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The Future of Petroleum Market In Nigeria

[1]Ayodele Charles O., M.Eng and [2] Omohimoria Charles U., M.Sc

[1]Department of Mineral Resources Engineering, Federal Polytechnic, Ado-Ekiti, Nigeria.
[2] Department of Petroleum Engineering, University of Ibadan, Nigeria.

Abstract: The petroleum industry in Nigeria is the largest industry and main generator of GDP in the West African sub-region. Nigerian oil reserve is estimated to last for the next 45 years. This is often welcomed with fear as Nigerians look forward to the 'doomsday'. But this is not as threatening as the fact that we are not fully prepared to face the challenge of shift in the market. With gradual shift of dependence on fossil fuel to nuclear, solar, biogenic sources of energy, leading to precautionary demand for oil, the 'dooms day' may be more imminent than expected. The oil companies come in too with bland public relations imagery, knowing fully well that any mention of the dreaded word "*Depletion"* would smell like a dwindling asset to the investment community. The critical issue is not so much on when oil will eventually run out, but rather when production will reach a peak and begin to decline, which will represent a major watershed for the world's economy. Decline contrary to belief, may not be due to depletion, but by shift of demand for oil as fuel to other renewable alternatives. It is therefore important to redirect our mind from petroleum as source of fuel to raw material, especially, for petrochemical industries so as to establish future petroleum market as a viable one and the petroleum industry as economically feasible.

Keywords: Petroleum industry in Nigeria, Depletion of the oil reserves, Renewable alternative energy sources, Patronage of petrochemical industries.

Introduction

Economic Potential of Petroleum industry in Nigeria: As of 2000, oil and gas exports accounted for more than 98% of export earnings and about 83% of federal government revenue, as well as generating more than 40% of its GDP. It also provides 95% of foreign exchange earnings, and about 65% of government budgetary revenues. Nigeria's proven oil reserves are estimated by the U.S. United States Energy Information Administration (EIA) at between 16 and 22 billion barrels (3.5×10^9 m^3), but other sources claim there could be as much as 35.3 billion barrels (5.61×10^9 m^3). Its reserves make Nigeria the tenth most petroleum-rich nation, and by far, the most affluent in Africa. In mid-2001 its crude oil production was averaging around 2.2 million barrels (350,000 m^3) per day. Nigeria is one of the few major oil-producing nations still capable of increasing its oil output. Unlike most of the other OPEC countries, Nigeria is not projected to exceed peak production until at least 2009. The reason for Nigeria's relative unproductively is primarily OPEC regulations on production to regulate prices on the international market. More recently, production has been disrupted intermittently by the protests of the Niger Delta's inhabitants, who feel they are being exploited. Nigeria has a total of 159 oil fields and 1481 wells in operation according to the Ministry of Petroleum Resources. The most productive region of the nation is the coastal Niger Delta Basin in the Niger Delta or "South-south" region which encompasses 78 of the 159 oil fields. Most of Nigeria's oil fields are small and scattered, and as of 1990, these small unproductive fields accounted for 62.1% of all Nigerian production. This contrasts with the sixteen largest fields which produced 37.9% of Nigeria's petroleum at that time. As a result of the numerous small fields, an extensive and well-developed pipeline network has been engineered to transport the crude. Also due to the lack of highly productive fields, money from the jointly operated (with the federal government) companies is constantly directed towards petroleum exploration and production. Nigeria is the largest producer of sweet oil (free of sulphur) in OPEC. This sweet oil is similar in composition to petroleum extracted from the North Sea. This crude oil is known as "Bonny light". Names of other Nigerian crudes, all of which are named according to export terminal, are Qua Ibo, Escravos blend, Brass river, Forcados, and Pennington Anfan. The U.S. remains the largest importer of Nigeria's crude oil, accounting for 40% of the country's total oil exports. Nigeria provides about 10% of overall U.S. oil imports and ranks as the fifth-largest source

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for oil imports in the U.S. There are six petroleum exportation terminals in the country.

