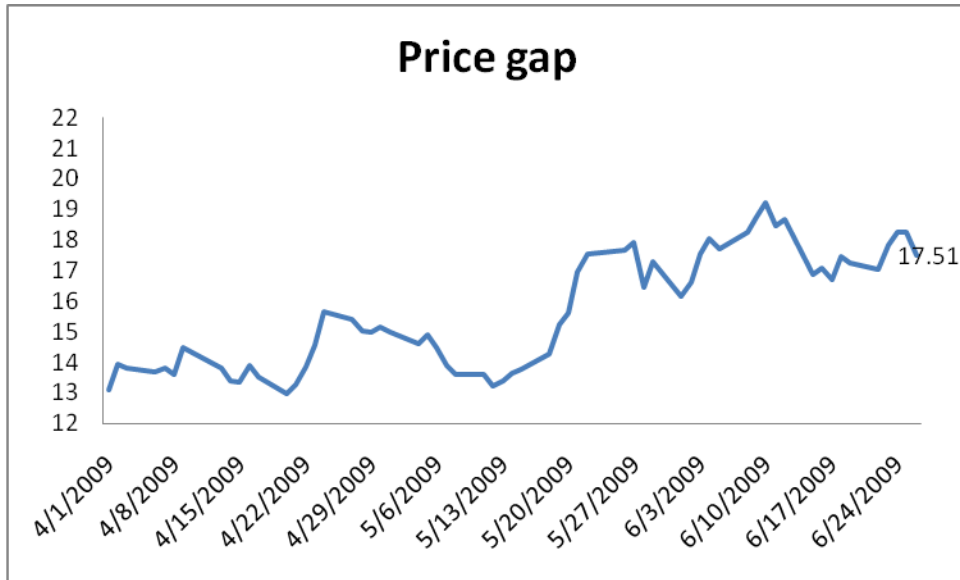
The seasonal demand for natural gas generally rises during November to February both commercially and residentially. In the summer months starting from June due to more than normal usage of electricity

for cooling needs Natural gas demand generally spikes. But however that demand spike depends on the weather. The summer season also coincides with the Atlantic hurricane season when strong hurricanes disrupt the production especially in the Gulf of Mexico.



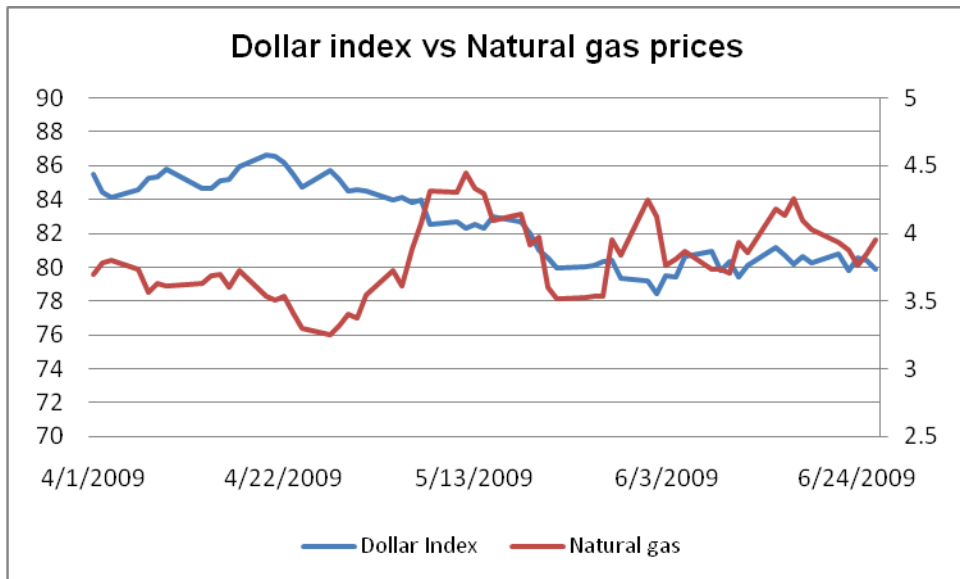
Price gap with Crude:

Historically speaking Natural gas cost around 9 times the price of Oil. With Natural gas able to substitute for crude oil in electric power sector or for transportation in the form of CNG (Compressed Natural gas) it can pose tough resistance to oil and its products like gasoline and diesel. The price gap with crude has steadily widened during Q2 contributed by weak demand and high inventory build up for Natural gas.



