

National Energy Policy and Gas Flaring In Nigeria

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Abstract

Gas flaring is a global environmental concern due to the negative effects it has on humans, the environment and the economy. The magnitude of the problem of gas flaring is dehumanising especially in Nigeria. The earth is a single system and hence any event anywhere affects the whole system. With global climatic conditions constantly changing in recent times, gas flaring in Nigeria can no longer be treated as a local phenomenon because of its global implications and consequences. It is against this background that this research is conducted, to safeguard the present and secure the future. This article critically analyse and evaluate the National Energy Policy 2003 as a legislative Instrument in tackling gas flaring in Nigeria. It also provides an overview of the effectiveness of the National Energy Policy 2003 in contributing to wider sustainable development goals.

Keywords: Gas flaring, sustainable development, Nigeria

1. Introduction

It is an undeniable fact that exploration and exploitation of oil and gas resources has economic gains for every country. It provides a strong base for wealth creation as well as building a sustained economy. Contrary to the economic gains, there are negative consequences associated with crude oil extraction where it is not well managed (Amorin and Broni-Bediako 2013). Gas flaring is one of the major environmental issues in the crude oil industry in recent times.

“When you drill for oil, you also get gas. In an ideal world this associated gas would be sold to consumers, or it would be used to generate power and then resold as electricity. But this requires costly investment into pipelines, power plants, and other infrastructure. Therefore, in practice, some oil producers opt to sell the oil and burn the gas. This is known as gas flaring” (Ebrahim and Friedrichs 2013).

In other words, gas flaring is the burning of natural gas that is associated with crude oil when it is pumped up from the ground. Nigeria is currently the second largest gas-flaring country in the world after Russia based on recent statistics (IRIN 2015; Ndubuisi and Olaode 2015).

According to the National Energy Policy 2003, Nigeria has a proven natural gas reserves of about 163 trillion standard cubic feet, which in energy terms is substantially larger than its oil resources. Over 50% of the produced gas (mainly associated gas) was flared, as at 2001.

Ibitoye (2014) suggests that there are three main reasons why most of the associated gas produced during oil extraction is flared. - firstly, domestic demand for natural gas is not large enough to utilise all the associated gas, if recovered; secondly, the high cost of recovery of associated gas compared to non-associated gas and lastly, the inadequacy of gas infrastructure for distribution of gas to potential consumers.

This article employs analytical method of research to achieve the following objectives;

- To appraise the development of the National Energy Policy 2003 as a legislative instrument in tackling gas flaring in Nigeria.
- To evaluate the effectiveness of the National Energy Policy 2003 in achieving sustainable development.
- To make recommendations for redress on the frailties of the National Energy Policy 2003.

2. Historical background of gas flaring regulation in Nigeria

Crude oil was discovered in commercial quantities in Nigeria in 1956 while oil production started in 1958. Gas flaring began at the onset of oil production and so did a realisation of its notoriety (ERA 2005).

The Petroleum Act of 1969 was the first legal regime established to oversee the activities of the Nigerian Petroleum Industry. In reality the law was designed for crude oil exploitation as gas had not obtained recognition as a commodity in its own right by then. As a precautionary measure, the Minister of Petroleum was given authority to make adjustments regarding licenses and leases given under the Act, including the prevention of pollution. One of the adjustments made by the Minister was the Petroleum Act (Drilling and Production) Regulations of 1969 which required the submission of a feasibility study for gas utilisation within 5 years after production start date.

Nonetheless, the Regulations declined to specify precise sanctions for companies who breached this regulatory requirement. Additionally, there were no legal obligations under the Regulations for the reduction of gas flaring before and after the submission of the feasibility study for gas utilisation (Orji 2014) . The lapses in the Regulations were therefore exploited by oil-producing companies.

In 1973, a Petroleum Amendment Decree was approved in which associated gas could be taken and used without royalty payments. This Decree was meant to encourage harnessing of associated gas as associated

gas could be taken and utilized without royalty payment. The Nigerian Government was therefore at liberty to exploit oil companies of their associated gas for free and convert it for domestic uses and other economic activities. Nonetheless, the Petroleum Amendment Act of 1973 also failed to control gas flaring because the Nigerian Government did not have the essential infrastructure for the usage of the associated gas (Orji 2014).

The Associated Gas Re-injection Act was passed in 1979. By this legislation no company was to flare gas after January 1984 without special permission from the Minister of Petroleum Resources. The penalty for the original enactment was punishment by forfeiture of concession (Flaring Policy and Regulation in Nigeria 2014).