Renewable and/or alternative energy sources

Alternative energy resources are those which could presumably replace the largest single conventional energy source which is oil. Continued improvements innovative technology of alternative energy and low consumption engines is expected to vastly decrease the rate of use of crude as fuel causing lapse in demand. Global hydroelectric and nuclear output each saw the strongest increases since 2004. Hydroelectric output grew by 5.3%, with China accounting for more than 60% of global growth due to a combination of new capacity and wet weather. Worldwide nuclear output grew by 2%, with three-quarters of the increase coming from OECD countries. French nuclear output rose by 4.4%, accounting for the largest volumetric increase in the world. Other renewable energy sources continued to grow rapidly. Global biofuels production in 2010 grew by 13.8%, or 240,000 b/d, constituting one of the largest sources of liquids production growth in the world. Growth was driven by the US (+140,000 b/d, or 17%) and Brazil (+50,000 b/d, or 11.5%). Renewable energy used in power generation grew by 15.5%, driven by continued robust growth in wind energy (+22.7%). The increase in wind energy in turn was driven by China and the US, which together accounted for nearly 70% of global growth. These forms of renewable energy accounted for 1.8% of global energy consumption, up from 0.6% in 2000. Additional information – including historical time series for the fuels reported in this Review; further detail on renewable forms of energy; and electricity generation.

There are three considerations when evaluating the worth and validity of alternative energy sources.

- One is the ability of alternative sources to really replace oil in the quantities we are now using oil.
- A second concern is how using alternative energy sources might affect and change current lifestyles. What would it really involve to change to a "solar energy economy" as is the popular concept among alternative energy enthusiasts?
- The third consideration is the environmental impact of converting to alternative energy sources. These three factors with their myths and realities are briefly treated here.

Replacing gasoline, kerosene, and diesel fuel for use in vehicles, airplanes in particular, by an alternative energy source will be much more difficult. At the present time, 97 percent of the world's approximately 600 million vehicles are powered by some form of oil. Going to another fuel source to meet this huge energy demand now met by the convenient, easily transported, very high grade energy source which is oil will not be easy. Transition to alternative energy sources, even to the major renewable energy source, solar can be daunting. Conversion to a solar energy economy would involve vast construction projects installing huge collecting systems. Houses and factories would have to be redesigned to much more energy efficient standards. In transport, an electric economy means electric cars, and the facilities to generate huge amounts of power beyond what is presently being used. And the electric car, as far as can be visualized with reasonably foreseeable technology, would not offer the degree of mobility which gasoline powered vehicles do. This would markedly alter both the work and recreational habits of people. It would markedly affect recreational related economies. Changing from the energy form which is oil to other energy sources can and will have to be done, but lifestyles will be altered, as may also be the standard of living. Sunlight as a source of energy would seem to be an ideal energy source with virtually no negative environmental consequences. Or, converting a relatively more polluting source of energy such as coal into a less polluting liquid fuel appears to be a good exchange. Converting coal to some liquid fuel form which could be used in transportation would require strip mining vast quantities of western land each year. If alternative energy considerations do not include coal, but rather are thought of in terms of solar energy, biomass, nuclear power, wind, hydropower, tidal, ocean thermal energy conversion (OTEC) or shale oil, they also have environmental impacts. Solar energy collectors in numbers sufficient to be significant in our energy supplies would use very large amounts of land. Mining the materials used to make these collectors would have an impact. Because the collectors would not have an infinite life, there would be the continual problem of replacement, involving more mining operations. The environmental impact

of using biomass as a major source of energy would be huge, especially in terms of the degradation of the highly important mineral resource, soil. Nuclear energy from fission has the potential (and the reality, in the case of Cherynoble) of having a huge impact on the environment. Fusion nuclear power is relatively more safe but not entirely so. Wind power devices are unsightly, noisy, kill birds, and, like solar collectors, deteriorate and have to be replaced with more materials mined from the Earth. Tidal power, hydroelectric power, and OTEC have undesirable effects on aquatic environments. If oil shale is part of the energy alternative for the United States, the impact of developing that energy source on already scarce southwestern water resources would be large, and probably not sustainable.

Biomass (plants) as source of liquid fuels. A variety of plants including greasewood in the arid Southwest U.S., sugar cane, sugar beets, trees in general, seaweed, and seeds have been cited as important possible sources of liquid fuel for the future. In 1979, an article in widely read U.S. magazine states: "Myriad forms of natural organic matter can provide heat or be converted into gas, oil, or alcohol. Wood holds the most immediate promise." [9]

In regard to wood as an alternative liquid fuel, a final report on a U.S. government-sponsored project on the conversion of wood to a liquid fuel stated as a conclusion: "Investigations to date have led the authors to be optimistic about the possibilities of oil from biomass. While difficulties in bringing the current facilities on-stream have somewhat limited information to date, it is felt that a vigorous activity in the future can eventually provide a new source of energy for the country in the form of oil from biomass." [6] A translation of this statement might be that "the project didn't turn out very well, but maybe in the future a lot of research could improve results." That may or may not be true. The project involved wood-to-oil conversion, and one conclusion was that "Information gained here should provide the means to be commercially competitive by approximately 1990." [6] The project was abandoned in 1981. No wood anywhere in the world is now being converted to liquid fuel.

