

Carbon Credit Development for Flared Gas to Power

**funded by the World Bank/
Global Gas Flaring Reduction
public-private partnership**

Stephen Wilson

ECONOMIC CONSULTING ASSOCIATES LIMITED
41 Lonsdale Road London NW6 6RA UK
tel +44 (0)20 7604 4545 / fax +44 (0)20 7604 4547
www.eca-uk.com

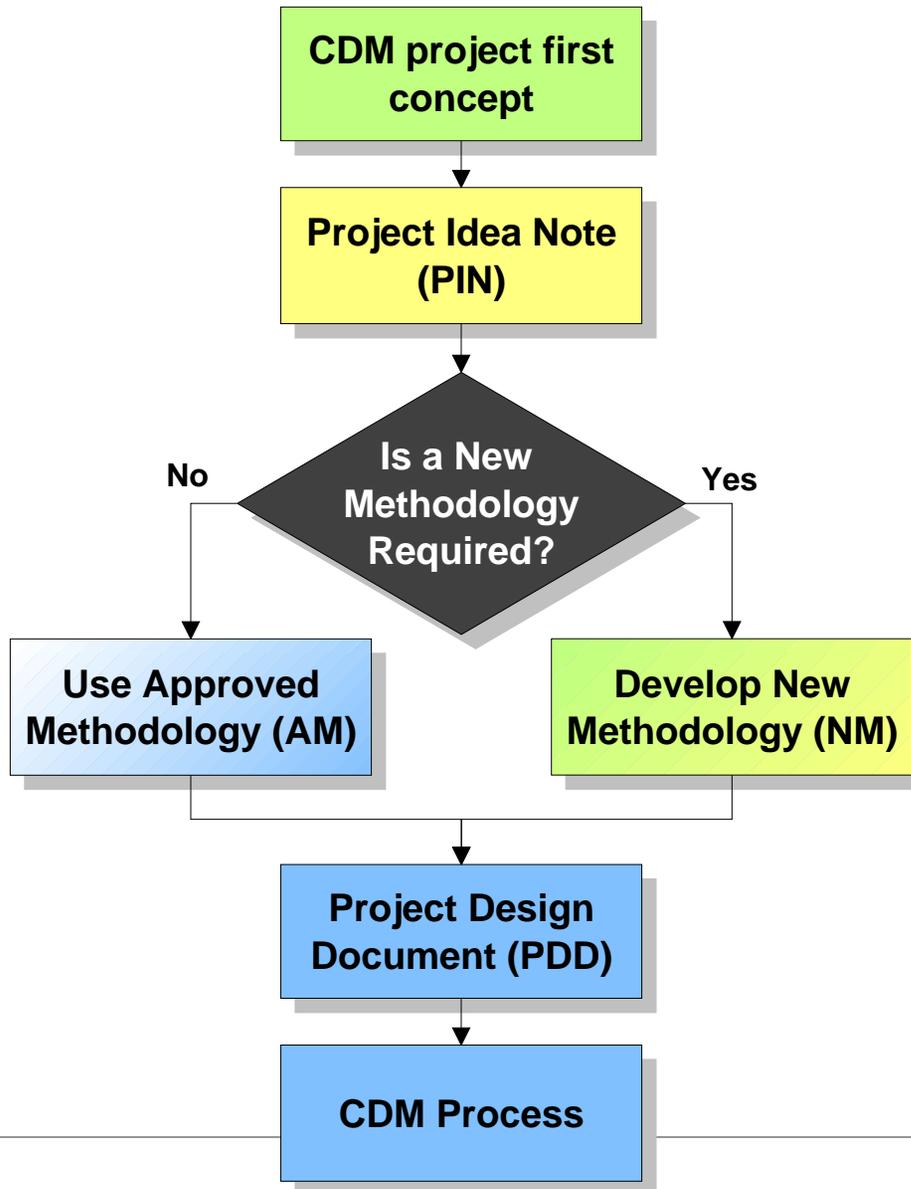
**Capacity Building Workshop, NICON Hilton
Abuja, 11-12 September 2006**



Agenda

- **Welcome by Dr Gardner/ PIC-CDM**
- **Monday AM**
 - 1. Introduction by Stanley Amam/ SPDC
 - Presentation on the Afam CDM case study
Coffee break
 - 2. Introduce project concepts
 - Group workshop development of project concepts
Lunch
- **Monday PM**
 - 3. Groups finalise draft outline PINs
Group representatives present to all participants
Coffee break
 - 4. The group leaders present on methodologies
- **Tuesday AM**
 - 5. Presentation on PDD development
 - 6. Presentation on CDM process

Structure



Time and session

Monday AM

1: Afam CDM case study

2: Group work on concept studies

Monday PM

3: Groups present conclusions

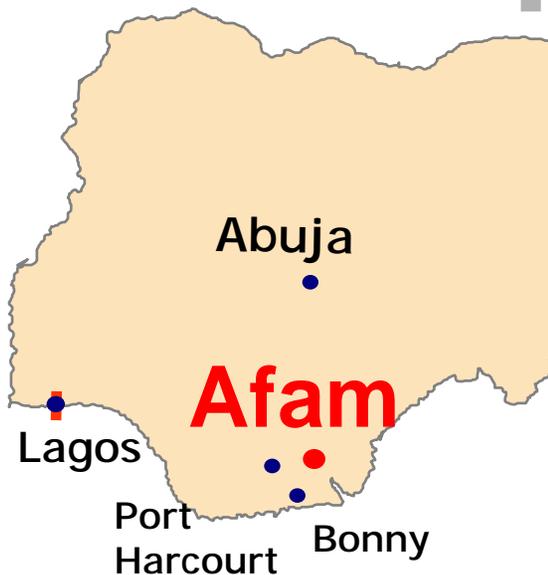
4: Group leaders present on the methodology for each concept study

