

NATIONAL OIL COMPANIES & ENERGY MARKET: THE ENERGY MATRIX CHANGE AND ITS IMPLICATIONS

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ABSTRACT

The resurgence of National Oil Companies (NOCs) in the global energy market is raising quite interesting discourse amongst academicians, industry players and even policy makers. They also control quite a handful of oil and gas reserves within the extractive industry of the world's oil and gas reserves. The role and performance rate in the international energy market has a direct link in effecting a change in the entire energy mix which could either contribute to the overall objective of any consuming nations of the world. The objective of this work to itemise based on qualitative data to compare the performance of the NOCs with IOCs and to bring to bear the reasons for their inefficient performance despite the fact that they control a sizeable number of the world's reserve as well as to present the changes in the National Oil Companies and Energy market and its implications of the later on oil companies.

1. INTRODUCTION

National Oil Companies (NOCs) that belong to countries of huge resource deposits may find it quite onerous to create value than their counterparts in countries with small resource deposits. Although the size of the resource endowments matters, the manner in which these resources are extracted matters more because greater resource deposits lead to greater value creation if there are "efficiency during extraction" and revenues derived are used to replace reserves as well as support production levels.³

The energy sector play a very significant role in the gamut of every developed and developing nation.

Their economic advancement and prosperity is hinged on the availability of affordable clean sources of

³Al Obaidan., A.H & G.W Scully , " *Efficiency Difference between Private and State Owned Enterprises in the International Petroleum Industry*", Applied Economics, Vol. 23 237-246, (1991)

energies. Without a proper solid planning these challenges cannot be overcome on theoretical analysis but practical implementation of the policies formulated for the industry. But this height cannot be achieved in vacuum; it needs the collaboration of certain players. This is where the Oil companies owned by national governments (“NOCs”) and oil companies with extensive international operations owned by diverse private investors (“IOCs”) which constitutes some of the massive and most important economic Organization on the planet. This is because either individually or collectively they wield a vast amount of capital and have huge potential impacts on the global macroeconomics conditions and global level environmental policies.⁴

2. NATIONAL OIL COMPANIES (NOCs)

What actually constitutes an NOC and what distinguishes an NOC from an IOC? Is it about owning a state majority in the oil deal? Or is it 100% state ownership? The distinction is anchored on whoever holds 51% or more of the voting shares and influences the way decision is reached on the overall. If the shares are majorly owned by the state, the company must answer to the government or state, therefore, such a company is construed as a NOC.⁵ Conversely if the 51% voting majority is privately held or listed it would be as an IOC. Although the purpose of establishing the NOC in the global energy market is basically to assume responsibility in order to steward oil wealth to tackle the developmental needs of a

⁴J, A. Roberts., Strategic Alliance Between National and International Oil Companies, (Program on Energy and Sustainable Development, Stanford University, Stanford, at <http://www.pesd.stanford.edu.com> (last visited on the 12/01/2013 at p.3

⁵Hartley, PR., Medlock III KB, A Model Of the Operation and Development of a National Oil Company, Rice University, James, A Baker III Institute For Public Policy, (2007), at <http://www.rice.edu/energy/publications/nocs.html>.

²Rob Jessen “ IOC Challenge: Providing Value Beyond Production” Special Report, Oil and Gas Journal, February, 2, 2009

nation and its teeming population in a sustainable manner.⁶

NOCs are a complex phenomenon. As commercial actors they compete not only around their home country between themselves but with major IOCs around the world. They opt for contracts source for finance, equipment's and technology that are intrinsic components of the recent energy scene. NOCs are never monolithic but rather in the area of refining and marketing, they have recorded a significant impact in Asia and in United States. They are weapons of state power and many of them are the epitome of national unity and independence. In the same ramification some host governments view their NOCs as a conduit pipe for the formulation of foreign policy which enhances their international prominence and boost strategic alliance within the comity of nations in the GEM.