- The energy conversion efficiencies are low, in some cases as with ethanol from corn, it is negative.
- The energy cost of harvesting and transporting the materials is high relative to the energy produced. In the case of wood, cutting the trees and loading and hauling them to a processing plant would be energy intensive even before processing into a liquid.
- The volumes of plant material available are not sufficient to yield large amounts of oil, given the low energy conversion efficiencies.
- The degradation of the land growing these materials by continuing harvesting without returning the fiber to the land is severe.
- If wood is considered, there is already a scarcity of wood in most of the world. In the form of wood waste (little is wasted now) there is insufficient raw material from this source to provide significant amounts of feedstock to convert to liquid fuel.
- The best land is now under cultivation for much needed human food supplies. If plants were used for raw material for liquid fuel conversion they would either have to displace food crops from present agriculturally developed land, or put marginal lands (thin soil, steep hillsides) into production which would greatly increase land degradation by erosion, and also have serious downstream effects, including silting up of reservoirs.

In summary, biomass, at least considering the size of world population today which has to be supported by crops, cannot be diverted from food supplies in significant quantities to be important as a liquid fuel, and at best energy conversion efficiencies from biomass to oil are low. The environmental impact of using biomass for conversion to liquid fuel on a large scale would be severe and unacceptable. Biomass is not a potential source of significant quantities of liquid fuel.

An important fact, commonly ignored in discussing alternative energy sources, is that energy sources come in very different forms. Adapting these various forms to various end uses presents many problems. Electricity and gasoline can each do work, but these energy sources present very different problems when it comes to using them in particular applications.

The conversion of the intermittently available very low-grade solar energy into an energy form which could be used to power the automobile as we use the automobile today is a complex process, and has not

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yet been satisfactorily solved. In many cases it is not possible to conveniently or easily substitute one energy source for another. Each has its own characteristics which may be useful in some circumstances and a decided problem in another situation. Coal can be used to produce electricity quite easily in a conventional coal-fired electric power plant. But using coal directly to power an airplane, or using the electricity produced by coal to power an airplane does not now, at least, seem possible, and may never be. Energy from a variety of sources is not universally interchangeable in its applications. The transition from one energy source to another will in many cases be difficult, and may cause major adjustments in lifestyles. Can we conserve our way out of the energy supply problem? Energy and mineral conservation and recycling are useful goals, but conservation is only a temporary solution to the overall problem of continued growth of energy demand from an ever-increasing population. To accommodate more and more people, each person might use less and less resources, but at some point there is a minimum amount of the resource which has to be used. Reducing the amount beyond that point is not feasible. If one uses a vehicle for business, by a careful planning of the necessary travel route, one can reduce the need for fuel, but one cannot continue indefinitely to reduce the amount of fuel needed. Eventually there is simply not enough fuel to do the job. At some point the real problem must be addressed—the demand for the resource—and this demand come from numbers of people, and lifestyle. There is no way to ultimately conserve out of the energy supply problem against an ever-increasing population. Demand can be reduced but if at the same time, an increase in population absorbs those savings there is no gain. Demands cannot be reduced to zero. Conservation and recycling can only buy time in which to stabilize population to a size which can exist on a renewable resource economy, which also has to be devised.

Table 1. Summary of Reserve Data as of 2012(OPEC Share of the World reserve 2012)

Year	Iran	Iraq	Kuwait	Saudi Arabia	UAE	Venezuela	Libya	Nigeria
1980	58.3	30.0	67.9	168.0	30.4	19.5	20.3	16.7
1981	57.0	32.0	67.7	167.9	32.2	19.9	22.6	16.5
1982	56.1	*59.0*	67.2	165.5	32.4	24.9	22.2	16.8
1983	55.3	65.0	67.0	168.8	32.3	25.9	21.8	16.6
1984	58.9	65.0	*92.7*	171.7	32.5	28.0	21.4	16.7
1985	59.0	65.0	92.5	171.5	33.0	*54.5*	21.3	16.6
1986	*92.9*	72.0	94.5	169.7	*97.2*	55.5	22.8	16.1
1987	92.9	*100.0*	94.5	169.6	98.1	58.1	22.8	16.0
1988	92.9	100.0	94.5	*255.0*	98.1	58.5	22.8	16.0
1989	92.9	100.0	97.1	260.1	98.1	59.0	22.8	16.0
1990	92.9	100.0	97.0	260.3	98.1	60.1	22.8	17.1
1991	92.9	100.0	96.5	260.9	98.1	62.6	22.8	20.0
1992	92.9	100.0	96.5	261.2	98.1	63.3	22.8	21.0
1993	92.9	100.0	96.5	261.4	98.1	64.4	22.8	21.0