The graph above shows the price gap with oil since beginning of Q2 2009. If the gap widens further then the demand for Natural gas as a substitute for oil can go up and as a result the price too will go up. [Price gap = Crude oil Price/Natural gas price]

The relationship exhibited between dollar index (Measures the dollars movement against six major currencies) and Natural gas price over Q2 is shown below. As the graph shows dollar depreciated over the period while Natural gas prices rose slightly, dollar depreciation being one of the factors.



Weather outlook

Natural gas prices generally rise at this time of the year due to seasonal demand for power generation that caters to space cooling needs like cooling/Air conditioning. So far barring a few regions the temperatures haven't soared enough to push the demand up in the U.S. However as the peak of the summer season arrives demand needs may change.

2009 Outlook for hurricane season

NOAA outlook for the upcoming hurricane season (June 1st to November 30th) predicts a **50% chance of a near-normal season**, 25% chance for a above-normal and 25% chance for a below normal season. Within the Atlantic basin over the next 6-months NOAA predicts with a 70% probability the formation of 9-14 storms that include 4 to 7 hurricanes of which 1 to 3 will be severe.

Based on Monte Carlo simulation the output at 50% chance for a near-normal season stands at 36 billion cubic feet. The regions that come under Atlantic hurricane region include the North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

Factors to watch out for:

Short term:

- We expect the prices for this quarter (Q3) to stay low as inventory levels are at such high levels and that too at such an **early period during the summer** season with **no significant demand visible**.
- The EIA inventory level was highest (since 1994) as on 2nd Nov 2007 at 3545 Bcf. The inventory level reported on 1^{9th} June 2009 was 2721 Bcf. At this level gas injections week on week at 45.7Bcf will hit the recent high. The last reported change in inventory level was 70Bcf.
- With mild weather so far and a forecast for near-normal hurricane season **weather might not play a big role** in moving the gas prices in Q3 of 2009.

Long term:

- Prices should recover towards the end of 2009 / early 2010 as it signifies demand revival with the beginning of winter. Here again demand can catch up only if the weather is above normal / severe.
- Since the price gap between crude and gas has been widening in Q2 towards historic highs chances are the demand for gas should be up as it can substitute for oil in electric power sector and transportation sectors.
- As the number of rigs (drilling machines used near wells) falls the weekly change in inventory levels should fall curbing the inventory build up to some extent.
- The last but not the least, revival of economies around the world especially the U.S and European economies holds the key to changing the demand outlook in the future. According to IMF while the rate of contraction should moderate from the second quarter onward, world output is projected to decline by 1.3 percent in 2009 as a whole and to recover only gradually in 2010, growing by 1.9 percent.

Technical point of view:

The most active Natural gas futures traded in an indecisive manner for the last quarter by closing the quarter near to its opening levels with the formation of “Doji” pattern. Market is likely to trade down since the closing of previous quarter candle renders down trend. The Market is witnessing an immediate support at \$3.15, on breach and sustain below the same confirms lower prices in the near term.

In the daily chart the formation of “**Symmetrical triangle**” is further strengthening the downward movements. Market has given downhill breakout and witnessing a support at \$2.4 levels (*Long term Trend line Support*).



The above fig showing formation of “**Symmetrical Triangle**” and market has given lower breakout (continuation pattern), expected to test trend line support at \$2.4 levels. The above statements are supported by Volume (Increase in volume during lower breakout)



The above figure indicates, the momentum indicator MACD is trading below “0” median line and showing potential towards down in the vicinity term. Likewise, the ADX indicator is at 21 levels signaling market is in trading phase and its better to avoid buying in the nearby term. Moreover, prices are expected to trade in the range of \$4.10 on the higher side and \$2.838 on lower side, on breach of the same likely to test \$2.4 levels on lower side.

Support: \$2.8, Resistance: \$4.10, \$4.65

Natural Gas MCX: Supports: 155,134, Resistance: 196, 223

Our stance: We expect Natural Gas prices to trade lower at NYMEX and possible targets are at around \$2.80 then \$2.40

Likewise, at MCX market may come down to around 134 assuming USD/INR to be constant at 48. However, going by the MCX chart, currently prices are trading at life time low at (167) and the potential supports are at 165, 150 and 135 levels. However, the market sentiments and the chart pattern suggest prices are almost at the oversold territory and hence investors may jump in, to take long positions at the bottom levels.

Although, chart pattern is not rendering any buying signal, but high risk tolerance investors may buy natural gas at around 135-140 for a long term investment having a target of 200-220 range with stop loss below 120.

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