International fuel market- behaviour and impact

The global energy consumption is projected to grow by 56 per cent between 2010 and 2040 with fossil fuels supplying almost 80 per cent of the world energy use by 2040 (US Energy Information Administration, 2013). Nearly 90 per cent of the coal produced world-wide is consumed by four heavy manufacturing sectors: power generation, steel, construction materials and chemicals. At the same time, the growth of natural gas, in production and share in the energy mix, is being supported by the growing supplies of tight gas, shale gas, and coalbed methane.

The mechanisms governing the production and consumption of coal and gas vary based on market conditions, availability of new sources of fuel, as well as the environmental risk and the sustainability factor surrounding exhaustion of fossil fuels. The US continues to be a major gas consumer with consumption of 722.1 billion cubic meters (bcm) in 2012 followed by Russia, Iran and China (BP Stats, 2013). Given the rising share of natural gas in the energy basket, coal will continue to hold a major share in the energy mix as power generation capacities continue to be set up across economies. European nations, in particular Germany, UK and Poland, are looking at coal as a major fuel in its energy mix, in the light of low international coal market prices.

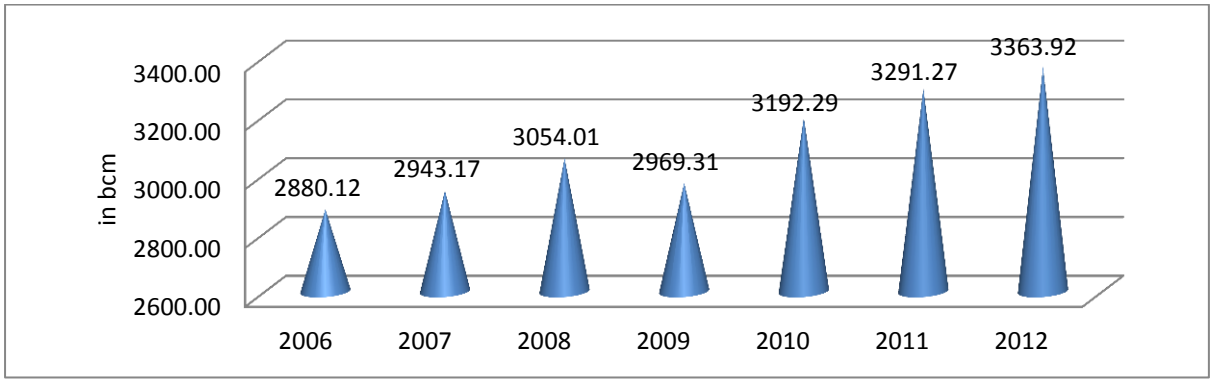
Global Gas Market

The regional gas markets have so far been located in North America, Europe and more recently Asia. While gas in the first two regions was being supplied through pipelines, the Asian market was supplied gas through liquefied natural gas (LNG) imports. First produced in Fredonia, New York in 1821, shale gas is not a new phenomenon. In the light of the precarious energy security present today, its recognition has grown multi-folds, with extensive exploration and extraction activities being carried out in US and Canada and commercial production in China.

Demand and Supply

Natural gas accounted for 23.94 per cent of world primary energy consumption in 2012 (BP Stats, 2013) and 21.3 per cent of total primary energy supply in 2011 (IEA, 2013). The world production of natural gas has increased over the last four decades at a compounded annual growth rate of 4.2 per cent, as depicted in the Chart 3. However, this growth is slower than the last ten-year average of 2.7 per cent per year on account of a less favourable economic environment.

Chart 1 World Natural Gas Production



Source: Statistical Review of World Energy 2013, BP Global

After reaching its initial peak in 2008, the natural gas production declined in 2009, owing to the 2008 economic recession and the fall in gas price (reduced industrial and manufacturing activity, and lower electricity use) as examined by the US-EIA.