Therefore, the economic, commercial and strategic dimensions expose the elements for the growing relevance of NOCs in the industry. Regarding the economy, many industry players are perturbed with the need for NOCs to meet the growing demand of hydrocarbons despite the bloated workforces, political interference and expensive consumer subsidies as features of NOCs.⁷ This shows the relevance of NOCs in the global energy market and the role they play in addressing the matrix change in the oil and gas sector. Without prejudice to the policies formulated by policy makers within the industry. It is therefore imperative to note that except NOCs increase their efficiency,⁸ the global energy market would be heading toward a rocky future. However, to ensure efficiency, one option is to encourage partial

⁷Keynote: The Honourable James Baker Institute III (2) Institute for Public Policy BIPP Event Monday, March 2007 at <http://www.Bakerinstitute.org> (last visited at 12/12/2012)

⁸P. Hartley., et al., "Empirical Evidence of Operational Efficiency of National Oil Companies," in *The Changing Role of National Oil Companies in the International Energy Markets*, March 27 at <http://www.rice.edu/energy/publication/noc.html> (last visited On 20/12/2012)

privatization. Beside that improved governance, institution of good business practices and greater transparency can improve the effectiveness of NOCs to curb the implications that bedevil the global energy market.⁹

In order to address the strategic challenges militating against the NOCs, cooperation is key because if the consuming countries are confident that their energy security is guaranteed the IEM, the less likely would they be inclined to hedge their bets by using their NOCs to build up alliances with unsavoury regimes. Likewise would producing countries use their energy resources as a means of coercion against neighbour states if they are confident that their access to market their products for the purpose of benefiting its citizens.¹⁰

3. RISE OF NATIONAL OIL COMPANIES AND GLOBAL ENERGY MARKETS

As s major producing countries are seeing their energy reserves decline rapidly as domestic demand appreciates as a result of the high returns sort by the IOCs operating within their countries call for an urgent resurgence of its NOCs with a bid to minimize cost of production and gain absolute control of the energy base of the nation.¹¹ This calls for SOCs to invest abroad to ensure their long term survival and to build strategic energy supplies. The national oil and gas companies as the major producing countries of the world have developed technical and commercial advantage to compete abroad with their international counterparts.

⁹Ibid
¹⁰Ibid
¹¹Ibid

3.1 Factors Responsible for Transformation of the NOC

During the late 1980s, host governments and NOCs found themselves in huge debts, increasing growth in demand for energy resources, tight exploration and production accounting, drastic depreciation in the production of energy resources at the domestic as well as the international level.¹² As government enterprises began to be perceived as bloated, not effective enough to translate the huge capital investments into increasing facilities for the industry as well as increasing revenues for the host governments in their operations, disenchantment regarding state ownership grew. In the same vein the global, social, political and economic environment was revamping again: the withering of socialism, the exits of the ideological conflicts between capitalism and communism, the expansion of the economy as a result of globalization, a long lasting decade of stagnation of oil prices all results in the transformation of the global energy market but the activities of the NOCs in value creation objectives and role, a clarion call for foreign direct investments and a massive competition for oil and gas investment.¹³

Energy industry liberalization and privatization became a trend all over the world. And this has caused all industry participants to place greater reliance on market forces and insignificant dependence on government in the distribution of resources (for the sake of uniformity any system that encourages a shift from public ownership of resource exploration and distribution to a private ownership style is generally construed as liberalized).¹⁴ All these factors have culminated into transforming the NOCs in the area of their strategies for the achievement of national mission in their activities and to boost foreign participation

¹²King & Spalding LLP., *An Introduction To Upstream Government Petroleum Contracts: Their Evolution and Current Use*, Vol.3, 2005 at <http://www.gasandoil.com/ogel/> (last visited 17/12/2012)

¹³Ibid at p.7

¹⁴Boubakri, N & J.C. Cosset, and O. Guedhami, "Liberalization , Corporate Governance and the Performance of Privatized Firms in Developing Countries" *Journal of Corporate Finance* 11:767-90 (2005).

in the exploration and production of hydrocarbons.

Due to the factors which led to the transformation of the NOC mentioned above, what has emerged is the level playing ground for competitive market investment of risk capital and modern technology in which host governments for the limited funds available for investments. Host governments through their NOCs often embark on some economic, political and legislative including fiscal, trade, monetary, commercial and industrial reforms in order to compete favourably with its competitors. These reforms are meant to meet the expectations of the Contractors and the risk capital markets relating to the host governments treatments, protection and regulation of the investments and its managements and distribution and wealth created from the said investment.

