Nigeria: Carbon Credit Development for Flare Reduction Projects

Guidebook

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List of Abbreviations

AAU	Assigned Amount Unit
AG	Associated Gas
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CDM EB	CDM Executive Board
COP	Conference of the Parties
CO2	Carbon Dioxide
CH4	Methane
DOE	Designated Operational Entity
DNA	Designated National Authority
ERPA	Emission Reduction Purchase Agreement
EUA	Emission Allowance under EU Emission Trading Scheme
EU ETS	European Union Emission Trading Scheme
GHG	Greenhouse Gases
GGFR	Global Gas Flaring Reduction - Public Private Partnership
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
LoA	Letter of Approval
MoU	Memorandum of Understanding
NNPC	Nigerian National Petroleum Corporation
PCF	Prototype Carbon Fund – World Bank
PDD	Project Design Document
PIN	Project Idea Note
PIC CDM	Presidential Implementation Committee for CDM
tCO2e	Tonne of CO2 equivalent
ET	Emissions Trading
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

Flaring of associated gas contributes significantly to global emissions of greenhouse gases, with flaring emissions currently estimated at about 300 million tons of carbon dioxide equivalent (CO2e) per year. The *Global Gas Flaring Reduction Public Private Partnership (GGFR)* was established to supplement and strengthen efforts made by governments and companies to reduce and eventually eliminate flaring. GGFR involves the World Bank and other stakeholders, including governments and oil & gas companies. GGFR considers the Clean Development Mechanism (CDM) of the Kyoto Protocol (KP) to reduce greenhouse gas emissions (GHG) as an effective financial incentive for projects that reduce flaring and venting of associated gas. These projects will in turn be instrumental in defining and furthering the role of the CDM in gas flaring reductions.

The CDM allows companies with approved projects in developing countries that reduce emissions to sell the emission reductions to a developed country with emission targets (Annex I under the KP). The main goals of this mechanism are to assist Annex I countries in reaching their emission reduction targets and promote sustainable development in the developing countries. This guidebook explains the characteristics of the CDM and describes in detail how companies can create an additional revenue stream from gas flare-out projects by including carbon credits obtained through the CDM mechanism. It also relates the CDM and its applicability to the Nigerian situation. Nigeria is eligible to participate in this mechanism since it has already ratified the Kyoto Protocol in 2004 and it has high potential for emission reduction projects, in particular in the oil and gas sector. This guidebook focuses on issues of most relevance to gas flareout projects in Nigeria. For more generic guidance on preparing projects for submittal to the CDM EB, the reader is referred to the UNEP document *PDD Guidebook: Navigating the Pitfalls* found at *http://www.cd4cdm.org/publications.htm*.

GGFR in Nigeria

In Nigeria, GGFR is implementing a program to assist the country in its efforts to reduce the flaring and venting of gas associated with the extraction of crude oil. A key element of this aim is to support the design of financial mechanisms for gas flaring reduction projects, including assisting Nigeria and oil and gas companies in obtaining carbon credit financing under the CDM.

The GGFR program "*Carbon credit development for flare reduction projects*" aims at developing the capacity and preparing pilot gas flare reduction CDM projects in the oil and gas sector in Nigeria. As part of this support, GGFR is helping to build CDM capacity among project developers and national authorities. This includes sponsoring a series of capacity building workshops and roundtable discussions, assisting the national government in streamlining the CDM process in Nigeria, and assisting project developers and companies in developing real CDM projects.

Under the GGFR program in Nigeria three Stakeholders Workshops have been undertaken. These workshops were aimed at raising awareness and knowledge of the CDM, the relevant stakeholders for CDM in Nigeria (including the Presidential Implementation Committee on CDM, or PIC CDM), the national procedures and institutional arrangements, and potential projects within the oil and gas sector. In addition, the workshops presented practical recommendations on how to align these institutional arrangements with the CDM project cycle. Finally, GGFR made a call for CDM project ideas from the industry in the form of Project Idea Notes (PINs), and selected one project as a case study in the oil and gas sector in

Nigeria. This pilot project is expected to serve as a foundation for developing future CDM projects in the oil and gas sector in Nigeria.

The workshops have identified challenges and priorities, which would need to be addressed to facilitate a high-quality pipeline of flare reduction projects under the CDM in Nigeria. These include, among others:

- ✓ Nigeria is currently reforming the institutional, legal and regulatory framework for the gas sector as well as the gas infrastructure. However, associated gas will need special attention and incentives to ensure that associated gas use is optimized. The emerging framework, for example, should ensure added incentives for CDM development, rather than discouraging projects (e.g., by confusion created among project proponents when there are calls for legislation to stop all gas flaring).
- ✓ Nigeria has the opportunity to capitalize in technology upgrades and flare reduction technologies, which the CDM would deliver. Certified Emission Reductions (CERs) under the CDM delivery will depend on the country's ability to produce an extensive project pipeline, since buyers are available in the market.
- ✓ National procedures and project developments need to be synchronized and capacity building enhanced. While many of the necessary precursors to a successful CDM project portfolio are already in place in Nigeria (e.g., political support, institutions, national criteria), project developers and relevant stakeholders still need to build the necessary capacity and promptly move forward in developing projects.

Nigeria – gas flare situation

Nigeria currently flares gas that is generated in association with crude oil production. Currently, gas flaring amounts to about 18.9 billion cubic meters (BCM) per annum, which translates to greenhouse gas emissions of 45 million tonnes CO_2 equivalent. This level makes Nigeria one of the top countries in volume of gas flared worldwide. Even though Nigeria has great potential for gas flare reduction projects, some market and institutional barriers affect the viability of such projects. These barriers include, for example: undeveloped domestic market for gas and gas products, low gas and gas product prices, lack of gas infrastructure, and a minimal electricity transmission and distribution network. Nigeria's next challenge is to establish the correct mechanisms to help remove those barriers and develop opportunities for investment in gas flare reduction activities.

The opportunity for developing gas flaring reduction projects would be achievable if there is a collaborative and concerted action among all stakeholders in the government and in the oil and gas sector in Nigeria. Nigeria is already in the process of establishing the institutions and procedures to participate in the CDM market. A major step was taken in December 2004 when Nigeria acceded to the Kyoto Protocol, making Nigerian gas flaring reduction projects eligible for CDM carbon credits. In addition, the government has already established the Designated National Authority (DNA) for the UNFCCC, represented by the Presidential Implementation Committee on CDM (PIC CDM) as the entity to organize CDM activities in Nigeria. Furthermore, the current GGFR program "Carbon credit development for flare reduction projects" aims at developing the capacity and preparing pilot gas flare reduction CDM projects in the oil and gas sector in Nigeria.

This guidebook presents the necessary information to understand the CDM characteristics and process in Nigeria. It also provides a guideline for understanding the current situation in

the oil and gas sector in Nigeria in terms of institutional arrangements, potential project types, opportunities and barriers for project development, and how to overcome those barriers.

1 Introduction

Flaring and venting of associated gas (AG) has led to global emissions of greenhouse gases (GHG) of about 300 million tons CO2e per year in the last decade. *The Global Gas Flaring Reduction Public Private Partnership (GGFR)* was established to supplement and strengthen efforts by governments and the petroleum industry to reduce and eventually eliminate flaring associated with the extraction of crude oil. GGFR is a global partnership, which involves the World Bank and other stakeholders, including governments (e.g., Algeria, Ecuador, Nigeria, etc) and oil companies (e.g. BP, Shell, Chevron Texaco, etc). The GGFR considers the Clean Development Mechanism (CDM) an important means to achieve flaring reductions and also sees such projects to be central to the objectives of the Kyoto Protocol. Promoting the CDM to accelerate flaring reduction investments is an important part of GGFR's work program.

GGFR is currently assisting the Government of Nigeria to build capacity associated with CDM from gas flaring reduction projects in Nigeria. For this project ("Nigeria: Carbon Credit Development for Flare Reduction Projects") GGFR is working with the Presidential Implementation Committee on Clean Development Mechanism (PICCDM[1]), the Nigerian National Petroleum Corporation (NNPC) and other relevant stakeholders in the oil and gas industry in Nigeria. This project aims to raise awareness and knowledge of the CDM, the Presidential Implementation Committee of CDM, and other linkages and institutional arrangements within the oil and gas sector; build capacity within the oil and gas sector for evaluating the carbon credit potential for flare reduction projects; and assist with the identification, selection, and preparation of CDM projects.

The key objective of the project was to build capacity among project proponents and national authorities through a "learning by doing" approach, which is vital for flaring reduction projects to become "mainstream" CDM projects. The project focused on activities that can help create incentives for project proponents to develop and finance first-rate projects under the CDM. The work program included:

- *Capacity building exercises*, through a series of workshops and roundtable discussions with project proponents and national authorities. This has assisted in sharing knowledge, integrating GGFR experience to date, establishing links among stakeholders, establishing criteria and processes to undertake CDM in Nigeria.

- *"Learning by doing" exercise* to assess and screen potential flare and venting reduction projects. This involved assistance in the creation of pre-feasibility assessments called Project Idea Notes (PINs), screening of projects through a tool designed to assess key CDM project parameters, selection of one project for full development as a pilot CDM activity, and development of the appropriate baseline and monitoring methodologies required under the CDM for projects to reach the validation stage. This was done in collaboration with PICCDM.

[1] Each country needs to designate some organization to lead CDM efforts within the country. The Government of Nigeria has designated PICCDM as the Designated National Authority (DNA) for Clean Development Mechanism activities in Nigeria

2 The Clean Development Mechanism (CDM)

The CDM is a project-based mechanism established by the Kyoto Protocol to achieve cost-effective solutions for mitigation of greenhouse gases. A CDM project is undertaken in a developing country with no emission reductions target (referred to as a non-Annex I country under the Kyoto Protocol). Emission reductions generated by the project (termed Certified Emission Reductions, CERs) can be sold to Annex I governments (developed countries with commitments to reduce emissions) and authorised companies.

The CDM has two major goals:

- To assist Annex I countries in reaching their emission reduction targets;
- To promote sustainable development objectives in the developing countries (Non-Annex I).

In order to be eligible for the CDM, a project must satisfy a set of criteria. Two critical criteria are broadly classified as additionality and sustainable development.

- Additionality. The emission reductions of the project must be in addition to those that would occur under a "business as usual" scenario. That is, it is not sufficient for a project just to reduce emissions. It must reduce emissions as a result of actions that would not have been made in a "business as usual" case. CDM projects must lead to real, measurable, and long-term benefits in terms of climate change mitigation.
- Sustainable development. The purpose of the CDM is to contribute to sustainable development in the host country. It is up to the developing countries which are host to the projects to determine their own criteria and assessment processes.

2.1 Participants in the CDM

Main participants in the CDM include:

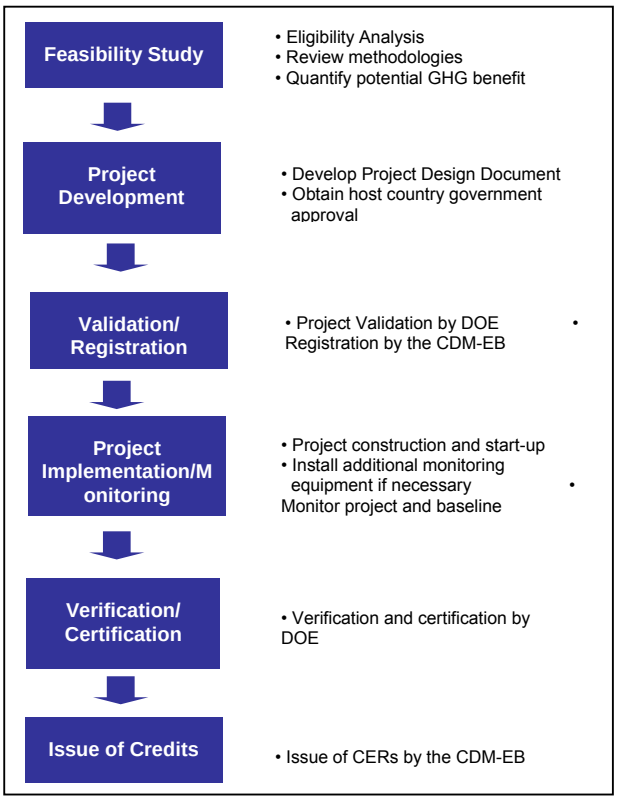
- **The CDM Executive Board (CDM-EB).** The CDM is supervised by the CDM-EB, which was appointed by the Conference of the Parties (COP, the countries participating in the Kyoto Protocol) in November 2001. The CDM EB oversees the operation of the CDM process, approves baselines methodologies and issues CERs (i.e., carbon credits).
- **Designated Operational Entities (DOEs).** The DOEs are independent third parties, accredited by the CDM EB. The DOEs validate proposed CDM projects, verify the resulting emission reductions, and certify those emission reductions as CERs.
- **Designated National Authority (DNA)**. The host country national authority empowered to issue relevant host country approvals and to manage the local regulatory aspects of the CDM. The approval from the host country DNA is required in order to register a project with UNFCCC. In Nigeria the Presidential Implementation Committee on Clean Development Mechanism (PICCDM) has been designated to be the Nigerian DNA.

- **Project proponent (PP).** The company/institution developing the CDM project.

In order for a project to be registered with the CDM-EB as a CDM activity it must follow a specific preparation procedure. This procedure is explained in the CDM project cycle below. Further detail on the CDM and its activities can be found at *http://cdm.unfccc.int/.*

2.2 The CDM project cycle

Each Clean Development Mechanism (CDM) project will have to follow a series of steps and a timeline to be progressed and approved, which is known as the CDM project cycle. The cycle will include all interactions between the project proponent and other stakeholders whose involvement will be required before a project realises Certified Emission Reductions (CERs). A typical CDM project cycle would involve the following steps:



Step 1: Preliminary Feasibility Study

The preliminary feasibility study should provide recommendations of whether a project meets the basic requirements of the Marrakech Accords and the CDM Executive Board (CDM-EB). The feasibility study should determine whether or not the project reduces greenhouse gases (GHGs) compared to a situation without the project, and whether or not the project is located in a country that is eligible. The project also needs to demonstrate that it is not business as usual, i.e., that the project would not have happened anyway without consideration of the potential value of any carbon credits. This requirement is imposed to avoid allowing Annex 1 (developed) countries to meet their targets under the Kyoto Protocol by purchasing CERs from developing country projects that are based on emission reductions that would have occurred regardless of concerns over climate change. The study should also determine the possible amount of emission reductions accruing from the project. Considering expected carbon credit prices, it would give a blueprint for the extent to which additional financing through the CDM can contribute to the overall profitability of the project. At the conclusion of the preliminary feasibility stage, the project proponent or the advisor may prepare a summary of the information collected during this phase in a document called the Project Idea Note (PIN).

