CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

A. General description of project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

Enclosure I : Loan details for investment and NPV calculations

SECTION A. General description of project activity

A.1 Title of the project activity:

>> **LKPPL Fuel switch project for generation of cleaner power**
Version 01
Date – 04/10/2007

A.2. Description of the project activity:

>>

Purpose

The purpose of the project activity is generation of electricity using clean fuel and exporting to the state grid thus reducing greenhouse gas emissions. The plant was installed with intent to generate power with liquid fuel[1]. The plant was operating on Naphtha as liquid fuel. In the project activity, Naphtha is replaced by Natural Gas (NG) as fuel for power generation. Combustion of Natural Gas for power generation emits less carbon dioxide as compared to existing fuel Naphtha and conventional fossil fuels like Coal/Lignite. The project activity helps to improvise the power deficit situation in Andhra Pradesh (AP) and also contributes to sustainable economic growth and conservation of environment. The project enhances the economic growth and development of the local area.

Project's contribution to sustainable development

The project activity will contribute to the Environmental & Social issues locally and globally in the following ways:

Environment Wellbeing:

The project activity is a clean fuel power project, which uses Natural Gas as a fuel for power generation and export the clean power to the state grid. The exported clean power will substitute the power generation by the state utilities which are predominantly operated with Coal as fuel. Since the Carbon Dioxide (Co_2) emission due to combustion of Natural Gas is substantially less as compared to combustion of Coal, Lignite or Naphtha, the project helps in reducing GHG emissions.

Since this project activity is based on Natural Gas, it will positively contribute towards the reduction in (demand) use of more GHG intensive fuels.

The project activity therefore has excellent environmental benefits in terms of reduction in carbon emissions and Coal resource conservation. Also, gas based power plants would not lead to production of huge quantities of solid waste (like ash in thermal power plants) and hence reduces the burden of solid waste disposal.

Technical Wellbeing:

[1] Power purchase agreement Dated 31.03.1997 " PPA for short gestation liquid fuel based power project "

The thermal efficiency of Natural Gas based combined cycle power plant is in the range of 48 – 50% as compared to average cycle efficiency of 36-42% of Coal fired Rankine cycle based thermal power plants.

Social Wellbeing:

The Plant is providing direct employment to about 90 persons and indirectly creating business opportunities to stakeholders like bankers, consultants, suppliers & contractors, traders, unskilled labour etc.,

Lanco Group has formed a public charitable trust by the name of Lanco Institute of General Humanitarian Trust (LIGHT) in 2000. In a short time, the Trust has succeeded in making its presence felt in the social service sector through its various programmes. LKPPL actively supports LIGHT to run its various charity activities. Till December 2006, LKPPL has donated 29.66 Million INR to LIGHT for its social activities.

LIGHT undertakes philanthropic activities such as providing medical assistance to the needy, setting up educational scholarships, providing basic amenities for the rural poor, setting up old age homes, environment protection and development, encouraging fresh talent in the area of sports, Taking up other humanitarian activities like relief at the time of natural calamities, felicitation of freedom fighters etc.

LIGHT has so far under the "Sujalavahini" scheme set up more than 800 bore wells in the villages. LIGHT has provided more than 9500 mobility / supportive devices for the physically challenged persons under "Shraddha" scheme.

Apart from this donation to LIGHT, LKPPL is paying tax to local panchayat / Andhra Pradesh Industrial Infrastructure Corporation (APIIC), which is being used for development of local region.
LIGHT has also tied up with the International Organization for Migration (IOM) for providing assistance to the survivors of human traffickers and other vulnerable people below the poverty line. LIGHT, in association with IOM, intends to provide alternative employment to trafficking women and provide necessary training to empower them[2].

Lanco Infratech Ltd, the holding Company of LANCO Group, has been adjudicated as one of the winners for the prestigious TERI (The Energy and Resources Institute) Corporate Awards for 2006-07 for the CSR activities of LIGHT.

LKPPL is also promoting local ancient art of making Kondapalli toys which are of historic relevance. It's a folk art which is becoming extinct and is facing an uphill task for its survival. Soft wood and natural dyes extracted from locally available material are used in the process. Kondapalli Toy making is a 400 year old art and is survived by 140 families in Kondapalli Village, Krishna District.Traditional toys include figures from Hindu mythology and popular village themes**.** In collaboration with NIFT and Crafts Council of Andhra Pradesh, the Artisans are imparted Training in new designs, Training in usage Vegetable colour dyes etc. LKPPL has helped local artisans to get the **Geographical Indication** (GI) for their art of making toys. LKPPL is supporting local artisans by providing Common Facility Centre where common work shed, show room etc., would be available to all the artisans. LIGHT under its "Satkala" scheme covered lives of Kondapalli Artisans under LIC (Life Insurance Corporation of India) Jeevan Bima Yojana scheme.

[2] Hyderabad edition of The New Indian Express, dated 4th of August 2007, Page 3, Hyderabad edition of The Hindu, dated 4th of August 2007, Hyderabad edition of the Business Standard dated 4/5 August 2007, Page 5.

Economic Wellbeing:

Implementation of the Project Activity resulted in the economic development in the region and also improved the economic wellbeing of neighbouring villages by providing direct and indirect employment opportunities. The Project activity also improved the power supply situation in the state which in turn helps industry to improve the productivity due to reduction in power cuts.
Overall, this project activity is contributing to the Environmental & Social issues locally and globally by:

- Exporting clean power to the state grid and thereby eliminating the generation of same quantity of power by a fossil fuel based power plants, which would have been installed to meet the increasing electricity supply and demand gap in the state;
- Conserving Coal, a fuel used by masses in India for daily living needs;
- Making Coal available for other important applications;
- Reducing GHG emissions;
- Providing direct employment to about 90 persons and indirectly creating business opportunity for stakeholders like bankers, consultants, suppliers, manufacturers, contractors, traders etc.
- Space requirements per MW for a gas based stations are less than Coal based stations.

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Lanco Kondapalli Power Pvt. Limited., Andhra Pradesh, India	No

Details for contact information are provided in annexure I.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party(ies):

>>
India

A.4.1.2. Region/State/Province etc.:

>>
Andhra Pradesh

A.4.1.3. City/Town/Community etc:

>>
Kondapalli

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

>> The project site is around 250 kms 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 32^0C and the relative humidity ranges between 40% and 75%. The Annual Average Rainfall is about 1000 mm Maximum. Climatic Condition are tropical, hot and humid.

A.4.2. Category(ies) of project activity:

>> The project activity falls in Scope Number 1 of Sectoral Scopes related to approved methodologies. The sectoral scope is as per "Link of sectoral scopes with approved methodologies (version-3)" [Source- http://cdm.unfccc.int/DOE/scopelst.pdf]

A.4.3. Technology to be employed by the project activity:

>>

The Combined Cycle Power Project (CCPP) with installed capacity of about 368.144 MW comprises of two (2) Gas Turbine (GT) Generating units of GE , two (2) Waste Heat Recovery Steam Generators (HRSG) of Doosan (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 state grid's 220 KV transmission lines evacuate Power through Kondapalli 220 KV Substation.

Prior to fuel switch the Power project was designed to use Naphtha as liquid fuel . Also the Power project did not have any hardware/infrastructure for using Natural Gas as combustion fuel in gas turbine like, Gas Conditioning Skids (GCS), Gas metering skids, Gas heating systems etc. etc before the fuel switch activity.