3.2 Strategies, Objectives and Performance of National Oil Companies

Approximately 77% of reserves in the energy sector are under the management the NOCs with no equity participation from the IOCs. This record is based on the 1, 148 world proven reserves. IOCs from the west now control less than 10% of the world's resources base in the global energy market.¹⁵ NOCs currently dominate the world current oil production rate. This is true because if one look at the top 20 energy producing companies, 14 are apparently NOCs. However, the NOCs still experience less return on capital than the IOCs in similar size and operations. Based on the low return on capital, many NOCs are set to reevaluate their business strategies with, adequate implications to the IEM.

¹⁵General Manager, Global Energy Markets US, Economics, BP, 1101 New York Avenue, NW, Suite 700, Washington, DC, 2005

As part of their strategies so many NOCs have begun to clamour for strategic resources in the Middle East, Eurasia Africa to meet up the increasing demand of energy resources within the global energy market with a view to increase its return on capital. In some cases they edge the major IOCs in major crucial resource development in the industry by establishing close and interlocking relationship with their national governments with geopolitical and strategic objectives factored into foreign investments instead of being commercial in all respect in its operations.¹⁶ And as such these NOCs compete for major capital budgets which would be channelled toward the development and replacement of reserves and production activities.

Thus, the relevance of the first limb of this section is key to understanding the changing strategies, behaviours and the impacts of NOCs in the energy market in order to appreciate the future supply, security and pricing of oil. Therefore, the goals, strategies and behaviours of the NOCs have changed from being solely commercial in their operations to a realm of actual participation in the exploration and production of energy resources locally and abroad in major world reserves. Understanding this strategic transformation is necessary to appreciate the future organization and operations of the international energy market.

Now regarding the objectives of NOCs, since NOCs are solely and majorly owned by their domestic governments; that is why in order to achieve the value of the company, it must therefore be considered alongside other delegated objectives by the domestic government. Although all NOCs responds to their

¹⁶N.M, Victor.,” On Measuring the Performance of National Oil Companies” Working Paper 64, Program and Sustainable Development, Stanford University, Stanford, 2007.p. 2

various governments objective in one respect but their level of influence is what differs. Most developed nations NOCs toe the part of a more commercially oriented strategy. The Statoil in Norway and petronas in Malaysia on a more commercially driven part unlike the Nigeria National petroleum Corporation (NNPC) and Petroleos de Venezuela, where government objectives takes precedence over the commercial objective of the companies. These specific objectives are discussed in detail below:

Wealth Distribution

NOCS in the world all over are engaged in wealth distribution of the resources derived from the sale of the hydrocarbons exported to consuming nations. The redistribution of the wealth realized may be achieved through the provision of fuel subsidy schemes, social welfare programmes and employment policies. Although subsidized fuel price creates an atmosphere for low price on energy prices, insulates the domestic economy from the damaging impacts of world energy prices, enhances transportation and industrial resources. These subsidy schemes have a downside effect of creating artificial demand growth and it puts some more expenses on the balance sheets of the government, inefficient use of fuels, arbitrage based smuggling and corruption within the regulatory bodies responsible for the redistribution of these subsidy monies. Fuel subsidies are prevalent, bringing down the price of gasoline in Venezuela to \$0.11 per gallon, Iran \$0.21 and Saudi Arabia to \$0.64.¹⁷ In the same vein the strong use of subsidies leads to a tightening of supply at the global energy market resulting to a higher energy prices in the energy importing nations.

Economic Development

¹⁷J.,A Meyers., The Changing Role of the National Oil Companies in the International Energy Markets: *Introduction and Summary Conclusions*, Baker III Institute of Public Policy, Rice University, March 1, 2007, p. 6

For a particular domestic government to achieve economic prosperity and development, the NOCs are a vertical tool for this lofty object of the national government. The energy sector is the first largest economic sector that is opened to the world economy in some nations. And as such concepts such as international investments and property law as well as accounting and financial standards were the first to be introduced in the sector.¹⁸ All these concepts accounts for the achievements of the economic development. Technologies are transferred to the larger economy through the industry. In order to achieve sustainable economic development, NOCs could be asked to supply subsidized fuels for various industries whose activities are contributory to the nation's economic development. Therefore, as part of achieving economic development, it might impose local content rule as part of the NOCs objectives to foster the development of ancillary services into the domestic economy. KMG of Kazakhstan is a clear example where its NOC is saddled with the responsibility of integrating the economy into the world's economy and ensuring that Kazakhstan's growth and development is transformed into a broad spectrum of economic growth in the nation.¹⁹

