

POLY GENERATION POTENTIAL OF THAR COAL

MUHAMMAD FARAZ YOUSFI

BACHELORS OF ENGINEERING CHEMICAL, KARACHI, PAKISTAN.

faraz.yousfi@gmail.com

ABSTRACT

Pakistan facing shortfall of thousands of megawatts, and more shortfalls predicted in the near future. The vast resources of coal at Thar appear as a beacon of hope to meet the current power crisis of the country. Although power crisis in the country is a major issue but its not the only one, Pakistan suffers from foreign dependence on petroleum oil, petroleum based fuels and specialized chemicals. This heavy foreign reliance has detrimental effects on the economy especially due to price hike of crude oil.

Coal though considered by majority only as a source of electricity, but it has much more to offer just than cheap electric power. Coal is a chemical feedstock for producing chemicals and fuels. The current problems faced by fertilizer industry of the country can counter by producing ammonia and urea via coal. Thus Thar Coal can be used to the huge spectrum of needs, the huge potential of coal reserves if fully realized and put into use can lead to a modern industrial revolution in Pakistan, due to integrated industrial units set up to tap the resources at Thar.

In this paper the social and economic effects are brought to limelight if poly generation potential of Thar Coal is utilized with special focus on meeting the needs of fuel and fertilizer via indigenous coal resources. Further options such as DME (Dimethyl Ether), Hydrogen and petrochemicals via coal has been suggested and discussed briefly.

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Although the huge coal reserves at Thar are targeted to meet the electricity shortfall by setting up coal based power generation plants. But the country suffers retarded economic growth due to crude oil price shocks as Pakistan depends heavily on imported crude oil and petroleum based products. The dependence on the imported crude oil and petroleum based products can be since in very sector. Nearly 70 percent of crude oil consumption and 55 percent of POL (Petroleum Oil Lubricants) is met by import (State Bank of Pakistan - a). With such heavy reliance on the imported commodities issues such as inflation, fiscal deficit, and weakening of currency in the international market. The subsidies provided by the government to reduce the burden on the public further worsens the fiscal imbalance. The burden of subsidies grows as the international prices rise, adding to the pressure on government budgets and increasing political and social tensions (Malik).

Pakistan experienced a worst shortfall of natural gas last year, the impact of which was borne by the industry and end consumers. This shortfall resulted unrest in all walks of life as the natural gas plays a significant role as fuel and raw material. The fertilizer industry which is a major consumer of natural gas for producing artificial fertilizer faced acute crisis, the supply of natural gas was curtailed up to 20 percent to this sector (State Bank of Pakistan - b). Pakistan being an agricultural country cannot bear any loss of production in the fertilizer industry.

The huge resources of coal can be put in to use to counter the above mentioned problems. The possible route to achieve this goal is liquefaction (either direct or indirect) of coal. Coal has low hydrogen to carbon ratio, addition of hydrogen or removal of carbon results transformation of coal to liquid fuels and SNG (Substitute Natural Gas).

Direct liquefaction is similar to hydrocracking process; it involves breaking of coal and subsequent addition of hydrogen to yield synthetic crude oil, which can process by conventional refining methods.

Indirect liquefaction is multi-step process (Global Oil and Gas Study); coal is first partially oxidized to produce syngas (mixture of carbon monoxide and hydrogen along with impurities). The molecules act as building blocks which can be used to produce wide range of hydrocarbons and organic compounds. This process offers more flexibility and versatility; the possible potential products are shown in figure 1.

The SNG produced can be transported by available pipelines of natural gas network; this gas can be used in the same manner of natural gas, i.e. heating, power generation and industrial applications. The most beneficial use of this gas could be supplying it to the hard hit fertilizer industry. This could have far reaching consequences as artificial fertilizer is valuable commodity in the country and government pays subsidy on it. Reliable raw material supply to this industry would lead to benefit to the end user and general public. Dakota Gasification Company produces

about 170 million scf/d from North Dakota Lignite. The efficiency of production coal is about 60% (HV Basis) (Gray et al, 2004).

As shown in the figure above the coal in Thar can be put into use to develop diverse products and setting up integrated power, fuel and chemical industries. This could lead to the economic prosperity of the country and the local region, but it must be ensured that the local population of Thar are duly acknowledged and rewarded in order to avoid any confrontation of the project. SASOL in South Africa is successfully operating on CTL (Coal to Liquid) for about sixty years, with a diverse production portfolio.

Apart from conventional horizon coal offers a spectrum of future. Hydrogen gas can be produced from coal which is used in hydroprocessing in refineries, but one particular interesting use is in fuel cells. Thus coal at Thar can be use to fulfil the dream of fuel cell based cars by ensuring abundant supply of hydrogen gas. DME (Dimethyl Ether) which is an environment friendly diesel substitute can be obtained by processing of coal; this offers a potential prospect for establishing market for environment friendly fuels. Which can have not only an advantage of being cleaner fuels but also be economic from their conventional petroleum based counter parts.

In a nutshell the huge reserves of coal at Thar provide a unique opportunity to resolve the current crisis of power, fuel and chemicals in Pakistan. If truly utilized in their duly manner these reserves of coal can be the turning point for the economy of the country which is in grave situation nowadays.

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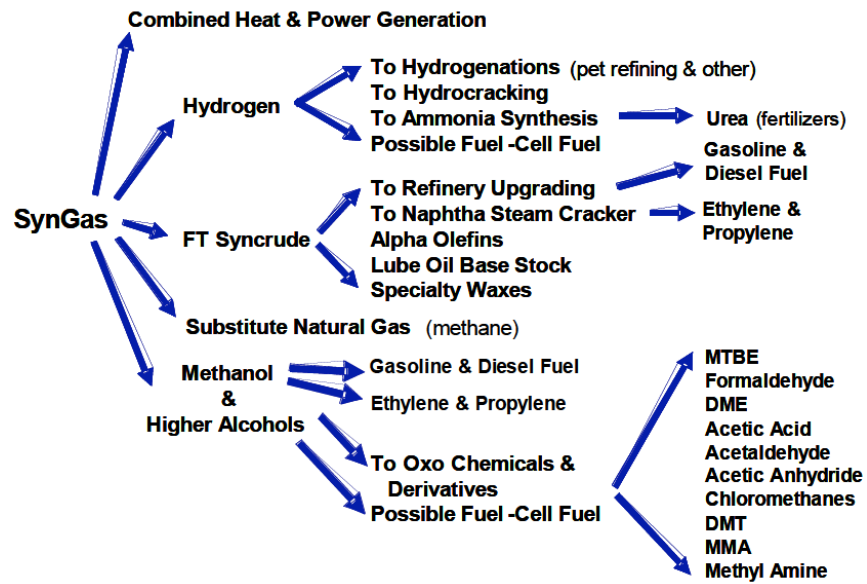


Fig 1. Process and Products