Step 2: Project Development

Once a project has met all the preliminary feasibility requirements it is then necessary to develop a complete Project Design Document (PDD). The PDD should contain the following information:

- ✓ General description of project activity
- ✓ Baseline methodology
- ✓ Duration of the project activity/Crediting period
- ✓ Monitoring methodology and plan
- ✓ Calculations of GHG emissions by sources
- ✓ Environmental impacts
- ✓ Stakeholders' comments

For further information on PDDs, including access to the official documents needed to complete a PDD, see *http://cdm.unfccc.int/Reference/Documents.*

- *Baseline Study*: The baseline for a CDM project activity is the scenario that reasonably represents the emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. In this step the project proponent (PP) defines the project boundaries, describes the baseline, applies the concept of additionality to the project, quantifies baseline emissions and establishes the crediting period of the project. The project proponent should determine whether an existing baseline methodology is applicable. If a new baseline methodology is needed, the PP should prepare and submit the new baseline methodology to a Designated Operational Entity (DOE) for evaluation.
- *Monitoring Plan*: Emission reduction projects need to result in real and measurable net emission reductions that are additional to what would have been emitted without the project. The plan includes methods to monitor baseline and project conditions and GHGs. The project proponent (PP) should determine whether an existing monitoring methodology is applicable. If a new monitoring methodology is needed, the PP should prepare a new methodology for monitoring.
- *Stakeholder Consultation*: For CDM projects it is required to invite local stakeholders for comments. The consultation includes preparing project documentation for use at the stakeholder event and a summary of comments received. It is also required to submit to the DOE a report that demonstrates how due account was taken of the comments received.
- *Environmental Impact Assessment (if required)*: The environmental impacts of the project activity will need to be analysed, in accordance with the requirements of the host country.

Once the PDD has been completed, it has to be submitted to the Designated Operational Entity (DOE) for validation of the project. The PP should contract one of the DOEs listed on the UNFCCC website (see *http://cdm.unfccc.int/DOE*).

Together with the PDD, the PP should submit written approval from the host government for the project. The host's Designated National Authority (DNA) for CDM issues this letter of

approval. It is the host government's responsibility to determine whether the project will create sustainable development benefits. In the case of Nigeria the DNA is the Presidential Implementation Committee on CDM (PICCDM).

Step 3: Validation and Registration

The DOE is charged with ensuring that the project methodology described by the PDD meets all of the necessary CDM project requirements. The validation process involves detailed scrutiny of the institutional capacity of the project stakeholders, the evidence underlying the calculations of carbon benefits, the systems to be used for monitoring, and the host government approval. During this step, the PDD will be made publicly available for comments.

If the baseline methodology correctly applies an already approved methodology by the CDM Executive Board, the DOE validates it immediately. If it is a new methodology, the DOE submits the new methodology together with the PDD to the CDM EB for review and approval.

After completion of the validation process, the DOE will produce a validation report, which the DOE will submit together with the PDD to the CDM Executive Board for registration of the project. Registration should be finalised after a maximum of 8 weeks from receipt of the validation report, unless a review is requested.

The Emission Reduction Purchase Agreement (ERPA), which is the contract between the seller (PP) and the buyer of CERs, is often arranged during this stage. However, an ERPA can be negotiated at any stage of the project cycle.

Step 4: Project Implementation and Monitoring

Once the CDM-EB has approved and registered the project as a CDM activity the project may be implemented[2]. As the project begins operation, the PP should periodically monitor the project and baseline performance, according to the monitoring plan (MP) developed in the PDD.

The PP also checks that specifications of the monitoring plan are met and ensure all MP-mandated data collection and management systems are in place to allow subsequent successful verification and certification. If any additional monitoring requirements have been identified during this stage, they need to be implemented.

The PP submits the monitoring report to a different DOE from the one who validated the PDD.

The case of the small-scale CDM Project Cycle

The development of CDM projects can lead to significant transaction costs. Therefore, separate provisions have been made for small-scale projects by the UNFCCC to reduce the burden on the project proponent. Small-scale projects are:
- Renewable energy projects that generate less than 15 MW;
- Energy efficiency projects that reduce less than 15 GWh;
- And other projects that emit less than 15,000 tonne CO_2 per year.

The CDM Project Cycle for small-scale projects is basically identical as for larger-scale CDM project activities. Main differences are the following:
- Simplified procedures for Project Proponents include: simplified PDD, baselines and monitoring program.
- Simplified procedures for Operational Entities: the same entity can validate, verify and certify the project.
- Lower registration fees for small scale CDM projects

[2] Some projects that have already started implementation before registration may claim carbon credits for a crediting period that starts before project registration, but only if the project is registered before 31 December 2005.

Step 5: Verification and Certification

This step involves scrutiny by the DOE to verify the project's monitoring system and determine the GHG reduction resulting from the project. The DOE produces a verification report for the project and provides it to the PP, the Parties involved and the CDM-EB. The DOE makes it publicly available. The DOE also produces a certification report for the project, which constitutes a request for issuance of the carbon credits and provides it to the PP, the Parties involved and the CDM-EB. The DOE makes it publicly available.

Step 6: Issue of credits

The CDM-EB issues the Certified Emission Reductions (CERs); this should usually be done within 15 days of the receipt of the certification report of the project by the DOE, unless the CDM-EB requests a review. CERs will be issued as per distribution agreement (e.g., per month, per annum, or whatever schedule has been agreed to between the buyer and the seller). The PP may then bank or sell CERs as desired.

2.3 The Global Gas Flaring Reduction Public Private Partnership and CDM

The aim of the Global Gas Flaring Reduction Public Private Partnership (GGFR) is to support national governments and the petroleum industry in their efforts to reduce flaring and venting of gas associated with the extraction of crude oil. There is a three-year work program underway that began in January 2003 and is coordinated by a small team based at the World Bank. The work program focuses on four areas of activity to reduce gas flaring and venting in partner countries: (1) commercialisation of associated gas; (2) regulations for associated gas; (3) establishing a flaring and venting reduction standard; and (4) capacity building related to carbon credits for flaring and venting reduction projects. Supporting activities include data gathering, consultations, and identification and dissemination of best practice. This project is largely focused on area number (4).

The Global Gas Flaring Reduction Public Private Partnership (GGFR) considers the CDM an important process for achieving flaring reductions and also agrees that such projects are key to the objectives of the Kyoto Protocol. The GGFR's work program includes several activities to promote the use of CDM and to accelerate flaring reduction investments. One important activity resulted in the GGFR Report No. 2 "Kyoto Mechanisms for Flaring Reductions", which explored how and under what circumstances GGFR investments can earn carbon credits. This formed the basis for the Report No. 6, "Framework for CDM Baseline Methodologies", which provides guidelines and recommendations for establishing CDM baseline methodologies in gas flaring reduction projects (these reports can be found at: *http://www.worldbank.org*).

GGFR believes that pilot projects will be instrumental in defining and furthering the role of CDM in gas flaring reduction. Therefore, its current project in Nigeria aims at providing capacity building to local stakeholders, partly by undertaking a "learning by doing" approach through development of a CDM pilot project in Nigeria's oil and gas sector.

3 Clean Development Mechanism (CDM) in Nigeria

3.1 Nigeria and the United Nations Framework Convention for Climate Change (UNFCCC)/the Kyoto Protocol (KP)

Nigeria is a Party to the UNFCCC, which it signed on June 13th 1992 and ratified in August 1994. Nigeria participated as a Party entity as well as a member of regional groupings (e.g. the Group of 77 and China for which it served as a Chairman at COP 6) to many of the Conference of Parties (COP) meetings. Nigeria ratified the Kyoto Protocol on the 10th of December 2004, and the Protocol came into force for the country on the 10th of March 2005. Even before this time, the Federal Government of Nigeria (FGN) has, over the years, encouraged activities towards meeting its climate change objectives.

3.1.1 Authorities

The Federal Ministry of Environment, as the Focal Point on Climate Change, is one of the relevant authorities for CDM in Nigeria. The Federal Ministry of Environment is mainly involved at the broader policy and national levels. Recently, the FGN introduced another authority named the Presidential Implementation Committee on CDM (PIC CDM) as the entity to organize CDM activities in Nigeria. Last year, the PIC CDM has been named the Designated National Authority (DNA) as required by the UNFCCC and as defined in the Marrakech Accords. In this capacity, the PIC CDM has complete responsibility for CDM activities, especially in areas where government intervention and activities are expected. The DNA is expected to be the first port of call for CDM activities in Nigeria. The DNA is expected to:

- promote CDM projects in Nigeria;
- have clear and flexible procedures for review and approval of CDM projects;
- have in place documentation and communication portals that provide clear information to project proponents and investors (i.e., both buyers of CERs and/or financiers of the project) on the necessary steps to have an approved CDM project in Nigeria;
- provide clear guidance on national sustainability criteria that should be taken into consideration in developing CDM projects;
- write Letters of Approval (LoA) for projects being sent to the Executive Board for review and other CDM project cycle activities (the LoA is written after the DNA has carried out some reviews of the proposed CDM project);
- and keep a registry of CDM projects in the pipeline in the country.

The PIC CDM as the Nigerian DNA is firmly in place now, and is working hard to put all CDM related activities in place soon in Nigeria. The capacity building component of the GGFR project is also contributing to the development of some of these issues. As currently conceptualized, the DNA is led by a Chairman (Dr. Collins Gardner) and operates a National Committee consisting of members from different relevant sectors of the economy.

3.1.2 Stakeholders

CDM stakeholders in Nigeria include organisations from both the public and private sectors. The relevant public sector stakeholders include: the Federal Ministry of Environment as the Focal Point for Climate Change in the country; the PIC CDM as the Designated National Authority (DNA) for CDM activities in the country; all the sectoral public entities that are relevant to the development of CDM projects in the country (for example, Federal Ministries and Parastatals responsible for: Industry; Power; Environment; Justice; Agriculture; and National Planning). Also, other public stakeholders could include academia, state and local government.

The private sector stakeholders would include potential sector participants that should cover all the possible areas of the national economy where CDM projects can be identified. Possible stakeholders are participants from the industrial sector; forestry; power sector; oil and gas producing and consuming activities; and the transport sector. In addition, other relevant stakeholders include NGOs, which are involved in environment, sustainable development, industrial development, and energy. For the particular project "Carbon credit development for flare reduction projects" the most relevant stakeholders are the oil and gas companies operating in Nigeria as well as various service providers to this industry.

4 Flare out policy and flare reduction projects in Nigeria in the context of CDM requirements

4.1 Gas flaring in Nigeria

Nigeria currently flares gas that is generated in association with crude oil production. Currently, gas flaring amounts to about 18.9 billion cubic meters (BCM) per annum, which translates to greenhouse gas emissions of 45 million tonnes of CO_2 equivalent. This level makes Nigeria one of the top countries in volume of gas flared worldwide. At current estimated market prices for emission reductions of around EUR 5-15 per ton of CO_2, this will imply market values of emissions reductions of approximately EUR 225-675 million per year.

For the past 20 years, global flaring levels have remained virtually constant despite efforts made in both the public and private sectors. In Nigeria flaring has been reduced significantly in the last several years on a percentage basis, but in absolute terms there has been virtually no reductions due to increasing oil production (~20bcm/y in 2003). At the same time, some stakeholders in Nigeria have called for a National goal to reduce flaring to zero by 2008 or shortly thereafter. To date this goal has not been formally adopted by the Nigerian Government. The Nigerian National Petroleum Corporation (NNPC) Joint Ventures as well as other companies operating in Nigeria are pursuing flaring reduction strategies. Nevertheless, a more pro-active approach could be achieved by including carbon finance as a tool to stimulate such strategies.

A number of major constraints hinder viable flare reduction projects. In Nigeria the main barriers are:

- undeveloped domestic market for gas and gas products (CNG, LPG, fuel methanol, etc);
- low gas and gas product prices;
- lack of gas infrastructure and electricity transmission & distribution;
- difficulty in securing project funding (e.g., gas trunk-lines, power distribution, transmission, generation, fuel supply);
- limited capacity to execute all necessary changes by 2008;
- security issues.

The 2008 goal of zero flaring would be achievable if there is collaborative and concerted action among all stakeholders in the government and in oil and gas sector in Nigeria. It should be noted, however, that the 2008 gas flareout goal is not a mandatory requirement; rather, it is an informal goal that has been mentioned by various stakeholders within Nigeria.

For example, Nigeria's growing demand for power is one of the major problems facing the country. The Nigerian government has criticized major oil companies for failing to provide sufficient backing for the state-sponsored Independent Power Projects (IPPs), which are intended to set up a viable and effective power sector to satisfy the growing domestic demand for electricity. The National Electric Power Authority (NEPA) commitment is to have generating

capacity of 10,000 MW by 2007 from a current capacity of between 2,800 MW and 4,000 MW. Gas powered generation could help to meet this commitment if the right synergies exist.

If GGFR is to meet its objectives, Nigeria must be successful in its goal to reduce gas flaring and develop an acceptable internal or external market for the gas that is currently flared. A major step was taken in December 2004 when Nigeria acceded to the Kyoto Protocol, making Nigerian gas flaring reduction projects eligible for CDM carbon credits. In addition, the current project "Carbon credit development for flare reduction projects" sponsored by GGFR aims at developing the capacity and promoting pilot projects for gas flare reduction opportunities in Nigeria.

4.1.1 Gas Flare Reduction Partnership (GGFR) in Nigeria and CDM

GGFR's stated Objective in Nigeria is to reduce key barriers to flared gas utilization. For this purpose, GGFR has undertaken a series of actions in gas flare reduction strategies and mechanisms to achieve its objectives. These include some recent workshops described below.

4.1.2 Standard for Global Flaring and Venting Reduction workshop

At the workshop on the Standard for Global Flaring and Venting Reduction, hosted jointly by the Government of Nigeria, NNPC and the GGFR, and which took place November 9-10, 2004 in Abuja, the Government agreed to establish a dedicated collaboration vehicle and take the lead in six areas:

- formulation and transparency of policies aiming at associated gas pricing and flaring reduction;
- mechanisms for integration of operator plans regarding flaring reduction;
- Gas-to-Power reform, consistent with gas sector reform, including collaboration on maturing and implementing proposal for a Gas-to-Power cluster approach;
- financing solutions for infrastructure projects to expand the domestic gas and power markets;
- create a special task force on small scale gas utilization and power supply with key stakeholders including producers, federal and local government, affected/local communities, and pursue regional pilot(s);
- *capacity building for carbon credits*, including awareness for project proponents and other stakeholders; institutional requirements and pilot project(s).

This last commitment has resulted in the following agreed actions:

- To build awareness and capacity of project proponents and other stakeholders;
- To build institutional capacity (DNA, assisting with sustainability requirements for projects);
- To provide on- the- ground training of local agents;
- To identify, screen and develop demonstration project(s) for early learning and wins.

While work is ongoing in all six areas, *carbon credit capacity building* is a key area on which Nigeria will need to focus. This area was also considered under this project "Nigeria: Carbon Credit Development for Flare reduction Projects". The aim of the GGFR and of its current work program in Nigeria is to contribute to the effective and cost-efficient elimination of gas flaring in Nigeria.

4.2 CDM and gas flaring reduction projects

4.2.1 Gas flaring reduction projects

Oil extraction from several kilometres below ground usually generates both oil and so-called associated gas. If oil is produced in areas which lack a well-developed gas regulation, gas infrastructure or a gas market nearby, this associated gas (AG) is released into the atmosphere, ignited (flared) or un-ignited (vented). The World Bank estimates that the annual volume of natural gas being flared and vented is about 100 billion cubic meters, which corresponds to enough fuel to provide the combined annual gas consumption of Germany and France.