In the project activity, gas based combined cycle configuration has been used for power generation with Natural Gas as primary fuel. Heat recovery units and steam turbines maximize cycle efficiency and power output. Figure A2.1 depicts the power generation at LKPPL with combined cycle configuration.

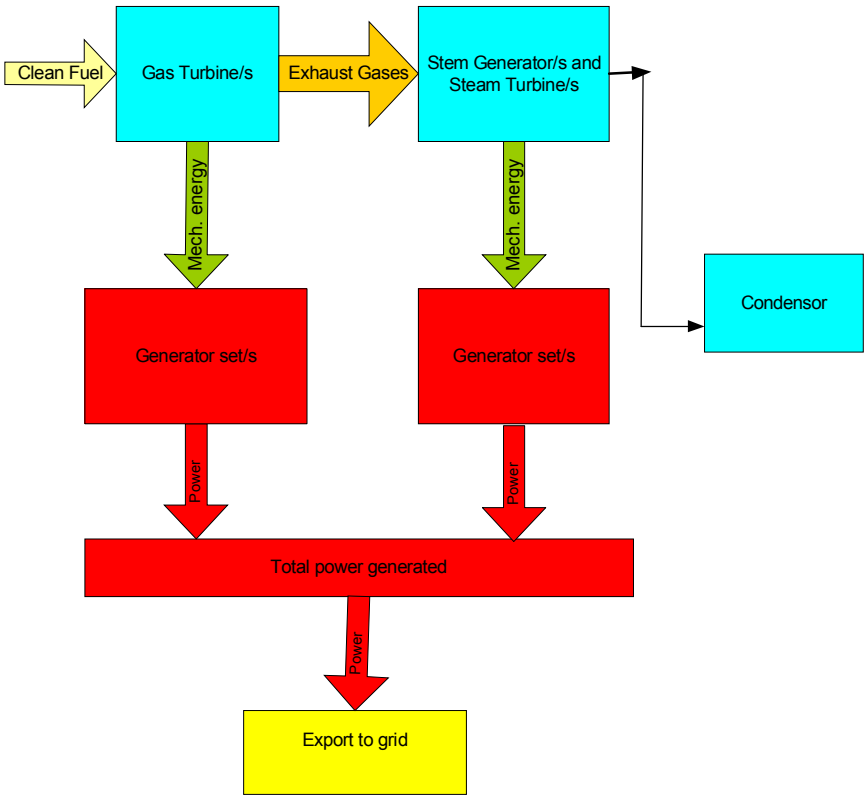

Fig A3.1: Power Generation process at LKPPL

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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The project activity has been estimated to result into CO_2 emission reduction of 3235905 tons during the entire crediting period.

Years (January to December)	Annual estimation of emission reductions in tonnes of CO2 e
2008-09	323,586
2009-10	323,586
2010-11	323,586
2011-12	323,586
2012-13	323,586
2013-14	323,586
2014-15	323,586

2015-16	323,586
2016-17	323,586
2017-18	323,586
Total estimated reductions(tonnes of CO2 e)	**3235860**
Total No of Crediting Years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	323586

A.4.5. Public funding of the project activity:

>> No Public funding from parties is available to the project, which is mentioned in Annexure 1.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

>>

Title: ACM 0011 Consolidated baseline methodology for fuel switching from Coal and/or Petroleum fuels to Natural Gas in existing power plants for electricity generation.

Version: 01

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

>>

The methodology is applicable to project activities that switch fuel from Coal and/or petroleum fuels to Natural Gas in an existing power plant. LKPPL has implemented the proposed CDM activity in its existing power plant at Kondapalli in Andhra Pradesh which had been using Naphtha as fuel before fuel switch. The plant was commissioned in October 2000 with Naphtha as fuel and the fuel switch project was completed in September 2001. The project activity involves fuel switch from higher carbon intensive fuel (Naphtha) to Natural Gas for generation of power and is not a cogeneration project or an energy efficiency project. Hence the primary applicability condition is met.

The other applicability criteria and LKPPL's qualification against those are provided in the table below.

Criteria	**LKPPL's qualification**
The Project Activity Power Plant (PAPP) supplies electricity to the grid or to a captive consumer.	LKPPL supplies power to the state grid and PPA was signed for the same with the state grid
Coal/Petroleum fuel is available in the country/ region for electricity generation.	Naphtha is sufficiently available in the region and proximity to fuel sources was one of the prime reasons for the site selection. LKPPL had been provided fuel linkage assuring it of supply of fuel in the long term. Additionally, the government had restricted the fuel linkage only to those projects which had achieved financial closure prior to 31st October 1998[3]. Hence, the possibility of an increase in demand for Naphtha for power projects leading to non-availability in the future was also ruled out. LKPPL was thus assured of sufficient fuel availability in the long term for sustainable operation of the power plant.
The captive consumer or grid, to which the electricity generated by the PAPP is sold, if applicable, is not restrained by regulations/law to	The Indian Electricity Act 2003 (which overrules all the existing electricity Acts in the country) does not restrain any user from sourcing power based on the

[3] http://powermin.nic.in/acts_notification/Liquid_Fuel.htm

purchase electricity generated from different types of fuel.	fuel used in the power generating plant. No other policies have been framed or expected to be framed in the medium or long term which would have restricted LKPPL from using Naphtha.
The facility does not involve major retrofits/modifications of the power plant other than the fuel switch, for instance, the removal of existing technology and installation of new technology, such as new gas turbines, new combined cycle gas power generation.	The change in the heat rate after the switchover from Naphtha to Natural Gas is insignificant. No major efficiency improvement has occurred during the process. The project activity did not involve removal of the existing technology or installation of new technology like new gas turbines or new combined cycle gas power generation. Hence this condition is not violated.
The project activity does not result in significant change in capacity, i.e. not more than 5% of the installed capacity before the implementation of the project activity.	Subsequent to the project activity, the total capacity of the power plant has increased from 360.788 MW to 368.144 MW, i.e., by 2.03%, which is less than 5% of the initially installed capacity.
The project activity does not result in an increase in the lifetime of the PAPP during the crediting period. If the lifetime of the PAPP is increased due to the project activity, the crediting period shall be limited to the estimated remaining life time of the power plant, i.e. the time when the existing power plant would need to be replaced in the absence of the project activity.	The technical life time of thermal power plants generally range between 20 to 30 years. The PAPP was commissioned on baseline fuel in the year 2000 and subsequently the fuel switch activity has been carried out and commissioned in the year 2001. The crediting period applied for is only for ten years. Hence there is no increase in the life time of the project activity during the crediting period. Hence this applicability criterion is met.
The methodology is applicable only if the most plausible baseline is the continuation of the use of high carbon intensive fuels like Coal and/or Petroleum fuels for electricity generation.	The most plausible baseline scenario is the continuation of the use of Naphtha and hence this applicability criterion is met. The same is discussed in detain in Section B.4.
Prior to the implementation of the project activity, only coal and/ or petroleum fuels (but not natural gas) was used in the PAPP to generate electricity	LKPPL has used only Naphtha as primary fuel for to power generation prior to Fuel switch. Hence this condition is not violated.
Regulations/laws and programs do not restrain the facility from using fossil fuels used prior to implementing the project activity neither require the use of natural gas or a specified fuel generated electricity	No regulations/laws restrain the facility using fossil fuels usage prior to implementation of project activity neither require the use of natural gas or a specified fuel to generate electricity fuel switch. Hence this condition is not violated.
The methodology is applicable only when the captive consumer or electricity grid, to which the electricity generated by the PAPP is sold, if applicable, is not restrained by regulations /law to purchase of electricity generated from different type of fuels, i.e. it is not prohibited to purchase	The power generation by using higher GHG intensity fuel (i.e. Naphtha in this case) is not restricted by any regulation / law and state grid buys from all sources of energy as demand vs supply gap is high

electricity generated using a higher GHG intensity fuel during crediting period of the project activity	

From the above, we can conclude that the project activity conforms to the applicability criteria as laid by the new methodology ACM0011.

