
VERIFICATION REPORT

LKKPL Fuel Switch Project For Generation Of Cleaner Power

Verification of Voluntary Carbon Emission

PROJECT No. CCP.VoL0036

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Approved by: Siddharth Yadav	Organisational unit: SGS Climate Change Programme
Client: Lanco Kondapalli Power Private Limited	Client ref.: Mr. K V Nagaprasad

Summary:

SGS United Kingdom Ltd was contracted by Lanco Kondapalli Power Pvt Ltd (LKPPPL) for verifying Voluntary emission reduction by LKKPL Fuel Switch Project For Generation Of Cleaner Power is located at Kondapalli Industrial Development Authority (IDA), Krishna Dist, Andhra Pradesh, India from September 10th 2001 – January 10th 2007.

The purpose of the project activity is generation of electricity and supplying it to state grid. The plant was operating on Naphtha as liquid fuel. The project activity replaced Naphtha with Natural gas (NG). NG generates less CO₂ emissions as compared to existing to Naphtha and conventional fossil fuels like coal/lignite.

The Combined Cycle Power Project (CCPP) with installed capacity of about 368 MW comprises of two (2) Gas Turbine (GT) Generating units of GE , two (2) Waste Heat Recovery Steam Generators (HRSG) of Hanjung, Korea and one common Steam Turbine Generating (STG) unit of Alstom, France, along with all Electrical Systems, Controls and Instrumentation, Civil, Structural and Architectural works. Heat recovery units and steam turbines maximize cycle efficiency and power output.

The Power generated from the Gas Turbine and Steam Turbine Generating Units is stepped up to 220 KV by generator transformers and AP Transco's 220 kV transmission lines evacuate Power through Kondapalli 220 kV Substation.

The project activity, by feeding clean power to grid will reduce CO₂ emissions, which would have been otherwise generated by coal dominated power plants. This project activity therefore has excellent environmental benefits in terms of reduction in carbon emissions and coal resource conservation

Report No.: CCP.VOL0036	Subject Group: GHG project verification	
Report title: LKPPL Fuel switch project for generation of cleaner power		
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Work verified by: Siddharth Yadav		
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Indexing terms

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Abbreviations

BEF	Baseline Emission Factor
BM	Build Margin
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
CM	Combined Margin
Cm	Centimeter
CO ₂	Carbon Dioxide
CUF	Capacity Utilization Factor
DPR	Detailed Project Report
GAIL	Gas Authority of India Ltd
GHG	Greenhouse Gas
GoI	Government of India
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	India Renewable Energy Development Agency
IRR	Internal Rate of Return
Kcal	Kilo Calories
Kg	Kilogram
KM	Kilometer
KP	Kyoto Protocol
KW	Kilowatt
KV	Kilovolts
kWh	Kilowatt hour
LKPPL	Lanco Kondapalli Power Private Limited
LP	Low Pressure
MNES	Ministry of Non-Conventional Energy Sources
MT	Metric Tons
MU	Million Units
MW	Megawatt
NGO	Non Government Organizations
NOC	No Objection Certificate
OM	Operating Margin
PDD	Project Design Document
PLF	Plant Load Factor
PM	Particulate Matter
PP	Project Proponent
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SGS	Societe General de Surveillance



STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joule
TNEB	Tamil Nadu Electricity Board
TNERC	Tamil Nadu Electricity Regulatory commission
UNFCCC	United Nations Framework Convention on Climate Change
TG	Turbine Generator

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1 INTRODUCTION

SGS United Kingdom Ltd was contracted by Lanco Kondapalli Power Pvt Ltd (LKPPL) for verifying Voluntary emission reduction by LKKPL Fuel Switch Project For Generation Of Cleaner Power is located at Kondapalli Industrial Development Authority (IDA), Krishna Dist, Andhra Pradesh, India.

1.1 Objective

The purpose of the project activity is generation of electricity and supplying it to state grid. The plant was operating on Naphtha as liquid fuel. The project activity replaced Naphtha with Natural gas (NG). NG generates less CO₂ emissions as compared to existing to Naphtha and conventional fossil fuels like coal/lignite. The Combined Cycle Power Project (CCPP) with installed capacity of about 368 MW comprises of two (2) Gas Turbine (GT) Generating units of GE , two (2) Waste Heat Recovery Steam Generators (HRSG) of Hanjung, Korea and one common Steam Turbine Generating (STG) unit of Alstom, France, along with all Electrical Systems, Controls and Instrumentation, Civil, Structural and Architectural works. Heat recovery units and steam turbines maximize cycle efficiency and power output.

The Power generated from the Gas Turbine and Steam Turbine Generating Units is stepped up to 220 KV by generator transformers and AP Transco's 220 kV transmission lines evacuate Power through Kondapalli 220 kV Substation.

The project activity, by feeding clean power to grid will reduce CO₂ emissions, which would have been otherwise generated by coal dominated power plants. This project activity therefore has excellent environmental benefits in terms of reduction in carbon emissions and coal resource conservation from September 10th 2001 – January 10th 2007.

The purposes of this verification exercise are, by review of objective evidence, to independently review:

- Whether the project has resulted in emission reductions as declared by the organization or GHG project's GHG assertion
- The data reported are accurate, complete, consistent, transparent and free of material error or omission.

