Energy consumption and sources of energy

The report aim of this outlook was to contribute critically to the global debate on energy issues. It is to identify long-term trends and build on statistical reviews of the world energy and more specifically China and establish projections for national and world energy markets to 2030 while taking into consideration the fundamental evolution of the world economy, policy and technological augmentations. Data used to develop this report were obtained from reliable organization web-sites such as World Bank, World Oil, Organization of Petroleum Exporting Countries (OPEC), the U. S. Energy Information Agency and Google scholar. National economy selected is China. Empirical results shows that China’s economy has maintained a remarkable growth since its economic reform in late 1970s, but projections indicate that it will continue grow towards 2030. China is the second largest economy and is forecasted to outgrow the United State economy in next decade, becoming the largest economy in the world. It is the most populous nation in the world and that is projected to decline by 2030 due to the one child policy, which prediction has shown it will affect its economic growth. China remains the highest energy consumer in the world. Coal remains its main source of energy and highest greenhouse gas (GHG) emitter. Its energy demand is rising due to rapid economic growth resulting to energy insecurity. China is increasing its oil production and it is expected to increase further by 2030. Its national oil companies (NOCs) are going into merger and acquisition with international oil companies (IOCs) creating present on the global energy environment. China quest for oil and gas will continue in the next decade but coal will still remain China main primary energy source. Shale gas production will also play a major role in China energy mix in the next two decade.

1. 0 Introduction

The world has of recent seen a sharp increase in the consumption of energy from the first industrial revolution in 1850 – 2000, from the usage of coal, oil and gas to other renewable forms of energy, which has brought dramatic changes to the future of the oil and gas industry. In the past century, it has been a case of the western markets benefiting from the growth in production, which brought some form of competition between private companies, and gave them ready access to reserves (John et al. 2012).

China is the world's most populous country and has a rapidly growing economy, which has driven the country's high overall energy demand and the quest for securing energy resources. According to the International Monetary Fund (IMF), China's real gross domestic product (GDP) grew at an estimated 9. 2 percent in 2011 and 7. 8 percent in the first half of 2012, after registering an average growth rate of 10 percent between 2000 and 2011 (EIA 2012).

Oil has become important in the world energy market, which is expected to see an increase in consumption mainly from emerging markets, which will see a continual shift towards other renewable forms of energy and natural gas. With the loss of market share affecting the oil sector, it will continue to experience an increase in consumption and production. This increase in global oil usage will be entirely due to continued growth in emerging economies, with the people's republic of China leading the pack (Finley 2011). Therefore, the current challenge for the international community is to identify the energy and environmental issues facing China and address these problems (Zhidong et al. 2012).

This report is discussed according to the following sections; (1) economic and population growth; (2) energy consumption and sources of energy; (3) oil and gas demand (4) Oil and Gas production (6) Energy Projection (7) Energy Policy and Sustainability (8) Conclusion.

2. 0 Economic and population growth

China’s economic outlook over the past three decades has been remarkable after its economic reform in late 19970s. It has been moving towards a market oriented economy (Economy watch 2010). In 2010, its GDP growth grew by 10. 5% averaging US$ 5, 745. 13 billion. It is expected to increase to 11. 79% in 2011 to US$ 6, 422. 28 billion. Projections shows that by 2015, China’s GDP will reach US$ 9. 982. 08 billion, increasing to 10-12% per year between 2010 and 2015 (Economy watch 2010). Agricultural product contributed to China’s GDP growth. 1980, the share of agriculture output in its total GDP rose from 30% to 33% in 2000. This figure dropped in 2002 and accounted for 15. 4% of the GDP. It further dropped in 2010 to 10. 9%. Industrial output accounted for 48. 6% and 40. 55% came from services sector while 39. 5% of the 812. 7 million of its labour force was employed in the agricultural sector and 27. 2% in the industry (Economy watch 2010). China’s unemployment rate was 4. 1% in 2010, it decreased from 4. 65% from previous year and it was projected to decline to 4% in 2011. Based on projection for 2015, China’s unemployment is predicted to remain at 4% (Economy watch 2010). See figure 1 and 2

Population and increase in revenue remains the key drive of China’s high energy demand. Since the start of twentieth century, the world population has grown tremendously (see figure 4). Although, China remains the most

populous country on earth by 1. 3 billion people and grows annual by a factor of 0. 4%. Also income level has grown by a factor of 22. 5% (BP 2011). In the next 25 years, China's population's growth is projected to increase geometrically by 10% or one hundred and thirty-five million. It is expected to reach a maximum population growth of 1. 443 billion by 2030, which is forecasted to drop (Wei et al. 2009). The risk and uncertainties surrounding surge in China's population growth; high increase in energy consumption that leads to increase in greenhouse gas (GHG) emission which contributes to rising in climate change, energy insecurity, rising in urbanization (As shown in figure 3).