Foreign Policy

Again because oil and gas is a strategic commodity the production and distribution can lead to strategic relations amongst nations of the world. It could however be used as a weapon, which is generally known in international relations as '*oil as a weapon*'. Therefore, it is without doubt that NOCs can also be used by their national governments to promote the foreign policy goals and objectives of the nation by

¹⁸Olcott, Martha Brill, Kazmunaigaz, Kazakhstan's National Oil and Gas Company: presentation at the James A. Baker III Institute of Public Policy, Rice University, March 1, 2007, p.3

¹⁹Ibid

establishing strategic alliances between consuming nations and supply nations of these energy resources.

And it could also establish a strong tie between two NOCs of different countries. By way of illustration, Saudi Aramco's conclusion to hike oil output in the beginning of the Iraqi invasion of Kuwait and China's oil based relationship with Venezuela, Iran and Russia is partially construed as politically inspired.

A more striking example of how NOCs are being linked to achieve the geopolitical aims and objectives of their domestic governments is PDVSA and President Chavez and his Bolivarian revolution.²⁰ In order to counter US expansionism threat against his regime he used economic aids, favourable oil pricing and joint energy project in the Caribbean and Latin America and other areas to discourage the promotion of democracy and global markets which are threats to his revolution.²¹ This is where the PDVSA was very instrumental in actualizing these policies. Iran too in the pursuit of its nuclear weapon used oil cut offs to the West as a possible threat signal as well as Russia interrupting natural gas supplies to Europe as a result of conflicts it had with former Soviet Union members over transport fees and supply price.²²

Energy Security

Energy security means different things to both consumer and the supplier of energy resources in the value chain. Security from the demand point of view means the ability of the supplier to diversify his supply chain such that no particular consumer is indispensable. Just like the action of PDVSA to direct its energy supply away from the US to reduce the economic influence US would have over its nation and as way of

²⁰CSR Report RL 32488 Venezuela: Political Conditions and US. Policy, by Mark P. Sullivan and Nelson Olhero: IN: J.,A Meyers., *The Changing Role of the National Oil Companies in the International Energy Markets: Introduction and Summary Conclusions*, Baker III Institute of Public Policy, Rice University, March 1, 2007, p. 6

²¹Mares, David R., and Nelson, Altamirano, *Venezuela's PDVSA and World Energy Markets: Corporate Strategies and Political Factors Determining Its Behaviours and Influence*. Presentation by the James Baker III Institute for Public Policy, Rice University, March 1, 2007,p.62

²²Ibid

exploring other markets for the Venezuelan crude. However, technological factors in some cases make the actualization of these strategic objectives onerous.

From the supply angle, security of supply means the ability of the NOC to diversify its supply lanes by having an absolute discretion to choose who to supply to and when to supply. In fact the NOCs have exclusive right to supplies of energy resources of which China falls under this strategy. The fore, the NOCs are a conduit to achieve the energy security objective of the national government from both supply and demand side economically speaking by diversifying its supplies lanes as well as controlling the level of demand and the quantity of resources that would be supplied to existing and prospective consumers.

Vertical Integration

In the downstream energy industry of the world, vertical integration is a term used by industry players to encourage competitiveness within the industry with a view to reduce the prices of energy products along the value chain. Here one company is allowed to own a generation value chain as well as the supply network. So other words, a NOCS are tools to encourage the vertical integration²³ of the production stage as well as the refining and the retail aspect of the value chain in the GEM. The advantages are that it helps the national government to maximize the value added from producing and selling energy products. It also promotes diversification and reducing risk by owning the production and refining aspect of the business of exploration and exploitation of these energy products. PDVSA acquisition of the refining and retail company in the US (Citgo) is a novel example of how demand security can be enhanced and making the NOCs to be profitable in the market during fluctuations in oil prices.