1.2 Scope

This engagement covers verification of emission reductions from anthropogenic sources of greenhouse gases included within the project boundary of the 'LKPPL Fuel Switch Project for Generation of Cleaner Power', criteria in proposed Voluntary Carbon Standard (VCS) has been taken into account for this verification.

Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the defined reporting period.

1.3 Description of the Project Activity

Sectoral scope 1: Energy industries

Project Parties:	Lanco Kondapalli Power Private Limited.
Title of project activity:	LKPPL Fuel Switch Project for Generation of Cleaner Power Project.
Project Entity:	Lanco Kondapalli Power Private Limited.
Location of the project activity:	Kondapalli, District Vijayawada, Andhra Pradesh, India.

The project site is around 110 km from Hyderabad (capital of Andhra Pradesh state) at Kondapalli village. The project site elevation is 35 metres above the mean sea level. The mean ambient temperature is 32°C and the relative humidity range is between 40% and 75%. The Annual Average Rainfall is about 1000 mm maximum. Climatic Condition is tropical, hot and humid.

The Project has started commercial operations from October 2000 onwards on naphtha as fuel. Later on the fuel switch took place and the Project is in operation on natural gas as fuel since September, 2001. The voluntary emission reductions were offered from 10th September 2001 till 10th January 2007.

The grid emission factor is calculated ex-ante to be 0.860 tCO₂/MWh. Thus, the emission reductions reported from the project for this period calculated as 1516054 tonnes of CO₂ equivalent.

2 METHODOLOGY

The verification process is a two-stage process.

In the first stage, SGS completed a strategic review and risk assessment of projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

At the end of this stage, SGS produced:

- A Periodic Verification Checklist which, based on the risk assessment of the parameters and data collection and handling processes for each of those parameters, describes the periodic verification protocol.
- Corrective Action Requests and New Information Requests, if necessary.

In the second stage, SGS verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question, using the Periodic Verification Checklist. This involved site visit and a desk review of the monitoring report.

At the end of this stage, SGS produced this verification report which will form the basis of verification statement.

Verification team

The verification team considered of the following personnel:

Mr. Pankaj Mohan	SGS India	Lead Assessor
Mr. Syed Khursheed Zaidi	SGS India	Assessor
Mr. Kaviraj Singh Pradhan	SGS India	Local Assessor Trainee

Duration of verification

Preparations:	<i>From 8-03-2007 to 9-03-2007</i>
On-site verification:	<i>From 18-07-2007 to 20-07-2007</i>
Reporting:	<i>From 10-08-2007 to 13-08-2007</i>

2.1 Review of Documentation

The verification is performed primarily as a document review of the monitoring report, the project design document against the approved CDM methodology ACM0011. The assessment is performed by trained assessors using a verification protocol. The verification team have also assessed the operational records, invoices of electricity sales and purchases, calibration records of the electricity meters for the period from 10 September 2001 to 10 January 2007, and the working requirement for the operation staff and training records of the operation staff.

2.2 Site Visits

Mr. Syed Khursheed Zaidi, Assessor and Mr. Kaviraj Singh Pradhan, Local Assessor (Trainee) visited LKPPL project site on 18-07-2007. During the site visit, the following personnel were interviewed or participated in the interview:

- /1/ Mr. P. Panduranga Rao, Director and CEO
- /2/ Mr. T. Suba Rao, Senior Manager
- /3/ Mr. P. S. Chakravarthy, Asst. General Manager (Project)
- /4/ Mr. A. Srinivasa Rao, Vice President, (Project)

Main topics covered by the interview were: Installation plan, Project management and monitoring; Operational issues and records, Evidences of electricity exchanged with the grid, GHG source, Data archiving...etc.

2.3 Assessment

The parameters and values presented in the monitoring report were assessed through review of detailed project documentation and production records, interviews with personnel at LKPPL, checking of log books, collection of electricity bills, observation of established monitoring and reporting practices and assessment of the reliability of measuring equipment. Data for determination of the grid emission factor have also been assessed.

Information which was not available during site visit was reported as New Information Request (NIR), following submission of additional information, monitoring and operational records, the reconsolidation of all reported data was assessed again.

2.4 Reporting of Findings

As an outcome of the verification process, the team can raise different types of findings

In general, where insufficient or inaccurate information is available and clarification or new information is required the Assessor shall raise a **New Information Request (NIR)** specifying what additional information is required.

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- I. mistakes have been made with a direct influence on project results;
- II. validation protocol requirements have not been met; or
- III. there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be verified.

The verification process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a NIR may result in a CAR. Information or clarifications provided as a result of an NIR may also lead to a CAR.

Observations may be raised which are for the benefit of future projects and future verification actors. These have no impact upon the completion of the verification activity.

3 VERIFICATION FINDINGS

Electricity delivered and imported from grid by the PP was measured using Main & Check Meters installed at grid sub station inside the plant site.

Emission Reductions	tCO ₂
As per the PDD annual reductions	284216
As per the First Monitoring Report	1516092
Verified Emission Reduction	1516054

After on-site visit, below findings have been raised, all of them were successfully closed after project proponent submitted new information.