Declared reserves of major OPEC Producers (billion of barrels)

BP Statistical Review - June 2009

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1994	94.3	100.0	96.5	261.4	98.1	64.9	22.8	21.0
1995	93.7	100.0	96.5	261.5	98.1	66.3	29.5	20.8
1996	92.6	112.0	96.5	261.4	97.8	72.7	29.5	20.8
1997	92.6	112.5	96.5	261.5	97.8	74.9	29.5	20.8
1998	93.7	112.5	96.5	261.5	97.8	76.1	29.5	22.5
1999	93.1	112.5	96.5	262.8	97.8	76.8	29.5	29.0
2000	99.5	112.5	96.5	262.8	97.8	76.8	36.0	29.0
2001	99.1	115.0	96.5	262.7	97.8	77.7	36.0	31.5
2002	*130.7*	115.0	96.5	262.8	97.8	77.3	36.0	34.3
2003	133.3	115.0	99.0	262.7	97.8	77.2	39.1	35.3
2004	132.7	115.0	101.5	264.3	97.8	79.7	39.1	35.9
2005	137.5	115.0	101.5	264.2	97.8	80.0	41.5	36.2
2006	138.4	115.0	101.5	264.3	97.8	87.3	41.5	36.2
2007	138.2	115.0	101.5	264.2	97.8	99.4	43.7	36.2
2008	137.6	115.0	101.5	264.1	97.8	172.3	43.7	36.2
2009	137.0	115.0	101.5	264.6	97.8	211.1	46.4	36.2
2010	151.2	143.1	101.5	264.5	97.8	296.5	47.1	36.2

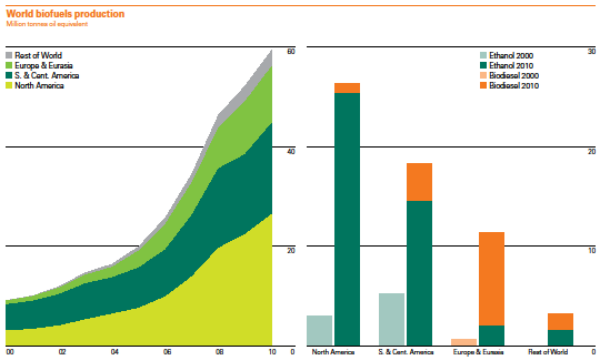

Figure 1.World biofuels production

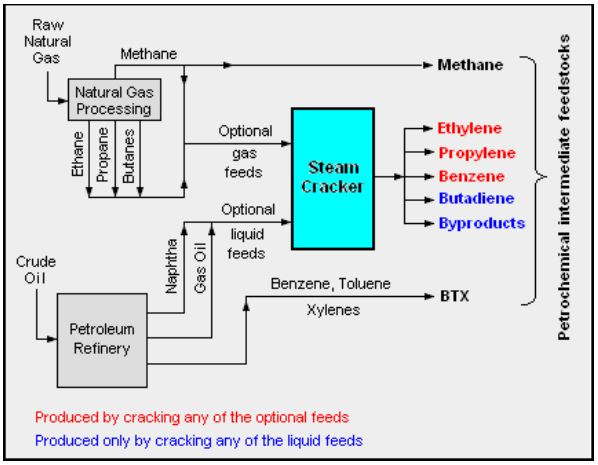

Chart 1. Petrochemical feedstock sources.

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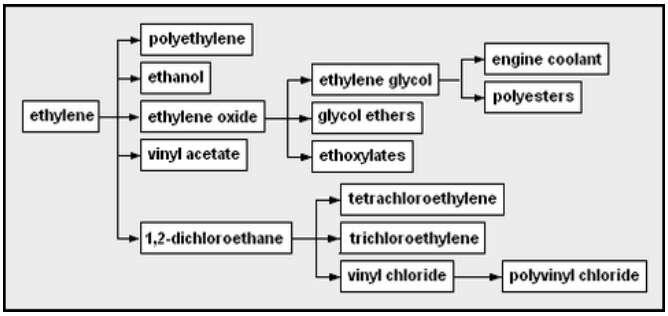