²³In the oil Industry, vertically integrated firms operate both at the upstream and the downstream markets.

On the issue of the performance of the NOC in the discharge of its objectives and fulfilment of the national mission of the government. Their performance is key because its implications affects the supply of oil and gas resources in the international energy market on the premise that they oversee a large junk of the world's oil and gas reserves. Due to a poor performance level or a government-dictated policy intervention measures that are quite distinct from those of the profit maximizing outfits, NOCs in terms of resource extraction is lower than that of the IOCs. This is not to say that some NOCs do not performing within the level of the major. But in all their performance level is far from monolithic and as such oil and gas reserves in the hands of NOCs are considered effectively “*dead*.” Hence there are some conclusions that are responsible for the poor performance of a NOC. Which are as follows:

NOCs and their governments and not IOCs and its shareholders control most the development of oil and gas resources at the upstream level. This accounts for the strong interference of the domestic government in the areas of investment and operational decisions of the NOCs which invariably makes the NOCs to be less efficient. Secondly market capitalization is another issue that affects the NOCs performance. Though it is an imperfect indicator for measuring performance.²⁴ Thirdly the corporate governance and transparency also affect the performance of a NOCs. This affects the inability of the NOCs to deliver the sustainable objectives due to its multiple and conflicting objectives, excessive political interference and opacity. In addition the ownership and control of the NOCs method affects their performance.

According to an analysis if NOCs would be converted to private enterprise, profit oriented entities, and then less resource input would be used to achieve large demand concerns within the operational

²⁴ Ibid

performance.²⁵ Having discussed the factors that militate against a NOCs performance rate in its operations, it is therefore pertinent to suggest some palliative measures to address some of these challenges that confront their performance. Privatization is one option, improved governance, greater transparency; the institution of good business practices can go a long way in increasing the effectiveness of a NOC.

4. ENERGY MATRIX CHANGE AND ITS IMPLICATIONS ON ENERGY SECURITY IN THE GLOBAL ENERGY MARKET

It is true that the demand for energy resources has been on the increasing scale over the past centuries of which developing countries are seen to be the main drivers for the said increase in the global energy market. Although the world energy mix is dominated by fossil fuels which are not sustainable in themselves. What this state of affairs brings to mind is the possibility of introducing and revamping the current energy matrix into a more sustainable and renewable sources of energy. Fossil fuels- including coal, crude oil and natural gas for many years has been the primary commercially sourced energies for industrial production, transportation and heating purposes.

Generally hydrocarbons, in particular petroleum's have had several need ranging from the pharmaceutical, construction, and clothing to the agricultural sectors of every producing country. Although the incorporation of other sources of energy like nuclear and renewable sources has been quite few due to the under developed technologies and the high cost associated with such energy sources in the energy matrix. Hence the identification of certain factors surrounding the consumption of fossil fuels right from

²⁵A.A Alchian., and H, Demsetz., Production, Information's Cost and Economic Organization. America Economic Review 62 , 1972 (5): 777-95

time immemorial has called for a change in the energy matrix in the global energy market. Whereas some of these factors borders on the environmental damage caused by the huge dependence on fossil fuels, the supply shocks experienced during the 1973 oil crisis and the 2008 oil supply shock that greeted the oil sector which spiked up the cost of a barrel oil to \$150.²⁶ All these put together, has raised policy makers within developed and developing nations to look for a more sustainable strategies to bring about a change in the energy matrix of the global energy markets.

It is upon this background that these sections seek to identify the state and the prospect of the future energy matrix and its implication to the global energy market. It also brings to bare the drivers behind the change in the energy matrix.

4.1 Drivers Of The Future Energy Change And The Challenges Therein.

A wide range of factors are responsible for the evolution of the change in the energy mix at both domestic and international levels within the extractive industry. These are generally hinged on the availability of resources, environmental benefits (and cost), production cost for fossil fuels, energy security concerns and technological constraints on producing nations since the exploration and exploitation of fossil fuels require a high level of up to date technologies to tackle the scientifically uncertain changes in the industry. The role and contribution non-renewable resources play in the energy matrix is dependent partly on how soon known reserves are depleted or the cost of extraction. Although experts believe production has peaked in some regions and has begun to decline. British Petroleum (BP) estimates that current rate of

²⁶United Nations Conference on Trade and Development, The Future Energy Matrix and Renewable Energy: Implications for Energy and Food Security Second Session- Geneva 24-25 March 2010.

production, oil reserves in less than 50 years would deplete, in 60 years natural gas would be exhausted and in 122 years Coal would deplete. Despite new discoveries has begun, it does not do away with the rising cost of production which is orchestrated by the increase in demand and the technological difficulties present in the global energy market.