There were few issues which were not clearly covered in the MR and thus the information was sought by issuing NIRs and CARs as below.

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan / Syed Khursheed Zaidi

No.	Type	Issue	Ref
1	CAR	Copy of Host country approval not provided along with the MR	MR
Date: 20 – 07 – 2007 [Comments- CLIENT] Project has received host country approval vide letter no. F.No.4/17/2006-CCC dated 22nd January 2007. The same is enclosed for your reference.			
Date: 26/07 /2007 Lead Assessor: Pankaj Mohan			

The certificate was seen during the site visit and verified from the DNA, copy of HCA also collected during site visit for our record.
[Acceptance and close out] CAR 1, Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan / Syed Khursheed Zaidi

No.	Type	Issue	Ref
2	NIR	The MR does not clarify, whether the PP uses calendar year or Indian Financial year for estimation of GHG reduction.	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

The year selected for calculation of emission reductions for every year is from 10th January to 10th January of next year as the billing date for the project is 10th of every month. Hence, the same can be considered as calendar year.

Date: 26/07/2007;

Lead Assessor: Pankaj Mohan

This was checked during the site visit and found that it is as per the certified energy meter reading date which is 10th of every month.

[Acceptance and close out] NIR 2 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan / Syed Khursheed Zaidi

No.	Type	Issue	Ref
3	NIR	No information provided along with MR, How the Stake Holder consultation (SHC) was invited and what media was used.	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

LKPPL invited all the identified stakeholders officially through invitation letters. Acknowledgement from all the invited stakeholders received. All the stakeholders are also invited personally using telephone. The proof for the same is attached for your reference.

Date: 24/07/2007;

Lead Assessor: Pankaj Mohan

Lanco Kondapalli Power Private Limited (LKPPL) conducted meeting on 19th June 2007 at their plant through sending invitation letters to all Stake Holders (SH) such as GAIL, APTRANSCO Local bodies representatives etc. Copies of the invitation letters sent to the SH were seen and collected during site visit.

[Acceptance and close out] NIR 3 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan / Syed Khursheed Zaidi

No.	Type	Issue	Ref
4	NIR	Proof of SHC not provided along with the MR. Please provide copy of the SHC and comments	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

The copy of SHC is enclosed for your reference. This includes stakeholder invitation process and comments received from each stakeholder.

Date: 24/07/2007;

Lead Assessor: Pankaj Mohan

LKPPL received comments from SH and the same were checked & reviewed. No adverse comment was received during the SH consultation about the project activity.

[Acceptance and close out] NIR 4 Closed Out.

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
5	CAR	The Monitoring report (MR) does not clearly define the term “both days included partly”	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

The joint meter reading takes place every month 10th between 10 AM to 12 AM. Hence, the first day of monitoring period starts from say 10 AM and last date of the monitoring period ends at again at say 10 AM. That is why full day was not covered, and the same is mentioned as “both days included partly”

Date: 24/07/2007;

Lead Assessor: Pankaj Mohan

The certified meter readings were checked and found matching PP response to CAR 5.

[Acceptance and close out] CAR 5 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
6	NIR	The amount of fossil fuel (i) in year (Y) [EFaux,i.y] used for auxiliary power is not given in the MR	MR

Date: 06 – 08 – 2007

[Comments- CLIENT]

There is some quantity of fossil used. The Consumption of (HSD) for auxiliary power use in the plant, that is for emergency DG set operations and the same is included in the revised monitoring report.

Date: 10/08/2007

Lead Assessor: Pankaj Mohan

The quantity of fossil fuel used for emergency DG set operations was checked from the plant records and found accordingly. This has resulted in VER reduction and also incorporated in revised excel sheet as well.

[Acceptance and close out] NIR 6 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
7	NIR	CO ₂ Emission factor for fossil fuel used as auxiliary power (EFi,y) not given in the MR	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

The emission factor for the same is considered as per IPCC value.

Date: 10/08/2007

Lead Assessor: Pankaj Mohan

IPCC guidelines were referred for values of fossil fuel used (HSD) being using for operation of DG set for auxiliary usage.

[Acceptance and close out] NIR 7 Closed Out

Date: 16 – 07 – 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
8	NIR	Calibration frequency is not defined for energy meters and gas flow meters.	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

Calibration of electricity meters is done once in six months with the help of Central Power Research Institute (CPRI) as per the requirements of APTRANSCO. The same is mentioned in the revised monitoring report (MR). The gas flow meters are calibrated on-line by GAIL India themselves following their procedures.

Date: 24/07/2007; Pankaj Mohan

Calibration records and certificates for energy meters were checked and collected for record. However, GAIL, Govt of India enterprises supply the gas through their terminal inside the plant and calibrate their on-line gas flow meters as per their requirement and procedures.

[Acceptance and close out] NIR 8 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
9	NIR	Provide evidence of considering grid emission factor as 0.86 tCO ₂ /MWh	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

Central Electricity Authority (CEA) of India publishes the emission factor of grid every year and the same is used for the project activity. The same can be referred at <http://www.cea.nic.in>

Date: 26/07/2007;

Lead Assessor: Pankaj Mohan

The PP uses CEA data available on their web site, the same was cross checked and verified using the web link and found OK

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm> ,

[Acceptance and close out] NIR 9 Closed Out

Date: 16 – 07 - 2007

Raised by: Pankaj Mohan /Syed Khursheed Zaidi

No.	Type	Issue	Ref
10	NIR	Check and correct the abbreviations mentioned in the MR	MR

Date: 20 – 07 – 2007

[Comments- CLIENT]

All the abbreviations mentioned in the MR are checked and corrected accordingly.