The penalty under the Associated Gas Re-injection Act was seen as too severe by most stakeholders and hence there was a failure to enforce this sanction. Lack of infrastructure for gas utilisation and the inability of the government to contribute its share to the cost of building gas re-injection facilities based on existing joint venture agreements with Oil-producing companies led to the failure of the Associated Gas Re-injection Act (1979).

The penalty for not re-injecting associated gas was changed to a low fine in 1984 which made gas flaring a much cheaper option for companies compared to the alternatives of marketing or re-injection. An oil company was quoted then as stating that it was cheaper for it to flare gas at a cost of 1 million US Dollars as against the 56 million US Dollars cost of switching from water to gas injection (Flaring Policy and Regulation in Nigeria 2014).

Although the fine was reviewed and increased a couple of times between 1990 and 1998, the amount remained significantly low compared to the cost of alternatives.

3. National Energy Policy 2003

The National Energy Policy (NEP) was introduced due to the apparent failure of previous legislations on gas flaring. The main objectives of this policy are;

- to eliminate gas flaring by 2008
- to create an economical and environmentally friendly operation, by substituting oil for gas

4. Factors Influencing Gas Flaring Policy

In Nigeria, oil companies engage in gas flaring, as a 24 hour-a-day, 365 day-a-year practice. According to JINN (2014) some of these flares have burned continuously for 40 years with people literally living next door to the deafening, ground-level flares that leap as high as several story building.

The negative impacts of gas flaring in Nigeria are enormous. Some of these impacts are discussed below.

4.1 Environmental Impacts

Gas flaring is regrettable from an environmental perspective because of the various toxins and greenhouse gases that it emits into the atmosphere.

❖ Climate Change

Carbon dioxide and methane are the two main greenhouse gases emitted by gas flaring. These two gases together make up about 80% of global warming to date (Ajugwo 2013). Climate change is notably heart-breaking for third world countries and Africa, owing to their limited ability to cope with the effects of climate change such as a scarcity of water, shortage of food, spread of pests and diseases as well as possible flooding in coastal areas (Sunmoni 2012).

❖ Acid Rain

Acid rain is primarily caused by emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO) which combine with atmospheric moisture to form sulphuric acid and nitric acid respectively. There has been prevalent cases of corroded roofs in oil-bearing communities and its environs due to the acidic nature of the rainfall they experience as a result of gas flaring. Acid rain acidifies lakes and streams and damages vegetation (Ajugwo 2013).

❖ Agriculture

Soil nutrients have been depleted due to acidification of the soil by the composites of chemical compounds such as Oxides of Nitrogen, Carbon and Sulphur, particulate matter, and hydrocarbon which all come about as a result of gas flaring (Ajugwo 2013). There has been reported cases of reduced crop yield in the Niger Delta resulting in hunger (JINN 2010). Gas flaring also tends to have detrimental effects on ecological and bacterial spectrum modification (Ismail and Umukoro 2012).

❖ Pollution

Gas flaring produces a black soot which collects on top of roofs and when it rains, it washes off into the soil thereby contaminating the land (Ishisone 2014). The roaring from gas flaring activities is a source of noise pollution. There are also report cases of thermal pollution due to the heat and elevated temperatures produced by the flared gas in Nigeria (Ismail and Umukoro 2012).

4.2 Health impacts

According to Ismail and Umukoro (2012), there are over 250 identified toxins released from flaring including carcinogens such as benzene and metals such as mercury. Exposure to benzene causes acute leukemia and a variety of other blood related disorders. Gas flaring causes surrounding communities to suffer from increased health risks including premature deaths, respiratory illnesses, asthma and cancer (Ismail and Umukoro 2012). Ajugwo (2013) suggests deformities in children, lung damage, skin problems, and neurological, reproductive and developmental effects have also been reported as adverse health impacts of flaring.

4.3 Economic impacts

Gas flaring is regrettable from an economic perspective because a valuable resource which could be used for electricity generation is wasted. It is estimated to cost Nigeria US \$2.5 billion annually with 66% of Nigerians living below the poverty line (ERA 2005).

5. Evaluation of the National Energy Policy

The NEP was effective at enhancing investment in the energy sector, diversifying energy mix in the country, facilitating increased energy supply in the economy, increasing efficient energy utilization, enhancing local capacity and creating greater awareness of the significance of the energy sector (Bala 2014).