Global Hydrocarbon Reserves and Production, 2008

	Reserves	Production
R/Y (years)		
Oil	195.3×10^9 tons	3.928×10^9 tons
		49.7
Natural Gas	185.0×10^{12} m ³	3.066×10^{12} m ³
		60.3
Coal	826.0×10^{12} tons	6.770×10^9 tons
		122.0

Source: BP Statistic Review of World Energy, June 2009

Accordingly the development of other sources of fuels is another factor responsible for the change in the energy mix in the global energy market. However, this is as a result of the rising cost of fossil fuels. For

example in power generation, nuclear fuel usage has been observed to be the alternative to generate electricity for the consumers at an affordable price.²⁷ Hydro energy is certainly the best alternative from a cost minimization point of view when considering the hassles associated with the disposal of nuclear waste. This is not to say that hydro energy generation system is free from limitations.

In addition the change in the energy matrix from fossil fuels to more sustainable renewable sources is attributable to certain environmental implications resulting from the combustion of fossil fuels. The bid to reduce the level of greenhouse gases produced as a result of the emission of carbon dioxide to a natural range of between 180 and 300 parts per million (ppm) as compared to its current levels over 400 ppm.²⁸

Again the improving national and energy security by digressing to greater dependence on local power sources has necessitated the immense rise of renewables into the global energy matrix. Approximately 80% of the world's oil reserves and more than 40% of global oil production are controlled by twelve countries.²⁹ Thus, this singular factor is possible to create adverse effects in the event of supply shocks which invariably accounts for a change in the energy matrix in the world market. The high point for this change in the matrix is to diversify other domestic fuels, in order to mitigate the cost at the pumps and to reduce the carbon dioxide emission level that emanate from the use of fossil fuels.

The rapid introduction of newer technologies such as carbon capture and sequestration³⁰ to tackle the damage caused by the use of fossil fuels within the global energy mix has a role to play in the adding to

²⁷The Economist of Nuclear Power at <http://www.World-nuclear.org/inf0/inf02.html> (lasted visited at 28/01/2013)

²⁸ibid

²⁹<http://www.opec.org/home/PowerPoint/Reserves/OPECShareWorldcrude.htm>. (last visited on the 31/01/2013)

³⁰A term used to describe the capturing of CO₂ from source point from power plants and other industrial facilities, compress it, transport it mainly by pipelines to suitable locations and inject it into deep subsurface geological formations for indefinite isolation from the atmosphere.

the climate change objectives. If this new technologies ranging from solar power, wind power to the use of hydrogen would invariably lower the cost of production of these renewable energy types. This automatically causes a change in the energy mix from fossil fuel use to a more sustainable energy type in the global energy mix. Estimates has it that from per unit of electricity generated from renewable energy industry, more jobs are created than from fossil fuels; the agricultural and the production sectors are not exempted from the benefits that are derived from the subsequent changes in the energy mix.³¹

4.2 Implications of the Change In The Energy Matrix On Energy Security In The Global Energy Market

The change recorded in the global energy mix in the international market has a lot of implications to importers, IOCs and investment in the industry. It is upon this backdrop that this section shall examine the various implications as it affects the global energy security issues of both producing and consuming nations of the world. The role of NOCS in the energy mix within the global market appears to grow in importance; NOCs of consuming countries offering access to rapidly growing reserves seem likely to increase in their influence given the preponderance of proved reserves under their control.³² Based on this investment prospects appears challenging, due to the mix of modest growth in global consumption- and declining consumption in matured OECD markets.³³

Because of the environmental implications the consumption of fossil fuels has on the global ecological market and the steady increase in the cost of production, alternative sustainable sources of energy has