2. 1 Energy consumption and sources of energy

The world energy marketed consumption is projected to grow from 2005 to 2030 by 50% (EIA, 2011). Total energy demand in the non-OECD nations is projected to increase by 95%, while in the OECD economies consumption is projected to increase by 24% (EIA, 2011). China remains the highest energy consumer in the non-OECD region (EIA, 2011). Its share of global energy consumption is predicted to increase from 15. 7% in 2007 to 18% in 2015 and this is projected to reach 23% in 2030 compare with the US (EIA, 2011). As shown in figure 4. China has substantial amount of oil, in early 1990s, it became the fifth ranked oil producer in the world. Due to its growing domestic demand for energy, its import demand is increasing dramatically (Economy watch 2011). According to Kang from the morning whistle (2013) statistics indicates that 3. 48billion tons standard coal was the complete energy consumed in china in 2011 and its growing by 7 % per year. It was forecasted by professionals that the growth rate of energy consumption in

2012 will drop below 5 percent, mark a low 10-year low since 2002. Coal imports have increased by 60 percent to 290million tons in 2012 Coal remains the most important energy source in China's economic growth; it generates over 70% of the country's electric power. Although it is the highest emitter of greenhouse gas, which causes climate change and increase severe weather condition. China is the highest emitter of CO2.

2. 2 China's Oil and Gas Demand

Looking back in the early 60s China was self-dependent in oil production and consumption. Presently, China is a majorconsumer of oil and gas. In 1993, demand overtook supply and China became a net importer of crudeoil. The key factor that affects this growth is because of rapid economic expansion in china. In year 2009, China was ranked the 3rd largest importer of crude oil after United States of American and japan, importing over one hundred and fifty million toe of crude oil. This is been driven by factors such as: macro-economicexpansions, energy demand for residential area, industrial and commercial energy demand (Zhou et al 2011). Because of this demand growth, China is now the second largest consumer of crude oil and a major competitor in global energy market. In national gas production, China is ranked fourteenth in the world but its production volume cannot fuel the rising demand. Natural consumption is making huge impact in china energy scenarios due to the construction of LNG and Natural Gas pipeline. China also has huge unconventional gas resources but because of rapid economic growth it still depends on importation (Ernest and Young 2011).

Most of china's import comes from Middle East, which account for over fifty percent of its crude oil imports (See figure 6). The country demand for

natural gas increased drastically from 24. 5 billion cubic meters in 2000 to an approximate value of 130 billion cubic meters in 2011. It is projected that china's import of crude oil may reach 320 million tons in 2015 (Koppelaar 2012). In the past four years china has accounted for over fourth percent of Global Oil demand growth. Projected demand of oil and Gas towards 2030 is shown in figure 7 below.

2. 3 Oil and Gas production

In 2010, China's crude oil production reached four million barrel per day and also its internal natural gas production reached 96. 86 billion cubic meters in 2010. In the recent USGS (2012) statistics highlighted that thirty three per cent of the undiscovered oil assets in Asian pacific are expected to be China. Furthermore, forty five per cent of the undiscovered natural gas reserve is also expected to be China. China oil and natural gas production has increase in recent years due to exploration and improvement in technology (see figure 8 and 9). But this improvement has not actually contributed much to the drastic rising demand. According to Chinascope Financial Report (2013) stated that shale gas production will become part of China's energy mix in few years when the commercial production starts. The county's has more shale gas than the United States of America (Soejima 2012). Its shale gas reserve is estimated to be around 134. 4 trillion cubic meters.