With production of shale gas, the total gas production in the US increased from a little over 550 bcm in 2001 to more than 680 bcm in 2012, recording an annual growth of nearly 2 per cent in the eleven year period. This increase in production has also led to a decline in the gap between gas consumption and production from domestic sources (TERI, 2014). The overall gas trade volumes (LNG and Pipeline gas) have only marginally increased from 1,029.83 bcm in 2011 to 1,033.39 bcm in 2012. The gas exports were concentrated among Russian Federation (200.73 bcm), Qatar (124.67 bcm) and Norway (111.35 bcm)[1]. On the import side, Japan LNG imports 118.79 bcm, accounted for 11.5 per cent of total imports followed by European nation (excluding Germany, Italy and Norway) with total imports of 105.83 bcm and a 10 per cent share (majority of pipeline exports). The US imports of LNG have undergone drastic decline to low quantities of 4.9 bcm in 2012, falling 50 per cent over 2011 imports (BP Stats, 2013). Authorizations are now being sought by developers to build new LNG terminals (green field) or expand existing terminal (brown field) for export purposes

The global natural gas markets is spread over three major regions — the North American, the European, and the Asia/Oceania region (Japan, China, Korea and Taiwan). Over the period January-August 2013, the North American gas demand stood at 597 bcm, Europe at 339 bcm and Asia/ Oceanic region at 244 bcm (Tetsuo Morikawa, 2014). With the falling international gas demand from the US, the supplies for exports are being diverted to the European and Asian markets. For Europe, this has particular significance as it reduces their (the countries') dependence on Russia, and helps diversify import sources. At the same time, countries in Asia/Oceania will also benefit as well, both from the increasing availability of short-term and long-term contracts as well as the possibility of reducing their risk basket through greater diversification of import sources. (Joshi, 2013). Meanwhile, slowdown in gas requirements significantly was seen in the European gas market[2], has been compensated for by an increase in LNG gas demand from the emerging Asian markets. Also, the Fukushima nuclear accident in Japan augmented the energy appetite for LNG in order to offset the deficit in nuclear-generated power.

So far, the prices in North America and Europe were being set through long-term contracts tied to the price of oil. As of 2012, the price of natural gas in the US has remained at low level of around $3 per million British thermal units (mBtu); the European spot prices, albeit three to four times higher than those in US, are still at a discount of European long-term contracts, while prices in Japan peaked at a level considerably higher than those in Europe (Warner ten Kate, 2013). In 2012, the sector registered demand growth of 2 per cent. The Fukushima Daiichi nuclear accident, that took place in March 2011, has also boosted the regional demand for gas that is likely to replace nuclear in Japanese power generation mix (imports increased by 4 per cent). In spite of Shale Gas revolution in the US, the pricing and supply-demand scenario in the three major hubs (*discussed ahead*) remains distinctly different. Therefore, a change in the circumstances or any possible market integration is less likely to be seen in the medium term.

[1] International Pipeline Trade: Exports sourced from Russia (27 per cent), Norway (15 per cent) and Canada (12 per cent); International LNG Trade: Exports sources from Qatar (33 per cent), Malaysia (10 per cent) and Australia (9 per cent)