A flare reduction project typically reduces GHG emissions by reducing the quantity of associated gas (AG) that is typically emitted to the atmosphere. AG combusted or released as un-combusted gas produces the primary greenhouse gases carbon dioxide (CO_2), and methane (CH_4). A flare reduction project reduces these GHGs by acting on the AG, which is currently or expected to be flared, through one or more of the following development options:

- ✓ Capture and re-injecting the gas into the oil reservoir,
- ✓ Capture and delivery through a pipeline to an end user, and
- ✓ Capture and process the gas into liquids (that is, liquefied natural gas [LNG], gas-to-liquids [GTL], or liquefied petroleum gas [LPG]) that can be transported and sold locally or internationally.

In general, choosing the appropriate option(s) depends on upstream conditions, such as field characteristics and the oil-to-gas ratio, downstream market opportunities for the recovered gas, and the legal and fiscal frameworks that may include various incentives and penalties.

Understanding and documenting how these factors influence decisions made by the petroleum industry are critical for the CDM to become an effective instrument for reducing the GHGs targeted under the Kyoto Protocol.

4.2.2 The gas value chain

In addition to the flaring of associated gas itself (AG), three basic emission activities occur along the gas value chain: vented gas, fugitive emissions, and emissions from combustion for energy use. These emissions occur at the three primary stages of the gas value chain: production and processing, transport and distribution, and end-use consumption.

1) *Vented gas*, i.e. the gas released directly into the atmosphere as CH_4 from the oil well (on average 2% of the total flared gas is released as methane).

2) *Fugitive emissions*, i.e., unintentional emissions from leaky valves, loose dry seals in compressors, flanges, loading and unloading of LNG from ships, and/or intentional venting away from the production site during maintenance operations, when the gas is not intentionally captured.

3) *Emissions from combustion for energy use*, i.e., CO_2 emissions from the operation of equipment that drives the gas production, processing, transport and LNG liquefaction.

Mitigation projects whose primary aim is to eliminate or reduce flaring and venting of associated gas will reduce emissions at the production site. However, partly because the project intends to find a market downstream, the project activity could actually increase emissions in processing, transport, and distribution of the associated gas if these facilities are not present in the baseline. The net carbon reductions need to be estimated (or measured), so that the carbon emissions from gas that is marketed instead of being flared is equal to the sum of carbon reductions at the wellhead minus any losses along the chain, plus the reductions from any end-use fuel switching.

4.2.3 CDM methodologies applicable to gas flaring projects

To achieve CDM designation, a project proponent must use a methodology approved by the CDM Executive Board (EB) to determine the baseline and calculate emission reductions. If a project cannot apply an existing approved methodology, then the project proponent has to develop a new methodology. To date only one CDM methodology has been approved by the CDM EB, which can be partly applied to gas flaring reduction projects. The methodology is called **AM0009 "Recovery and utilization of gas from oil wells that would otherwise be flared"** and it refers to the Rang Dong Oil Field Associated Gas Recovery and Utilization Project, Vietnam. Its baseline study, monitoring and verification plan and Project Design Document belong to Japan Vietnam Petroleum Co. Ltd. The methodology was approved by the CDM EB in March 2004 and revised in May 2005. (For more information on this methodology see: *http://cdm.unfccc.int/methodologies*)

This methodology is applicable to projects recovering gas at oil wells under the following conditions:

- Gas at oil wells is recovered and transported in pipelines to a process plant where dry gas, LPG and condensate are produced.
- The energy required for transport and processing of the recovered gas is generated using the recovered gas.
- The products (dry gas, LPG and condensate) are likely to substitute in the market only the same type of fuels or fuels with a higher carbon content per unit of energy.
- The substitution of fuels due to the project activity is unlikely to lead to an increase in fuel consumption in the respective market.
- In the absence of the project activity, the gas is mainly flared.
- Data (quantity and fraction of carbon) is accessible on the products of the gas processing plant and on the gas recovered from other oil exploration facilities in cases where these facilities supply recovered gas to the same gas processing plant.

The methodology applied for the Rang Dong project has several features that restrict its applicability, even for projects similar to the Rang Dong flaring reduction project:

- The additionality assessment puts nearly all weight on the economic and financial analysis by comparing the project's internal rate of return (IRR) against a hurdle rate. The methodology defines the level of the hurdle rate and the actual hurdle rate (as well as the IRR of the project). Clearly, this hurdle rate (set by the Japan Vietnam Petroleum Company Ltd. for overseas investments) is not generally applicable.
- The methodology does not account for venting elimination. This was done to follow the CDM EB's guidance for project proponents to be conservative in their estimation of claimed emission reductions. In this case the vented gas (in the baseline) was assumed to be carbon dioxide (CO_2) rather than CH_4, which is a stronger GHG. It seems likely that project proponents of future GGFR projects would seek credits for elimination of un-combusted gas as CH_4 given the fact that flare efficiency never can be 100%. However, a project proponent would need to be able to measure the quantity of CH_4 accurately in order to make any such claim.
- The methodology does not include downstream use of the gas as part of the project boundary, even if gas from Rang Dong replaces other fuel use downstream. In many similar cases, it is possible that project proponents will include these emissions in the project boundaries and seek credits for any possible emission reductions downstream.

4.3 Gas flaring reduction and opportunities/barriers for CDM in Nigeria

4.3.1 Flare out policy in Nigeria

Nigeria's proven natural gas reserves are conservatively estimated to be about 159 trillion cubic feet (Tcf) (4.5 trillion cubic meters -TCM). This represents more than 5% of the world's total, while the undiscovered potential could be even larger. This estimate consists of about 84 trillion cubic feet of associated gas (AG) and 79 trillion cubic feet of non-associated gas (NAG). This makes Nigeria the 10th largest gas zone in the World.

Production of natural gas in Nigeria is currently about 4.6 billion cubic feet per day (Bcfd). This production figure is a summation of production mostly from joint venture companies (Upstream Operators) involving Shell, Mobil, Chevron, Elf, NAOC, Texaco, Pan Ocean, and NPDC.

Over the years, there has been a growing utilization of natural gas in the country. For example, in 1970, about 8.1 billion cubic meters of natural gas was produced in Nigeria. Of this quantity, about 0.111 billion cubic meters (slightly less than 1.4%) was utilized for productive activities such as for gas injection in oil fields for field pressurization and oil lifts, as industrial fuels and for power generation, within the Nigerian economy. The balance of about 98.6% amounting to about 8.0 billion cubic meters was wastefully flared. In 2002, the picture was very different. In that year about 48.2 billion cubic meters of natural gas was produced in Nigeria. Of this amount, about 23.4 billion cubic meters representing about 48.5% of total production was utilized in the domestic economy or exported as LNG while the balance was flared.

Given the foregoing, some officials of the Federal Government of Nigeria have made a series of attempts and efforts to discourage gas flaring, including calls to phase out gas flaring by the end of 2008. In addition, various stakeholders in the Nigerian Oil and Gas industry have engaged in different flaring reduction projects. Examples include: the Nigerian Liquefied

Natural Gas (NLNG) projects, the Escravos Gas Project (EGP), and the Escravos Gas to Liquid (EGTL) project.

Natural Gas Flare Out Policy

The Natural Gas Flare Out Policy, as presented in the National Energy Policy, aims, among others, at[3]:

- Cessation of gas flares in Nigeria by 2008 (current dateline)
- Expand natural gas utilization as industrial feedstock, industrial and domestic fuel, and for central electricity generation
- Use natural gas to diversify foreign exchange earnings
- Encourage indigenous entrepreneurs to participate in the end-use devices for natural gas utilization

The strategies of the Nigerian government to accomplish this include, among others to:

- Encourage oil producing companies to gather and utilize more associated natural gas
- Impose appropriate and effective penalties to discourage flaring
- Encourage establishment of infrastructure for effective gathering, transmission and distribution of natural gas
- Provide incentives to facilitate participation of local and foreign investors in gas utilization
- Develop suitable infrastructure to support gas export
- Formulate suitable urban and regional planning regulations to ensure effective distribution/utilization by domestic and industrial consumers.

The strategies identified in the flare out policy could be attained through the CDM. The Nigerian Government believes that Flare reduction/Flare-Out could be attained under the auspices of the CDM using the following categories of projects:

- Power Generation Schemes
- Expanded LNG Programme for Export
- Introduction of Gas to Liquids programme
- Increased supply to industrial markets (for feedstock and energy)
- Supply to domestic residential/commercial markets
- Introduction of CNG in the transport sector
- Development of strategic programme to ensure effective switch from mining and use NAG to use of AG.

[3] C.O. Gardner, PICCDM; I. B. Obioh, Atmospheric Research and Information Analysis Laboratory, Centre for Energy Research and Development, Obafemi Awolowo University, Nigeria, 2005

In order to make these projects acceptable as CDM projects, the government considers it important to identify key measures that meet CDM criteria, especially:

- ✓ Meeting the Additionality Criteria
- ✓ Monitoring of Leakage
- ✓ Definition of natural baseline for the gas sector

4.3.2 Opportunities for flare reduction projects as CDM in Nigeria

There are several opportunities for CDM projects arising from flare reduction in Nigeria. Primarily, the driver is based on the consideration of "Additionality", meaning that, for a project to qualify as a CDM project, it must be a project that would ordinarily not have taken place without CDM. As such, while current gas injection projects to boost reservoir pressures probably do not qualify as CDM projects, new re-injection projects might qualify and co-generation and/or trigeneration projects will most likely qualify to be considered as CDM projects. In the same vein, conversion of a project from liquid/solid fuels to natural gas may be considered a CDM project, as long as emission reductions can be achieved.

A number of viable CDM projects are currently in the pipeline throughout Nigeria. A current one in the oil and gas sector is the Shell Afam Power Plant Refurbishment. The Afam plant is currently fired on automotive gas oil (AGO)/low pour fuel oil (LPFO). However, there are plans to refurbish the plants to be gas-fired. To this end, therefore, an emissions baseline and an estimate of the anticipated emissions reductions that may be accruable from the project would need to be established.

Several other oil and gas companies would have the opportunities to emulate this project type, e.g., either by establishing Combined Heat and Power (CHP) projects or by converting liquid-fuel fired plants into gas-fired plants. Whichever option is taken, it would clearly result in some emission reductions and this would therefore establish the project potential as a CDM project.

4.3.3 Domestic Uses and Export Market Development for Natural Gas

Domestic Utilization of Natural Gas

The quantum jump in the utilization of natural gas (depicted in Section 4.3.1) was propelled by the increased use of natural gas to generate power, and more recently the penetration of natural gas as an industrial energy fuel. The later was catalyzed by the proliferation of the long distance gas pipeline infrastructure from Escravos in the Niger Delta to supply fuel to the Egbin thermal power generating plant located in Lagos. This gas transmission infrastructure is commonly referred to as the Escravos-Lagos Pipeline (ELP). The realization of the ELP opened up the possibility of gas utilization for manufacturing outfits along the pipeline route.

This catalyzed the shift from fuel oil to natural gas by Cement manufacturing plants such as Ewekoro and Sagamu Works in Ogun State. Some few years later, with the completion of the Ibafo-Ikeja City Gate transmission facilities by the Nigerian Gas Company and the City Gate-Ikeja Industrial Business District distribution facilities by Gaslink Nigeria Ltd., more industries in the Lagos area had access to natural gas and actually shifted from the use of fuel oil and

diesel for thermal energy and onsite power generation, respectively. Another recent development that has contributed to the reduction of gas flaring in Nigeria is the successful takeoff of the Nigerian liquefied natural gas project in September 1999. By 2002, three trains were on stream with a combined natural gas feedstock requirement of about 10.8 billion cubic meters per year (about 22.4% of the national gas consumption in 2002). The other natural gas feedstock option that entered into the domestic consumption equation during the last decade was for the production of fertilizers. However, due to the low capacity utilization of fertilizer facilities that came on stream in Nigeria, this consumption of natural gas has been relatively negligible.

Export of Nigerian Natural Gas

Export of Nigerian natural gas commenced in October 1999 when a consignment of liquefied natural gas (LNG) was shipped out of the facilities of the Nigerian Liquefied Natural Gas Company (NLNG) in Bonny. NLNG base project (Trains 1 and 2) has a total contract quantity of 7.22 billion cubic meters per year (BCM). The entire production from this base facility is exported under a long term Sales and Purchase Agreement with the following international buyers:

- Enel of Italy 3.50 BCM per annum
- Gas Natural/Enagas of Spain 1.60 BCM per annum
- Botas of Turkey 1.20 BCM per annum
- Gas De France 0.50 BCM per annum
- Trangas of Portugal 0.35 BCM per annum

As of February 2003, NLNG had loaded 318 LNG cargoes to its long-term customers since inception. Compared to the plan to load 103 LNG cargoes, 107 were actually loaded in 2002. Four out of the 107 cargoes were sold as spot cargoes.

Train 3, also known as the Expansion Project, began operation during the fourth quarter of 2002. The design capacity of Train 3 guarantees the delivery of 3.7 BCM/year. 21-year Sales and Purchase Agreements have been executed with the following for the entire volume capacity of Train 3 as follows:

- Gas Natural/Enagas 2.7 BCM per annum
- Transgas 1.0 BCM per annum

This makes Nigeria LNG Limited the largest supplier of LNG to Portugal. Table 1 below provides data on natural gas export volumes from Nigeria from 1999-2003.

Figure 1: Export of Natural Gas (LNG) from Nigeria

Years	LNG Export Quantity (BCM)
1999	1.805 (1)
2000	7.220
2001	7.220
2002	8.425 (2,3)
2003	10.920

Notes: (1) Assumed that only a quarter of Base Project Capacity was achieved
(2) Assumed that a quarter of the Capacity of the Expansion Project was achieved
(3) Additional cargoes were sold as spot cargoes.

Barriers to the Development of the Natural Gas Sector in Nigeria

Certain barriers have limited the ability to optimally exploit the natural gas resources of Nigeria over the past years. While some of the barriers are characteristics of a gas sector, others are peculiar to Nigeria. A recently concluded study on "Strategic Gas Plan for Nigeria" listed the following significant barriers to the exploitation of natural gas resources of Nigeria:

a. The Fact that the Gas Resources are Located in Remote Locations;

b. The Fact that Major Markets (Potential and Existing) are in a State of Economic Stagnation;

c. The Limited Infrastructure Available in the Country to Transport Gas beyond the current Gas Markets in Lagos and Port Harcourt;

d. The High level of Initial Investment Required to Develop the complete Network of Gas Transmission, and distribution Facilities;

e. Poor Investment Climate due to Lack of a Proper, Consistent, Legal, Fiscal and Approval Framework.