Date: 10/07/2007;

Lead Assessor: Pankaj Mohan

The PP provided the revised MR with corrections. Revised MR Version 02 dated 19/07/2007 was checked and found Ok

[Acceptance and close out] NIR 10 Closed Out

3.1 Remaining Issues, CARs, NIRs from Previous Validation or Verification

No. This is the first voluntary verification and no validation was done before. The PDD is under CDM validation and web hosted for international stake holder consultation. The web address is as

<http://cdm.unfccc.int/Projects/Validation/DB/GZ6RGUV3G1A7RFPLNVW8E4KN7GMTAG/view.html>

3.2 Project Implementation

The physical components, project boundaries are in conformity with description in PDD and monitoring report. No additional emission sources used for project activity.

The copy of LoA from MoEF, Government of India has been submitted to the validator. As there was no approved methodology exists for fuel switch activities in Power plants, the project was delayed for submission to validation. The methodology was submitted in Jan 2006 and approved as ACM0011 in EB 32 meeting.

3.3 Completeness of Monitoring

The monitoring of the project activity is found to be in conformity with monitoring methodology described in ACM0011 Version 01 dated 22nd June 2007 and monitoring plan indicated in PDD of project activity.

The required metering systems have been installed and operational. The meters comply with appropriate quality standards applicable for the used technology.

The sustaining records were sufficient to enable verification of emission reductions.

3.4 Accuracy of Emission Reduction Calculations

Data of electricity delivered to the grid are telemetric download. Calibration records or certificates have been presented for verification. Total uncertainty of metering system is properly addressed by using conservative values.

Emission factor of the grid is assessed as per ACM0002 version 06 methodology.

Formula used to calculate the emission reduction is checked and found correct.

Project proponent used conservative value to calculate emission reduction where uncertainty occurs.

Baseline Emissions:

As per VCS version 1, section 3/8B, Calculation Methodology mentions that in situations where an existing CDM Executive Board methodology is not available in its entirety or as a combination of existing approved methodologies, the project proponent shall clearly illustrate how the Project baseline was identified and emission reductions calculated. The proponent may use a performance standard or best practice approaches to determine the baseline emissions and calculating the emissions reductions, as described in the GHG –PP.

As allowed by the VCS, verification entity can accept the performance standard and best practice for the baseline emissions. Although, the plant is available for generation since beginning (i.e Sept 2000) till completion of fuel switch over (Sept 2001) i.e. for almost thirteen months with Naphtha as fuel meeting the methodology requirement of operation of plant at least one year, two months data was used for baseline calculations as the other months data was not comparable due to abnormal load factors. The reason of this abnormal data was checked during site visit. The emission factor and load factor using two months baseline data was again compared with the other plants emission factors running in the country as verified with the publicly available data on CEA website. The baseline was found conservative and hence accepted.

The details of the load factor and tCO₂/MWh for other Naphtha based plant which is in operational in India are as follows:

Name of the plant: Reliance Energy

Location: Goa

Capacity: 48 MW

Fuel used: Naphtha

Generation, load factor and tCO₂/MWh details*:

* <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

Year	Generation, MWh	Load Factor	tCO ₂ /MWh
2003-04	317	0.75	0.69
2004-05	336	0.80	0.65
2005-06	341	0.81	0.62

The load factors of the project plant during various months' operation with Naphtha as fuel with relatively less grid related problems were verified as below:

Period	Load Factor
10 Jan - 10 Feb 01	0.55
10 Feb - 10 Mar 01	0.69
10 Mar - 10 Apr 01	0.84
10 Apr - 10 May 01	0.14
10 May - 10 Jun 01	0.49
10 Jun - 10 Jul 01	0.38

From the above evidence it is clear that plant operated with load factor equivalent or slightly lower to load factor of other plants only for two months. The plant was not in continuous operation during rest of the months due to various technical reasons mainly grid related which was beyond PP's control. All the correspondence by APTRANSCO with PP regarding various technical problems the grid faced and requesting PP to restrict the plant operations were verified and cross checked. Hence, the generation data for only two months were accepted for the calculations. Furthermore, the emission factor of project plant is 0.60 tCO₂/MWh which is below than the other referred plant in India running on Naphtha as primary fuel and hence conservative. The data for two months was considered for baseline calculations based on the following criterion:

- Plant load factor of other Naphtha based power plants in the country is observed to be in the range of 70-80%
- Though plant operated for more than 12 months with Naphtha as fuel, the load factor of plant other than two months considered for calculations are below than normal levels of other plants (60%) due to various technical reasons beyond PP control
- The efficiency of the plant even with consideration of two month's data is observed to be conservative compared to other Naphtha based power plants in the country.