Contrary to the aforementioned achievements, the NEP failed to achieve its objective of eliminating gas flaring by 2008 due to the following reasons;

5.1 Lack of Infrastructure

Oil fields are generally scattered, and gas collected at one single field must first be piped to a common collection point, compressed and transported to a processing unit (Ibitoye 2014). The Nigerian government lacked the required infrastructure to harness and transport associated gas from oil wells to facilities where it can be stored, processed and distributed (Orji 2014).

5.2 Insecurity

The Niger Delta has four ecological zones: coastal barrier islands, mangroves, freshwater swamp forests, and lowland rainforests (Ishisone 2014). This makes investment in the gas industry even more expensive as the geographical location of the Niger Delta has the potential of increasing cost of building infrastructure and hence discourages oil operators. Furthermore, the Niger Delta region of Nigeria is increasingly becoming notorious due to rampant terrorism and vandalism which scare off potential investors.

5.3 Financial incapacity of the government

The bulk of Nigerian oil is produced under joint venture agreement where the government through NNPC is the major shareholder. NNPC was responsible for a proportionate share of gas re-injection facilities. The Nigerian government failed to honour his part of the agreement by not contributing its share to the cost of installing gas re-injection facilities eventually resulting in the failure of the policy (Orji 2014).

5.4 Penalties were of economic advantage to oil operators

The penalty for gas flaring was comparatively cheaper compared to the cost of investing in gas utilization and re-injection projects. Oil companies therefore found it more economical to flare gas and pay meagre fines than the costly alternatives of gas flaring.

5.5 Lack of legal framework

One of the main impediments of the NEP is poor implementation of anti-flaring measures due to weak regulatory oversight. The Department of Petroleum Resources (DPR) seems to have failed to oversee the activities of oil companies due to the absence of requisite technology to monitor the volumes of gas flared in order to impose proportionate fines. There were hindrances of weak institutional capacity and discrepancies in the government's anti-flare policies (Orji 2014).

5.6 Lack of Political will and corruption

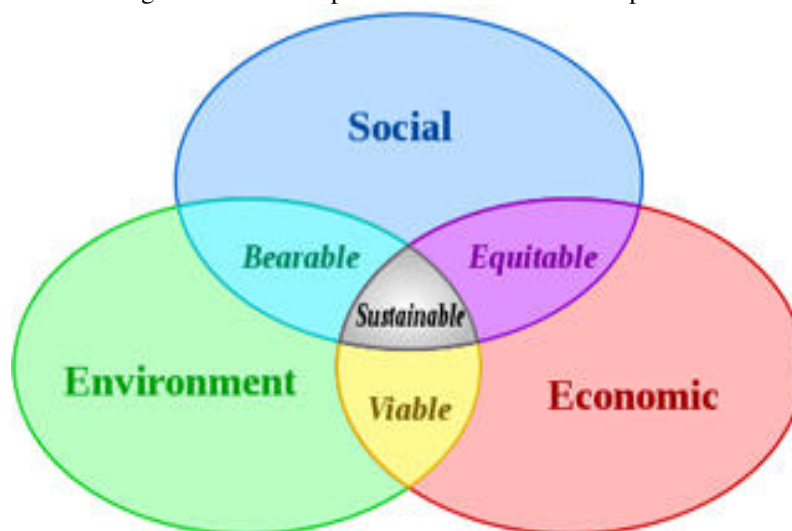
According to the NEP, the Nigerian government is over-dependent on oil revenue. This makes effective enforcement and implementation of relevant policies in the oil and gas sector restrained. The oil companies virtually run the economy and as such there is the apparent fear that the Nigerian government may lose money needed for the sustenance of the economy if the interest of oil companies are not met. Although the National Energy Policy 2003 tried to move away from over-relying on the oil revenue, there is still lack of political will to make any meaningful progress due to the many self-seeking kleptocratic politicians in the country.

6. Gas Flaring and Sustainable Development

The most widely accepted definition of sustainable development is that offered by the Brundtland Report, which defines it as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. It contains within it two concepts;

- the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs." (iisd 2014).

Figure 1: The three pillars of sustainable development



(Barbier 1987)

Barbier (1987) suggests that for a development to be sustainable, there should be a balance between the three pillars of sustainable development in the long term.

The NEP 2003 like every other environmental policy aims to achieve sustainable development but it is quite obvious from earlier discussions in this article that it has failed in achieving wider sustainable development goals.