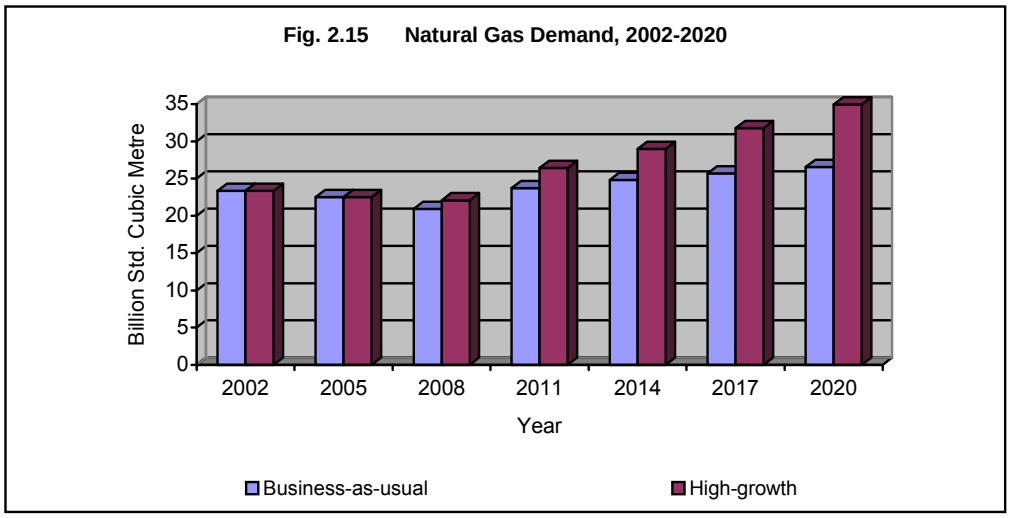
The report concluded that for the realization of future gas projects in Nigeria, *(at a level far above what we have seen in the recent past)*, the barriers listed above will have to be eliminated. In addition to removing these barriers, certain cogent developments must occur to catalyze the utilization of the Nigeria natural gas resources. One of these is the emergence of a revamped power sector that is able to improve its ability at implementing very dynamic capacity expansion planning. Natural gas will definitely benefit from such activities given its competitive pricing when compared to alternative fuels and the fact that it is likely to become an internationally accepted bridge fuel, due to its relatively lower carbon content, as the global economy transitions from the use of high carbon fuels to zero carbon fuels in the future. Nigeria will definitely benefit from the increased export of its gas to satisfy the expected global reliance of natural gas as a transition fuel. However, for domestic utilization to be carried along, not only must the sets of barriers earlier listed be removed with dispatch, but also Nigeria must have in place sound gas sector plans and policies, which must become components of its development plans and objectives.

Expected Future Trend in Gas Consumption in Nigeria

As part of a recent study for the Manufacturer's Association of Nigeria (MAN), Triple "E" Systems Associates developed a useful energy forecast, as an input to MARKAL a supply system optimization model, which was utilized to study the Nigerian energy system. The results of the model indicated that during the period 2002-2020, increase in demand for natural gas was observed in the status quo (13.7%) as well as in the Millennium Development Growth (MDG) assumptions (about 50%). The trend for the demand for natural gas consumption in Nigeria during the period is shown in Figure 2 below.

The manufacturing sector gas consumption during the period 2002 – 2020 for the high growth scenario is dominated by: the natural gas requirements at the NLNG facilities to meet the contractual obligations of Trains 1-5; the expected consumption of gas at new LNG projects that is firmly in the planning stages; increased use of natural gas as fuel for the generation of thermal energy and power in manufacturing plants; and use of gas as feedstock for fertilizer and petrochemical plants. For the status quo scenario, natural gas consumption in the manufacturing sector grew from the 2002 level of about 9.31 BCM to about 11.62 BCM by 2020, about 25% growth. For the Millennium Development Growth assumption, a growth of about 114% during that period is expected with the gas consumption in the sector rising from the 2002 level to about 20.0 BCM in 2020.

Figure 2: Natural Gas Demand



5 Addressing Key Challenges of Gas Flareout Projects in Nigeria

5.1 Summary of Stakeholders Workshops in Nigeria

The GGFR team conducted three capacity building workshops in Nigeria ("Nigeria: Carbon Credit Development for Flare reduction Projects"), as part of a larger effort of the GGFR to assist Nigeria in its efforts to reduce the flaring and venting of gas associated with the extraction of crude oil. A key element of the workshops' aim was to support the designing of financial mechanisms for gas flaring reduction projects, including assisting Nigeria and oil and gas companies in obtaining carbon credit financing under the *Clean Development Mechanism (CDM)* of the 'Kyoto Protocol' to reduce greenhouse gas emissions.

5.1.1 First Stakeholders Workshop

The first workshop was undertaken on 12 October 2005 in Abuja. This workshop included an introduction to the CDM and to the opportunities for gas flare reduction projects in the oil and gas sector in Nigeria.

The objectives of this workshop included:

- To raise awareness and knowledge of the CDM, the Presidential Implementation Committee on CDM (PIC CDM) procedures and other linkages and institutional arrangements within the oil and gas sector, including associated stakeholders.
- To present practical recommendations on how to align these institutional arrangements with the CDM project cycle.
- Call for CDM Project ideas from the industry in the form of Project Idea Notes (PINs) (*See Annex 1)*

The workshop identified priorities and gaps, which needed to be addressed to facilitate a good pipeline of flare reduction projects under the CDM in Nigeria. These include:

The barriers which inhibit natural gas development are exacerbated when addressing associated gas utilization

- There is an absence of a fully developed formal gas policy, the current Industry structure needing a gas Institutional, Legal and Regulatory framework, PSC gas terms, Gas pricing, infrastructure constraints and access funding constraints.
- The strategies identified in the flare out policy could be assisted through the CDM but the emerging framework needs to ensure it does not create the situation where, due to legislation, projects become ineligible for CDM.
- Use of associated gas currently flared is an opportunity to utilise gas more effectively via the mechanism in an economic and sustainable manner.

Conclusion: Whilst for natural gas the overall sectoral reform is underway to address these issues, associated gas will need special attention and incentives to ensure that associated gas use is optimized.

Kyoto Mechanisms are a driver for new flare reduction projects

- The Flexible Mechanisms (JI/CDM) are a financial tool initiated under the Kyoto Protocol to facilitate the transfer of "clean" technology between countries in return for emissions reduction credits.
- Buyers worldwide are seeking to purchase emissions reductions from CDM projects (World Bank is managing over $1billlion funds for carbon purchase).
- There is a finite time to develop projects; stakeholders need to act now to maximize benefits of carbon funds (2008-2012 commitment period). Action is needed now to ensure incentives offered via mechanisms are optimised, as gas flared is forever wasted.
- Flaring contributes significantly to Nigeria's national GHG Emissions, i.e., flaring contributed 36% to CO2 emissions in 1990 and 24% in 2000.

Conclusion: Nigeria has the opportunity to capitalise in technology upgrades and flare reduction technologies, which the flexible mechanism would deliver. It is the lack of an extensive project pipeline, not absence of buyers, that is holding up the delivery of Certified Emission Reductions (CERs)

Many of the necessary precursors to a successful CDM project portfolio are in place in Nigeria

- High level political support is evident as illustrated by the speeches made at the workshop by the permanent secretaries to Ufot Ekaette, Secretary to the Government of the Federation and Dr. Iyorchia Ayu, Ministry of Environment.
- The Government and the Nigerian National Petroleum Corporation (NNPC) are progressing a flare out policy which this GGFR work seeks to enhance via project identification and facilitation via Kyoto mechanisms.
- Nigeria has ratified the Kyoto Protocol.
- The National Authority is established - Presidential Implementation Committee on Clean Development Mechanism (PICCDM) is in place but will need to evolve with legislation to be a fully functioning Designated National Authority (DNA). This will be important to create inward investment confidence.
- The criteria and indicators for sustainable development have been articulated in the ***National Economic Empowerment and Development Strategy (NEEDS)*** document.
- There is a solid structure on a national level via PICCDM and highly competent academics are experts on the CDM methodology and frameworks for Nigeria. The capacity is available but needs to be extended and linked to project developers.

Conclusion: National procedures and project developments need to be synchronized and capacity building enhanced.

Industry engaged but not linked with emerging processes

- GGFR is active via demonstration projects with its Partners in finding projects to be eligible for participation in Kyoto Mechanisms. – Nigerian Project Idea Notes (PINs) have been invited and GGFR is catalyzing development of the mechanisms, e.g., assistance in project development to remove barriers, reduce transaction costs and lead the way forward.
- GGFR is ready and in place to support the flare–out goal and can assist in linking the Nigerian sustainable gas flaring reduction policy with international practices.
- Timing is important, the first commitment period (2008-2012) is approaching, and projects need to be sourced now to take full advantage of the incentive of carbon finance.
- Only a few demonstration projects for CDM are under consideration to date; other oil and gas companies need to be encouraged to participate in this opportunity.

Conclusion: There is a need to pro-actively solicit potential projects from the industry. Also, there is a need to integrate emerging incentives with projects and sector reform.

This workshop provided the basis for the next steps of the GGFR project in Nigeria. The workshop provided the information and tools necessary for stakeholders in the oil and gas industry to be able to prepare project ideas, in the form of a final Project Idea Note (PIN) to be presented for consideration in the selection process for full CDM development ***(See PIN template in Annex 1)***

5.1.2 Second Stakeholders Workshop

The second workshop took place in Lagos, Nigeria, on 9th February 2006. This workshop was a continuation of the previous one, which was capacity building for the mechanisms plus a call to project developers to develop PINs. Since that time, the GGFR team had helped project developers and companies consolidate project information in the form of Project Idea Notes (PIN), and the forward activity was to assess and screen projects to select a pilot project for full development as a CDM activity. This would include developing the Project Design Document (PDD). This pilot project would serve as a foundation for developing future CDM projects in the oil and gas sector in Nigeria.

The *objectives* of this workshop included:

- To ensure that there is a full understanding of what it takes for a gas flare reduction project to become an eligible CDM project.
- To allow project developers to present their project ideas and receive feedback
- To review project ideas presented by project developers as Project Idea Notes (PINs)
- To consider project ideas that could be recommended for the next stage of the CDM project cycle: full development of the Project Design Document (PDD).

The workshop identified seven potential projects, which had been developed in the PIN format. Project developers presented their project and feedback was provided within the meeting and separately after the meeting. The project developers were able to network amongst themselves, and have access to experts, and government authorities that would be able to approve such projects within the national approval processes.

A draft comparison table of the different projects was presented, with an initial scoring, based on a project screening tool developed by the GGFR team to assess project risks and rank projects. Companies that presented projects included ENI, Chevron, Shell, GIEC and Multiple Development Systems.

The CDM project risk evaluation criteria were presented by the GGFR team, and then followed a session designed to involve all participants to work together in teams to propose improvements to the issues and criteria for project selection. Dr. Collins Gardiner from PIC CDM addressed the policy of the flare out target, its effect on CDM eligibility and the recent high court judgment on the legality of flaring. He was very clear that the CDM was intended to play a key role in helping oil and gas companies eliminate gas flaring in Nigeria.

The workshop achieved its objective of transferring knowledge about relevant issues pertaining to the CDM and the oil and gas sector. Relevant issues covered included the CDM project process, evaluation of CDM projects, the issue of additionality, national policies in Nigeria in terms of gas flaring and CDM approval, and the issue of sustainable development. In addition, this workshop provided the basis for the next steps of the GGFR project in Nigeria. The workshop provided the information and tools necessary for participants to be able to have the ideas ready in the form of a final PIN, to improve their existing PINs, and to evaluate CDM project ideas. The PINs discussed were re-evaluated for the selection of a project for the PDD stage and for the following workshop.

5.1.3 Third Stakeholders Workshop

The third Workshop took place in Lagos, Nigeria on 4 May 2006 with the participation of various stakeholders (e.g., international oil companies, consultants, NGOs). The workshop presented the lessons learned from current flare out projects around the world, presented the technical information relevant to PDD development, and transferred knowledge related to the main aspects and challenges in a case study exercise with a real project selected in Nigeria.

The case study presented was the ENI Ob/Ob re-injection project in Nigeria, as a learning exercise for addressing the PDD development process and to demonstrate the issues and challenges faced when developing a PDD for a gas flare-out project in Nigeria (this is the first project involving re-injection under the GGFR program worldwide). In addition, other CDM projects were also discussed (e.g. Shell, Chevron, Rang Dong). Then followed a session designed to involve all participants to work together in teams to propose improvements and new ideas to the issues and challenges for PDD and baseline methodology development in the oil and gas sector in Nigeria.

Project developers presented their ideas on how to address main aspects of the PDD development process, in particular within the Nigeria situation; and feedback was provided within the meeting from the GGFR team.

The GGFR team addressed the main characteristics of the PDD development process (including all the steps to develop a new methodology). It also addressed issues related to the

"additionality" of the project, project alternatives, and project boundary issues. They also addressed the Nigerian national circumstances, including the policy of the flare out target, its affect on CDM eligibility, and the recent high court judgment[4] on the legality of flaring.

The workshop provided the information and tools necessary for participants to be able to understand the PDD development process and relevant issues for developing a new baseline methodology, and to understand the Nigerian CDM situation applied to the oil and gas sector.

5.2 Key CDM issues

5.2.1 PIN development

The Project Idea Note (PIN) is a brief document of approximately 5-7 pages that provides indicative information on certain characteristics of the proposed CDM project.

The PIN should include at least the following information on the proposed project:

- the type and size of the project
- the project location
- the technology used in the project
- the anticipated total amount of Greenhouse Gas (GHG) emissions reduction compared to the "business-as-usual" scenario [which will be elaborated in the baseline later on at Project Design Document (PDD) level]
- the suggested crediting period
- the suggested Certified Emission Reductions (CER) price in € or US$/ton CO2eq reduced
- the financial structuring (indicating which parties are expected to provide the project's financing)
- the project's other socio-economic or environmental effects/benefits

The PIN is generally prepared by project developers and/or their advisors after it has been positively assessed that the proposed project can be eligible under the CDM framework. The PIN may also be submitted to one or more carbon credit buyers in the marketplace in order to gauge the level of their interest in the project.

Development of a PIN is not an official requirement of the UNFCCC in the CDM process. In fact, the PIN should not be submitted to the CDM Executive Board in order to request the registration of the project. The benefit of preparing a PIN consists in the fact that the developers and their advisors will receive feedback indicating whether or not the project is of interest to potential buyers. The PIN represents an inexpensive way to get market feedback

[4] A local branch of the Federal High Court in Nigeria ruled on 14 November 2005 that flaring at oil installations in the Delta State contravened the right of the local community to live in a poison-free, pollution-free area. This ruling cannot be considered to be effectively binding since this ruling is still under challenge within the Nigerian court system

without engaging the entire CDM process. In addition, it provides basic information that could assist in screening potential projects.

Different buyers may have dissimilar motivations in the marketplace and consequently look for different types of projects. Buyers, therefore, screen the received PINs against the CDM rules and their own investment criteria. Also the information requested in the PIN and the minimum criteria set for this information depend on the specific rules and interests of the buyer. Such rules may regard, for example, the minimum price for emissions reductions, minimum acceptable size of the proposed CDM projects, geographic location of acceptable projects, types of technologies applied in the project, etc.

There are great similarities between most of the PIN formats available on the Internet and disseminated by carbon buyers (e.g., carbon funds, governmental procurement programmes, private buyers and brokers). Most private buyers also prefer to see Project Idea Notes as their first form of contact with potential projects, however, private buyers are generally more flexible than governmental and international institutions in case the developer submits only a partial description of their project.