3. 0 Energy Projection

The economic growth of China will continue towards 2030. Its GDP is projected to continue to grow towards 2030 (ExxonMobil 2012). See figure. It is projected that China may account for 30 per cent of the 50 per cent growth of Asian economies. It is projected that the rapid economic growth

will still remain within industrialization. The industrial sector will remain the consumer of the country's energy (IEA 2007). Figure 10 is showing the China energy consumption by sector. According to Zhou et al (2011) China's rapid urbanization will be among the key driver of the country's energy consumption. It is estimated that the urbanization will increase by 79 per cent in 2030. In terms of environmental issue which is CO2 emission it is projected to reach its peak by 2030. This will come from coal emission related C02. The emission is projected to soar to 11 Gtc (Giga tonne Carbon) in 2030 which is below present OECD level per-capita. According to IEA (2007) China's energy future will largely depend on coal. See figure 10. Ernest and Young (2011) concluded that China's oil and gas consumption will double to an approximate value of 19MMb/d for oil and 22. 4 trillion cubic feet for gas. This will be about 25 per cent of the total global oil demand growth and 7 per cent the total global gas demand growth. This will make China the main driver of non-OECD countries oil demand growth. The gas demand growth is expected to be about 6. 1 per cent towards 2030, which over 500 billion cubic meter (IEA 2012). The gas growth will be in power sector. China Greentech initiative (2012) stated that China will continue to depend on foreign import of crude oil towards 2030. According to Zhou et al (2011) Chinese government is making effort to strengthen its energy policies to different economic sectors. The aim is to reduce its CO2 emission. There are plans to start production of China's shale in commercial quantities in 2016. This could also reduce China dependency on gas importation. According to Shaungfeng report (2012) China oil and reserve may increase towards to 2030 due to government encourage of exploration. Xinhua (2013) highlighted that China will still continue import most of its energy towards

2030 by the country is in an early phase of rapid urbanization and industrialization. According to UNEP (2006) coal will continue the major source of primary energy towards 2030 (See figure 11 and 12).

3. 1 Energy Policy and Sustainability

Presently, China is facing high demand growth for energy even with its high oil daily production and coal resources. China key energy policy are energy efficiency, natural gas incentive, enhance natural gas supply and technology to reduce cost, and also promote renewable energy (UNEP 2006). Government is currently giving incentive on domestic exploration, expanding regional trading, constructing storage facilities, and securing long term contract in supply agreement in foreign crude oil producing countries (Ernest and Young 2011). Its national oil companies (NOCs) are going into merger and acquisition with international oil companies (IOCs) creating present on the global energy environment. The Chinese government is promoting localize gas production and constructing more storage facilities for gas in other to increase gas production through LNG and pipeline. There are also environmental plan and investment to keep the country energy stable (China Genentech Initiative 2012). Technology is the key of clean energy and sustaining energy supply. According to Energy Forum (2011), the Chinese government is making strong plan in developing coal to liquid technology to produce oil products. The purpose of this is to reduce energy demand which could release pressure on energy supply and energy imports and also energy security (UNEP 2006). In other to reduce consumption by households, the Chinese government is developing plan to be more energy efficient (Zhou et al. 2011). According to projection toward 2030, China household appliance

will be more energy efficient (Zhou et al. 2011). In terms of renewable the government has huge investment in photovoltaic production, large scale wind capacity and waste to energy (China Greentech Initiative 2012). Policy implementation will be a major player in China energy mix and sustainability. Taking the right choice and plan, this will determine its energy stability towards 2030. Figure 13 is showing the coal consumption by countries towards 2030.

4. 0 Conclusion and Author's statement towards 2030

Based on the outcome of the data used to critically analyse China energy scenario, the key important factors that would stimulate the future energy of China would be rapid economic growth and the country policy on energy mix. China will not be self-dependence on oil and gas supply towards 2030. Population effect will not be much but by projection it is expected to peak by 2030. The main economic factors that will affect energy demand growth will be infrastructural development, commercial and commercial energy demand. Coal will continue to be main source of primary energy China towards 2030. CO2 emission will still continue towards 2030. Power generation and industrial consumption will be the main source of CO2 emission. The development of shale gas will help in reducing China dependence on imported gas. The impact of the country's renewable development will not be much. The essence of this development is to reduce CO2 emission while sustaining the country's energy demand. In conclusion China thirst for oil and gas will continue towards 2030 due to it rapid economic growth and energy insecurity. The will continue to depend on foreign source of supply of oil and gas.

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