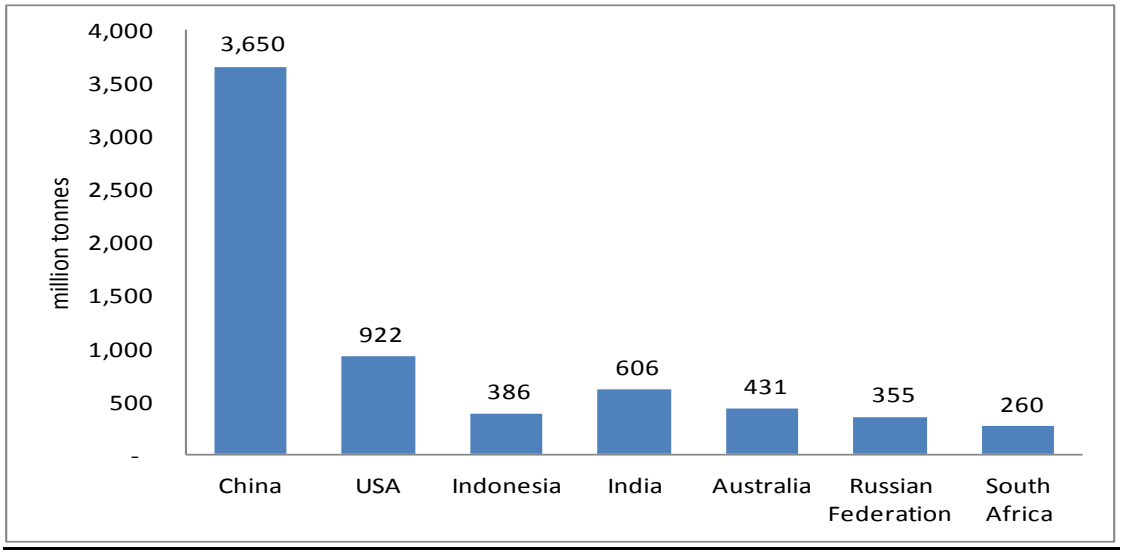
[2] With a shift towards coal based generation

Global coal market

Production and Consumption

International hard coal (includes steam and coking coal) trade increased from 385 million tonnes (mt) in 1982 to an estimated 1,276 mt in 2012. Yet, only 17 per cent of the total coal production is traded internationally, while the trade share stands at 60 per cent for oil and 33 per cent for natural gas. This is also because much of the coal production is domestically consumed by the countries (Cornot-Gandolphe, 2013). The coal production is dominated by China with 3,650 mt in 2012, registering a 3.8 per cent increase over 2011. This is distantly followed by US, India and Australia with 922 mt, 606 mt and 431 mt respectively. While China consumes all of its coal production, the Asian market comprises nearly 25 per cent of the US coal exports. The US coal is also being taken up by the European countries including Germany, UK and Italy.

Chart 2 Major Coal Producers (2012)



Source: Statistical Review of World Energy 2013, BP Global

The coal export space has been concentrated by Australia, Indonesia, US, Russia, South Africa, and Colombia, collectively accounting for about 84 per cent of the total (Cornot-Gandolphe, 2013). While Columbia has a modest coal production of 89.2 mt, over 90 per cent of its production is exported (to European and now Asian markets) bringing significant foreign capital to the developing country. Indonesia surpassed Australia as the leading coal exporter in 2011 with exports of 310 mt. to India, China, Japan, South Korea and European nations. Production of coal in Indonesia quadrupled in the period 2001-2011, with however a relatively low domestic consumption. The export growth has been driven by the close proximity of key export markets (India and China), low capital and operating costs and speedy mine-approval mechanism. South Africa of its total production exports nearly 30 per cent, mainly through the Richards Bay Coal Terminal.

During 2006-10 period, the Chinese coal intake captured 46 per cent of the consumption basket. At the same time, emerging and growing Asian markets (Korea, Taiwan, India among others) in the process of upgrading their industrial capacities increase their demands to meet their growth potentials. India witnessed a significant jump of nearly 180 per cent in coal imports from 49.79 mt to 137.56 mt in 2007-13 period. The high import dependency surfaced on account of the chronic power shortages, domestic coal supplies deficits and the logistical constraints in coal transportation. Amidst