The World Bank PIN template was firstly developed for the world first carbon purchasing vehicle, the World Bank Prototype Carbon Fund. This detailed PIN format is included in Annex 1 of this document. This PIN format- with only minor alterations- is currently used by many organisations including all the World Bank carbon funds, the funds launched by the European Bank for Reconstruction and Development, the Asian Development Bank and many governmental procurement programmes. Most PIN templates used by private buyers are generally less sophisticated and require less information than the World Bank template.

To fill in the World Bank PIN template accurately, the project developer and/or his adviser should follow in detail the indications and requests included for each section of the template. In particular, the following issues should be addressed accurately:

- In the *baseline scenario analysis* project developers should answer *all* the following questions:
  - What is the proposed CDM project displacing?
  - How would the future look without the proposed CDM project?
  - What would the estimated total GHG emissions be?
  - Is the project a “Small scale” or a “Large scale” CDM project and why?
  - What will be the possible lifetime of the baseline?
  - Which sources and sinks will be taken into account for the baseline and which not?
  - What are the current circumstances (including historical emissions data) and policies?
  - What baseline methodology will be chosen and why?
  - What are the uncertainties associated with the estimated emission reductions?
  - What are the key variables potentially affecting future credibility of the baseline?

- In the section on sector background project developers should provide the best available information on the general structure, main policies and main challenges and opportunities of the sector. For example, if the project is an energy project, this section should provide a description of the power generating capacity in the last five or ten years, the electricity production and consumption in the last one or two years and the predicted electricity production and consumption in the next five years. Attention should also be paid to the

organizational sector and institutional framework in the region and/or country. Also a description of the energy policy and future strategy of the government related to the use of fossil fuels and renewable energy sources should be provided as well as a description of the financial, institutional, technical and/or commercial challenges/barriers and opportunities in the sector.

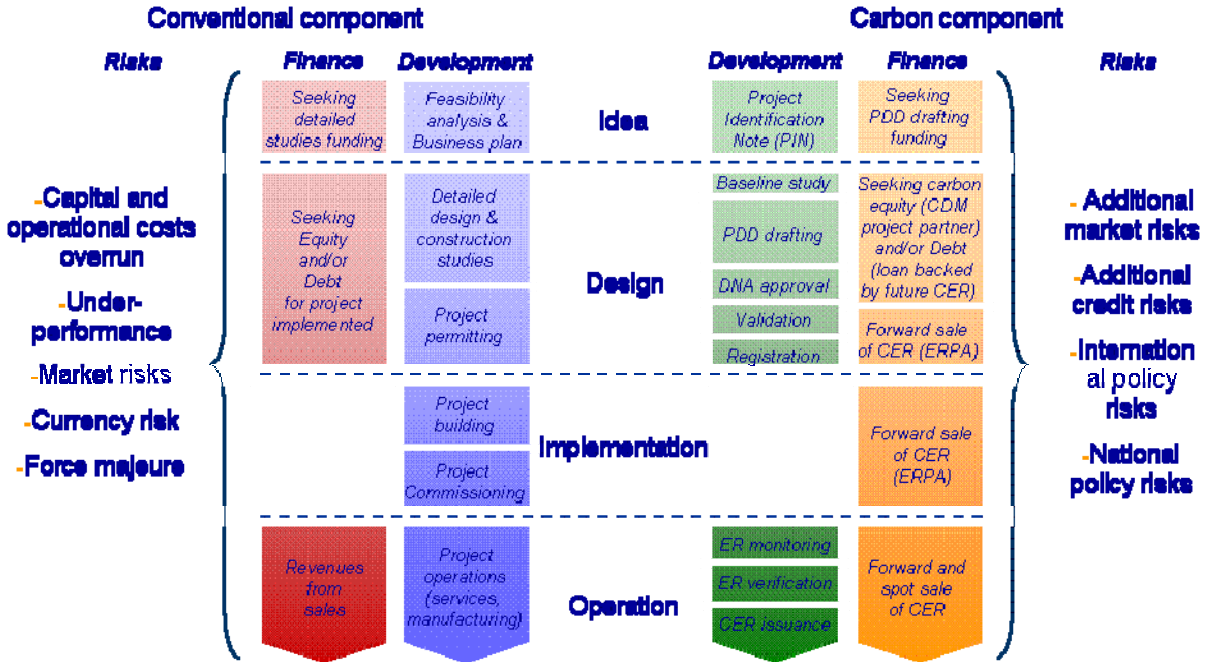
- In the project risks section, the project developer should mention the major risks and issues with a brief explanation of mitigating factors, if any -- especially as they relate to the project-, the chosen baseline, and any environmental and social compliance of the project.

The World Bank and other buyers generally recognise that full information on every item listed in the template will not be available at all times for every project; although it is also generally requested that every effort should be made to provide as complete and extensive information as possible.

5.2.2 CDM evaluation criteria

When evaluating a CDM project, a number of risks need to be taken into account. Within the CDM cycle, the number of *steps and activities* that need to be implemented are different from those that must be undertaken for traditional investment projects, as shown in Figure 3 below.

Figure 3: Traditional projects versus CDM projects



Source: ICF International 2006

Also the *risks* of CDM projects are different than the typical risks of traditional investment projects, as shown in Figure 4 below.

Figure 4: Traditional projects versus CDM projects

Risks of conventional projects	Additional risks of CDM and JI projects
- Capital and operational costs overrun: e.g., technology employed is more costly than expected, repairs are needed during construction - Underperformance: management team of the project is unqualified, equipment is not efficient as expected - Market risks: e.g., increase in energy prices; - Credit risk: counterparties (suppliers of technology, services, energy) are insolvent - Currency risk: inflation in the country host of the project is higher than expected, high exchange rates fluctuations - Force majeure: an event beyond the control of the parties occurs (e.g., natural catastrophe, war)	- Exceeding costs: for administrative procedures and institutional barriers (e.g., difficulty to obtain host country approval), legal costs for litigation over ownership of credits - Additional market risks: price uncertainty of credits - Additional credit risks: host country insolvency, illiquid markets cause information dissymmetry - International policy risks: Kyoto 2nd commitment period not yet defined; CDM Executive Board may not register the project; rules may change. - National policy risks: legislation regarding CDM/JI may change (e.g., national caps on JI/CDM amounts to use in EU ETS), risk of confiscation/nationalisation of credits by host country

Source: ICF International 2006

In particular, three groups or classes of risks of a CDM project need to be evaluated:

- the level of advancement of a project along the Kyoto process "pathway" (Kyoto Process)
- the risk associated with the technology of a specific project (Project Technology)
- the level of experience and knowledge of the project participants (Project Proponent)

Kyoto Process

The Kyoto Process risk element quantifies the risk associated with an individual project gaining CDM EB registration and, ultimately, issuance of CERs based on how far along the Kyoto "pathway" the project has progressed to date. Typically, the further along the process, the greater the likelihood that the project will deliver CERs.

The questions to be asked for the assessment of the Kyoto process risks are:

- Is the PDD complete?
- Has the PDD been validated?
- Is the project using an approved methodology?
- Has the CDM EB registered the project?
- Have monitoring protocols been implemented?

- Have CERs been verified?
- Have CERs been certified?
- Have CERs been issued?

Project Technology

The ability of a project to achieve estimated tonnes of emission reductions (vintage and volume) is mostly dependent on the reliability of the abatement technology. GHG abatement projects that use a proven technology have a lower risk of delivery of emission reductions. The more than 200 projects currently registered in the CDM process are dependent on a variety of technologies, each with a variety of related risks.

Related issues assessed under this element include:

- Technology cost associated with engineering, installation, and maintenance
- Permanency of credits (i.e. ability to monitor the emission reductions and evaluate the actual generation of carbon credits during the crediting period)
- Level of market penetration of a technology

The more "proven" a technology is, the greater the likelihood that the project will be successful.

The following questions should be posed when assessing technology risk of a CDM project:

- Is the technology established?
- What are the technology specific capital costs?
- What revenues does the technology entail other than carbon revenues?
- What are the risks specific to that technology? (e.g. biomass supply chain reliability for a bio-power plant; defaults in a Renewable Energy technology; change in organic material availability in landfills)

Project Proponent

Project risk can be mitigated where project proponents are credit worthy and experienced in the development of Kyoto projects. The project proponent's ability to demonstrate effective project management from prior experience - both from a financial and technical standpoint - needs to be assessed.

The following issues must be addresses when assessing the project proponent factors of a CDM project:

- What is the previous experience of project proponents in the host country and with the technology?
- What are the number of participants in the project?
- Who owns the project?

- Are contractual arrangements clear on who owns the carbon credits?
- Are project proponents creditworthy?

By evaluating the above-mentioned issues of a CDM project, one can gauge the level of likelihood of a CDM project in successfully delivering CERs on schedule and in the expected volumes. The level of overall risk of a project needs to be assessed in order to understand the type and magnitude of risks facing issuance of the CERs that will be delivered.

5.2.3 Developing the complete PDD

The Project Design Document (PDD) is the official document required for submitting the project to the relevant international authorities (e.g., the CDM Executive Board – CDM EB). The PDD has to be submitted for validation to a Designated Operational Entity (DOE – a third party validator or "auditor"); and then will have to be submitted for approval and registration of the project to the CDM Executive Board.

The PDD includes the following sections:

A. General description of project activity;
B. Baseline methodology;
C. Duration of the project activity / Crediting period;
D. Monitoring methodology and plan;
E. Calculations of GHG emissions by sources;
F. Environmental impacts;
G. Stakeholder comments.

A. General description of project activity

In general, much of the information to be included in this section can be taken directly from a business plan or project proposal. At a minimum the following project information must be provided:

- Title of the project activity;
- Purpose of the project;
- List of project participants;
- Technical description of the project, including the location of the project, the project category, technical performance information, how the technology applied will be transferred and how the reduction in GHG emissions are to be achieved;
- Justification that public funding, if used, is not being diverted from other uses. The project developer should be able to demonstrate that the funding of a CDM project is not counted towards the financial obligations of any donor to the country hosting the CDM project (i.e., Official Development Assistance).

Additionally, information regarding project background, problems and barriers being addressed by the project, project planning and any other information deemed relevant within reason are recommended to be also included in this section to provide more insight into the project.

B. Baseline methodology

Sections B and E of the current PDD address issues concerning **baseline assessments**, **calculations of GHG emissions by sources**, and **additionality**. A significant step in setting an emission baseline is selecting the baseline approach. The baseline approach forms the basis for a baseline methodology. In the Marrakech Accords three different baseline approaches have been identified that should be for CDM projects. These include:

- Use existing, actual or historical GHG emissions, as applicable; or
- Use GHG emissions from a technology that represents an economically attractive course of action, taking into account the barriers investment; or
- The average emissions of similar activities undertaken in the previous 5 years, in similar social, economic, environmental and technological circumstances, and whose performance is of the top 20 percent of their category.

The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity.
The baseline assessment shall cover emissions from all activities and gases within the so-called project boundary.

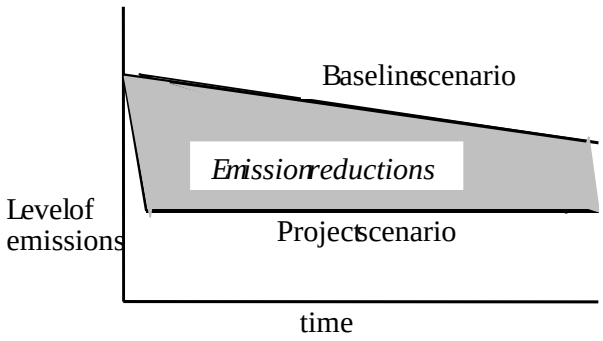
The baseline is the basis for estimating the quantity of emission reductions (i.e., carbon credits) that a project generates by comparing the emissions from both the baseline and project scenarios (see Figure 5). Developing the baseline involves the selection of an appropriate methodology.

To facilitate project development, the CDM EB has set out a process through which methodologies developed under one project can be used for other, similar activities. Thus, baseline methodologies should be developed generically, and project-specific elements should be excluded. Typically, methodologies should include the following key elements:

- An overview of each of the steps needed to develop the baseline scenario
- A test to demonstrate additionality (*see below*)
- Data to be collected and included in the baseline
- Formulae to use for calculating the emission reductions
- Key parameters and assumptions to be considered
- Definition of the emissions sources in the baseline (the project boundary)
- Dealing with uncertainties and emissions that have not been taken into account in the calculations (leakage)
- Ensuring that the emission reductions calculated for the project are conservative (i.e., are not overestimated)

Figure 5: Baseline and project emission scenarios

The figure shows the emissions for both a baseline scenario and a project. The introduction of the CDM project leads to a significant decrease in emissions compared to the baseline. The difference between the two scenarios represents the emission reductions. Here it is assumed that the baseline emissions slowly decrease over time because of business-as-usual decrease in e.g., gas flare activities. However, the baseline scenario will vary depending on specific circumstances.



Project participants willing to validate / register a CDM project activity shall choose one of the following:

1. **Use an approved baseline methodology (AM)**. If a methodology exists that is approved by the CDM Executive Board (EB) and that is applicable to the project, the existing methodology can be used. (An up-to-date list of methodologies already approved by the CDM EB) can be found at: http://cdm.unfccc.int/methodologies/approved). As of June 2006, there are 30 approved methodologies for large scale projects, 9 consolidated methodologies for large scale projects, 19 methodologies for small scale projects and 3 approved methodologies for afforestation and reforestation projects.

2. **Propose a new baseline methodology (NM).** If none of the previously approved methodologies is applicable to the project activity, a new methodology can be proposed to the Executive Board for consideration and approval, if appropriate (completing the NMB form, which has to be validated by the Designated Operational Entity and submitted to the CDM EB and Meth Panel for approval)

When applying an existing methodology, this section of the PDD should specify exactly what is the name and number of the methodology applied. It must be shown that all the applicability conditions required by the methodology are fulfilled for this specific project. Especially for small scale projects there may be some misunderstanding of how to apply methodologies of different categories for different projects. If in doubt, it is recommended to contact the Designated Operational Entity to discuss the applicability of the methodology to the specific project.

Assessment of CDM Additionality

Section B also covers the issue of *additionality.* The Kyoto Protocol states that the *emission reductions of any CDM project must be additional to any that would occur in absence of the project* (or in the baseline or "business as usual" scenario). For example, in the case of a flare reduction project, without the existence of the project the "business as usual" situation would be continuation of flaring.

One aspect of additionality is related to GHG additionality: the project has to reduce GHGs compared to a situation without the project. This requires a *quantitative analysis,* which involves quantifying the difference between the GHG emissions of the baseline scenario

(without the project) and the project scenario. A project activity satisfies GHG additionality if it generates GHG emission reductions compared to the emission baseline.

The CDM EB has provided an **additionality screening tool** or flow chart to assist in evaluation of additionality. This tool is provided in Figure 1 below. It is an option that could be used to develop an "additionality argument"; which will be the basis for the baseline methodology. The steps of this tool address more *qualitative* aspects to demonstrate additionality.