³¹D, Kammen et al., Putting Renewable to Work: How Many Jobs Can The Clean Energy Industry Generate? (2004) at http://www.unep.org/civil_society/GCSF9/pdfs/karmen-energy-jobs.pdf (last visited on the 31/01/2013)

³²CEE-UT (Centre for Energy Economics- University of Texas) “ Commercial Framework for National Oil Companies” Bureau for Economic Geology, Jackson School of Geoscience, University of Texas at Austin

³³U.S Energy Information Administration (2010). Annual Energy Review

been explored which appears to be cheaper as a result of their availability. This in the mind of this work potends an implication that there would be a shift in the dependence of fossil fuels to more renewable energy sources thereby causing the rate of CO₂ emissions level to drop drastically. In the same vein since there are diversifications within the value chain, the issue of producing nation's ability to influence the policies of consuming nation is addressed. Therefore, the implication of the energy change to the international energy markets creates a reduction in the investment prospects³⁴ and the investments which were concluded prior to the change in the matrix would become no longer viable since the discovery and the shift to renewables would force the final prices of fossil fuel to depreciate.

The formulation of effective energy security policy of a nation is hinged on an understanding of the energy independence of that nation. To attain "energy independence" a state must be at the level where its economic, military and foreign policies is never under the directing wheel of an energy producers. Although this definition captures the essential ideas but a measurable definition is the one that reflects the uncertainty about the future energy market conditions.³⁵ Therefore, to achieve energy independence certain measures such as fuel substitution, a diversification in the uses of fuels and fuel transformation that can meet demand growth even when conventional supplies seem to be affected, and increase efficiency. The implication of this is that the prices of fossil fuels would drop drastically as a result of the change in the energy matrix in the global energy market and energy security would be sustained since

^{34,34}J, A. Roberts., Strategic Alliance Between National and International Oil Companies, (Program on Energy and Sustainable Development, Stanford University, Stanford, at <http://www.pesd.stanford.edu.com> (last visited on the 12/01/2013 at p.3

^{35,35}For example, "the annual economic oil dependence will be less than 1 percent of United States GDP, within 95 percent probability, 2030." Source Greene DL and Leiby PN (2007) Oil Dependence: Realistic goal or empty slogan? Oak Ridge National Laboratory, March.

alternative sources of energies have been brought on board to compete with the conventional energy sources in the market.³⁶

In addition due to the volatility in the prices of fossil fuels this has resulted in a change in the GEM. As a result, the security of demand and security of supply would be threatened in the entire energy mix. Maintaining security of demand is a crucial indices for facilitating supply of energy. In order to address the issues linked to the security of supply and security of demand as a means of attaining energy security, the appropriate method of measuring it, is to ascertain whether the supplies are easily accessible, available, affordable and even acceptable by the final consumers.

To conclude the change in the energy matrix in the global energy market that has diverse implication to the IOCs, importers, and the final consumers. To the IOCs it would certainly create a situation whereby project financiers would no longer find it lucrative to lend money for the execution of projects since there are a variety of energy resources which are cheap and affordable in all ramifications than the fossil fuel which ordinary pose a serious threat to the ecological system. It also has a consequence/implication of creating huge unemployment rate within the extractive industry. Workers in the oil and gas sector would be relieved of their jobs since the production level would reduce as a result of the introduction of renewables in the energy mix which creates a competitive market such that consumers of fossil fuels would shift to other sources of energies. Another implication that this work tends to bring to the reader is that the cost of production of commodities will increase. This is because when there is a shift from fossil fuels which are regarded as cheap and affordable to renewable which are regarded as environmentally

³⁶See supra note 4 at 24

friendly however expensive it maybe, it would definitely increase the cost of commodities that were produced from renewable energy source.