B.3. Description of the sources and gases included in the project boundary

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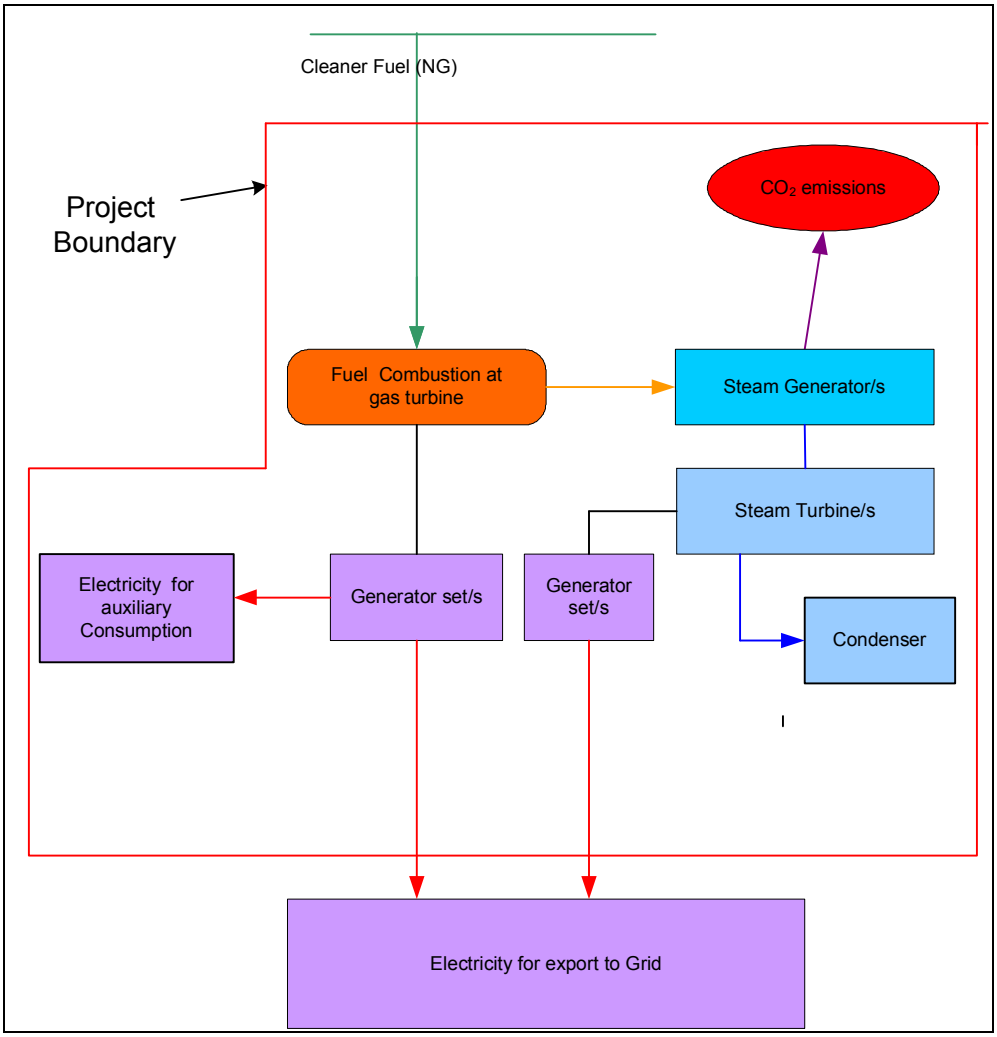
The project boundary encompasses the PAPP. The project boundary for the project activity is from the point of fuel supply to the point of power export to the grid where the project proponent has full control. Thus, the project boundary covers fuel storage and processing, Gas Turbines, Generators, Heat Recovery Steam Generator units, Steam Turbine Generators and all other auxiliary equipments and captive consumption units.

The upstream and downstream emissions for the project activity may take place due to transportation of fuel and transmission of electricity. But for these emissions project developer do not have any control and hence these cannot be included within the project boundary. These emissions are to be treated as leakage.

Table of gases included in the project activity

	Source	**Gas**	**Included?**	**Justification / Explanation**
Baseline	Emissions due to the combustion of the baseline fuel (Naphtha) for electricity production in the PAPP	CO_2	√	The combustion of fuel emits GHG
		CH_4	X	Minor Source
		N_2O	X	Minor Source
Project Activity	Emission due to the combustion of NG for electricity production in the PAPP	CO_2	√	Main Emission Source
		CH_4	X	Minor Source
		N_2O	X	Minor Source
	Emissions due to the use of energy(auxiliary fuel, purchased electricity) for the operation of the PAPP	CO_2	√	Main Emission source
		CH_4	X	Excluded for simplification
		N_2O	X	Excluded for simplification


Cleaner Fuel (NG)
Project Boundary
CO_2 emissions
Fuel Combustion at gas turbine
Steam Generator/s
Steam Turbine/s
Electricity for auxiliary Consumption
Generator set/s
Generator set/s
Condenser
Electricity for export to Grid

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>> The baseline methodology has been applied in following steps

Estimation of the Life time of the project:

The power plant at Kondapalli in Andhra Pradesh was commissioned in October 2000 with Naphtha as fuel before fuel switch. On an average, the technical life of thermal power plants range between 20-30 years and therefore the plant was expected to function till at least 2020[4]. The fuel switch activity took place in less than one year of operation from Naphtha to Natural Gas, which has happened at the very initial stages of operations. Also, the crediting period applied for is only for ten years which is well within the Project technical life time.

Estimation of the capacity of the project:

The capacity of the project activity prior to the implementation of the project activity was 360.788 MW. With the implementation project activity, the capacity of the power plant has been increased by around 2.03% to 368.144 MW due to improvement in heat rate. As this increase is within the prescribed limit of 5%, the applicability of methodology is justified. The test report for the estimation of capacity of the project can be made available to the DOE during validation.

Procedure for the selection of the most plausible baseline scenario:
Identification of the baseline scenario

Overview of the existing practice:

The Indian National Grid is divided into five parts, viz., the Northern, Southern, Western, Eastern and North-Eastern Grid. The PAPP is located in the state of Andhra Pradesh and supplies electricity to the Southern Grid. Hence the existing practice analysis has been done for the Southern Grid.