Step 0 is for projects that wish to claim credits retroactively for emission reductions that were generated before registration of the project under the CDM. This is a clause open only to those projects that started between 1 January 2000 and 18 November 2004 (the date of the first registration of a CDM project). According to the CDM EB, starting date means the date at which the implementation or construction or real activity of a project begins. This step has been incorporated in order not to penalize projects that started at a time before the CDM institutions were fully operational. For these early started projects it is crucial to provide sound evidence that CDM has played a role in the decision to actually start the project.

The project proponent can demonstrate additionality by relying on arguments that the project activity could reduce emissions *beyond regulatory and policy requirements* (Step 1). The amount of emission reductions beyond what is required would be the quantity of carbon credits potentially available for certification. For example, in some countries this could occur from the amount of flare reduction that is done beyond a particular percentage required by law (assuming that there is a legally-defined percentage reduction requirement to begin with).

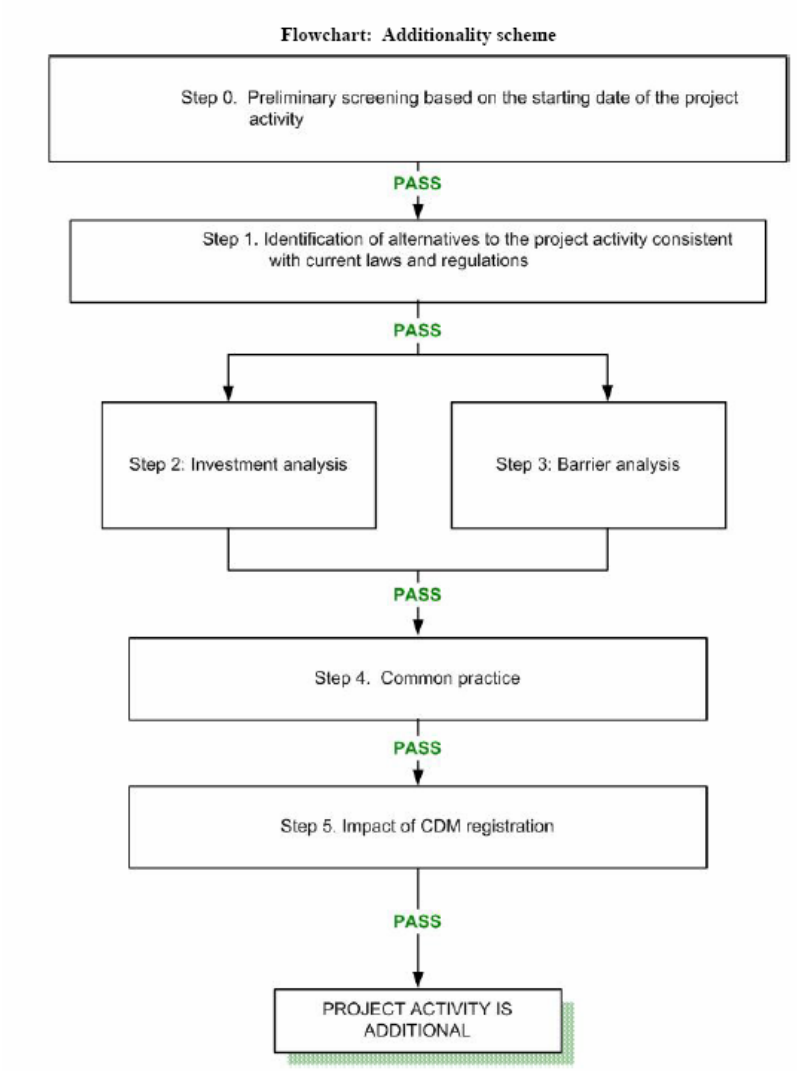
In addition, a project proponent can demonstrate *financial additionality* by documenting that the project would not be financially viable except for the value to be realized by the CERs (Step 2). That is, it is the potential value of the carbon credits that moves a project from being "uneconomic" to "economic." This is one of the options to demonstrate additionality but is not a requirement by itself, and there are other ways to prove additionality.

Also, a project proponent could demonstrate that the CDM helps to *remove market barriers* for implementing the project (Step 3). These can include technological, regulatory, competitive disadvantage, social, and managerial barriers. For example, the introduction to the country of a new technology that has never been tried could be risky; CDM certification could help mitigate the risk.

Step 4 is a "*common practice*" analysis and aims at complementing step 2 or 3. This step basically checks whether the proposed CDM project is common practice in the country, i.e. is it implemented widely already without the CDM. In that case, the project would not be deemed additional. For example, if technologies that reduce gas flaring are already widely used in the oil and gas industry in the country, and have already been implemented without the CDM, then the practice would be considered a "common practice" and not meet the additionality test.

In step 5, the project proponent should explain how the *CDM registration impacts* the project. This may be done in a quantitative manner, e.g., by showing that the Internal Rate of Return (IRR) is below the threshold and would be increased significantly with the claimed benefits of the CDM. However, a qualitative explanation may also be given. In such cases one can qualitatively explain which reasons have played a role in the decision making. For example, if barriers are thought to exist, one could explain how the CDM registration of the project contributed to overcoming the identified barriers.

Figure 6: Additionality scheme flowchart (source UNFCCC)



Definition of the Project Boundaries

Section B should also define the boundaries of the project. The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the CDM project activity.

The project boundary reflects:

1. The physical/geographical location of the project activities, and
2. The sources and gases included in the project calculations.

C. Duration of the project activity / Crediting period

The crediting period defines the period over which emission reductions from project implementation can be claimed. During the crediting period the defined emission baseline must not be adjusted or revised.

The crediting period could be different from the project lifetime, as the project lifetime relates to the technical or economical lifetime of the project, which is, in general, longer than the period over which carbon credits can be claimed. For the CDM, project developers have two options to determine the crediting period. They are:

a) A crediting period for a maximum of 7 years, which may be renewed at most two times; or

b) A maximum crediting period of 10 years with no option for renewal.

To calculate total emission reductions, the annual emissions reductions are multiplied by the quantity of years in the selected crediting period. The total anticipated crediting period (e.g. 3 x 7 years or 10 years) must not be longer than the expected lifetime of the project activity.

D. Monitoring methodology and plan

The project developer creates a monitoring plan that outlines how data will be collected from the project once it is operational. The monitoring plan sets out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the project are controlled and reported. This requires an ongoing monitoring of the project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

The monitoring plan should provide for the collection and archiving of all relevant data necessary for estimating and measuring project-specific GHG emissions within the defined project boundary and for the appropriate crediting period. The monitoring plan must describe the relevant factors and key characteristics of the project to be measured. The plan may also indicate who is responsible for the measurements, as well as the registration and reporting of the monitoring activities. Moreover, the monitoring should be carried out in such a way that the indicators of project performance and emissions can be compared with the baseline scenario. The data collected as a result of the implementation of the monitoring plan form the basis for verification of emission reductions as a result of the CDM project activity.

Similarly to section B, project participants can use a monitoring methodology previously approved by the Executive Board; or propose a new monitoring methodology (filling out the NMM form), if appropriate.

When using an approved methodology, *all the* requirements of the approved methodology must be followed. In particular, it must be ensured that:

- All applicable data variables that are listed. In some cases other data variables may be added or some data variables may be deleted because they are not applicable for this specific project. These choices should be made transparent.
- The units must be the same as those required by the methodology
- Indicators that are required to be measured ex-post should not be calculated or estimated

- Recording frequency should be identical with or higher frequency than the methodology requires

Any deviations from the methodology (e.g. lower recording frequency another unit calculated instead of measured) need to be thoroughly justified and should be seen as a contribution to conservativeness.

E. Calculation of GHG emissions by sources

This section of the PDD includes the formulas used to estimate the emissions of the project activity, the leakage, the emissions of the baseline and the net emission reduction of the project activity. Formulas should be transparent presented.

Emission reductions are calculated as the differences between the baseline and project emissions, taking into account any adjustments for leakage.

The equation used to calculate the emission reductions is:

Emission Reductions = ΣBaselineEmissions – ΣProjectEmissions– ΣLeakages

Baseline Emissions - are the baseline emissions in year y (tCO_2e)

Project Emissions - are the project emissions during the year y (tCO_2e)

Leakages - are the leakages during the year y (tCO_2e)

Each part of the equation should be explained.

F. Environmental impacts

The PDD should include an analysis of the environmental impacts of the project. This includes an assessment of non-GHG related impacts. If environmental impacts of the project are considered significant, or if the host country requires by law an environmental assessment (or review), an Environmental Impact Assessment (EIA) has to be carried out. There are no specific indicators for determining what is considered a 'significant impact'. This will be assessed on a case-by-case basis. It is reasonable to assume that sustainable development criteria can also be applied to determine the environmental impact. It should be noted that the arguments made for assessing the significance of environmental impacts will be evaluated by the Designated Operational Entity.

G. Stakeholder comments

The final step of the PDD is inviting local stakeholders to comment on the proposed project. Stakeholders are defined as the public, including individuals, groups or communities affected, or likely to be affected, by the CDM project activity. To satisfy the requirements under the CDM the Project developers must: 1) Invite local stakeholders for comments on the proposed CDM activity; 2) Provide a description of how local stakeholders were invited for comments; 3) Give a description of the comments received; 4) Review comments received and provide a

report that demonstrates how the comments received have, or will be, taken into account; and 5) Submit the description of the stakeholders' process and the review of comments for validation by the Designated Operational Entity (DOE).

5.2.4 Case Study Using the Ob-Ob Re-injection project

The case study presented at the last GGFR stakeholders' workshop in Nigeria was the ENI Ob/Ob re-injection project in Nigeria. This project was analysed as a learning exercise to address the PDD development process and to demonstrate the issues and challenges faced when developing a PDD for a gas flare-out project in Nigeria (this is the first project involving re-injection under the GGFR program worldwide).

The main aspects of the PDD explained in section 5.2.3 above are applied to this case study, to demonstrate the practical applicability of the most relevant aspects of the PDD.

Description of the Ob-Ob Re-injection project

The purpose of the project is gas flare reduction and use of associated gas for:

- Re-injection into the oil reservoir for enhanced oil recovery
- The remainder: supply via pipeline to LNG plant and internal consumption

The project involves the installation of a new turbo compressor, which increases capacity of the re-injection facility to 350 Million Standard Cubic Feet of Gas/day (350 MMscfd) from the previous 270 MMscfd.

The project is located at the Obiafu/Obrikom (Ob/Ob) oil field, which is approximately 80km North West of Port Harcourt, in Rivers State in Nigeria.

The project is proposed by a Joint Venture (JV) between the 3 companies in Nigeria. The equity shares of these Companies in the Joint Venture are:

- Nigeria National Petroleum Corporation (NNPC) - 60%
- Nigerian Agip Oil Company Ltd (NAOC) - 20%
- Phillips Oil Company Nigeria Ltd (PONL) - 20%

The CDM status of the project is PDD under development. The estimated Certified Emission Reductions (CERs) are 2.46 million tones of CO2/year. The project started operations in 2003.

Assessment of Additionality

For the Ob/Ob project in Nigeria an *additionality* approach based on Rang Dong was applied. Rang Dong is an associated gas recovery and utilization project in Vietnam; its baseline methodology has been approved by the CDM Executive Board (AM0009).

In the Ob/Ob case study, additionality is addressed by determining the most likely course of action (baseline), taking into account barriers and economic attractiveness. Five options for the treatment of associated gas at oil fields were analyzed:

Option 1: Release to the atmosphere at the oil production site (venting).

Option 2: Flaring at the oil production site.

Option 3: On-site consumption.

Option 4: Recovery, transportation, processing and distribution to end-users.

Option 5*:* Re-injection into the oil reservoir.

In addition, two steps were then addressed:

Step 1: Evaluating legal aspects

In evaluating legal aspects, the following issues should be addressed:

- Are the options permitted by law or other (industrial) agreements and standards?
- Are there laws or other regulations (e.g. environmental regulations) which implicitly restrict certain options?

Step 2: Evaluating the economic attractiveness

The economic attractiveness is assessed for those options that are feasible in technical terms and that are identified as legally permitted by law or other (industrial) agreements and standards in Step 1. The option that is economically the most attractive course of action is considered as the baseline scenario. To apply the methodology project participants should demonstrate that flaring (Option 2) is the baseline scenario.

Identification of alternatives to the project activity consistent with current laws and regulations

Step 1a. Define alternatives to the project activity:

For the Ob/Ob project, the following evaluations were undertaken:

Option 1. Release of associated gas to the atmosphere at the oil production site (venting). Release of associated gas to the atmosphere at the oil production site (venting) (Option 1) is prohibited by law and other agreements with the Nigerian government; so this option cannot be implemented.

Option 2. Flaring at production site (*baseline*).Continuous flaring of the gas produced in association with oil from the wells presents the most economically attractive course of action at present as it presents far lower capital risk than other options. Currently, oil companies operating in Nigeria flare almost 40% of the total amount of associated gas they produce and re-inject as much as 12% to enhance oil production (World Bank, GGFR, 2005).

Option 3. On site consumption. Associated gas produced with oil at the wells is already used for onsite power generation. There are no additional power requirement needs at the site, and the system is optimized for current power demand.

Option 4. Re-injection into oil reservoir (*project activity*). Re-injection into oil reservoir (option 4) is a desirable option since it makes rational use of the recovered gas and it enhances oil production. However, in the absence of the CER credits, this option would be unattractive. This option is more expensive than options 3 and 5.

Option 5. Recovery, transport, processing and distribution of gas to end-users. There is little demand near the project, and it is commercially unfeasible to collect and sell the large amount of AG involved in the project. There are no specific contracts with buyers in place, there is not enough AG to justify an LNG plant investment, and the local market is not big enough to generate demand for more gas. Currently part of the AG is pipelined to Bonny LNG for export, Eleme Petrochemical Company, Nigerian Gas Limited for Liquified Petroleum Gas (LPG), Rivers State Government Power Plant.

Step 1b. Enforcement of applicable laws and regulations:
Despite the introduction of various laws designed to regulate the volumes of associated gas flared in Nigeria, these have largely been unsuccessful because of the inherently financially riskier alternatives associated with utilisation of associated gas, relative to flaring and the payment of penalties (which are not substantial). Also the recent Nigerian Federal High Court that ruled against the burning of natural gas by oil firms in the Niger Delta cannot be considered to be effectively binding since this ruling is still under challenge within the Nigerian court system and was specifically directed at flaring in one company's production area. Currently, oil companies operating in Nigeria flare almost 40% of the total amount of associated gas they produce and re-inject as much as 12% to enhance oil production (World Bank, GGFR, 2005). It is estimated that Nigeria accounts for 16% of the world's total gas flaring (World Bank, GGFR, 2005).