Tuesday AM

5: Presentations on GGFR and PDD development

6: presentation on process

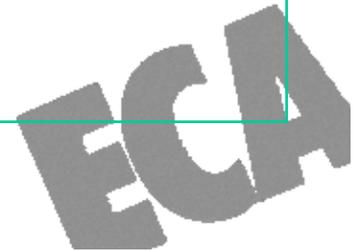
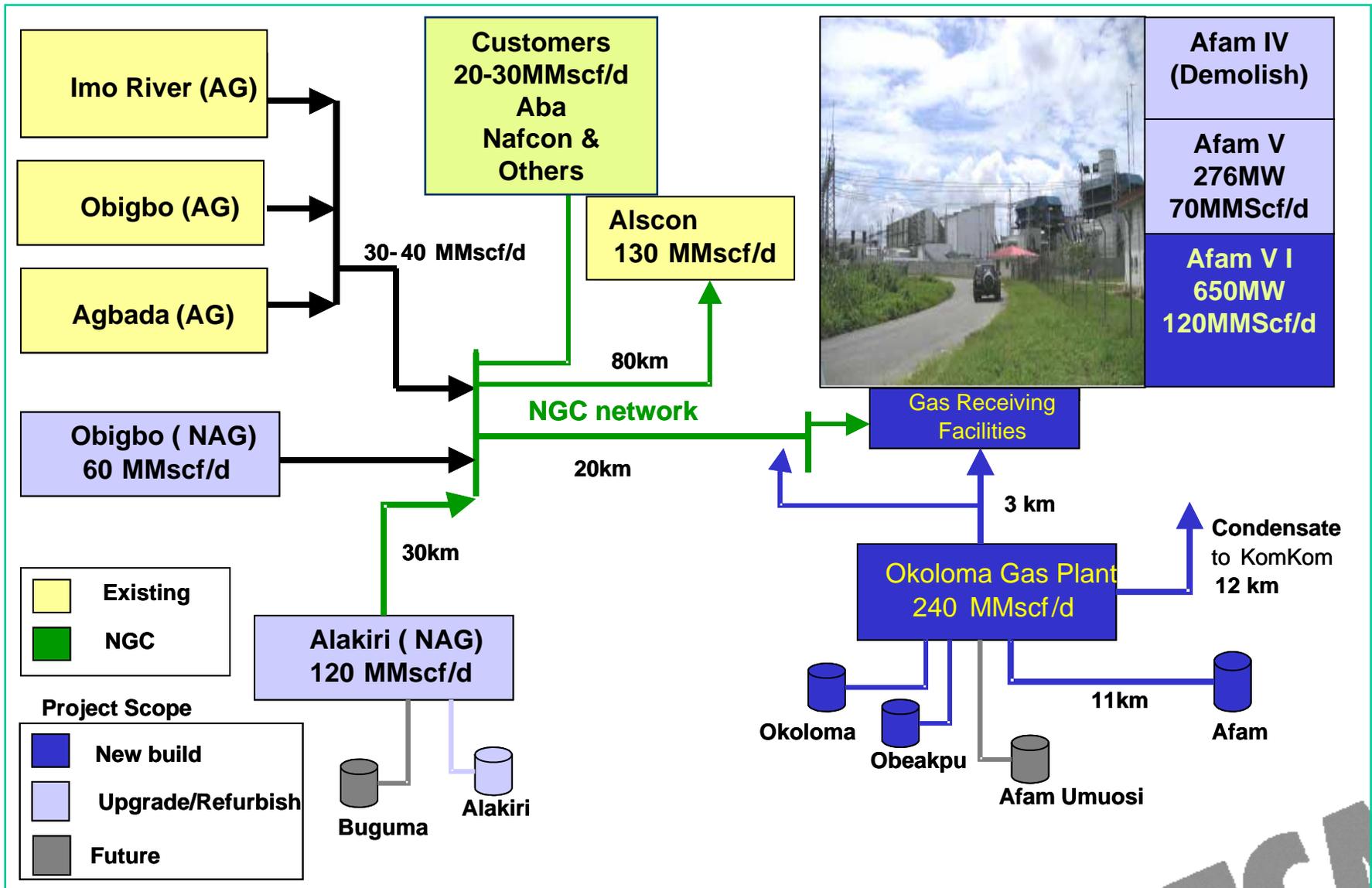
Overview of the Afam project



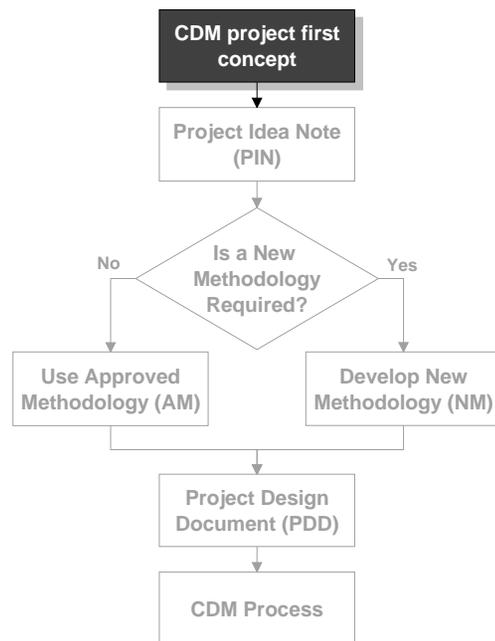
- **Afam Integrated Gas and Power (AIGP) project being developed by Shell/SPDC**
- **Partners include NNPC/NAPIMS, NAOC/ENI and Total**
- **Total project CapEx is significant**
- **AIGP will:**
 - **increase the available capacity on the Nigerian power grid**
 - **rehabilitate 276 MW of existing GT capacity and**
 - **add about 650 MW of new CCGT capacity**