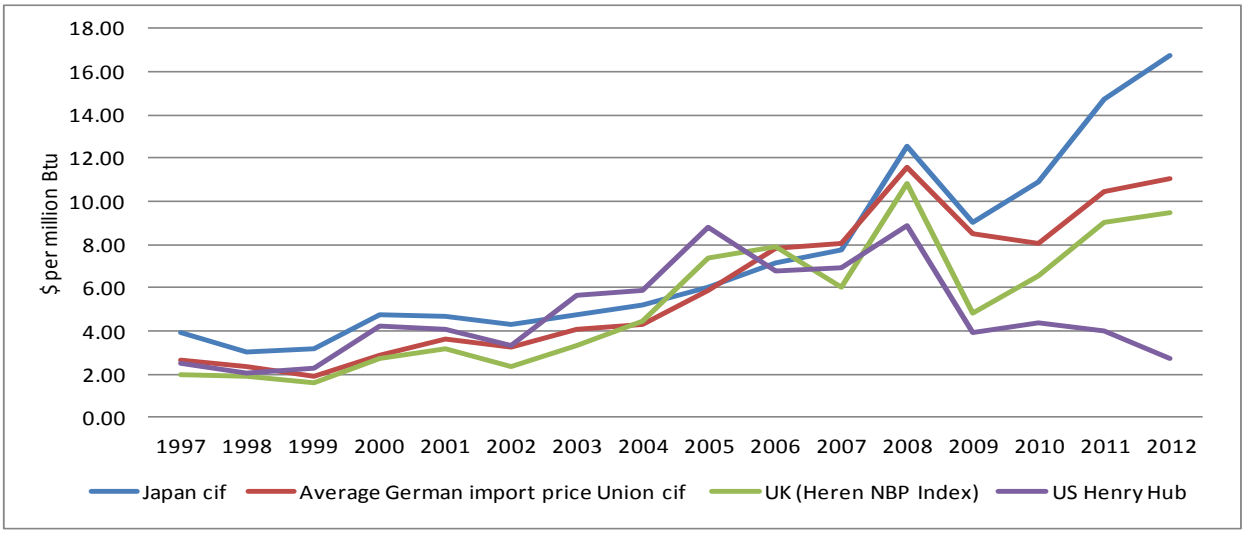
severe regulatory blocks, Indian coal players, such as JSW Energy Limited, Reliance Power Limited and Tata Power Company Limited, have resorted to increased overseas mine acquisitions to achieve fuel security.

China's transformation into a net importer of coal (175 mt, 2011) has made it one of Australia's main export markets in less than five years (Ben Caldecott, 2013), constituting 18 per cent of its thermal coal exports in 2012. Japan imported 184 mt in 2012 while South Korea imported 126 mt, sourcing their coal from Australian and Indonesian coal markets. However the growing concern over environmental deterioration is likely to shift Chinas coal demand for low rank imports away from currently expected levels (Ben Caldecott, 2013).

Coal and Gas Interplay

The coal and natural gas imports have considerably fallen in the US, while use of domestic natural gas for power generation has risen. Today natural gas and coal nearly match in share (32 per cent and 34 per cent respectively) in the US primary energy mix. A relative substitution of gas for coal can be seen in the US market with coal consumption falling from 495.5 mtoe in 2011 to 437.8 mtoe in 2012 and gas consumption rising from 626.5 mtoe to 654 mtoe over the same year (BP Stats, 2013).

Chart 3 International Natural Gas Prices (15-year period)