The emission factor of the Naphtha is taken as per the guidelines provided in the methodology. Referring Page No. 15 of the methodology ACM0011 where in it is suggested to take default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. The efficiency of the power plant with Naphtha as fuel is calculated based on the plant performance parameters with baseline fuel which is very realistic for the specific project activity. Also, the tCO₂/MWh of the plant is less than the value of other plants in the country as given below (tCO₂/MWh is more than 0.62 compared to 0.60 of the project plant) as per the data available with CEA.

Year	Reliance Energy	Ratnagiri
	tCO ₂ /MWh	tCO ₂ /MWh
2000-01	-	0.64
2001-02	-	0.64
2002-03	-	0.64
2003-04	0.69	-
2004-05	0.65	-
2005-06	0.62	-

These are the only plants running with Naphtha (excluding dual fuel plants with Naphtha) in the country as given in data sheet available at <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>.

The comparison has been restricted to only those power plants which are operating with Naphtha as primary fuel but not as secondary fuel. There are only Reliance Energy and Ratnagiri power plant in the CEA data which are using Naphtha as primary fuel. Though there is one more power plant i.e. Cochin CCGT operating with Naphtha as fuel, this was not included in the analysis as the plant is not in full operation for the reasons unknown.

As clarified above, the IPCC emission factor was accepted mainly due to non availability of data through sources (a), (b) and (c) mentioned in the methodology. As the methodology itself suggests using of upper value of IPCC default value at 95% uncertainty in the absence of availability of data through first three sources, the same was considered and accepted. This upper value was accepted by EB and definitely this would be accepted with reasonable assurance before approving the methodology. Also, the tCO₂/MWh of the project plant calculated with upper value of IPCC emission factor (76.3) was verified to be conservative compared to the tCO₂/MWh of other plants derived using IPCC default value (73.3).

The emissions were calculated considering the actual export, generation, NG consumption and NG quality. The monthly electricity export levels are being recorded and certified jointly by PP representative and recorded and certified jointly by PP representatives and state utility. The NG consumption is recorded and certified by PP, GAIL and state utility. These documents are verified during site visit by verifier. The emission factors for other gas based power plants can be viewed from <http://cea.nic.in> where in plants with 0.39 tCO₂/MWh are also observed.

Project emissions:

Project emissions due to the usage of gas was calculated based on the standard emission factor of the NG as defined by the IPCC as there are no supplier specific data available. In fact, the project emissions calculated are on conservative basis because total NG consumption was considered for calculating the project emissions where as lowest of the baseline generation and actual generation was considered for estimating the baseline emissions. Plant used auxiliary fuel (HSD) for DG set during emergency when there is no power and the quantity used for the same is very minimal and the emissions due to the same are estimated at 31tCO₂ which are also considered in the calculations.

Leakage:

Leakage calculations are calculated as per the procedure and calculations provided in the methodology ACM0011. LELNG,CO₂,y was not considered as the gas used in the project does not involve any LNG usage.

As mentioned in the methodology page 11, where reliable and accurate national data on fugitive CH₄ emissions associated with the production, and in case of natural gas, the

transportation and distribution of the fuels is available, project participants should use this data to determine average emission factors by dividing the total quantity of CH₄ emissions by the quantity of fuel produced or supplied respectively. Where such data is not available, project participants may use the default values provided in Table 2 of the methodology. As per the Table 2 of the methodology, 296 tCH₄ /PJ is applicable for rest of the world and 160 tCH₄ /PJ is for USA and Canada. The US/Canada value was used as the system element (gas production and/or processing/transmission/distribution) is predominantly of recent vintage and built and operated to international standards. This was verified with GAIL internal procedure and standard followed.

Based on the information available on GAIL website, annual reports and other public data available on the quality control and safety measures the company has been following, the upstream methane emission was considered as per the guidelines provided in the methodology. All the GAIL facilities are of recent vintage at the time of fuel switch over because the above awards is the 11th consecutive year award that GAIL's HVJ Pipeline has received. Gas Processing Units of GAIL at Vijaipur, Pata, Usar and Vaghodia have been receiving Best Performer awards from OISD in the previous years.

GAIL is maintaining all its processing plants and gas transmission lines matching the international standards. GAIL also formulating guidelines for the pipelines along with the BIS for development of uniform standards for high-pressure oil and gas transmission pipeline systems. Also GAIL conducts the regular safety audits to maintain the international safety standards with some reputed international firms. These national standards would be in line similar international standards such as the American Petroleum Institute and European Standards as verified with <http://www.blonnet.com/2005/04/23/stories/2005042301550200.htm>

Two projects from India which take the gas from GAIL are already registered with UNFCCC where in the methane fugitive factor was considered as 160tCH₄/PJ (UNFCCC ref no. 0999 and 1116). Also, the information provided by various sources and GAIL are checked wherein they confirm maintenance of their facilities at international standards and hence the same was accepted for the calculations. Please refer the link below, GAIL (India) Limited has bagged the coveted "Oil Industries Safety Award" from Oil Industries Safety Directorate (OISD) for the year 2006-2007
http://gail.nic.in/gailnewsite/mediacenter/pressrelease_september29_07.html

As per methodology, this parameter needs to be made available to the validator at the time of validation (included in 'Data and Parameters not monitored' Section) and is required to be fixed through out the crediting period (ex-ante). That means this value will hold good for entire crediting period. All the GAIL facilities are of recent vintage at the time of fuel switch over and hence the same is considered for the calculations.