ECA

Schematic of AIGP within the existing system



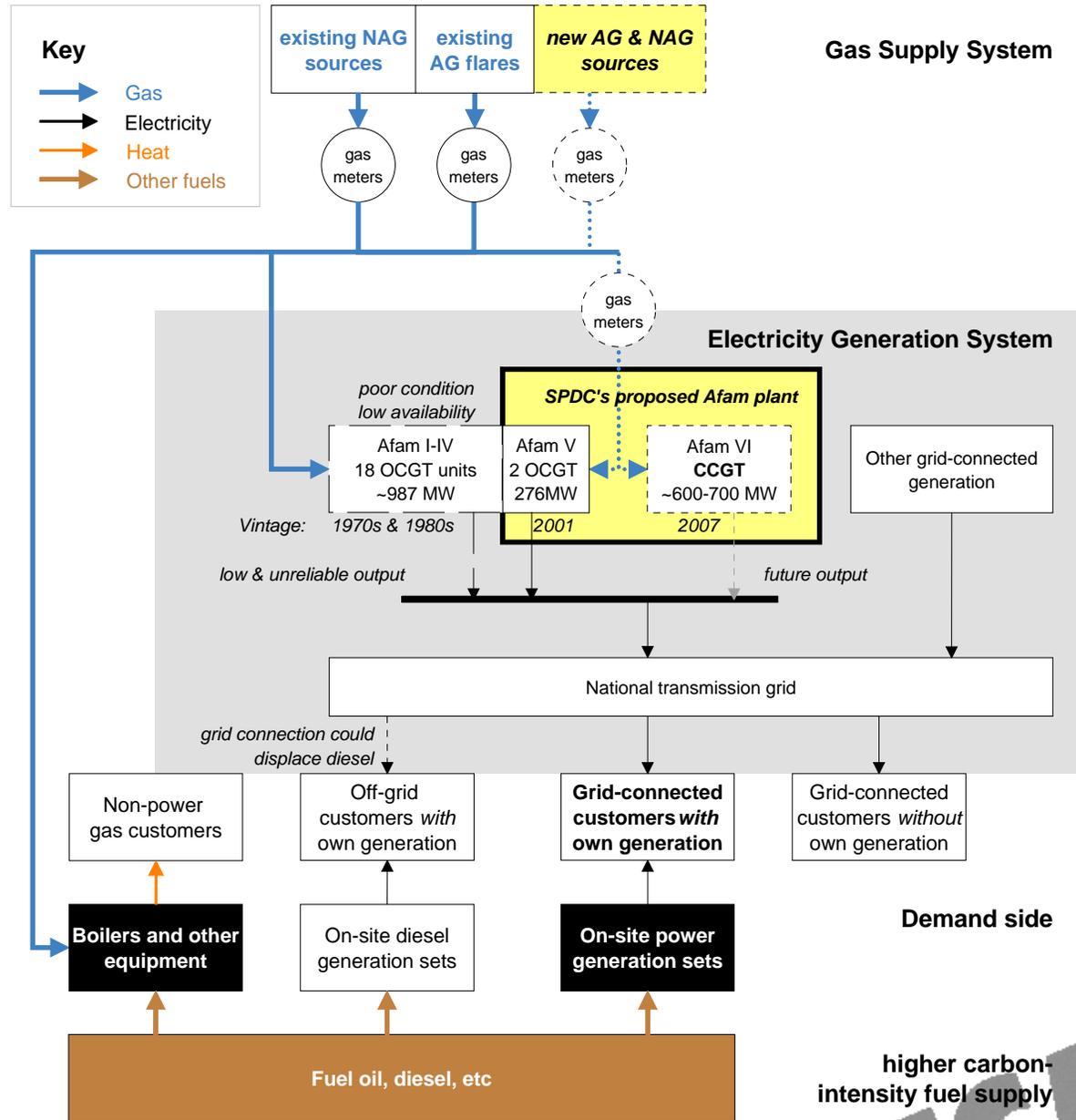
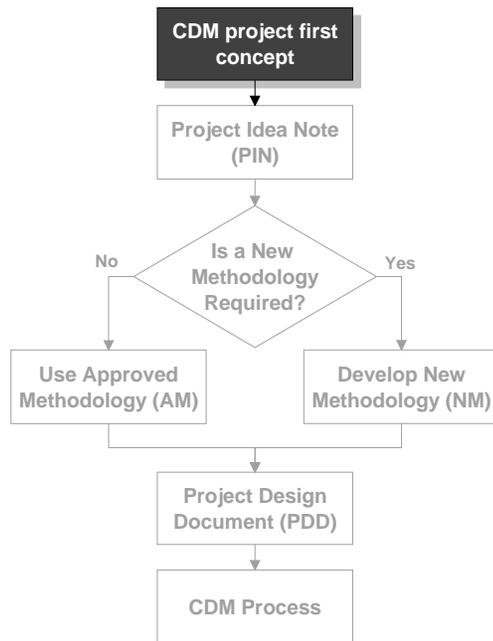
How and why is AIGP a CDM project?



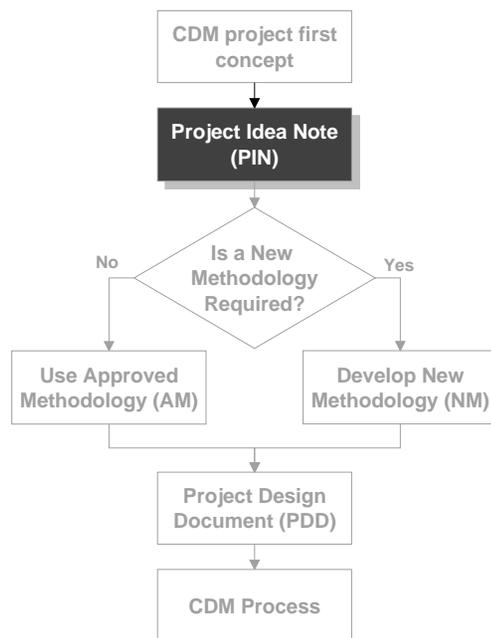
■ AIGP will:

- Underpin Shell/SPDC's commitment to reduce gas flaring in Nigeria:
UPSTREAM benefits
- Supply electricity demand that would otherwise need to have been served by small diesel generators:
DOWNSTREAM benefits
- Provide **SUSTAINABLE DEVELOPMENT** benefits in Nigeria by contributing to the reduction of resources lost to flaring elsewhere in the system and by improving the availability of more economic grid electricity

Step 1: Afam as initially conceived as a CDM project



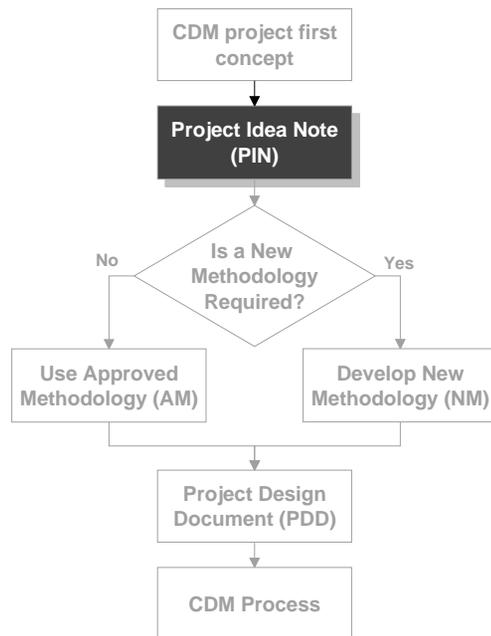
Step 2: Develop a PIN



- A Project Idea Note (PIN) is not a formal CDM requirement, but is an excellent discipline
- It forces you to think systematically, identify the key issues, decide whether your initial project concept is a viable CDM project
- It provides a useful tool to persuade internal decision-makers and external supporters, financiers, etc
- The World Bank Carbon Finance team requires applicants to start with a PIN

Step 2: the PIN for the Afam project

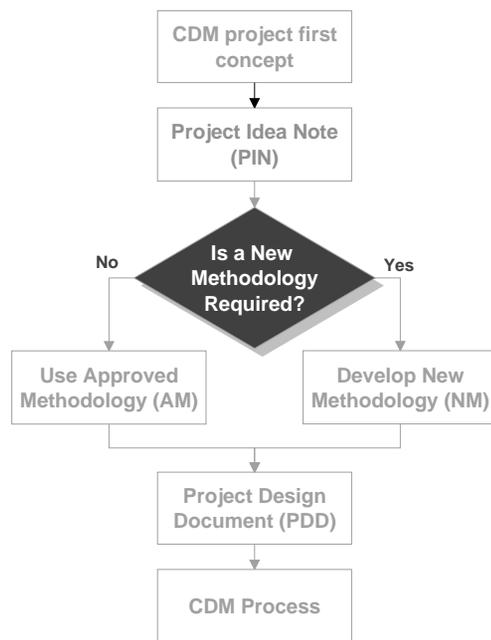
- **Written by Shell/ SPDC in the standard template used by the World Bank Carbon Finance team**
- **Describes the project investment**
- **Estimates the magnitude of the emission reductions that the project would generate**



The Shell/ SPDC PIN enabled the AIGP CDM project to secure GGFR support and provided the initial point of reference for the GGFR study team to develop the project further

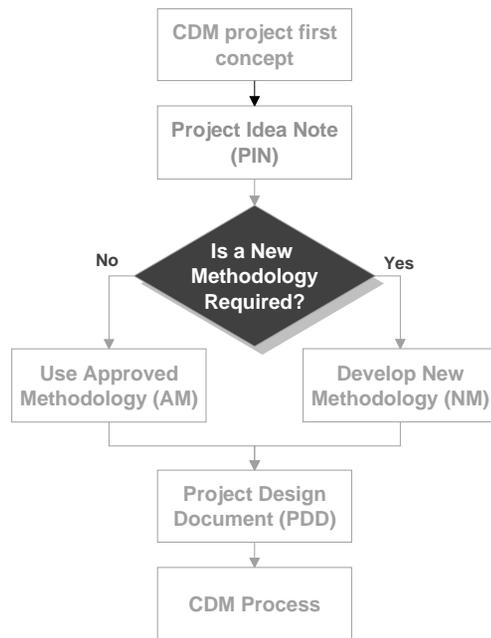
ECA

Step 3: Is a suitable methodology already available?