Socio-economic conditions of local people in the oil-bearing communities remain fundamentally deplorable, without good roads, health facilities, schools and teachers, jobs, access to legal services, good nutrition and other basic facilities that make for good living for a country that has generated over \$300 billion in revenue from 50 years of oil exploration and production in the Niger Delta region of Nigeria (Allen 2014).

According to Akpomuvie (2011), the Niger Delta has been described as a pathetic paradox; so rich and yet so poor; so endowed and yet so mismanaged; so much potentials and yet so prodigal. Unfortunately, the Niger Delta which is considered to be the heart-beat of Nigeria's economy has known little peace as the area has remained conflict prone with vehement upheaval against the government for the regulation of its bountiful resources. In Nigeria, there is a predatory contraption in which power is based not on the usually recognized broad public support but on force or coercion (military or locally sourced mercenary) and the impact of some selfish egocentric elite and in which state power faces few constraints (Akpomuvie 2011).

The idea that government is reluctant in enforcing policies to end gas flaring contributes tremendously to the sense of frustration among people and groups living in oil-bearing communities whose social and economic conditions have been worsened by pollution of their environment caused by exploration and production activities (Allen 2014).

According to NEP 2003, the expected life-span of Nigeria's natural gas is about 88 years, based on the 2001 production rate of 1850 bscf. If indeed that estimation is true, it is only logical to say that the needs of the future generation have been compromised with over 50% of gas produced being flared. The flared gas could be saved to cater for posterity's electricity needs since gas is a non-renewable resource.

The Niger Delta is one of the largest wetlands in the world and contains enormous biodiversity, including unique and rare species (Ishisone 2014). The inability of the NEP to end gas flaring means there is a global risk of biodiversity decline due to pollution. Sustainable development is about food security, poverty eradication, environmental consciousness, job creation, judicious use of resources, healthy living, good social services and equity. Nigeria with all its oil and gas reserves is not able to meet its domestic electricity needs. There are still many rural areas including some of the oil-bearing communities without electricity. The

continuous power outages, injustice, human abuse, crime, lack of job opportunities, pollution, extinction of species, deforestation, poverty, vandalism and armed conflicts in Nigeria are all evidence that sustainable development has not been achieved.

Allen (2014) postulates that poor living conditions and vehement upheavals for resource control by local groups in the oil-bearing communities of Nigeria are signs that sustainable development is far from achievement. Besides, policies like NEP that are meant to generate practices that improve local economic conditions have failed to bring such results, leading to frustrations among local communities. Such frustration has contributed to rising tension and violence in the Niger Delta.

7. Conclusion and Recommendations

Nigeria is deeply afflicted by what economists call the resource curse: countries with a rich resource endowment are often less well governed, have lower growth rates, and are less socially developed than resource-poor countries. One manifestation of the resource curse in Nigeria is seen in poor national governance (Ebrahim and Friedrichs 2013).

The major challenge of the National Energy Policy 2003 has been with its implementation. The Nigerian economy is highly dependent on oil revenue. As such, any policy that does not consider the interests of multinational oil-producing companies who are now seen as 'sacrosanct' may not be effectively enforced due to the apparent fear that the Nigerian government may lose money needed to run the state (Orji 2014). The following measures are therefore recommended;

7.1 Provision of an enabling environment for policy implementation.

- ❖ Although no incentives are needed to produce associated gas, they may be required to stimulate investment in its utilization. Incentives for harnessing associated gas should preferably be provided in combination with regulatory requirements to eliminate or reduce flaring (GGFR 2014). Incentives could be in the form of tax exemptions for oil companies that effectively harness their associated gas. The regulatory requirements were lacking in the National Energy Policy 2003.
- ❖ Penalties should be set at a reasonably high level to make the alternative of investing in flare reduction more appealing than paying the penalty. Otherwise, it will only increase the operator's costs and the government's revenues - while flaring continues. It should not however be so high that closing in on oil production becomes the preferred option for the operator (GGFR 2014).
- ❖ It is the Nigerian government's responsibility to prioritise the development of gas gathering and transmission infrastructures which will help to enhance the use of associated gas for critical economic purposes such as the generation of electricity and other industrial activities (Orji 2014). It will also be of great help to develop the domestic gas market so that associated gas can be marketed for domestic consumption. In order to develop the domestic gas market, the Nigerian government can use realistic pricing mechanisms to incentivise investment in the gas sector. The domestic price of natural gas should therefore be the equivalent of the cost of supply and not lower. Power supply should also be reflective of the cost of natural gas supply.