An overview of the practice that prevailed at the time the project activity was undertaken is provided in the table below:

Fuel	In Andhra Pradesh	In Southern Grid.
Hydro	3583.35	10775.60
Thermal (Coal, Gas etc)	7875.00	14237.52

Registered CDM projects have not been included in the analysis. The analysis has been done for more than 10 power plants as required by the methodology.

As shown in the table above, the majority of power was being sourced from thermal power plants primarily due to the ample availability of conventional fuel like Coal, Naphtha and Natural Gas.

[4] http://www.powermin.nic.in/generation/renovation_modernization_thermal.htm

Step 1a: Identify all realistic and credible alternatives to the project activity:

The following alternatives have been identified for the project activity and have been analyzed in the following section:

a) Continuation with the current energy source (Naphtha)
b) Generation with Coal as fuel
c) Generation with Diesel/ FO / LSHS as fuel
d) Renewable Energy, viz., Biomass and Solar Energy.

Evaluation of the various alternatives:

Power generation using current energy source (Naphtha), i.e. the current practice:

The continued operation of the power plant with Naphtha as fuel was a plausible option for the reasons outlined below:

Profitability

As per the PPA signed by LKPPL with the off-taker, the variable tariff for the energy exported to the grid would be calculated as "Energy charge" based on the station heat rate (h), the GCV of the fuel (g) and the cost of the fuel procured during the billing month (C). The cost of the fuel includes:

a) the basic weighted average cost of fuel in case of indigenous fuel and in case of imported fuel, the weighted average CIF value plus in each case, finance and procurement costs,
b) taxes, duties, cesses and other government agency levies,
c) handling, storage, transportation and importation charges.

The Energy Charges, as per the PPA is calculated on a monthly basis (billing period) on account of the variation in h, g and C.

The Energy Charges payable was to be modified on a monthly basis to take into account any variation in the landing cost of the fuel. Thus profitability of LKPPL would not have been affected with the change in the price of fuel.

The fixed charges for the project were to be paid as "Capacity Charge" calculated as the sum of Foreign Debt Service Charge (FDSC) for a period of 12 years and Other Fixed Charge (OFC) for the entire term of the agreement. FDSC and OFC were to be calculated as a factor of the Cumulative Available Energy[5]. Thus the fixed charges to be paid were dependent on the installed capacity.

Fuel Supply

Naphtha is sufficiently available in the region for sustained operation of the power plant and proximity to fuel sources was one of the prime reasons for the site selection. LKPPL had been provided fuel linkage

[5] Sum of the declared capacity for each of the settlement period.

assuring it of supply of fuel in the long term. Additionally, the government had restricted the fuel linkage only to those projects which had achieved financial closure prior to 31st October 1998[6]. Hence, the possibility of an increase in demand for Naphtha for power projects leading to non-availability in the future was also ruled out. LKPPL was thus assured of sufficient fuel availability in the long term for sustainable operation of the power plant.

Demand for Electricity

As per the Ministry of Power, the total energy shortage, during 2000-2001, was 39,816 million units, amounting to 7.8 per cent and the peak shortage was 10,157 MW translating to 13 per cent of peak demand[7]. Based on the demand projections made in the 16th Electric Power Survey, over 1,00,000 MW additional generation capacity needs to be added by 2012 to bridge the gap between demand and supply of power. With the demand for electricity being high in the growing Indian economy, LKPPL had assurance on the demand side as well. Hence, the power produced by the project activity would have been bought by the off-taker as well.

Additionally, as per the PPA in case if the Board directed shutdown or backing down or any reduction in generating capacity resulting from a condition of the grid system, LKPPL was allowed to include the amount of available capacity that LKPPL expected could be delivered to the Board if the project were fully loaded. Thus LKPPL would have recovered the fixed charges even in case it was asked to back down by the off taker. Also, the PPA restricted the off taker from issuing back down instruction requiring the company to operate below 60% of the Project's installed Capacity. The PPA also restricted the aggregate duration of back down during any tariff year to 1200 hours.

With the assurance on the demand and supply side, as well with assured profitability, LKPPL did not perceive any problem in continuing operations with Naphtha as a fuel in the medium as well as the long term. Hence continuation with the use of Naphtha as a fuel was a plausible option.

Power Generation using energy sources other than that used in the project activity:

Coal

The purpose of the project activity was to generate power for sale to the state grid using liquid fuel. Switchover to Coal would require high investment as the plant was primarily designed to operate only with liquid fuels. The turbine installed is a gas turbine and hence switching over to Coal would require replacement or addition of steam turbine(s). Hence, the cost incurred to switch over from Naphtha to Coal would be much higher as compared to that required for a switchover to Natural Gas. The tariff however, would have remained the same or increased marginally and the returns would have been substantially low. Thus, a switchover to coal was technologically and economically not feasible.

Coal being GHG intensive, the project would not have been eligible to receive CDM funds as well. There was no alternative source as well to fund the switchover. With no other incentive being available for the switchover to Coal, LKPPL would not have undertaken the same.

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[6] [6] http://powermin.nic.in/acts_notification/Liquid_Fuel.htm

[7] http://powermin.nic.in/indian_electricity_scenario/blue%20print/executive_summary.htm

Diesel, FO & LSHS

The Government of India, on July 8, 1997[8], notified that HSD as a fuel will be permitted for power generation only as a special case in inaccessible and isolated areas where use of no other fuels is feasible. Hence Diesel was not available as an option for LKPPL.

The notification also stated that linkages for FO & LSHS were to be provided only to those projects which achieved financial closure by 31st October 1998. Since, LKPPL considered the fuel switch activity in the year 2000, it would not have received fuel linkage and hence these as options for the fuel switch are also ruled out. The notification also indicated that the Indian Oil Public Sector Units were also not under any obligation to give fresh linkages for any new projects. Hence accessibility to any other liquid fuel for LKPPL was ruled out.

Renewable Energy

The investment was being made for a fuel switch project and not for a new project. Hence hydro and wind power were not considered as an alternative. Solar power as an option was also not realistic for the proposed scale of generation of 360.788MW

Biomass based power projects generally have the capacity of 4 to 20 MW based on the fuel availability. The fuel for such projects needs to be sourced from over a distance of 50 to 100 km. As the project activity was 360.788MW power project, biomass as an alternative was not realistic. Additionally, the project activity was set up with the purpose of operating on liquid fuel and had employed gas turbines. Hence, biomass as an alternative is ruled out.

The project activity undertaken without being registered as a CDM project (switching from Naphtha to Natural Gas):

The switchover from Naphtha to Natural Gas resulted in an additional investment of around 350 Million INR for installation of gas conditioning unit, pressure boosters, gas monitoring station and other required infrastructure facilities.

However, as per the terms of the PPA discussed above, the additional cost that LKPPL incurred could not have been recovered from the off-taker as the fixed cost was to be paid as a factor of the installed capacity. With the fuel switch activity resulting in only a marginal 2% increase in the installed capacity, the capacity charge that LKPPL would have received would not have been sufficient to cover the capital investment. Additionally, the variable cost was being paid as a factor of the fuel cost. Natural Gas being cheaper than Naphtha, LKPPL receives lower Energy charges and hence, the lower cost of the fuel also would not have helped LKPPL in improving its profitability and recovering the capital investment.