- Review the available methodologies
- 1: scan the titles of the methodologies for likely candidates for your project
- 2: make sure the sectoral application is relevant.
- 3: carefully read the applicability criteria for possible methodologies
- Over 30 approved methodologies exist at this stage as well as a number of methodologies for small-scale projects
- If a proposed New Methodology (NM) may be applicable to your project, you will need to keep track of its approval status
- More NMs become Approved Methodologies (AMs) at each meeting of the CDM Meth Panel every few months

Step 3: Methodology review for the Afam project

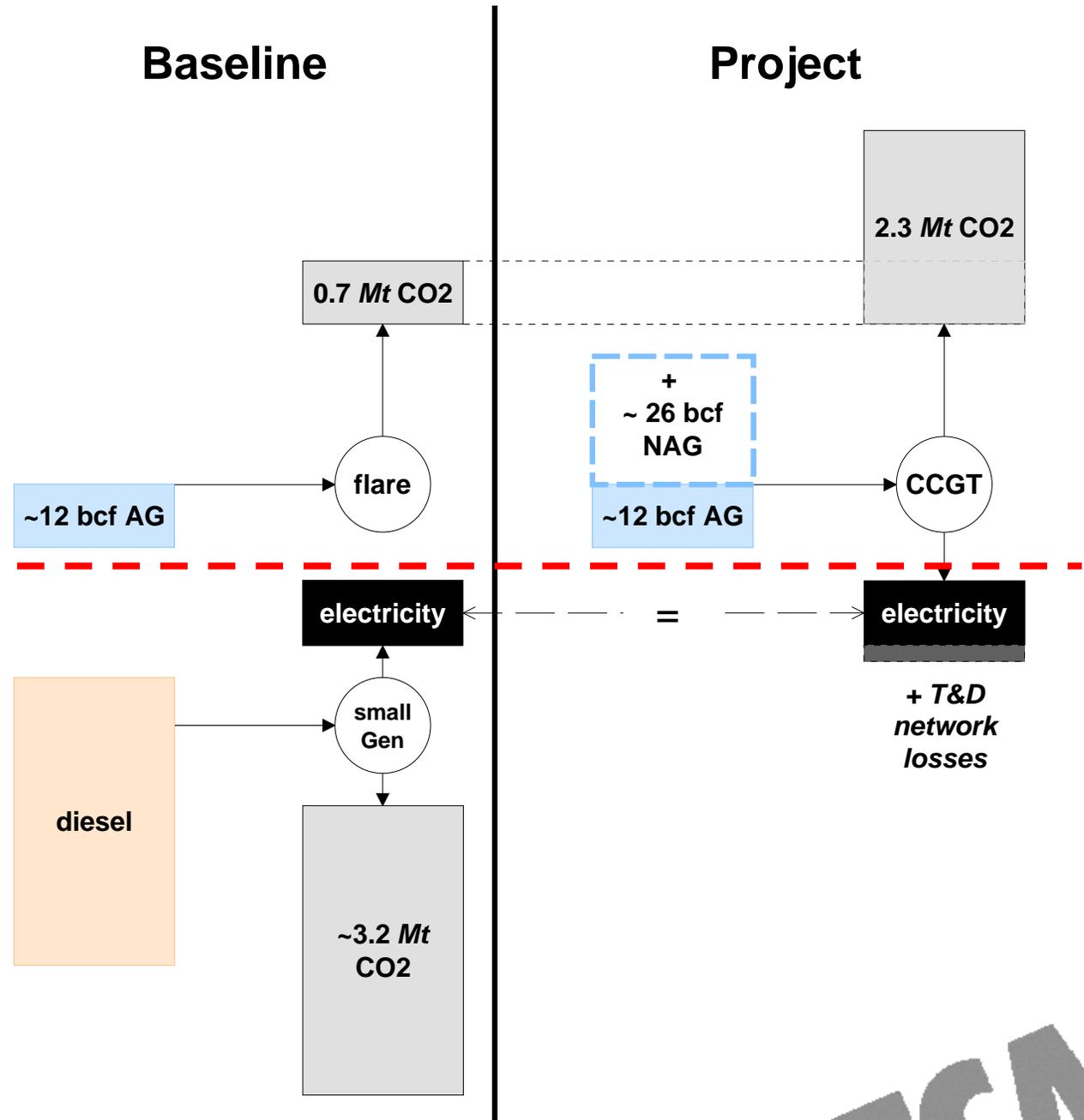


- The AIGP CDM project potentially has two sides:
 - Potential for gas flaring reduction
 - Potential for reducing power generation emissions
 - Several possible methodologies could apply, of which two were the most relevant:
 - AM0009: 'Recovery and utilization of gas from oil wells that would otherwise be flared'
 - ACM0002: 'Consolidated baseline methodology for grid-connected electricity generation from renewable sources'
 - The sectoral applications are:
 - Sector 10 (gas capture and use to avoid flaring)
 - Sector 1 (power sector issues)
 - The applicability criteria
 - AM0009 is OK
 - ACM0002 as it stands is renewables-limited
- ➔ No methodology could be used 'off the shelf'
Decisions were required on the approach

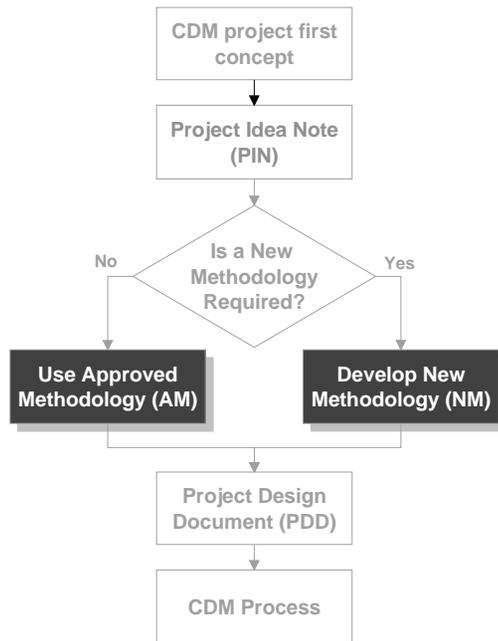
Step 3: Methodology review for the Afam project