7.2 Diversification of the Nigerian Economy

The over-dependence of the Nigerian government on oil revenues makes it difficult to master courage and exert the necessary political will in policy implementation especially where oil companies are involved. It is therefore incumbent on the government to diversify the economy by exploiting other avenues of foreign exchange earnings such as Agriculture. By so doing, the government will be able to implement policies in the energy sector effectively where there is non-compliance.

7.3 Monitoring and Enforcement

Benchmarks need to be established to monitor compliance to the rules and guidelines governing the oil and gas industry. Annual Field Reports of oil operators might also need to be scrutinized and on-site inspections conducted. This will help to assess the success of the policy (UK Flaring Policy 2014).

7.4 Setting voluntary targets for flare reduction with some attractive incentives for oil producing companies.

The government may need to enter into negotiations with oil-producing companies to set voluntary targets for flare reduction. Oil companies may be allowed to trade off emissions by providing economic incentives for achieving targets. This will provide enough challenge for compliance by operators. Again this requires a central authority or governing body to regulate the activities in this regard.

7.5 The Petroleum Industry Bill (2012) needs to be passed

Nigeria's long-awaited Petroleum Industry Bill (PIB) is supposed to address all the problems in Nigeria's oil and gas sector at once: to establish a new legal framework, to create efficient and effective regulatory agencies, to

reform the scandal-prone national oil company and to develop a new set of guidelines governing operations in the oil and gas sectors (Liewerscheidt 2014). The PIB has not been passed into law. This is mainly due to opposition to the projected economic effects of some of the PIB's provisions. Lack of support from key stakeholder groups (notably IOCs), presidential elections in 2011, ongoing parliamentary debate and the promotion therein of diverging versions of the PIB have all contributed to the slow progress of the PIB through the legislature (Comyn and McArdle 2014).

It is my honest opinion that Nigeria can put an end to gas flaring with the recommendations in this article. The key however is good governance.

This research highlights only the main issues of gas flaring and weaknesses in policy implementation in Nigeria, hence further studies are required to explore this broad area of research. Building on this research, each issue highlighted makes up an individual research question that needs to be investigated, however, this article provides a basis for much more in-depth research in the future.

References

- AJUGWO, Anslem O. (2013). Negative Effects of Gas Flaring: The Nigerian Experience. *Environment Pollution and Human Health*, **1** (1), 6-8.
- AKPOMUVIE, Benedict O (2011). Tragedy of Commons: Analysis of Oil Spillage, Gas Flaring and Sustainable Development of the Niger Delta of Nigeria. *Sustainable Development*, **4** (2), 1-11.
- ALLEN, Fidelis (2014). *Oil Companies and Imlementation of Government Environmental Policy In the Niger Delta*. [online]. Last accessed 9 December. HYPERLINK "http://graduateinstitute.ch/files/live/sites/iheid/files/shared/executive_education/Global%20South%20Workshop/paper_Allen.pdf"
- AMORIN, R. and BRONI-BEDIAKO, E. (2013). Major Challenges in Ghana's Oil and Gas Discovery: Is Ghana Ready? *ARPN Journal of Science and Technology*, **3** (1), 21-25.
- BALA, E. J (2014). Overview of the National Energy Policy and Energy Demand and Supply Projection Studies for Nigeria. *Energy Commission of Nigeria*, 1-63.
- BARBIER, Edward B. (1987). The Concept of Sustainable Economic Development. *Environmental Conservation*, **14** (2), 101-110.
- COMYN, George and MCARDLE, Hamish (2014). *The Petroleum Industry Bill – Looking Forward*. [online]. Last accessed 16 December. HYPERLINK "<http://whoswholegal.com/news/features/article/30613/the-petroleum-industry-bill-looking-forward>"
- EBRAHIM, Zoheir and FRIEDRICH, Jörg (2013). Gas Flaring: The Burning Issue..
- ENERGY COMMISSION OF NIGERIA (2014). *National Energy Policy 2003*. [online]. Last accessed 1 December. HYPERLINK "http://wacee.net/getattachment/21cca4e4-ef1b-4c59-8501-98b3e8624b88/National_Energy_Policy_Nigeria.pdf.aspx"
- ERA (2005). Gas Flaring In Nigeria: A Human Rights, Environmental and Economic Monstrosity. *Environmental Rights Action(Friends of the Earth Nigeria)*, 1-36.
- Flaring Policy and Regulation in Nigeria*. (2014). [online]. Last accessed 19 November. HYPERLINK "<https://cdm.unfccc.int/filestorage/I/J/V/IJVMCX2UTZ43S7916KDPORN8OABHE5/Annex%203A.pdf?t=Qmp8bmZha3NkfDCNwxXEpc9xB-Kusozy5S32>"
- GGFR (2014). *Guidance on Upstream Flaring and Venting: Policy and Regulation*. [online]. Last accessed 16 December. HYPERLINK "http://siteresources.worldbank.org/INTGGFR/Resources/fr_policy_regulations_guidance.pdf"
- IBITOYE, Francis Idowu (2014). Ending Natural Gas Flaring in Nigeria's Oil Fields. *Journal of Sustainable Development*, **7** (3), 13-22.
- IISD (2014). *What is Sustainable Development? Environmental, economic and social well-being for today and tomorrow*. [online]. Last accessed 8 December. HYPERLINK "<https://www.iisd.org/sd/>"
- IRIN (2015). *NIGERIA: Gas flares still a burning issue in the Niger Delta*. [online]. Last accessed 19 May. HYPERLINK "<http://www.irinnews.org/report/95034/nigeria-gas-flares-still-a-burning-issue-in-the-niger-delta>"