As per the terms of the PPA, the additional cost that LKPPL incurred on account of the fuel switch would have been made good by the off taker only if it were mandated by a change in law or permit. However, there was no law which prohibited the use of Naphtha or mandated a switchover to Natural Gas. Hence LKPPL cannot recover the additional cost from the off taker.

[8] http://powermin.nic.in/acts_notification/Liquid_Fuel.htm

LKPPL faced other barriers as well in implementing the fuel switch activity which have been discussed in detail in Section B.5. Considering the favourable conditions for continuing operations with Naphtha, the high capital investment required for the fuel switch and the barriers it faced, LKPPL would not have taken up the project activity without registering it as a CDM project.

Power generation using the same fossil fuel, but technologies measures other than that are currently used in PAPP that could reduce the emissions intensity of electricity generation

The PAPP was set up in October 2000 and was operated using Naphtha as fuel. During the conceptualization stage the power plant had employed best available technology for obtaining maximum efficiency. The combined cycle technology employed is more efficient than IC combustion engine technology for the proposed scale of generation. Since the exhaust gas temperature from the gas turbine is high, a waste recovery steam generator was installed to improve the efficiency of the system. The fuel switch project was conceptualized and implemented within a years time after the commissioning of the plant with Naphtha as a fuel. Within this period, there was no other technological upgrade available which would have reduced the emission intensity to the levels which could have been achieved through a fuel switch to Natural Gas. No similar upgrades were expected in the short to medium term as well. Hence such an alternative is also ruled out.

Project activity undertaken without being registered as a CDM project activity, undertaken at a later point of time

No regulations are envisaged in the medium or in the long term that would have compelled the switchover from Naphtha to Natural Gas.

Fuel price changes was not considered as a reason which would have resulted in switchover from Naphtha to Natural Gas as the higher cost of fuel could have been recovered with higher variable component in the tariff that LKPPL would have received. With Naphtha being sufficiently available, non-availability of fuel also would not have forced LKPPL to switchover from Naphtha to any alternative fuel. The long term agreement that LKPPL entered into with suppliers also helped in hedging any risk of fuel cost escalation.

Continuation with Naphtha, as described above was a feasible option, which would have ensured the standard returns for the power plant. Switchover from Naphtha to Natural Gas resulted in investment and the resultant decrease in the cost of raw material resulted in reduced variable tariff that LKPPL received. Thus the reduced cost of fuel would not have helped in improving the profitability. Hence, LKPPL would not have invested in the project activity before the end of lifetime of the power plant.

The estimated life time of the power plant is 20-30 years and the power plant is expected to function at least up to the year 2030. The project activity may have been undertaken after the end of the lifetime of the PAPP. However, that would extend beyond the crediting period and would have resulted in emissions of higher intensity. The credits are being claimed for the emission reductions for a crediting period of 10 years only.

Hence the options available at the end of Step 1a for LKPPL are:

a) Continuation of the use of Naphtha
b) Project activity not undertaken as CDM project.

Step 1b: Consistency with applicable laws and regulations.

All the alternatives considered as outcome of step 1a are in compliance with applicable legal and regulatory requirements.

Hence the options available at the end of Step 1b for LKPPL are:

a) Continuation of the use of Naphtha
b) Project activity not undertaken as CDM project.

Step 2: Eliminate alternatives that face prohibitive barriers

The continued use of Naphtha as fuel did not require any additional investment and did not face any financial barrier. Manpower with the required skill set to run the power plant with Naphtha was available. There were no logistical and transportation problems as well.

LKPPL however faced logistical problems as the infrastructure had to be implemented for the transport of the gas through pipelines. Development of infrastructure meant incurrence of higher cost further reducing the economic attractiveness of the project activity. With the project activity expected to generate low returns, LKPPL faced difficulty in access to long term debt for implementation of the project. The State or the National Government too was not providing any incentives or subsidies for taking up the fuel switch activity.

Hence the options available at the end of Step 1b for LKPPL are:

a) Continuation of the use of Naphtha

Step 3: Comparison of economic attractiveness of remaining alternatives

The investment analysis has been carried out by the project proponent between continuation of Naphtha as fuel and the fuel switch project undertaken as a CDM project activity.

The continued use of Naphtha did not require any investment and hence the NPV for the same may be considered as zero.

The total investment required for the switchover from Naphtha to Natural Gas was 350 Million INR. Due to increase in the capacity of the project by around 2% due to fuel switch activity, LKPPL estimated additional annual revenue of 59.19 Million INR. Considering the interest rate of 14.75% on the long term debt as the discounting factor, the Present Value of the additional revenue was 161.86 Million INR and hence the NPV was negative (- 188.14 INR). The detailed NPV calculations are provided in **Enclosure I**.

Based on the above analysis, continuation of existing fuel (Naphtha) turned to be economically attractive and is considered as the baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

This project activity is additional[9] 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[10] 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 August 2000 and completed by September 2001. The purchase orders placed for supply of equipment and initial communications regarding consideration for CDM in decision making satisfies this step.

Step 1: Investment Analysis
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 State Utility. 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 Natural Gas 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 activity in the project resulted in increase in Capacity by around 2% only . With the change in capacity being negligible, the increase in the fixed cost was also not adequate to cover the capital investment.

LKPPL incurred about INR 350 Million for the Fuel Switch from Naphtha to Natural Gas. It also expected incurrence of about Rs.225.86 Million as cost of capital during the tenure of the Loans obtained for Fuel Switch. Considering the interest rate on debt (14.75 %) as the discounting factor, the Net Present Value of the Investment made by LKPPL works out to – 188.14 Million INR.

In addition to this, Naphtha is abundantly available in the region compared to Natural Gas. LKPPL took the risk of switching over to Natural gas though there is no financial gain in terms of increased revenue from the state grid per unit of export considering the additional revenue from CDM to mitigate these risks to certain extent.

[9] As per 17/cp.7

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

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

- Non availability of incentives / subsidies
- Fuel linkages and bottleneck infrastructure

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 installed capacity of around 130,000 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[11].

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[12]:

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 Natural 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.

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

[12] Infraline's paper on "Natural Gas for power sector: issues and challenges"

The percentage of gas based power plants in India since 1999-2000 is as given below as per the information provided by the CEA[13]:

FY	Total installed capacity of Gas Power Plants, MW	Total installed Capacity of all power plants, MW	%
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 details of the power plants, their installed capacity, commissioning date are available in CEA website[1].

It is also clear from above table that similar activities i.e. power generation using Natural Gas as a fuel is not widely observed and is not commonly carried out. All the power plants using Natural Gas as fuel in the country are facing the barriers like uncertainty in returns. In addition to above, the major hurdle in the growth of the industry has been uncertain regulatory environment. Also, low penetration of gas based power generation in the country is due to inadequate pipeline infrastructure.

The percentage share of gas based power generation in the country during 9th five year plan, during 10th and 11th plans[14] are as follows:

	% of Grid Mix			
Power from	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%	11.0%	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.

[13] http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

[14] www.infraline.com (Indian Power Sector – Challenges and opportunities); http://cea.nic.in

Sub-step2b. 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

On receipt of CDM funds, the Present Value of the cash flows is expected to be improved for the investment made by LKPPL for fuel switch activity.