Chart 2. Chemicals produced from ethylene

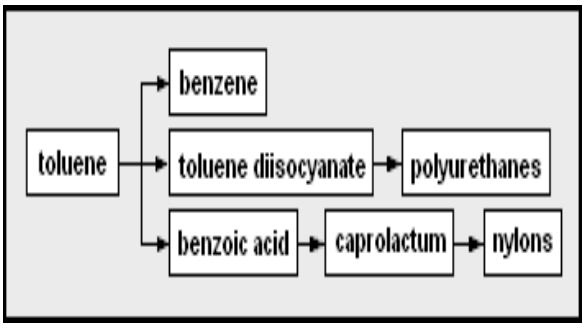


Chart 5. Chemicals produced from toluene

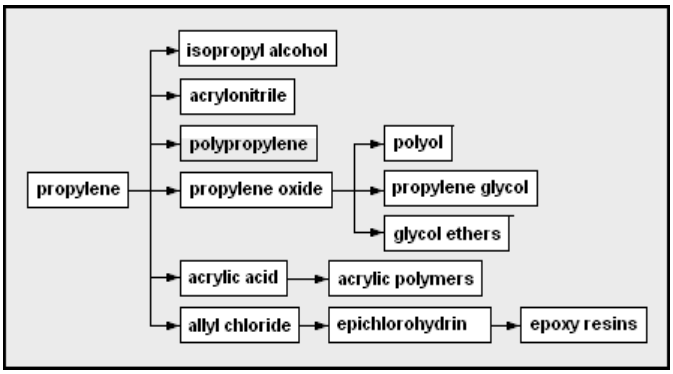
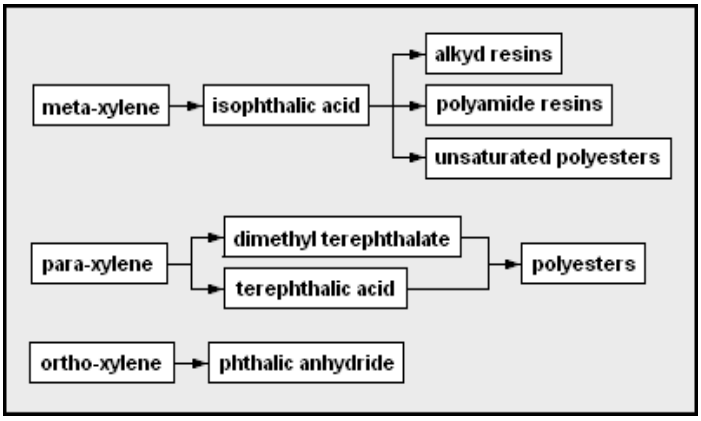


Chart 3. Chemicals produced from propylene



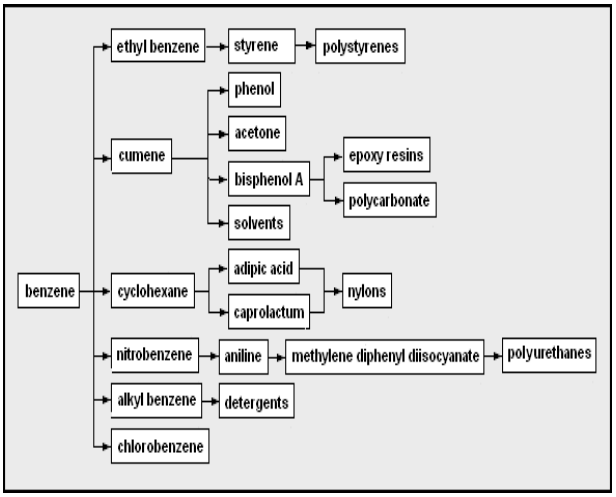


Chart 4. Chemicals produced from benzene

Patronage of petrochemical industries.