- ISHISONE, Michiko (2014). *Gas Flaring in the Niger Delta: the Potential Benefits of its Reduction on the Local Economy and Environment*. [online]. Last accessed 8 December. HYPERLINK "<http://nature.berkeley.edu/classes/es196/projects/2004final/Ishone.pdf>"
<http://nature.berkeley.edu/classes/es196/projects/2004final/Ishone.pdf>
- ISMAIL, Saheed O. and UMUKORO, Ezaina G (2012). Global Impact of Gas Flaring. *Energy and Power Engineering*, **4**, 290-302.
- JINN (2014). *Gas Flaring in Nigeria: An Overview*. [online]. Last accessed 16 December. HYPERLINK "<http://justiceinnigerianow.org/gas-flaring>" <http://justiceinnigerianow.org/gas-flaring>
- LIEWERSCHIEDT, Malte (2014). *Nigeria: any chance of progress on the Petroleum Industry Bill?* [online]. Last updated 19 June. HYPERLINK "<http://africanarguments.org/2014/06/19/nigeria-any-chance-of-progress-on-the-petroleum-industry-bill-by-malte-liewerscheidt/>"
<http://africanarguments.org/2014/06/19/nigeria-any-chance-of-progress-on-the-petroleum-industry-bill-by-malte-liewerscheidt/>
- NDUBUISI, Francis and OLAODE, Funke (2015). *Nigeria Yet to Endorse New Global Initiative to End Gas Flaring by 2030*. [online]. Last updated 20 May. HYPERLINK "<http://www.thisdaylive.com/articles/nigeria-yet-to-endorse-new-global-initiative-to-end-gas-flaring-by-2030/207198/>" <http://www.thisdaylive.com/articles/nigeria-yet-to-endorse-new-global-initiative-to-end-gas-flaring-by-2030/207198/>
- ORJI, Uchenna Jerome (2014). Moving from gas flaring to gas conservation and utilization in Nigeria: a review of the legal and policy regime. *OPEC Energy Review*, **38** (2), 149-183.
- SUNMONI, Mobolaji (2012). *The Environmentalist*. [online]. Last updated 26 June. HYPERLINK "<http://ecoremediation.blogspot.co.uk/2012/06/gas-flaring-in-nigeria-what-are-harmful.html>"
<http://ecoremediation.blogspot.co.uk/2012/06/gas-flaring-in-nigeria-what-are-harmful.html>
- UK Flaring Policy. (2014). [online]. Last accessed 16 December. HYPERLINK "http://siteresources.worldbank.org/EXTGGFR/Resources/578068-1258067586081/UK_Flaring_Policy.pdf"
http://siteresources.worldbank.org/EXTGGFR/Resources/578068-1258067586081/UK_Flaring_Policy.pdf

Appendix I: List of Acronyms

bscf.....	Billion Standard Cubic Feet
DPR	Department of Petroleum Resources
IOCs	International Oil Companies
NEP	National Energy Policy
NNPC	Nigerian National Petroleum Corporation
PIB	Petroleum Industry Bill

About the Author

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