**Gas/ flaring
Upstream side**

**Electricity/
Downstream side**

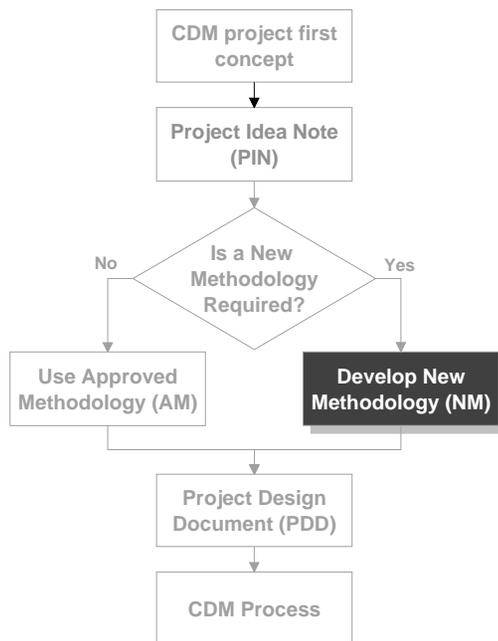


Step 4: Develop a new methodology



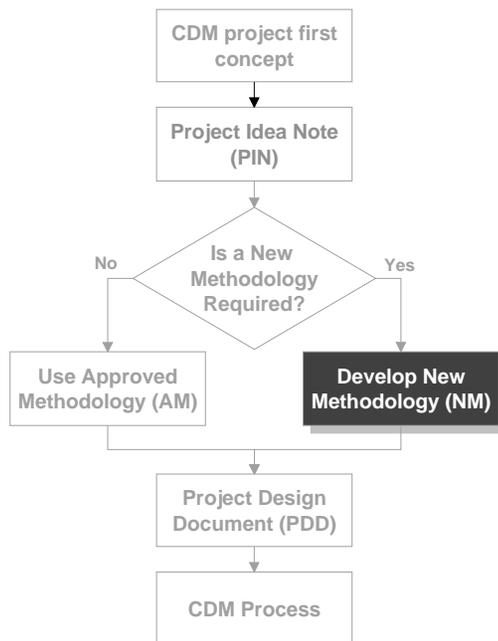
- If an Approved Methodology (AM) is available, the CDM project development process is both shorter and involves less risk because there is no uncertainty over methodology approval
- If a New Methodology (NM) is required, a number of key issues should be considered:
 - To what extent can it draw on existing methodologies?
 - Are any existing methodologies sufficiently similar that revisions to them can be proposed?
 - What precedents are inherent in other methodologies that are likely to be either:
 - HELPFUL to the proposed new methodology, OR
 - PROBLEMATIC for the proposed new methodology?

Step 4: Developing a proposed NM for the AIGP CDM project



- Key decisions required included:
 - Should the new methodology aim to combine the upstream flaring reduction side and the downstream power generation side in one methodology or should two separate methodologies and two PDDs be used?
 - What is the project baseline? Possible examples included:
 - emissions from an alternative power station investment (eg: open cycle gas turbine instead of combined cycle?) OR
 - emissions from small off-grid diesels that would be displaced by the Afam generation
- ➔ A decision was taken to develop a combined upstream/downstream flaring reduction and power sector methodology, using AM0009 and ACM0002 as starting points, with small off-grid diesels as the baseline.

Step 4: Developing a proposed NM for the AIGP CDM project



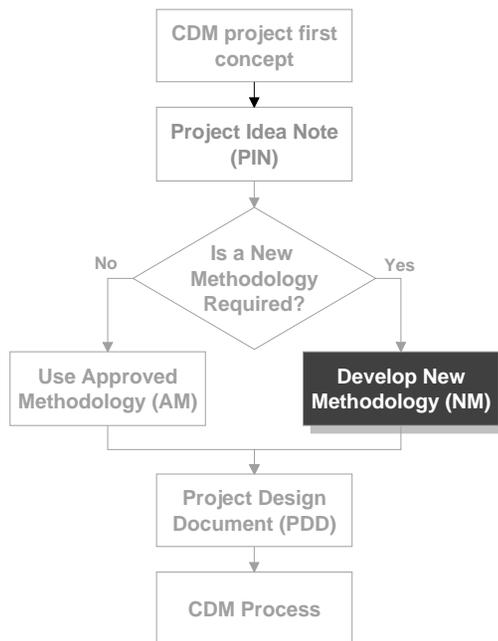
- **Most of the challenging methodological issues for the NM for Afam are on the power sector (downstream) side.**
- **How can we establish that small off-grid diesels represent the baseline emissions?**
- **How can we quantify the emissions that would have arisen in the baseline case (which economists call the ‘counter-factual’)?**



The methodological approach of ACM0002 provided the foundation for the solutions.

ECA

Step 4: Providing a way in the NM to show that small diesels represent the baseline



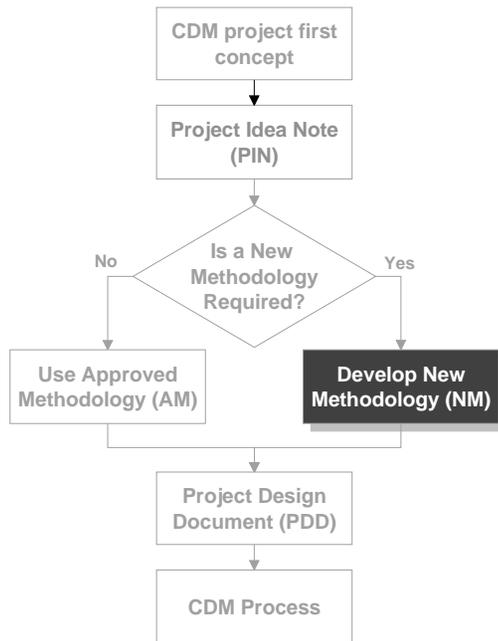
- To establish that small off-grid diesels represent the baseline emissions requires a significant extension to the scope of ACM0002, which is limited to *ON-GRID*, *RENEWABLE* electricity generation projects
- Nigeria has a ‘deficit’ grid that is unable to serve all electricity demand at all times
- Therefore, we have to deal with the issue of unmet and suppressed demand
- We did this by defining the concept of a ‘demand stack’ arranged in ‘merit order’
- Tests are then used to establish which tranche of demand is on the margin

Non-grid served energy 'demand stack' categories for countries with a supply deficit electricity grid