Alternative energy sources can replace oil, pragmatically speaking, in its energy uses, but in some uses much less conveniently than in others. Fuel oil used under steam boilers can be replaced by nuclear fuel, or coal. The fact really is that buying some ideas would result in energy cost of transportation that is astronomical. While looking at alternative fuel, it would be timely to project prospects of petroleum industries. Petroleum is such a product that almost has no waste. Components of petroleum can be directed to petrochemical and its allied industries as feedstock [(4)], President Jonathan noted that the petrochemical industry will provide us with the potential not only to manufacture low-end plastic and packaging products, but also very high-end products. With a capacity that spans such a wide continuum, there is opportunity for industrialisation

Nigeria via this initiative. Petrochemicals are chemical products derived from petroleum. Some chemical compounds made from petroleum are also obtained from other fossil fuels, such as coal or natural gas, or renewable sources such as corn or sugar cane. The products produced by the petrochemical industry play an enormous role in our daily lives. It would be difficult to imagine life without gasoline, cosmetics, fertilizers, detergents, synthetic fabrics, asphalt, plastics, flavorings, and many medications. All of these products—and many more—are made from petrochemicals; chemicals derived from petroleum or natural gas. The petrochemical industry has done so many things to improve our daily lives, yet most of us are completely unaware of how much we depend on them even much so in the future.

Conclusion

Petroleum reserves make Nigeria the tenth most petroleum-rich nation. This economic potential of Petroleum industry in Nigeria made Nigeria by the far the most affluent in Africa. In mid-2001 its crude oil production was averaging around 2.2 million barrels (350,000 m^3) per day. It also provides 95% of foreign exchange earnings, and about 65% of government budgetary revenues, as well as generating more than 40% of its GDP. Nigeria is one of the few major oil-producing nations still capable of increasing its oil output. Unlike most of the other OPEC countries. Yet, this merriment is speculated to go away so soon by 2050, when the oil reserves will be depleted. . Some efforts through improved technology are geared towards increasing the reserve by accessing resources that were before non-producible. Economic viability as well as return on energy invested should properly be considered in their feasibility studies so that intelligent choices could be made. Enthusiasts over a particular alternative resource ought to carefully examine the hard facts, not just be aware of them. As the trend of production due to demand is increases, it is expected that there will be a peak and then a lapse in oil consumption, but not because supplies are running out, but because of the advancement of technologies. Cars consuming less fuel and stricter environmental regulations, hydroelectric output, worldwide nuclear output growth, other renewable energy sources - Global biofuels. The increase in wind energy. Three considerations should be considered when evaluating the worth and validity of alternative energy sources.

- One is the ability of alternative sources to really replace oil in the quantities we are now using oil.
- A second concern is how using alternative energy sources might affect and change current lifestyles. What would it really involve to change to a "solar energy economy" as is the popular concept among alternative energy enthusiasts?
- The third consideration is the environmental impact of converting to alternative energy sources. These three factors with their myths and realities are briefly treated here

The role of petrochemical industry play in our daily lives is as important as inevitable. Gasoline, cosmetics, fertilizers, detergents, synthetic fabrics, asphalt, plastics, flavorings, and many medications, etc are few derivatives of petroleum. All of these products—and many more—are made from petrochemicals.

REFERENCES

1. Craft, B.C. and Hawkins, M. (Revised by Terry, R.E.): *Applied Petroleum Reservoir Engineering*, 2nd ed. Englewood Cliffs, NJ: Prentice Hall. 1991. Pp 235-236.

2.Tarek, Ahmed. Reservoir Engineering Handbook, second edition, Butterworth –Heinemann publications, 225 Wildwood Avenue, Woburn, MA 01801-2041, 2001.

3. Andrew Tweedie (2003). "Petroleum Economics". Department of Petroleum Engineering, Herriot- Watt University, Edinburgh. PetEcons version 1. Pg 25.

4.John M. C (1960). "Oil Property Evaluation Cliffs". Englewood Prentice-Hall, Inc.

5.Michael, J. E (2010) "Market outlook for Major Energy Products, Metals and Minerals". The World Bank, 1818H Street, N.W. Washington D.C. 20433, USA. Page 23.

6.U.S. Environmental Protection Agency (1995), *Compilation of Air Pollutant Emissions Factors Volume: Stationary Point and Area Sources*, Fifth Edition with Supplements, January.

7.Andrew Tweedie. (2003) "Petroleum Economics". Department of Petroleum Engineering, Hariot-Watt University, Edinburgh. PetEcons version 1, Pg 22.

8. Guardian Newspaper (2011) "Unlocking Nigeria's gas potential" September 28, page

9.Sami Matar and Lewis F. Hatch (2001). *Chemistry of Petrochemical Processes.*Gulf Professional Publishing. ISBN 0-88415-315-0.

ISSN 2348 - 7968

10.Staff (March 2001). "Petrochemical Processes 2001". *Hydrocarbon Processing*: pp. 71–246. ISSN 0887-0284.

.

11. Jean-Pierre Favennec (Editor) (2001). p*etroleum Refining: Refinery Operationand Management*. Editions Technip. ISBN 2-7108-0801-3.