Since LKPPL projects uses Main and Check meters for recording the import and export of electricity to the grid, these meters are maintained by APTRANSCO, Government of Andhra Pradesh. APTRANSCO biannually calibrate these equipment through Central Power Research Institute (CPRI), Government of India and accredited to National Board for Accreditation of Testing Laboratory (NABL), equivalent to ISO17025. Gas flow meter is being calibrated online every three month interval by GAIL. The GAIL follows the calibration and frequency as per procedure no 8 (Control of monitoring & measuring devices) of their QMS. The GAIL is ISO 9001:200 certified by DNV (Certificate No.02183-2005-AQ-BOM-RvA). Power Generation, Export & Auxiliary Consumption, gas consumption are being recorded daily and the same are being verified by Operations Dept, reviewed by General Manager and approved by the Director.

The PP activity has been accorded certification by Lloyd's Register Quality Assurance for ISO 14001: 2004 (Certificate No. MUM0060838), Certificate expiry 30th April 2009, ISO 18001: 1999 (Certificate No.161052) Certificate expiry 10th June 2008 and ISO 9001:2000 (Certificate No. 160545) Certificate expiry 31st May 2007 (The PP has gone through the audit and is in the process of getting the new certificate issued).

Hence all the parameters are being monitored and documented as per the Monitoring plan.

3.5 Quality of Evidence to Determine Emission Reductions

Operational records and other evidences have been documented, collected and archived in either hard-copies or electronic manners. Electricity is measured by calibrated instruments; data can be crosschecked through log book of turbines, meter readings, and electricity bills. All values used in determining emission reduction are substantiated with proofs which are free from any material error.

3.6 Management System and Quality Assurance

GHG management organization of LKPPL has been established, all related records have been documented. Team member responsibility has been allocated as per PDD and monitoring plan and as per the internal standard operating procedures as laid down under The PP activity has been accorded certification by Lloyd's Register Quality Assurance for ISO 14001: 2004 (Certificate No. MUM0060838), Certificate expiry 30th April 2009, ISO 18001: 1999 (Certificate No.161052) Certificate expiry 10th June 2008 and ISO 9001:2000 (Certificate No. 160545) Certificate expiry 31st May 2007 (The PP has gone through the audit and is in the process of getting the new certificate issued).

3.7 Additionality

This project activity is additional* if anthropogenic emissions of GHGs by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. The additionality has been demonstrated using the recommended guidelines† of Methodology Panel through the following steps:

The approved additionality tool is used to demonstrate whether the project activity is the baseline scenario or not by examining possible barriers to implementation of the fuel switching activity. The additionality tool is applied as follows:

Step 0: Preliminary screening based on the starting date of the project activity

The project activity has started during September 2000 and completed by October 2001. The purchase order for equipment and initial communications regarding consideration for CDM in decision making satisfies this step. EPC contract was signed on 14th February 2001 and all the equipments required for switch over were ordered subsequently as verified. Main equipments like turbines and generators were ordered in the year 1998 to commission the project with Naphtha as fuel. The same turbines and generators are retained even after the fuel switch as the same will cater the requirements of the plant with new add on equipments required for the fuel switch over like gas conditioning units, pressure boosters, gas monitoring station etc.

Step 1: Investment Analysis

* As per 17/cp.7

† As per "Annex 1: Tool for the demonstration and assessment of additionality" of CDM EB 16.

Investment additionality:

The project supplies electricity to the southern grid and revenue from sale of electricity is obtained from them as per tariff agreement between the project proponent and APSEB. As per the terms of the PPA, the variable component was to be calculated as a factor of the fuel cost and the Fixed cost as a factor of the available capacity.

Although NG is cheaper than Naphtha, with the reduction in the cost, the variable Energy cost that LKPPL receives also correspondingly decreases. Hence, lower cost of fuel did not help in improving its profitability. The fuel switch project also resulted in around 2% change in capacity. With the change in capacity being negligible, the increase in the fixed cost was also not adequate to cover the capital investment.

LKPPL incurred INR 350 Million for the Fuel Switch from Naphtha to Natural Gas. It also incurs about Rs.190 Million towards interest payments during the tenure of the Loans obtained for Fuel Switch. Considering the interest rate on debt (12%) as the discounting factor, the Net Present Value of the Investment made by LKPPL works out to be INR -162.16 Million.

In addition to this, Naphtha is abundantly available in the region compared to Natural gas. There are few new gas based power plants in the region still awaiting for government approval to start up their commercial operations (in spite of being commissioned long time) due to certain constraints in the gas purchase agreements with the government. LKPPL took the risk of converting to gas though there is no financial gain in terms of increased revenue from APTRANSCO per unit exported and with uncertainty in gas availability to produce at peak load factor considering the additional revenue from CDM to mitigate these risks to certain extent.

The NG purchase agreement with GAIL was signed in August 2000. Based on the gas availability and demand data in India, it is evident that the supply of the gas at present fails to meet the demand of the country available as verified with <http://petroleum.nic.in/ng.htm> and by India hydrocarbon vision 2025.