Also, with the decrease in the tariff on account of use of Natural Gas for Project Activity, LKPPL is passing on economic benefits to the end user.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Project activity adopted the procedures mentioned in the new submitted methodology to calculate project emissions, baseline emissions, leakage emissions and emission reductions. The procedures used for calculating these emissions are described below:

The proposed new methodology has got two options based on type of projects. One type of projects is related to those which are controlled by grid (i.e., grid dispatch power plants) and other is non grid dispatch plants and captive power plants. In the project scenario, as the power plant generation is dispatched by the grid, the most plausible baseline scenario is to generate as per grid requirements and export to the grid.

Baseline

$BE_{,y} = EL_{BL,y} \times EF_{elec, BL}$

Where

$BE_{elec,y}$	Baseline Emissions due to the generation of the electricity supplied to the grid in year y of the crediting period (tCO_2)
$EL_{BL,y}$	Electricity supplied to the grid in the year y of the crediting period, not exceeding the supply in the absence of the project activity.
$EF_{Elec,y}$	Emission factor of the baseline plant, tCO_2/MWh

The electricity supplied to the grid, $EL_{BL,y}$ is calculated as below :

$EL_{BL,y} = EL_{Pr,y}$ if $EL_{Pr,y} < EL_{his}$
$EL_{BL,y} = EL_{his}$ if $EL_{Pr,y} >= EL_{his}$

Where,
EL_{his} = Electricity supplied to the grid in the absence of the project activity.
$EL_{PR,y}$ = Electricity supplied to the grid by the PAPP in the year y of the crediting period in MWh.

The amount of electricity that would be supplied to the grid in the absence of the project activity is the maximum historic annual amount of electricity over three most recent years prior to implementation of the

project activity. If the three year data is not available then the electricity supplied during the most recent one year prior to the implementation of the project activity is to be used.

LKPPL operated the power plant between the period 10 Jan 01 and 10 August 01 on Naphtha. However, being the first year of its commercial operations, LKPPL undertook plant shutdowns for testing and other purposes apart from having power evacuation problems outside the Project boundary.

However, between the period, 10Feb 01 and 10 Apr 01, the plant functioned uninterruptedly and hence the same has been used for the estimation of the $EL_{his.}$. Between 10 Feb 01 and 10 Apr 01, LKPPL exported 399428 kWhrs to State Grid. Extrapolating for an year,

EL_{his} = 399428 x 6 = 2396568 kWh p.a = 199714 kWh per month

Calculation of Emission Factor

$$EF_{elec,BL} = \frac{44}{12} \cdot \frac{3.6}{1000} \cdot \frac{EF_{FF,BL}}{NCV_{FF,BL} * \eta_{BL}}$$

Where,

$EF_{FF,BL}$	CO_2 emission factor for the Coal or petroleum fuel used in the PAPP prior to the implementation of the project activity. (tC/mass or volume unit)
$NCV_{FF,BL}$	Net calorific value of the fuel used in the PAPP prior to the implementation of the project activity. (TJ/Mass or volume unit)
η_{BL}	Efficiency of the power plant prior to the implementation of the project activity.

The emission factor for Naphtha has not been provided by the fuel supplier. Hence the project participant wishes to use the IPCC default values at the upper limit of the uncertainty at 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG inventories.

$EF_{FF,BL}$ = 76.3 tCO_2/GJ.

Efficiency of the plant:

The efficiency of the plant is calculated on the basis of the power exported and the fuel consumed between the period 10 February 2001 and 10 April 2001.

Electricity exported = 399,428 MWh.
Naphtha Consumed = 70817 MT
NCV of Naphtha = 10593.11 kcal/kg
Efficiency = 0.46

Baseline Emission Factor:

The Baseline Emission Factor is calculated as 0.60 tCO2/MWh as given in attached excel sheet.

Therefore, the baseline emission factor is 0.60tCO_2/MWh. The project proponent wishes to fix this baseline emission factor for the entire crediting period of ten years.

Therefore, the Baseline Emissions = 0.6 x 2396568
= 1437609[15]

Project Emissions

The project emissions are calculated as below:

$PE_y = PE_{NG,y} + PE_{aux,y}$

$PE_{NG,y}$ = Emissions due to the combustion of Natural Gas for the production of electricity in year y of the crediting period (tCO_2)
$PE_{aux,y}$ = Emissions due to the use of energy (fuel other than Natural Gas and/or electricity) in year y of the crediting period.

$$PE_{NG,y} = \frac{44}{12} \times NG_y \times EF_{NG,y}$$

The total quantity of gas expected to be consumed in a year is 510. 223 MMSCM

NGy = 510.22374 MMSCM

The IPCC default value as provided in table 1.4 of Chapter 1 of Vol.2 has been used for the calculation of the project emission

$EF_{NG,y,}$ = 56.1 tCO_2 /TJ

For Ex Ante estimation of the Emission Reduction, the NCV of the gas is considered as 8794.80 kcal/Sm^3

Therefore,

NCV_{NG} = 8794.80 kcal/Sm^3
= 8794.80 x 4.179 /10^9 TJ/Sm^3
= 36.75347 TJ/ MMSCM

Therefore,

$PE_{NG,y}$ = NG_y x $EF_{NG,y}$ x NCV_{NG}
= 510.22374 x 36.75347 x 56.1
= 1052015[16]

The total emissions on account of consumption of Natural Gas over entire crediting period is expected to be as below

[15] Figures may not match due to rounding off

[16] Figures may not match due to rounding off.

$PE_{NG,y}$ = 10,52015 tCO2

Project Emission Due to Auxiliary Fuel Consumption

$$PE_{aux,y} = \frac{44}{12} \cdot \sum_i \left(FF_{aux,i,y} \cdot EF_i\right) + EL_{aux,grid,y} \cdot EF_{elec,y}$$

The project proponent has used little quantity of HSD as fuel as auxiliary fuel in DG set to meet the load requirements in emergency in addition to importing electricity from the grid. However, the same is not included in the calculations as the emissions due to the same are negligible.

Emissions due to import of electricity

$EF_{elec,y}$ for the Southern grid calculated as per the requirements of the ACM0002, using 50/50 OM/BM Weight is 0.86[17].

$EF_{elec,y}$ = 0.86 tCO_2/ MWh

LKPPL may import on an annual basis 720 MWh from the grid for start up purpose.

$EL_{aux,grid,y}$ = 720MWh.

$$PE_{,aux,y} = \frac{44}{12} PE_{HSD} \times FF_{HSD} + EL_{aux,grid,y} \times EF_{elec,y}$$

= 0 + 720 x 0.86

= 619 tonnes of CO_2

For the calculation for the Natural Gas consumed between the period 10 September 2001 and 10th January 2007, the NCV figures on a monthly basis have been used for calculating the NCV. The NCV figures used for rest of the crediting period are detailed in attached excel sheet.

Therefore,

PE_y = $PE_{NG,y}$ + $PE_{aux,y}$
= 10,52015 + 619 tonnes of CO_2
= 1052634 tCo2

Estimation of Leakage

[17] http://cea.nic.in

Leakage emissions are to be calculated as follows:

$LEy = LE_{CH4,y} + LE_{LNG,CO2,y}$

Where,
LEy = Leakage Emissions during the year y (tCO_2)
LECH4,y = Leakage Emissions due to fugitive upstream methane emissions in the year y (tCO_2)
LELNG,CO2,y = Leakage Emissions associated with the liquefaction, transportation, re-gasification and compression of LNG into a Natural Gas transmission or distribution system during the year y (tCO_2)

Calculation of $LE_{LNGCO2,y}$

As the project activity did not involve liquefaction, transportation, re-gasification and compression of LNG into a Natural Gas transmission or distribution system,

$LE_{LNG,CO2,y} = 0$.