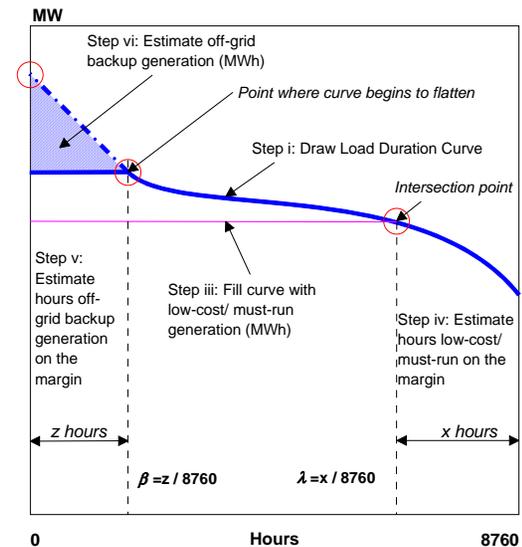
	Is the grid:		Category/Tranche of electricity demand is:	Conditions for demand to 'appear' on the grid:	Time-frame for demand to appear:	Basis for CERs	Data
	available?	connected?					
6	Y	Y or N	Suppressed/ income-related	increase in income levels and/or the conditions below	years	n/a	Not required. Limit captured by leakage criteria.
5	N	N	Supply-constrained/ not served	a grid connection made available and/or other conditions below	years	n/a	
4	N	N	Supply-constrained/ prime auto-generation	a grid connection made available and/or the conditions below	years	Build margin is off-grid plants*	Requires off-grid data sources, indirect estimates or surveys
3	Y	N	Displaced/ prime auto-generation	the conditions below and/or new connection made to available grid	months to years	Build margin is off-grid plants	
2b	Y	Y	Displaced/ prime auto-generation	supply constraint/s relieved: fuel avail, generation availability or capacity and/or transmission constraints and/or reliability improvements	months to a year	Operating Margin includes off-grid plants. Build margin includes off-grid plants.	
2a	Y	Y	Displaced/ backup auto-generation	supply restored	minutes to hours	Operating Margin may include off-grid plants if justification is provided. Build Margin excludes off-grid plants.	
1	Y	Y	Unmet/ electricity unserved	supply restored	seconds to minutes	BM or deem as off-grid if sustainable development test is met	Can only be inferred or estimated
0	Y	Y	Met/ electricity is grid-served	n/a	n/a	OM, BM or CM as in ACM0002v4	Measurable, should be available

* But off-grid emissions from this tranche would only be displaced (and CERs claimable) if the relevant grid extension is actually made.

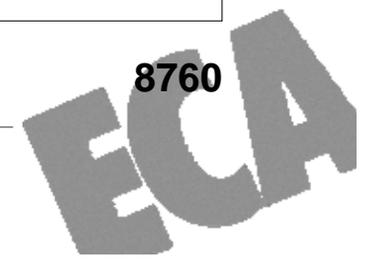
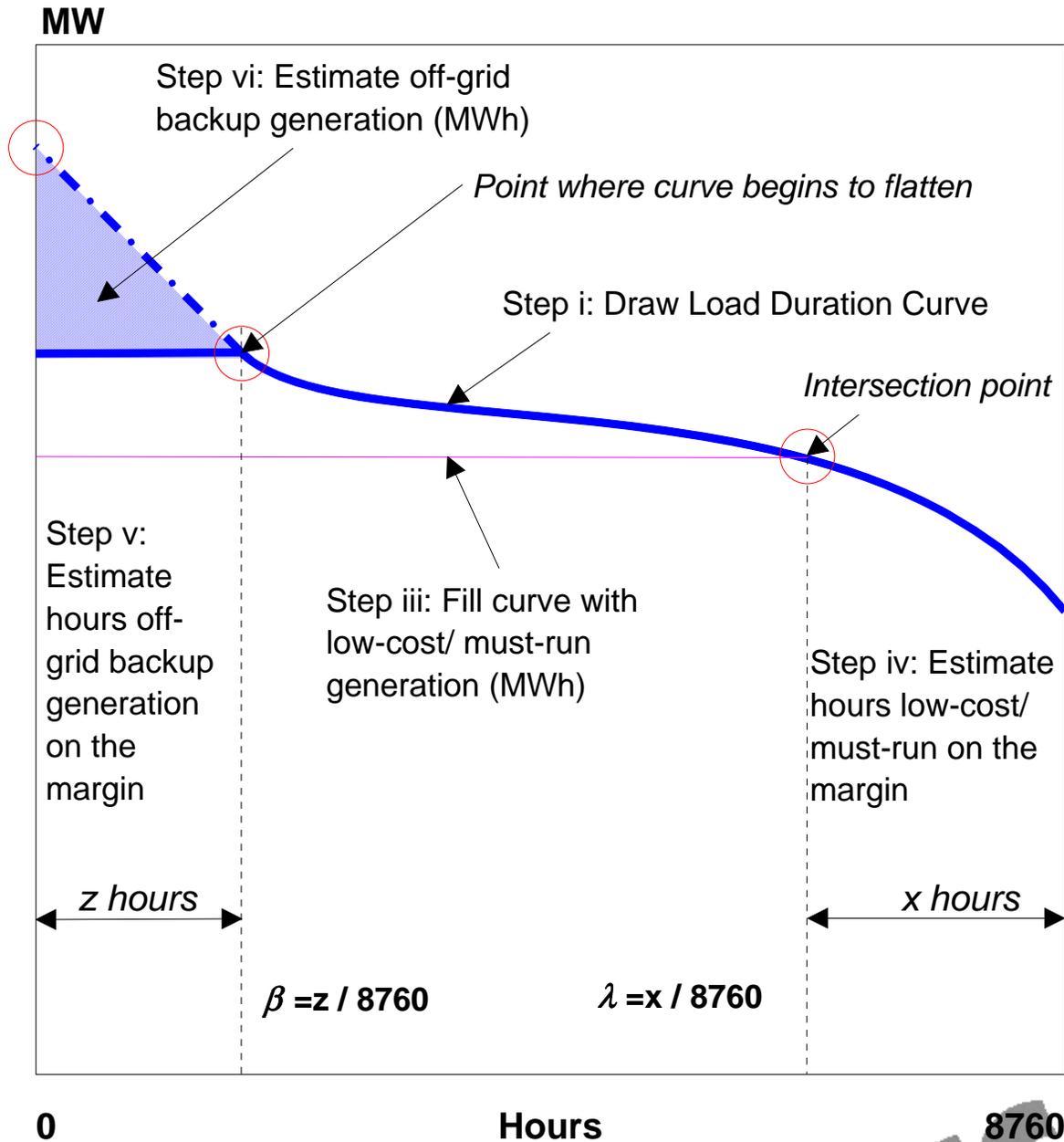
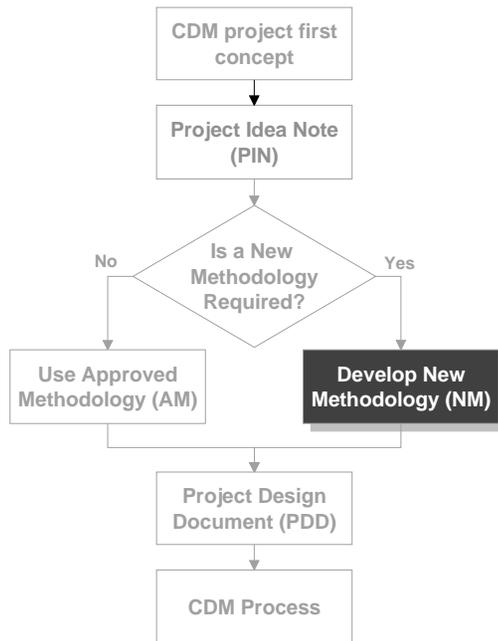
Step 4: Providing a way in the NM to quantify small diesel baseline emissions