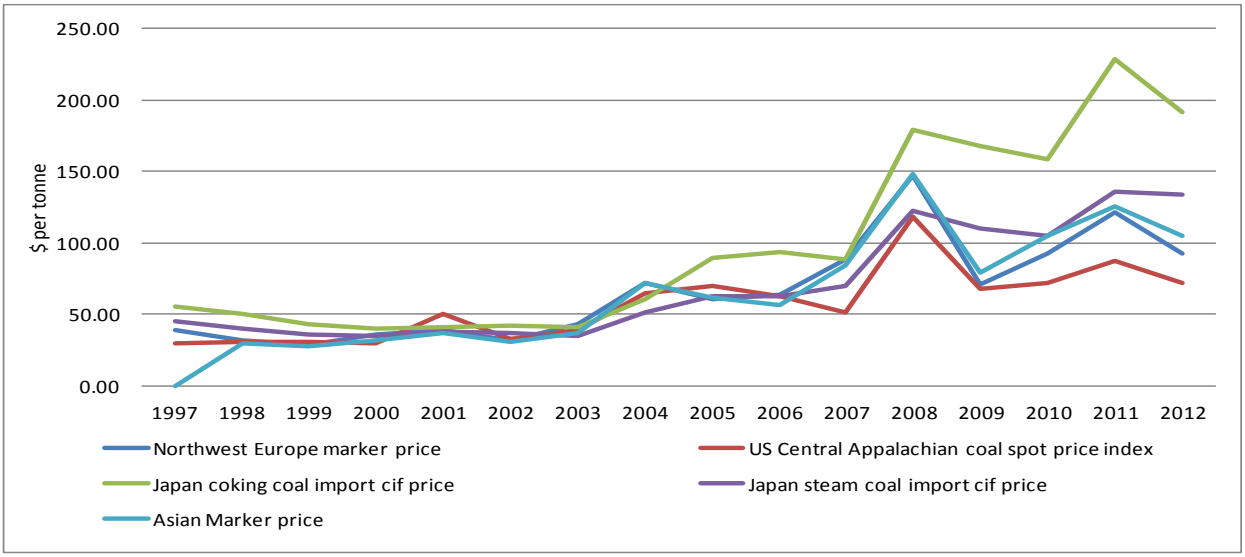


Source: Statistical Review of World Energy 2013, BP Global

The gas abundance reduced its prices at the US Henry Hub, giving it an advantage for trade over other suppliers. The Henry Hub plunged more than 30 per cent over 2012, as producers pursued production of shale gas and maintained ample supply. However, the same was not seen at other terminals. As examined by CEDIGAZ, in 2012, gas price differentials between the three main regional markets (US, Europe, and Japan) widened further. The surge in the Japanese LNG price is reflected in the rise in the oil price. In Europe, the average gas price of long-term contracts (which include a share of spot indexation) was also pushed up by both the rise in the Brent price and the NBP spot price. However, the existing price differentials between the North American and Asia-Pacific gas markets—current gas prices are about $3 per million British thermal unit (mmBtu) in North America, and $13–$16/mmBtu in the Asia Pacific—make the prospect for exports to Asia attractive to some producers.

In the interim, with falling US coal consumption (since 2007) the prolonged oversupply situation in the international markets has led to Newcastle benchmark coal prices crashing by 13.1 per cent to $81.45 a tonne in 2013. Further, the coal prices on all trading platforms plummeted in 2012 by 16-24 per cent (BP Stats, 2013). This is likely to drive distressed producers in coal exporting majors - Indonesia and Australia- to cut back production activities and hold supplies until the trend reverses.

Chart 4 International Coal Prices (15-year period)



Source: Statistical Review of World Energy 2013, BP Global

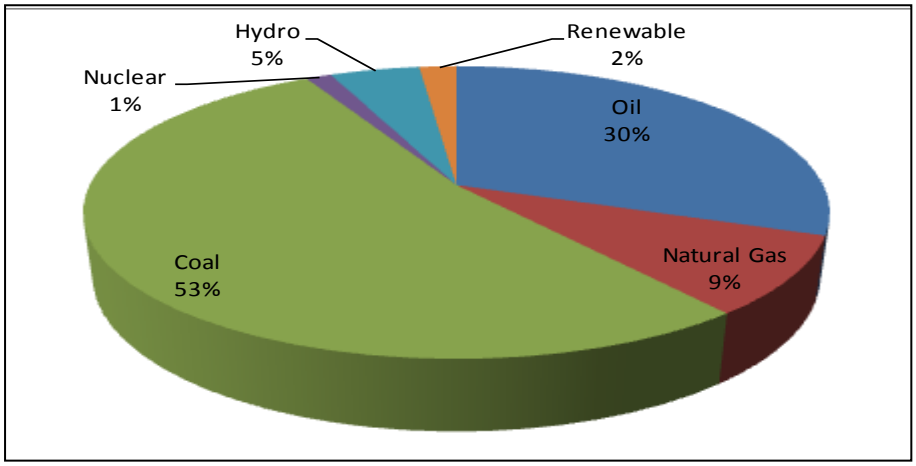
At the other end, the favourably low prices were taken up more significantly by European countries looking at switching from gas to coal. Increasing competitiveness against natural gas in the power sector pushed up coal imports by nearly 6 per cent from 199 mt in 2011 to 210.9 mt by end of 2012[3]. A major part of this increase came from Germany that has been replacing its nuclear consumption with coal based power generation that now contributes 52 per cent of its electricity demand (Franke, 2013). Coal consumption for Germany rose by 4.2 per cent over 2012. Further, the low cost of carbon allowance (Euro 4 per mt as compared to Euro 20 per mt in 2011) has made gas-to-coal switch relatively more profitable. While renewables such as solar and wind have grabbed increasing shares in fuel mix in Germany, they have displaced gas but not coal. Having said that, though coal availability increased mainly because of the U.S, pricing in the Asian market, unlike the European market, remained light. Nevertheless, the overall environmental implications not withstanding coal demand in both European and Asian markets will increase because of the cost advantage gas offers.