Calculation of $LE_{CH4,y}$

The methodology requires the calculation of the leakage due to fugitive upstream methane emissions is to as per the following formula:

$$LE_{CH4,y} = \left[NG_y \cdot NCV_{NG,y} \cdot EF_{NG,upstream,CH4} - \frac{EL_{BL,y}}{\eta_{BL}} \cdot NCV_{FF,y} \cdot EF_{FF,upstream,CH4} \right] \cdot GWP_{CH4}$$

$= (1\text{-}2) \times GWP_{CH4}$

Where,

NG_y	Total amount of Natural Gas used in the project power plant in year y of the crediting period.
$NCV_{NG,y}$	Net calorific value of the Natural Gas.
$EF_{NG,upstream,CH4}$	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of Natural Gas.
$EL_{elec,BL,y}$	Electricity supplied to the electricity grid in the year y of the crediting period upto the baseline level of supply
$\eta_{BL,y}$	Efficiency of the power plant in the baseline as function of the load factor of the PAPP in year y of the crediting period.
$NCV_{i,y}$	Net Calorific Value of Naphtha.
$EF_{FF,upstreamCH4}$	Emission Factor for upstream fugitive emissions from production of Naphtha
GWP_{CH4}	Global Warming Potential of Methane

The total quantity of gas used since the fuel switch is expected to 510.22374 MMSCM

NG_y = 510.22374 MMSCM.

$NCV_{NG,y}$ has been provided by the suppliers and the data on a monthly basis is available. The same has been used for the estimation of the leakage.

$EF_{NG,upstream,CH4}$ = 160 tCH_4 /PJ

The NCV of Natural Gas is considered as 8794.80 kcal/SCM

NCV_{NG}= 8794.80 kcal/SCM.

The emission Factor for Naphtha is considered 4.1 tCH4/PJ

$EF_{FF,upstream}$ = 4.1 tCH_4/PJ

The Global Warming Potential of Methane is considered to be 21.

GWP_{CH4} = 21

The detailed calculations for leakage have been provided in the attached excel sheet.

The total leakage on an annual basis is estimated to be 61389 tonnes of CO_2

Emission Reduction

The emission reduction *ERy* by the project activity is expressed as

Where,

NGy	Total amount of Natural Gas used in the project power plant in year *y* of the crediting period
$EF_{NG,y}$	CO_2 emission factor of Natural Gas (tC/ mass or volume)

ER_y = $BE_y - PE_y - LE_y$ in tonne of CO2 equivalents (tCO_2e/yr).

= 1437609 – 1052634 – 61389

` = 323586 tonnes of CO_2

B.6.2. Data and parameters that are available at validation:

The following are the list of data and parameters that were not required to be monitored during the crediting period but that were determined only once and remained fixed throughout the crediting period.

Data / Parameter:	**EL_{his}**
Data unit:	MWh
Description:	Electricity supplied to the grid in the absence of the project activity.
Source of data used:	Electricity meters at the project site
Value applied:	2396568 MWh p.a.
Justification of the	LKPPL commissioned the plant in October 2000 on baseline fuel. After

choice of data or description of measurement methods and procedures actually applied :	stabilization period, the PAPP operated successfully for a period of two months from 10 Feb 2001 to 10 Apr 2001 only. LKPPL undertook shutdowns for testing and other major reasons like problems in evacuation system, instructions from State utility to run the Plant under partial loads etc which are beyond LKPPL's control. . Although the plant did run intermittently after Apr 2001, it was for routine maintenance checks and fuel switch activity works other than forced shut downs due to external factors. Hence the data available for the above two months is only considered.
Any comment:	The data for two months has been extrapolated to arrive at the historical annual power generation. As there was no three years data available, the data is taken from the maximum electricity meter readings available prior to the project implementation for those months with full generation happened ignoring those months with lesser production.

Data / Parameter:	η_{BL}
Data unit:	Fraction
Description:	Efficiency of the PAPP prior to the implementation of the project activity.
Source of data used:	Measurement of the efficiency
Value applied:	0.46
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the methodology ACM0011, efficiency is to be calculated at a range of load factor representative of the situation during the project activity. The efficiency of the project activity as measured at the project site between the period 10 February 01 and 10 April 01 is used in the calculations.
Any comment:	All measurements are conducted at an average load factor of the plant that is representative of the situation during the project activity

Data / Parameter:	**$EF_{FF,BL}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of Naphtha used in the PAPP prior to the implementation of the project activity.
Source of data used:	Based on IPCC values
Value applied:	IPCC value of 76.3 tCO_2/TJ is considered for calculations
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of the emission factor has not been provided in the supplier's invoices. Hence IPCC values are used. The Emission Factor provided in 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories is in terms of kg/GJ. Hence using the IPCC default value for the NCV of Naphtha, the Emission Factor for Naphtha in terms of kgC/tonne of Naphtha has been calculated.
Any comment:	This methodology states that the preferred source of data for NCV and Emission Factor of the fossil fuel is the values provided by the supplier in the invoices. The supplier has provided the NCV of the fuel but not the emission factor. Hence the CO_2 emission factor in terms of kgC/tonne of Naphtha has been calculated.

Data / Parameter:	**$NCV_{FF,BL}$**

Data unit:	GJ/kg of Naphtha
Description:	Net calorific value of Naphtha used in PAPP prior to the implementation of the project activity.
Source of data:	Test reports by Suppliers
Value applied	0.04427
Justification of the choice of data or description of measurement methods and procedures actually applied :	The invoices provided by the suppliers do not provide the NCV value of Naphtha Hence, the value of the NCV, as provided in the test reports for the fuel, conducted at Government approved laboratories, have been used for the estimation of the emission reduction.
Any comment:	The NCV has been calculated as the average of the NCV of the fuel supplied between the period 10 Feb 01 and 10 Apr 01.

Data / Parameter:	**$EF_{CO2,upstream,LNG}$**
Data unit:	tCO_2/TJ
Description:	Emission Factor for upstream CO2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a Natural Gas transmission or distribution system.
Source of data:	Data published for North American LNG systems. "Barclay, M. and N. Denton, 2005. Selecting offshore LNG process. http://www.fwc.com/publications/tech_papers/files/LNJ091105p34-36.pdf (10th April 2006)
Value applied	6
Justification of the choice of data or description of measurement methods and procedures actually applied :	Reliable and accurate data on upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a Natural Gas transmission or distribution system is not available.
Any comment:	

Data / Parameter:	**$EF_{FF,upstream,CH4}$**
Data unit:	tCH_4/PJ
Description:	Emission Factor for upstream fugitive emissions from production of Naphtha used in the PAPP prior to the project implementation.
Source of data:	As provided in ACM0011
Value applied	4.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	As reliable and accurate data on fugitive methane emissions associated with the production is not available, LKPPL wishes to use the default values provided in Table 2 in the Leakage section of the baseline methodology.
Any comment:	

Data / Parameter:	$EF_{NG,upstream,CH4}$
Data unit:	tCH_4/PJ
Description:	Emission Factor for upstream fugitive methane emissions from production of Naphtha used in the PAPP prior to the project implementation.
Source of data:	As provided in ACM0011
Value applied	160
Justification of the choice of data or description of measurement methods and procedures actually applied :	LKPPL wishes to use the default values provided in Table 2 in the Leakage section of the baseline methodology. As the systems in place by the supplier of Natural Gas is of recent vintage and is built and operated to international standards, US/Canada values are used.
Any comment:	As the project activity is located in India, the data pertaining to 'Rest of the World' has been used.