- To quantify baseline emissions from small diesels requires an extension to the ‘build margin’ and ‘operating margin’ method provided in ACM0002
- A distinction needs to be made between diesel generators that operate in back-up mode and diesel generators that operate in prime mode
- The approach works from a Load-Duration Curve (LDC) >



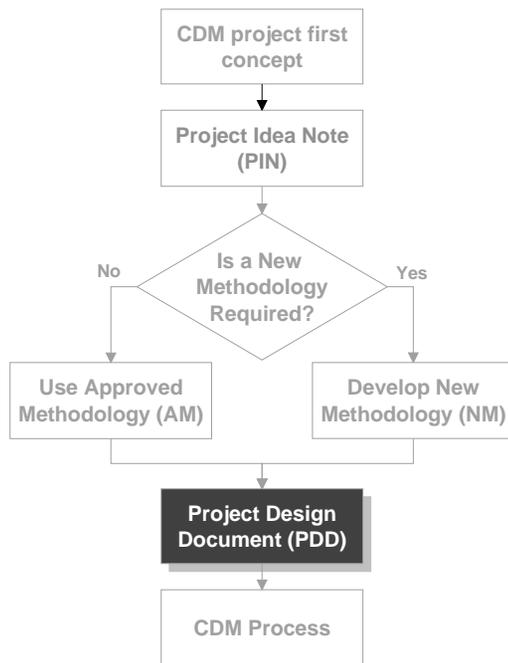
Approach to baseline operating margin calculation



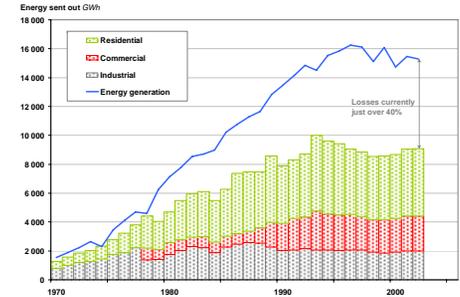
Step 5: Write the PDD

- **The Project Design Document (PDD) applies the chosen (or proposed new) methodology to your CDM project**
- **A proposed NM can only be submitted for a specified CDM project, and must be accompanied by a PDD**
- **Therefore the PDD needs to be developed in parallel with the methodology**
- **Care must be taken to make the NM generic (and not specific to the project) and to include in the PDD only methodological steps that are defined in the proposed NM**
- **The more substantial the data from documented sources that can be provided in the PDD, the greater the chance of success**

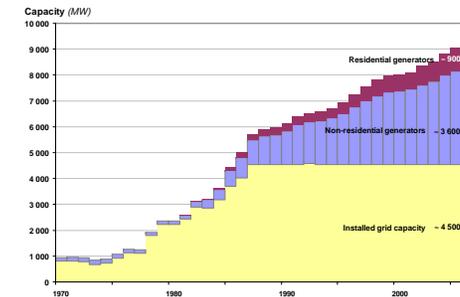
Step 5: PDD 'It's all in the baseline'



- **Data on the current and historical electricity consumption in Nigeria supports the observation that grid-served supply has not kept pace with demand or economic growth and that off-grid generation in effect represents the ‘operating margin’ in Nigeria**



- **Analysis of data on installed grid and off-grid capacity shows that off-grid diesel generators represent the ‘build margin’ in Nigeria.**



➔ The proposed New Methodology is capable of accounting for the time in future when the OM and BM become a mix of on- and off-grid



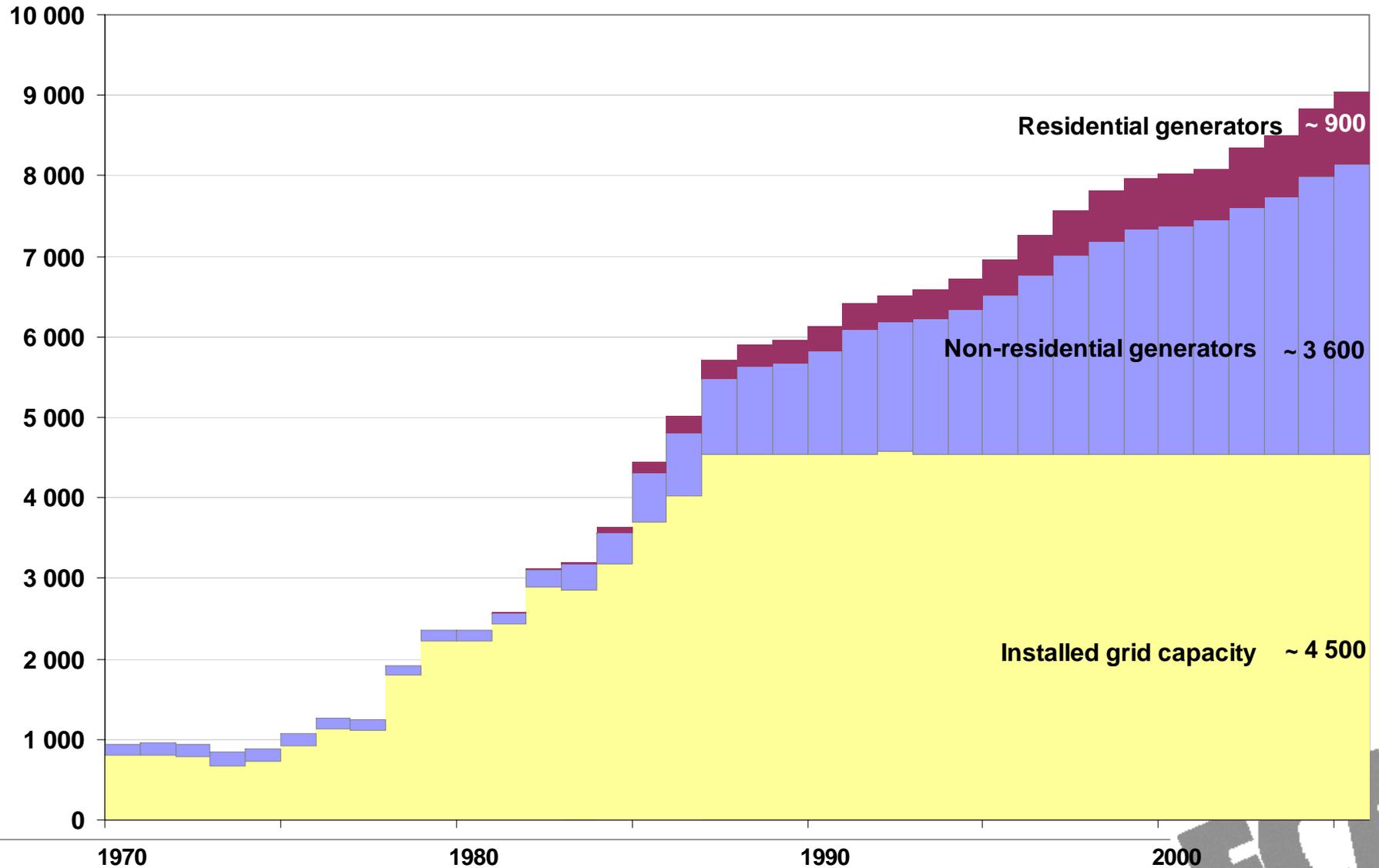
Step 6: Process and approvals

- **Get approval of the methodology**
- **Validate the project**
- **Submit the PDD**
- **Monitor and verify the emission reductions**
- **Issuance of Certified Emission Reductions (CERs)**