Fuel price changes was not considered as a reason for switchover from Naphtha to Natural Gas as the variation in cost of fuel could have been recovered with variable component in the tariff that LKPPL normally receive as per the agreement from state utility. With Naphtha being abundantly available and scarcity of switch over fuel would not have forced LKPPL to switchover from Naphtha to any alternative fuel. The long term agreement that LKPPL entered into with Naphtha suppliers also helped in hedging any risk of fuel cost escalation as verified.

Investment analysis for the project has been done based on the recommendations in the methodology. As verified PP has no gain over switch over to cheaper fuel than baseline fuel as the PP has an agreement with state grid to get the entire variable cost component irrespective of type of fuel used. As PP incurred additional investment to change over to cleaner fuel to reduce green house emissions, hence the same is considered for the calculations. The additional revenue generated towards increased export levels is included as inflow of the funds from the projects while calculating the NPV of the project as there was an increase in generation due to slight increase in installed capacity about 2% against 5% allowed as per the methodology. Also, the project under consideration for CDM is fuel switch project activity only and hence investment and any other benefits like increased revenue due to increased export are only considered for the financial calculations. Further, the operational costs after fuel switch activity remain same.

Some of the other barriers/issues that LKPPL have over come and taken a business risk to go ahead with the project activity are:

- Problems for arranging the funds for implementation
- Non availability of incentives / subsidies
- Fuel linkages and bottleneck infrastructure
- Lack of power sector back ground and experience

Step 2: Common practice analysis

Sub-step 2a. Analyse other activities similar to the proposed project activity:

In the Indian power scenario installation of combined cycle power project and exporting the power to the selected state grid compared to conventional coal based power projects are itself has very low penetration. Moreover, such fuel switch projects supplying power to the grid itself boils down to a miniscule number compared to over 100,000 MW of power installations in India.

In the similar, project sector, socio-economic environment, geographic conditions and technological circumstances the project activity uses an energy efficient technology with higher costs, which has limited penetration. Natural gas based power plant accounts for only 11% of total power generation in India*.

Coal-based power plants generate about 60% of the total capacity and around 80% of the total thermal capacity. This is because coal is available in abundance and is a cheaper fuel. The region wise status of power generation using coal and gas in India is as follows†:

Region	Total thermal power generation, MW	Generation using coal as fuel, MW	%generation using coal as fuel	Generation using gas as fuel, MW	Gas based installed capacity as % of total installed capacity
Northern	19143	15915	83	3213	10
Western	25845	20792	80	5035	16
Southern	16982	13393	79	2650	9
Eastern	15235	15027	97	190	1
North Eastern	1223	330	27	751	32
Island	64	0	0	0	0
All India	78491	65456	83	11840	11

From the above table, it is clear that percentage of power generation using coal is very high out of total thermal power generation in India. This indicates the popularity of the fuel mainly due to easy availability and low cost of generation than other fuel sources like gas, diesel etc. Therefore, in view of the methodology, the project activity is not a common practice which further determines that it is an additional activity.

It is also clear from above table that similar activities i.e. power generation using gas as a fuel is not widely observed and is not commonly carried out. All the power plants using gas as fuel in the country are facing the barriers like uncertainty in gas availability, lower returns etc. In addition to above, the major hurdle in the growth of the industry has been uncertain

* Source: cea.nic.in/gov/opm/thermal_performance_review/0405/cea_thermal%20performance%20review0405/section-10.pdf.

† Infraline's paper on "Natural gas for power sector: issues and challenges"

regulatory environment. Also, low penetration of gas based power generation in the country is due to inadequate pipeline infrastructure.

The percentage of gas based power plants in India since 1999-2000 is as given below as per the information available at CEA*:

FY	Total installed capacity of Gas Power Plants, MW	Total installed Capacity of all power plants, MW	% Contribution
1999-00	8421.7	96343.82	8.7%
2000-01	9353.2	100021.5	9.4%
2001-02	10053.9	103811.7	9.7%
2002-03	10492	106362.9	9.9%
2003-04	10697.9	110321.3	9.7%
2004-05	10767.9	114355.7	9.4%
2005-06	11401.7	117824.5	9.7%

The percentage share of gas based power generation in the country during 9th five year plan, during 10th and 11th plans† are as follows:

Power from	% of Grid Mix			
	At the end of 9th Plan	As on 31.12.06	At the end of 10th Plan (likely)	At the end of 11th Plan (Estimated)
Gas	10.6%	11%	10.5%	10.0%

From the above table, it can be seen the share of power generation from gas is likely to be reduced by the end of 10th plan and 11th plan. This is mainly due to the government's plan to encourage coal based ultra mega power projects. From the above discussion, it is evident that gas based power generation is unlikely to become common practice in India considering abundant availability of cheaper fuels like coal.

Thus the above substantiate the claim that the project activity is not a widely observed and commonly carried out practice. Therefore, this project is additional.

Sub-step 2b. Discuss any similar options that are occurring:

The similar known activities in India are in the process of methodology submission as CDM has been considered thereof as far the project proponent's knowledge goes.

Step 3: Impact of CDM registration

With the receipt of CDM funds, the Present Value of the cash flows is expected to be higher than the investment made by LKPPL (considering the interest rate on debt as the discounting factor). Also, with the decrease in the tariff on account of use of NG, LKPPL would also be passing on economic benefits to the end user.