Application of a methodology

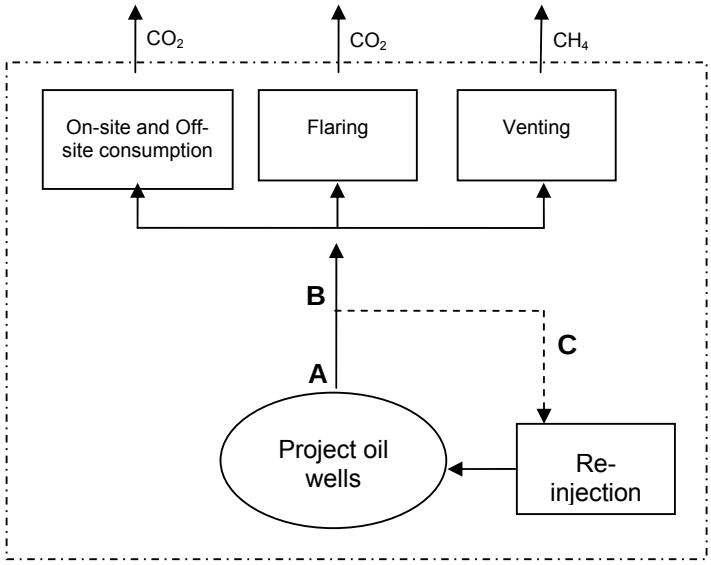
NM for Ob-Ob: *"Re-injection of associated gas (AG) from oil wells that would otherwise be flared"*

- **Description**. This methodology is based on the Rang Dong approved methodology (AM0009). It also incorporates aspects of NMB0167 and NMB0168. It is applicable to project activities involving the re-injection of associated gas at oil wells that would otherwise be flared. The methodology can only be used if the business as usual scenario (total/partial flaring of associated gas) is the only plausible baseline scenario.
- **Approach**. The methodology uses baseline approach (b) of Article 48 of the Marrakech agreement: "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment". As such, this methodology requires comparing figures that indicate the relative economic feasibility of each of the potential scenarios.
- **Demonstrating Additionality**. Because without carbon credits re-injection of the gas into the oil reservoir is not economically attractive (or sufficiently attractive for someone to develop this project option), the baseline scenario is the flaring the gas. This project would thus only be implemented if carbon credits can be obtained, thereby proving the project's additionality.
- **Calculating Emission Reductions**. The methodology provides the formulas to calculate the baseline and project emission reductions. The emission reductions are calculated by taking the amount of associated gas that would be flared in the baseline and the project emissions.

Definition of the Project Boundary

In the case of Ob/Ob the project boundary is the physical, geographical site where the associated gas is generated and re-injected. The project boundaries include the entire geological storage area to monitor whether there is any subsequent leakage or migration of CH_4 as well as all leaks from, pipeline, accidents and other. A schematic illustration of the project activity and its boundaries is below.

Figure 7: Schematic illustration of the Ob/Ob project activity



Calculation of emission reductions

Emission reductions are calculated as the differences between the baseline and project emissions, taking into account any adjustments for leakage. In the case of Ob/Ob:

Baseline Emissions: The baseline emissions are flaring at the oil production site

Project Emissions: The project emissions include emissions from: venting, flaring, on-site consumption, recovery, transportation, processing and distribution to end-users, in the project scenario; the energy consumption due to the re-injection process; transportation and re-injection of AG, and any escape from the pipeline, the injection well and the reservoir

Leakages: all possible leaks from the process. The methodological approach in this methodology accounts for all possible leaks from the process as project emissions.

5.2.5 Addressing Nigerian policies and regulations

It is important to assess the host country's policies and regulations to:

- Assess that the project is beyond regulatory requirements (i.e., it meets the additionality criterion)
- Assess that the project satisfies the sustainability criteria of the country

Nigeria is one of the top countries in volume of gas flared worldwide. Given this situation, some officials of the Federal Government of Nigeria have made a series of attempts and efforts to discourage gas flaring, including calls to phase out gas flaring by the end of 2008. The Nigerian Government believes that Flare reduction/Flare-Out could be attained under the auspices of the CDM as an incentive, using among others, projects that capture and use Associated Gas (AG).

Nigeria has introduced various laws designed to regulate the volumes of associated gas sent for flaring. For example, some regulatory steps include:

- 1973 - *Petroleum Amendment Decree*: allowed the use of associated gas without payment of royalties.
- 1979 - *Associated Gas Re-injection Decree 99*: stated that companies producing oil should have stopped flaring the associated gas by 1984, except those with a special permission of the Minister of Petroleum and Resources.
- 1985 - *Associated Gas Re-injection Amendment Decree 7*: introduced a fine (proportional to the amount of gas flared) to those fields where the authorities had not granted the permission of flaring. The penalty was increased in 1990 but it remained ineffective in comparison to the business as usual strategies of the companies that considered flaring still the best economic solution. Currently, the level of fine is 5 Naira (approximately USD$0.04) per mmbtu gas flared. Considering this latter issue and the fact that investments for gas utilization were extremely costly compared to the country risks, gas flaring continued to be the common way of disposing of associated gas.
- 1992 - *Associated Gas Framework Agreement (AGFA):* was introduced as part of a package of fiscal incentives for the utilization of natural gas.

For the most part, however, these regulations have largely been unsuccessful and the law is not fully enforced. Oil companies prefer to pay the penalties (which are insignificant) and continue with flaring, because of the inherently financially riskier alternatives associated with utilisation of associated gas.

A local branch of the Federal High Court in Nigeria ruled on 14 November 2005 that flaring at oil installations in the Delta State contravened the right of the Iwaherekan community to live in a poison-free, pollution-free area. This ruling cannot be considered to be effectively binding. According to government officials the federal government has appealed this decision, which will possibly end up at the Supreme Court of Appeal of Nigeria. Until this case is resolved, it is not binding on any existing project activities. With few concerns that the court case would derail flaring projects, at present various projects are under consideration for CDM in Nigeria.

Sustainable development in Nigeria

Sustainable development is an important issue for the Nigerian Government. The criteria and indicators for sustainable development have been articulated in the ***National Economic Empowerment and Development Strategy (NEEDS)*** document. As part of its strategies, the NEEDs document indicates the need for improved efficiency, which can be achieved by an increase in industrial process efficiencies and reduction in energy intensity. The document also mentions the need for technological development and opportunities for technology acquisition and transfer to be achieved by contribution to capacity and utilization of clean technologies. In addition, gas flare reductions in the oil and gas industry are certainly considered a key way to achieve sustainable development, and the government considers CDM a key instrument to achieve this.

A solid structure on a national level to implement CDM projects has already been established in Nigeria; via the Presidential Implementation Committee on Clean Development Mechanism – (PIC CDM) - which is the Designated National Authority (DNA) for CDM. The PIC CDM is in charge of issuing the Letter of Approval required by the CDM process which determines, among other issues, if a project complies with the sustainable development criteria of Nigeria. Until present two projects have received letters of approval from the DNA; these are an offshore gas flaring project at the Ovade Ogharefe oil field involving Pan Ocean Oil and the state oil firm Nigerian National Petroleum Corporation, and an onshore gas-to-power project at Okpai, involving Agip, Eni and NNPC. These projects are set to reduce emissions by 4 million tonnes of CO2 equivalent each year.

5.2.6 Lessons learned from CDM projects in oil and gas industry

The CDM process, which came into force about two years ago, has recently achieved the one billion mark target in greenhouse gas emission reductions (as indicated by the quantity of emission reductions in the CDM project application process). However, to date projects from the oil and gas industry have not really contributed to this remarkable achievement. Of the thirty currently approved methods (AMs) and the nine approved consolidated methods (ACMs) that can now be used to estimate emission reductions in a CDM project setting, only two AMs can be classified as relating to the oil and gas industry. The first AM 0009 deals with the recovery and utilization of natural gas from oil fields (Associated Natural Gas) that would otherwise have been flared, while the second AM 0023 focuses on reduction of leakage of methane from natural gas pipeline compressor or gate stations. A review of the methodology process table available on the United Nations Framework Convention for Climate Change (UNFCCC) website leads to the same conclusion. This table provides information on new methodology baselines that have been proposed by project proponents, but are still undergoing the process of review by the CDM Executive Board and are yet to be approved. Of the 55 new methods (NMs) under review, only the five listed in Table 1 below pertains to the oil and gas industry[5]. Another pertinent conclusion that can be drawn from a review of CDM activities so far and how it relates to the oil and gas industry is that all the existing methodology activities (approved or still undergoing review) are focused on projects dealing with natural gas. The focus has either been the reduction or elimination of flaring of associated

[5] For list of new methodologies: http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html

natural gas that would have been flared and a reduction or complete elimination of fugitive methane emissions from natural gas systems. The focus on reducing flaring is not surprising, given the fact that gas flaring has been shown in many national emission inventories to be a significant global source of GHG emissions. As a result, gas flare reduction projects are emerging as a strong option in the effort to reduce global GHG emissions. However, although the potential for these projects in Nigeria is very high, few projects have been developed so far.

Despite of the scarcity of CDM project activities from the oil and gas sector so far, there are still pertinent lessons that can be drawn. These can be summarized as follows:

- Gas flare-out projects have emerged as the most plausible CDM project from the oil and gas sector. This is evident from the fact that it is the first CDM activity from the sector for which an approved baseline and monitoring methodology now exists;
    - This methodology, AM 0009 deals with the recovery and utilization of associated natural gas from oil wells that would have been flared;
    - In this project (popularly referred to as the Rang Dong project), the natural gas is recovered and transported in pipelines to a process plant where dry natural gas, Liquefied Petroleum Gas (LPG) and condensate are produced. The dry gas is then utilized instead of flared, with a reduction in the amount of GHGs that would have been emitted in the absence of the project;
    - The recovered gas could have been: vented; partly used onsite for energy; utilized as a feedstock to produce Liquefied Natural Gas (LNG) or to produce other industrial outputs; used as a fuel for power generation; or re-injected;
- The following key methodological issues can also be discerned from the efforts to develop oil and gas sector CDM projects in Nigeria:
    i. In order to develop a successful CDM project in this sector, clear and unambiguous definition of what constitutes the CDM project activity must be provided;
    ii. The project boundary must be clearly and explicitly defined. This will facilitate a clear delineation of what are project emissions and what are leakages;
    iii. The proper definition of the baseline requires an exhaustive and realistic consideration of alternative project scenarios;
    iv. This will enable the generation of sound arguments to show that the project is additional to what would have been implemented, in the absence of the CDM project, i.e. not a business as usual situation;
    v. More often than not, additionality of oil and gas sector CDM projects may not be easily proven using only barrier analyses alone;
    vi. Methodology must reflect national policies and realities for a sound and consistent argument about additionality to be made;
    vii. Many methodology semantics must be clearly defined for clarity of understanding by users. For example, the methodology may need to answer questions such as, what is a deficit grid? How do we handle non-grid electricity supplies? Are upstream and lifecycle emissions important in the determination of emission reductions?
    viii. If a new methodology is too specific for the project activity scenario and not generic enough, it may result in the methodology being developed

to be limited in scope and applicability, and would have a higher risk of rejection from the CDM EB.

Table 1: Approved Baseline and Monitoring Methodologies and CDM New Methodologies Undergoing Review for the Oil and Gas Industry

	METHODOLOGY TITLE	METH. NUMBER
	Approved Methodologies	
1.	Recovery and utilization of gas from oil wells that would otherwise be flared (version 2)	AM008
2.	Leak Reduction from Natural Gas Pipeline Compressor and Gate Stations	AM0023
	New Methodologies Undergoing Review	
1.	Reduction of flaring and use of Recovered Natural Gas for Methanol Production	NM0145
2.	CEG Gas Distribution Pipeline Replacement Project in Rio de Janeiro, Brazil	NM0151
3.	The White Tiger Oil Field Carbon Capture and Storage (CCS) Project in Vietnam	NM0167
4.	Capture of CO2 from LNG complex and its Geologic Storage in the Aquifer Located in Malaysia	NM0168
5.	Methane Leak Reduction in Natural Gas Pipelines	NM0172

Source: UNFCCC

The experiences gathered so far in the development of the few gas flare-out projects that have been conceived as CDM will continue to provide a base for the development of other oil and gas sector activities as CDM projects with realistic, reliable and sustainable GHG emission reductions. Many of the lessons elucidated above, which were generated in the development of the few existing CDM projects in this sector, if utilized in future development, will ensure that the development cycle, including the necessary approvals, certification and issuance will occur in a reasonable time frame.

It is important to stress that none of the currently approved methods or the new methodologies that are currently going through the CDM process pipeline are applicable for projects involving flare reduction through re-injection into oil fields. The ENI Ob-Ob CDM project case considered in this GGFR study in Nigeria is a step in the direction of putting in place an approved methodology (AM) for such an important oil and gas sector activity.

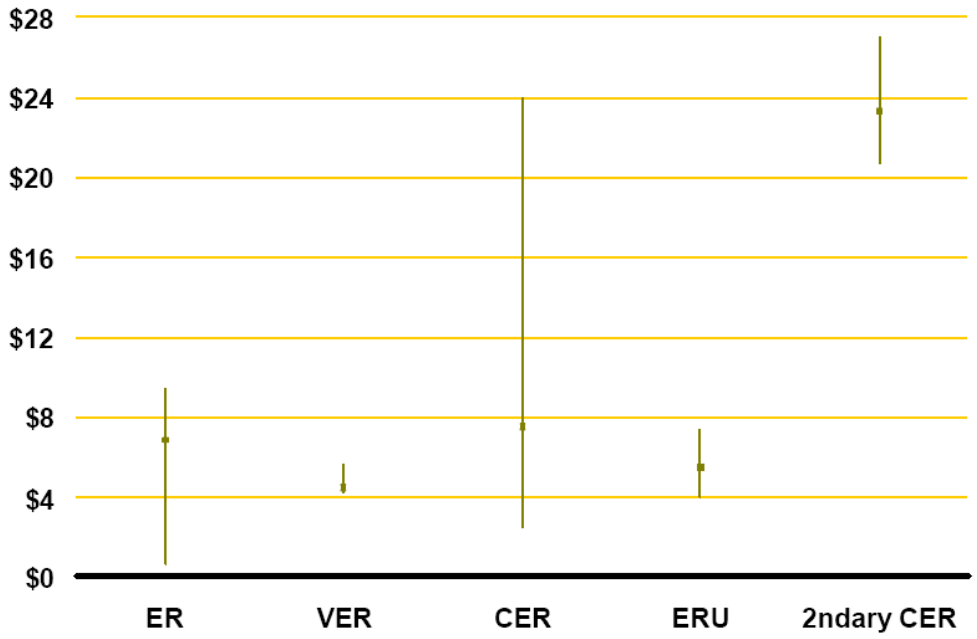
6 Financial and Contractual Considerations

6.1 Potential value of Certified Emission Reductions (CERs)

Currently, there is no standard contract for purchasing CERs and prices are often not publicly disclosed, so that it is difficult to state a specified price for CERs. The contract structure of an Emissions Reductions Purchase Agreement (ERPA) may vary considerably among transactions, but contracts with large upfront payments typically command a lower nominal price per tonne of CO2e than contracts where all the payment is made on delivery, since in the former case the seller is more exposed to project risk and will take this project risk into account by applying an appropriate discount factor.

The World Bank reports the ranges of prices for carbon commodities shown in Figure 8 below; differentiated by types of carbon credits currently offered in the emerging global carbon markets: Emissions Reductions (ERs, i.e., emissions reductions not for Kyoto compliance purposes), Verified Emissions Reductions (VERs, i.e., credits assigned to buyers who take the CDM registration risk of the project), Certified Emissions Reductions (CERs, i.e. credits transferred from a seller who takes most of the registration risk), Emission Reduction Units (ERUs, from Joint Implementation projects) and issued CERs (i.e. CERs traded on the so-called secondary market).