Indian Energy Market

In 2012, the India's energy consumption from all fuels stood at 563.5 million tone oil equivalent (mtoe). Heavy dependence on imports to meet its annual coal requirements persist, despite huge geological coal reserves of 298.91 billion tones (CMPDI, 2013). The coal imports increased from 102.85 mt in 2011 to 145.79 mt in 2012 (Bureau, 2012). This is expected to further rise with supercritical coal-fired thermal capacities being planned to be set up.

[3] Not only were the domestic coal prices on a higher scale, the coal imports stood cheaper compared to the high gas prices (that were linked to oil prices). Despite European gas contracts negotiated previously with Russian gas giant, Gazprom, the domestic gas prices continued to stay high.

Chart 5 Energy Mix in India (2012)



Source: Standing Committee on Petroleum and Natural Gas, 19th Lok Sabha Report

Imports from Indonesia recorded an increase of 50 per cent, to around 82 mt in 2012-13, a 10 per cent increase from Australia to 30.5 mt for the period, with the biggest growth seen from South Africa, which increased by about 66 per cent to 20.3 mt (Lok Sabha , 2014). Changes in coal policy regulations (such as coal pricing mechanism and carbon taxing) in the respective markets will thus have huge short and medium term cost implication on the Indian coal industry. At the domestic level, this cost increase has caused stalling of installed capacities, affecting company revenues and power supply levels. Subsequently, towards securing sustainable supply, developers have begun identifying new avenues for supply, like Mozambique and Columbia.

Despite the current coal price windfall at the international market, the eventual expenditure by Indian consumers has gone up substantially, due to rupee depreciation and firming up of shipping rates. In addition, the higher landed fuel cost, coupled with pressure on final product prices, has made coal users extremely price-sensitive, leading to narrowing of cost margins at the trading end. As the consumers avoiding long-term contracts with traders to take advantage of weak prices in the spot market, the traders end-up missing the opportunity to hedge risks of price volatility.

While the renewable energy portfolio is yet to come a long way in displacing conventional energy sources, the case with natural gas is laden with distressed cost characteristics. Majority of domestic natural gas today is priced at $ 4.2 per mBtu almost one-third the price at which LNG is imported. At the same time, domestic production has been significantly lower than projected due to a steady decline in gas output from the Reliance Infrastructure's Krishna-Godavari D6 field. In addition, non-conventional sources like coal bed methane, shale gas and gas hydrates remain unexplored. Given the low sale-price of electricity, coal stands as a more economic fuel[4], thus putting added pressure on coal imports.

In order to sustain the domestic LNG market and keeping green targets in mind, the overall operationalization and development of LNG terminals needs to be carried out; producer-consumer price expectation must be firmed up; decisions on upstream participation in integrated liquefaction projects must be taken and a tax efficient structure needs to come around.

[4] Price of power from coal is $0.7 per kWh and gas is $1.5-2 per kWh

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