4.3 Policy Intervention To Address The Challenges and the Drivers of Change in the Energy Matrix

Having discussed the drivers of change in the energy matrix in the global energy market which creates the implications for the entire market. It is therefore necessary to explore certain policy options in which the players and stake holders need to adopt to cushion the negative effects of energy security challenge in the global energy market. Prior to this time major IOCs produce their fields at maximum production, it is not out of place to ask whether these majors are sufficiently reinvesting their cash flow with a bid to find reserves and accelerate production. This question imperative because it is crystal clear from facts before us the majors are not replacing reserves fully and therefore their long term asset base is slowly liquidating.³⁷

One germane option in order to address the implications created as a result of the energy matrix change is for the IOCs and NOCs to collaborate to cease the opportunity in the present times of high energy prices and huge profit turn over by devoting a large share of their soaring profits and cash flow to exploration of new fields. If this policy option is followed it would go a long way address the energy security at the international energy market. This is true if one go back to memory between the 1970s and 1980s when strong IOC spending spurred a large increase in non OPEC production, promoting diversity of supply and

³⁷Boubakri, N & J.C. Cosset, "The Financial and Operating Performance of Newly Privatized Firms: Evidence from Developing Countries, Journal of Finance 53(6) 1081-110 (1998)

enhancing U.S energy security for two decades. Now unfortunately these legacy assets are heading for geological and natural decline, thereby raising the question about what new resources will be available to replace them.³⁸

Secondly, the wave of consolidation of the largest traded oil firms that took place in the 1990s should be discouraged as a policy decision to address the inefficiency trend in firms operating within the energy market. This is advised because if large oil exploring and exploiting companies merge for the purpose of maximizing production. When such consolidations of firms are encouraged it could lead to a situation where firms becomes too large to exploit effectively he kind of reserves presently available for private capital. One explanation for this trend is that companies would become opportunity constrained due to change in political climate in major energy producing countries.³⁹

5. CONCLUSION

The global energy market is a completely interesting phenomenon in the contribution of energy resource nations the world. The world solely depends on certain sources of energy for the development of some strategic sectors in any given nation. But due to factors which are sometimes unforeseen, it is very difficult to interpret how this phenomenon dwindles to cause a change in the entire energy market. However, this work has carefully brought to bear the dynamics involved in the changes and some of the reasons for such change in the energy mix. In the same ramification, how the resultant implications of the

³⁸Gately, "What Oil Export Levels Should WE Expect from OPEC?" (2007):151-173; Gately, OPEC's Incentives for Faster Output Growth," (2004):75 -96.

³⁹"Genealogy of Major U.S Oil and Gas Producers," 1/18/2007. Energy Information Administration. www.eia.gov [Product#: upstream.pdf] <http://www.eia.doe.gov/emeu/finance/mergers/upstream.pdf> last visited on 24/02/2013

change in the energy matrix has really impacted on importers and consumers, as well as IOCs in the value chain.

NOCs is monolithic in its operations despite the fact that it has greater access to reserves but yet cannot translate such opportunities to meet global demand of energy resources. Whereas the IOCs are a completely different entities which are out to make profit for themselves and for the company in general and as such are profit oriented and nothing more.

The crux of the matter is that the energy market at both domestic and international markets needs palliatives to address the energy security challenges in the world. To achieve this, this work also agreed with some of the postulations of some writers and commentators which had been discussed here in this work to say that the introduction of other sources of energy is a step in the right direction. This is because the fossil fuels in themselves are not environmentally friendly and the cost of production is very capital intensive and above all the availability is what is really raising the big worries since virtually all nations of the world depend on energy resources for industrial purposes.

In view of the foregoing, for there to be a level of energy security at the global energy market, governments of producing countries should be flexible toward the activities of its national oil companies so as to allow them operate as a profit oriented entity with total control but a little supervision would do the magic to increase their efficient level which invariably contribute to security at the supply chain. NOCs should not exist primarily to achieve the national objectives of the owning government but rather it should operate more effectively by competing with its counterparts so that the revenues generated could be

divested to developing the various sectors of the economy. And for the fact that they embody a broad spectrum of efficiency, profitability and governance there is every need to actually balance the economic and social benefits which ought to accrue to the nation with its commercial imperatives if it wants to attain the security on both supply and demand side of the value chain. In the same vein this work has demonstrated that assessing the emerging policies and priorities is critical to appreciating the future of the global energy market. Therefore, their position in the scheme of events ought to be monitored for the purpose of effective production and exploitation of energy resources.

Policies that should encourage diversification of supply are a step in the right direction, policies which encourage investments at both the downstream energy sector and the upstream. This is to make the market more liberalized which creates a level of competition amongst the IOCs and the NOCs thereby creating an efficient production and optimum demand need within the energy industry.

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