This project is currently applying to be registered as CDM project for activity from 2001 onwards.

* <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

† www.infraline.com (Indian Power Sector – Challenges and opportunities); <http://cea.nic.in>

4 TESTING ON VCU VERIFICATION CRITERIA

#	Criterion	Finding/Conclusion
1	Project Category	1. Energy Industries (Renewable/non-renewable)
2	Geographic Location	In conformity with the description in PDD.
3	Eligible GHGs	1. Carbon dioxide
4	Project Start Date	September, 2000.
5	Emission reduction start date	Emission Reduction start date is 10 th September 2001.
6	Public Funding and Grants	No Public Funding, grants or Official Development Assistance ("ODA") was sought for the project activity
7	Project Boundary/GHG Assessment Boundary	LKPPL Project site is selected as the project boundary.
8	Calculation Methodology	CDM methodology ACM0011 Version 01 has been correctly used.
9	Secondary Effects	No secondary effect is envisaged as the plant operates with all clearances required from Statutory bodies such as Pollution Control Board, Directorate Of Boiler, Andhra Pradesh etc.
10	Project Additionality	Confirmed, please refer to section 3.7 for details.
11	Quality of Reductions	Relevant permits have been obtained by project owner. Project's design and implementation has been carried out in compliance with all relevant local and national environmental and social legislation in India.
12	Monitoring Process	CDM monitoring methodology ACM0011 version 01 has been used, sustaining records were sufficient to enable verification of emission reductions.

5 VERIFICATION STATEMENT

Reporting period: From 10th September-2001 to 10th January 2007

Verified emission in the above reporting period:

Period Parameter	10 Sept 01 - 10 Jan 02	10 Jan 02 - 10 Jan 03	10 Jan 03 - 10 Jan 04	10 Jan 04 - 10 Jan 05	10 Jan 05 - 10 Jan 06	10 Jan 06 - 10 Jan 07	TOTAL
Baseline Emissions, tCo2	420999.95	1421034.45	1360775.31	1313044.43	1305510.90	1006433.20	6827798
Project Emissions, tCo2	308041.99	1053746.96	969769.84	945911.06	950437.48	791179.17	5019086
Leakages, tCo2	17947.98	61465.47	56505.10	55120.01	55411.91	46206.84	292657
Emission Reductions, tCo2	95009.97	305822.02	334500.37	312013.36	299661.51	169047.19	1516054

LKPPL Fuel Switch Project for Generation of Cleaner Power Project

Verification Statement

Introduction

SGS United Kingdom Ltd. has been engaged by LKPPL to examine the greenhouse gas (GHG) emission reductions under VCS criteria for their Fuel Switch Project for their Project, "LKPPL Fuel Switch Project for Generation of Cleaner Power Project". The Projects reduces emission reduction from the project activity to the tune of 1516054 tCO2 equivalents.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported for the period from 10th September 2001 to 10th January 2007 and the verification testing conducted against the GHG Assertion of the LKPPL and the PDD of LKPPL Fuel Switch Project for Generation of Cleaner Power Project VER Projects.

Responsibilities of LKPPL and SGS United Kingdom Ltd.

The management of the LKPPL is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the LKPPL.

It is SGS responsibility to express an independent GHG verification opinion on the GHG emissions from the project for the period mentioned above and on the calculation of GHG emission reductions from the project based on the verified emissions for the same period.

Basis of GHG verification opinion

Our verification approach was based on the requirements as defined in Voluntary Carbon Standard version 1.

Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for the period mentioned above.

We planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the period mentioned above, prepared on the basis of the Monitoring Plan, are fairly stated.

We conducted our verification with regard to the client's GHG projects/assertion which included VER Project plan, baseline applied and baseline GHG emissions, Monitoring Plan and GHG Emission reductions. This assessment included:

- a) Collection of evidence supporting the reported data
- b) Checking whether the provisions of the Monitoring Plan in the PDD, were consistently and appropriately applied

We have verified whether the information included in the monitoring report representing the project baseline is current and has been correctly extracted from the project site and the emissions reduction achieved has been determined by correctly subtracting emissions for the monitoring period from the baseline figure for the comparable period.

Opinion

Based on process and procedures conducted, in our opinion LKPPL Fuel Switch Project for Generation of Cleaner Power contributes to emission reduction. GHG assertion on voluntary emission reductions for the LKPPL project during the reporting period from 10th September 2001 to 10th January 2007 is materially correct and is a fair representation of the GHG data and information and the emission reductions are fairly stated. The GHG emission reductions were calculated correctly on the basis of approved monitoring methodology ACM0011 version 1.

SGS United Kingdom Limited 18-10-07

SGS India Pvt. Ltd.

18-10-2007



Siddharth Yadav



Pankaj Mohan

6 REFERENCES

- /1/ Monitoring report Version 02 dated July 19th 2007
- /2/ PDD Version 01 dated July 4th 2007
- /3/ Methodology AM0011, Version 1
- /4/ Grid emission factor , CEA documents
- /5/ Emission reduction calculations sheets along with monitoring data daily, monthly
- /6/ Calibration process and certificates for meters
- /7/ Electricity export to the grid (Bills)

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