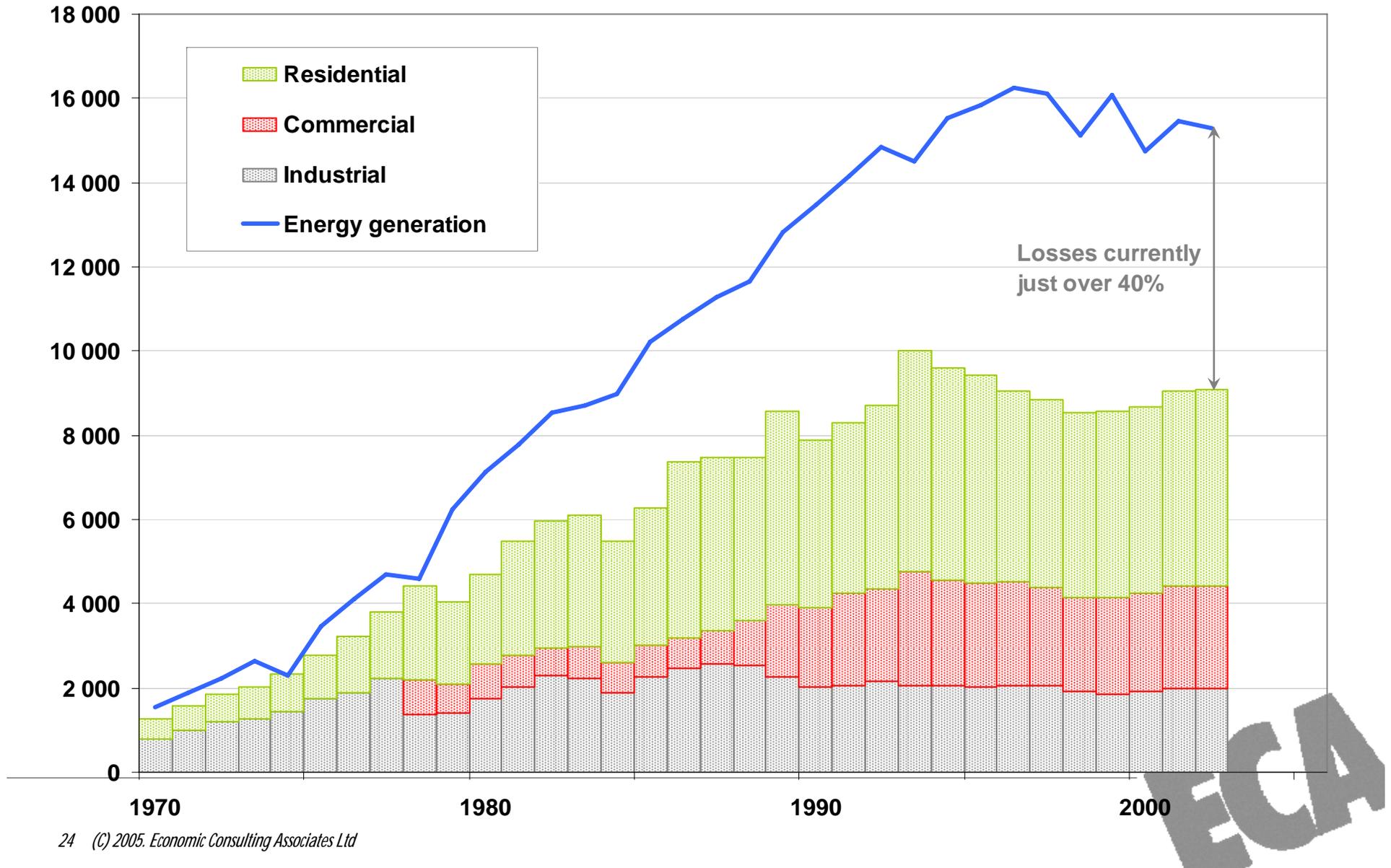
Current and historical on- and off-grid generation capacity in Nigeria

Capacity (MW)



Historical on-grid energy consumption by sector, losses and energy sent out in Nigeria

Energy sent out GWh



Carbon Credit Development for Flared Gas to Power

**funded by the World Bank/
Global Gas Flaring Reduction
public-private partnership**

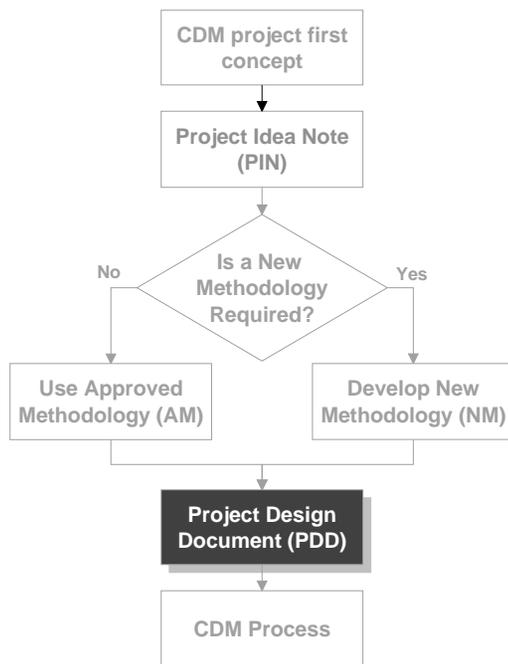
Stephen Wilson

ECONOMIC CONSULTING ASSOCIATES LIMITED
41 Lonsdale Road London NW6 6RA UK
tel +44 (0)20 7604 4545 / fax +44 (0)20 7604 4547
www.eca-uk.com

**Capacity Building Workshop, NICON Hilton
Abuja, 11-12 September 2006**



Step 5: PDD postscript: AIGP revised approach



- Since the original planning, there have been some changes in the AIGP project configuration
- In addition, a new methodology proposed for the Torrent Power gas-fired generation project in India has been approved (AM00029)
- A strategic decision has been taken to separate the upstream gas flaring (AM0009-derived) parts of the methodology from the downstream power (ACM0002-derived) parts
- If the NM is approved, then future projects similar to Afam will have the flexibility of making a claim on either the downstream side or the upstream side (using AM0009) or both



The PDD will be submitted explaining that there are upstream flaring reduction benefits, but that CERs will not be claimed for these, in line with the principle of conservatism

ECA