Figure 8: Prices for emissions reductions in US$/tCO2e observed in January 2005 to first quarter of 2006.

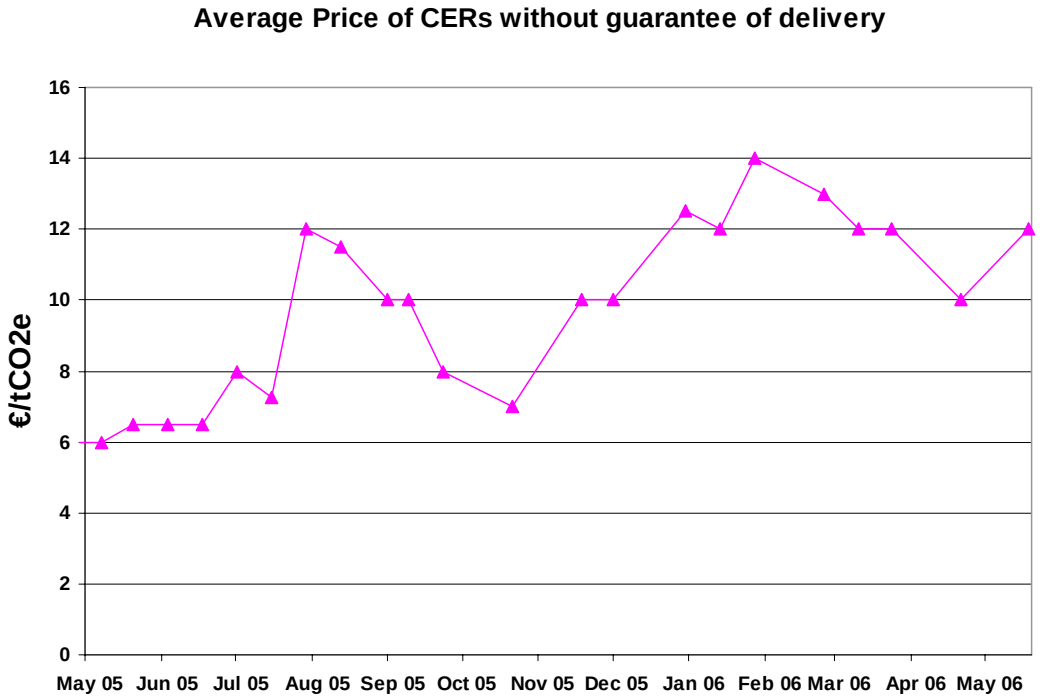


Source: World Bank Carbon Finance Business, "State and Trends of the Carbon Market 2006". Note that lines indicate price ranges, while the black points indicate the weighted average price of credits.

Carbon credits prices have increased substantially from Jan.2003 – May 2004 to Jan.2004 - April 2005 and to Jan.2005- first quarter of 2006. The weighted-average price of VERs has increased in 2004/5 by 10% relative to 2003/4, and the price of CERs has increased by 21% over the same period. In 2005/6, the price increased even further. The weighted average-weighted price of ERs was US$1.91 per tCO2e in 2004 and reached US$7.2 per tCO2e. In the meantime, the range widened considerably from US$0.65 per tCO2e to US$ 9.36 per tCO2e over the period covered by the World Bank study. Though the average-weighted mean for retail does not exhibit such a trend, maximum prices for transactions in the public record have also been increasing, from US$ 14.35 per tCO2e in 2004 to US$ 17.34 per tCO2e in 2005 and 1stQ06. This may reflect the atmosphere that prevailed, particularly in Europe, for compliance assets last year and in early 2006.

More recent data show that CERs prices are increasing further. Figure 9 below illustrates the increase in the average price of CERs without guarantee of delivery.

Figure 9: CERs prices



Source: Point Carbon

The total size of the CDM market is difficult to determine, but a range of values could be given. The estimated market potential of the CDM, i.e., the potential demand for CERs in 2010, is 250 MtCO2e (with a range of 50 to 500 MtCO2e) at a price of $11.00 /tCO2e (range + 50%). This represents a total demand for CERs of 1,250 MtCO2e by 2012, or an approximate market value of nearly US$14 billion. This estimated potential assumes a continued preference for CERs and ERUs (Emission Reduction Units, or project-related carbon credits

from Annex I countries) by buyers and restricted sales of surplus Kyoto units by Russia and the Ukraine.[6]

6.2 Carbon credit ownership

For any project proponent it will be important to consider which entity is legally entitled to any claimed emission reductions. At first glance this issue may not seem controversial, but ownership of carbon credits is often determined on an *ad hoc* basis depending on regulations present in the investing and host countries and on contract structures defined in the Emission Reduction Purchase Agreement (ERPA), among other factors.

Many Host Country Designated National Authorities are adopting very different local rules to implement the CDM and as such there is a real lack of consistency on the issue of legal ownership of CERs. This can affect the chances for project approval and lead to confusion about how to interpret the local CDM rules.

For example, in the case of a joint venture in the oil and gas sector, it might not be clear who would have the legal entitlement to the carbon credits resulting from the flare reduction (e.g., are all members of the joint venture equally entitled, does one member have responsibility/ownership of the associated gas, what is the government's claim, what about the actual project proponent, or the technology provider?). Thus, it is important to establish clear legal entitlement to any carbon credits upfront.

ERPAs also define specifically who the owner of the CERs is among the different actors involved in the contract. It is essential to define in the contract the legal ownership and the quantity of the CERs owned by each Party. For example, all or some of the CERs to be generated by a certain project may be owned by the following parties:

- The project proponent
- Special Purpose Vehicle (SPV) - (A SPV is a firm created by a company to fulfill narrow or temporary objectives, primarily to isolate financial risk)
- Buyer of CERs
- Technology provider
- Financial institution
- Broker
- Host country

The structure of the ERPA should also define other relevant terms, such as whether the contract is a forward or a spot contract, whether upfront payments will be provided by the CERs buyer (and in that case what will be the discount rate), what liabilities the seller is willing to undertake in case it fails to deliver upon contract commitments, what penalties the seller agrees to pay in case of non-delivery of CERs, and what is the seller's capacity to pay these penalties.

[6] Haites, "Estimating the Market Potential for the Clean Development Mechanism: Review of Models and Lessons Learned" 2004

ANNEX 1 PIN Template

PROJECT IDEA NOTE (PIN)

A. Project description, type, location and schedule

Name of Project:_____

Technical summary of the project ***Date submitted:***_____

Objective of the project	*Describe in less than 5 lines*
Project description and proposed activities	*About ½ page*
Technology to be employed	*Describe in less than 5 lines.* Please note that support can only be provided to projects that employ commercially available technology. It would be useful to provide a few examples of where the proposed technology has been employed.

Project developer	
Name of the project developer	
Organizational category	a. Government b. Government agency c. Municipality d. Private company Non Governmental Organization
Other function(s) of the project developer in the project	a. Sponsor b. Operational Entity under the CDM c. Intermediary d. Technical advisor
Summary of the relevant experience of the project developer	Describe in less than 5 lines
Address	Address, PO Box, City, Country
Contact person	Name of the Project Development Manager
Telephone / fax	
E-mail and web address, if any	
Project sponsors	
(List and provide the following information for all project sponsors)	
Name of the project sponsor	
Organizational category	a. Government b. Government agency c. Municipality d. Private company e. Non Governmental Organization
Address (include web address, if any)	Address, PO Box, City, Country
Main activities	*Not more than 5 lines*
Summary of the financials	*Summarize the financials (total assets, revenues, profit, etc.) in not more than 5 lines.*

Type of the project	
Greenhouse gases targeted	CO_2 / CH_4 / N_2O / HFCs / PCFs / SF_6 *(mention what is applicable)*
Type of activities	Abatement / CO_2 Sequestration
Field of activities	
a. Energy supply	Renewable energy, excluding biomass / biomass / cogeneration / improving energy efficiency by replacing existing equipment / minimization of transport and distribution / fuel switch (e.g., switch coal to biomass) *(mention what is applicable)*
b. Energy demand	Replacement of existing "household equipment" / improvement of energy efficiency of existing production equipment *(mention what is applicable)*
c. Transport	More efficient engines for transport / modal shift / fuel switch (e.g. public transport buses fuelled by natural gas) *(mention what is applicable)*
d. Waste management	Capture of landfill methane emissions / utilization of waste and wastewater emissions *(mention what is applicable)*
e. Land Use Change and Forestry	Afforestation/ reforestation/ forest management/ wetlands management/ watershed management/ improved agriculture / land degradation prevention *(mention what is applicable) -> Additional information to be provided in Annex I*
Location of the project	
Region	East Asia & Pacific / South Asia / Central Asia / Middle East / North Africa / Subsaharan Africa / Southern Africa / Central America & the Caribbean / South America/Central & Eastern Europe *(mention what is applicable)*
Country	
City	
Brief description of the location of the project	*No more than 3 - 5 lines*
Expected schedule	
Earliest project start date	Year in which the plant will be operational
Estimate of time required before becoming operational after approval of the PIN	Time required for financial commitments: xx months Time required for legal matters: xx months Time required for negotiations: xx months Time required for construction: xx months
Expected first year of verified Emission Reduction or CER / ERU delivery	Year
Project lifetime	Number of years
Current status or phase of the project	Identification and pre-selection phase / opportunity study finished / pre-feasibility study finished / feasibility study finished / negotiations phase / contracting phase / etc. *(mention what is applicable and indicate the documentation [e.g., the feasibility study] available)*
Current status of the acceptance of the Host Country	Letter of No Objection is available / Letter of Endorsement is under discussion or available / Letter of Approval is under discussion or available / Host Country Agreement is under discussion or signed / Memorandum of Understanding is under discussion or available / etc. *(mention what is applicable)*
The position of the Host Country with regard to the	The Host Country a. signed or acceded to the Kyoto Protocol or

Kyoto Protocol	b. signed and has demonstrated a clear interest in becoming a party in due time (e.g., countries which have already started or are on the verge of starting the national ratification, acceptance or approval process) or c. signed the Kyoto Protocol, d. .is a Party to the UNFCCC. *(mention what is applicable)*

B. Expected environmental and social benefits

Estimate of Greenhouse Gases abated / CO_2 Sequestered (in metric tons of CO_2-equivalent)	Annual: Up to and including 2012: xx tCO_2-equivalent Up to a period of 10 years: xx tCO_2-equivalent Up to a period of 7 years: xx tCO_2-equivalent Up to a period of 14 years: xx tCO_2-equivalent
Baseline scenario	CDM/JI projects must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least: • Which emissions is the proposed Clean Development Mechanism (CDM)/Joint Implementation (JI) project displacing? • What would the future look like without the proposed CDM/JI project? • What would the estimated total greenhouse gas (GHG) reduction be? *(About ¼ - ½ page)*
For sequestration projects only: Existing vegetation and land use	*(What is the current land cover and land use? Is the tree cover more or less than 30%?)*
Specific global & local environmental benefits	*(In total about ¼ page)*
Which guidelines will be applied?	Name and, if possible, the website location
Local benefits	
Global benefits	
Socio-economic aspects What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project? Indicate the communities and the number of people that will benefit from this project.	*(In total about ¼ page)*
Which guidelines will be applied?	Name and, if possible, the website location
What are the possible direct effects (e.g., employment creation, capital required, foreign exchange effects)?	
What are the possible other effects? For example:	*training/education associated with the introduction of new processes, technologies and products and/or*

•	*the effects of a project on other industries*
Environmental strategy/ priorities of the Host Country	A brief description of the relationship of the consistency of the project with environmental strategy and priorities of the Host Country *(Not more than ¼ page)*

C. Finance

Total project cost estimate	
Development costs	xx US$ million
Installed costs	xx US$ million
Other costs	xx US$million
Total project costs	xx US$million
Sources of finance to be sought or already identified	
Equity	Name of the organizations and finance (in xx US$million)
Debt – Long-term	Name of the organizations and finance (in xx US$million)
Debt - Short term	Name of the organizations and finance (in xx US$million)
Not identified	xx US$million
Carbon finance contribution sought	xx US$million
Carbon finance contribution in advance payments. (The quantum of upfront payment will depend on the assessed risk of the project by the World Bank.)	xx US$million and a brief clarification (*not more than 5 lines*)
Sources of carbon finance	Name of carbon financiers other than PCF that your are contacting (if any)
Indicative CER/ERU or vER Price (subject to negotiation)	
Total Emission Reduction Purchase Agreement (ERPA) Value	
A period until 2012 (end of the first budget period)	xxUS$ / €
A period of 10 years	xx US$ / €
A period of 7 years	xx US$ / €
A period of 14 years (2 * 7 years)	xxUS$ / €
If financial analysis is available for the proposed CDM activity, provide the forecast financial internal rate of return for the project with and without the CER revenues. Provide the financial rate of return at the expected CER price above and US$3/ tCO_2e. DO NOT assume any up-front payment from the PCF in the financial analysis that includes PCF revenue stream. Please provide a spreadsheet to support these calculations.	

ANNEX 2 CDM assessment tool

ICF Consulting CDM assessment tool

PROCESS	*Module Weighting (Percent):*	*33%*
1.	Is the project activity reliant on an Approved Methodology? *Not Approved* If methodology is approved, answer the following questions:	
2.	Is the PDD complete?	Yes
3.	Has the Host Country approved?	Yes
4.	Has the PDD been validated?	Yes
5.	Has the project been registered?	Yes
6.	Has the project been implemented?	Yes
7.	Have the Monitoring protocols been implemented?	Yes
8.	Have emission reductions been verified?	Yes
9.	Have emission reductions been certified?	Yes
10.	Have CERs been issued?	Yes
	If methodology is not approved, answer the following questions:	
2.	Has a methodology (Sect. 1 to 3 of a PDD) been completed for submission?	Yes
3.	Has the methodology been submitted to an OE for review?	Yes
4.	Has the OE approved methodology been submitted to the CDM?	No
5.	What is the status of approval of the methodology?	Pending/Unsure
	Total Risk Score for CDM Process	**1.15**
PROJECT	*Module Weighting (Percent):*	*33%*
1.	Is this the project activity reliant on a mature, proven technology?	Yes
2.	What technology type is this project? If technology type is "other," complete the following:	Landfill Gas Capture - Flare
	Name:	
	Rank each of the following (1 - 10):	
	Capital Cost	
	Baseline and Additionality	
	Financial Hurdle	
	State of development/ BAT	

	Reliability	
	Cost of Maintenance	
	Ease of Maintenance	
	Permanence	
3.	How many CERs are expected to be created each year (annual average metric tonnes)?	0
4.	In what year will the project begin to achieve emission reductions?	2010
	Total Risk Score for Project Technology	**5.000**
PROPONENT	*Module Weighting (Percent):*	*33%*
1.	Does at least one of the project participants "own" the project activity?	Yes
2.	Do any of the proponents have project related experience in this country?	Yes
3.	Do any of the proponents have experience with this project type / technology?	Yes: in the host country
4.	If any of the proponents have a credit rating, specify the rating (if none, choose none):	Lowest Risk (e.g., AAA)
	Total Risk Score for Project Proponent	**12.00**