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_{2e}/tCH_4
Description:	Global Warming Potential of Methane valid for the relevant commitment period.
Source of data:	IPCC
Value applied	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	As required by the Methodology ACM0011.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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The ex-ante calculation of project emissions, baseline emissions and leakage emissions expected during the crediting period, applying all relevant equations provided in the approved methodology are provided above.

The total project activity emission is estimated to be 1052633.7 ton CO_2 e per annum.

The baseline emission estimated in a conservative manner as described in above sections. The estimated baseline emission is 1437609.4 ton CO_2 e per annum.

The estimated leakage in the project activity is 61388. tCO2e per annum.

As there is no increase in the electricity consumption due to auxiliary loads, the same is not considered in the calculations as conservative purpose as per new proposed methodology.

Project emissions and leakage are estimated with 100% Natural Gas usage (and corresponding power generation) using formulas mentioned in Section B.6.1.:

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year (January to December)	Estimation of Project Activity Emissions (tCO2 e/annum)	Estimation of Baseline Emissions (tCO2 e/annum)	Estimation of leakage (tCO2 e/annum)	Emission reductions (tCO2 e/annum)
2008-09	1052634	1437609	61389	323586
2009-10	1052634	1437609	61389	323586
2010-11	1052634	1437609	61389	323586
2011-12	1052634	1437609	61389	323586
2012-13	1052634	1437609	61389	323586
2013-14	1052634	1437609	61389	323586
2014-15	1052634	1437609	61389	323586
2015-16	1052634	1437609	61389	323586
2016-17	1052634	1437609	61389	323586
2017-18	1052634	1437609	61389	323586
Total (tonnes Of CO2 e)	10526340	14376090	613890	323586

B.7 Application of the monitoring methodology and description of the monitoring plan:

The monitoring methodology for the project is based on the methodology described in the new proposed methodology.

B.7.1 Data and parameters monitored:

Data / Parameter:	**NGy**
Data unit:	MMSCM
Description:	Quantity of Natural Gas used in power generation
Source of data to be used:	On site measurement and consumption certification reports
Value of data applied for the purpose of calculating expected emission reductions in section B.5	510.22374
Description of measurement methods and procedures to be applied:	Natural Gas for the Power generation is being supplied by Gas Authority of India Ltd (GAIL) to the Power Plant by a dedicated pipe line. GAIL has gas metering station at the gas supply terminal in the Power Plant to ensure proper monitoring and quantification of gas intake to the Plant. Quantity of gas intake to the Power

	Plant is being measured with the help of Gas Flow meter installed at GAIL station continuously and daily readings are being recorded. The gas flow meter is calibrated at regular intervals as per GAIL standards. GAIL is ISO 9001 certified organization.
QA/QC procedures to be applied:	Natural Gas supply metering to the project is subject to regular (in accordance with stipulation of GAIL) maintenance and testing to ensure accuracy. The readings will be double checked by the gas company.
Any comment:	Nil

Data / Parameter:	**Installed Capacity** **&** **Electricity Generation**
Data unit:	MW & MWh
Description:	Capacity of the PAPP before and after fuel switch from Naphtha to NG
Source of data to be used:	Reports of the test conducted in the plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	368.144 & 2396568
Description of measurement methods and procedures to be applied:	The measurement of the installed capacity was tested and the report for the same is available in the plant.
QA/QC procedures to be applied:	Measurements were conducted in line with the national standards.
Any comment:	Nil

Data / Parameter:	**$EL_{PR,y}$**
Data unit:	MWh
Description:	Electricity supplied to the grid
Source of data:	Joint meter readings are taken on 10th day of every month in the presence of LKPPL and State Utility officials
Description of measurement methods and procedures to be applied:	These readings are noted from the main meter installed at the plant sub station. These meter readings are taken jointly in the presence of LKPPL and State Utility officials and are duly signed. These readings are used to raise the invoices.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2504352
QA/QC procedures to be applied:	As mentioned in B.7.2

Any comment:	Nil

Data / Parameter:	**$EL_{aux,grid,y}$**
Data unit:	MWh
Description:	Electricity used in the project power plant (Import from grid) to serve auxiliary and back loads that is obtained from the grid, if any
Source of data:	Joint meter readings and invoices
Description of measurement methods and procedures to be applied:	Meter readings for import of electricity from grid are recorded every month on 10^{th} in the presence of officials from the state grid and Plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	720
QA/QC procedures to be applied:	The Meters are calibrated regularly according to standard procedures prescribed by the grid operator. Measurement results can be cross checked with the quantity mentioned in the invoices from the grid operator.
Any comment:	

Data / Parameter:	**$FF_{HSD,y}$**
Data unit:	KL
Description:	Total amount of HSD consumed in the Emergency DG set installed in the power plant to serve auxiliary and back-up loads incase of total blackout in year *y* of the crediting period.
Source of data:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	DG set Level Gauge Indicator.
QA/QC procedures to be applied:	As per internal procedures
Any comment:	The Project is certified for ISO: 9001, ISO: 14001 and OHSAS: 18001.

Data / Parameter:	**$EF_{elec,y}$**
Data unit:	tCO_2/MWh
Description:	Emission Factor for the southern grid.
Source of data:	CEA Carbon Dioxide Database. http://cea.nic.in

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.860
Description of measurement methods and procedures to be applied:	Calculated as per ACM0002 procedures by CEA.
QA/QC procedures to be applied:	Data used is from official sources.
Any comment:	Nil

Data / Parameter:	**$EF_{NG,y}$**
Data unit:	tCO_2/TJ
Description:	Emission Factor for Natural Gas
Source of data:	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	56.1 tCo2/TJ
Description of measurement methods and procedures to be applied:	IPCC as there is no value supplied by the fuel supplier in invoices and no regional and national default values are available. Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
QA/QC procedures to be applied:	IPCC value is proposed to be used.
Any comment:	As no value has been provided by the fuel supplier, IPCC values are being used.

Data / Parameter:	**$EF_{i,y}$**
Data unit:	kg/TJ
Description:	Emission Factor for HSD
Source of data:	IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	74.1 kg/TJ
Description of measurement methods and procedures to be applied:	IPCC

QA/QC procedures to be applied:	IPCC value is proposed to be used.
Any comment:	As no value has been provided by the fuel supplier, IPCC values are being used.

Data / Parameter:	**$NCV_{NG,y}$**
Data unit:	kcal/Sm^3
Description:	NCV of NG
Source of data:	Values provided by the fuel supplier in invoices
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8794.80
Description of measurement methods and procedures to be applied:	The calorific value of the gas is provided by the supplier (GAIL) and recorded by the project participant
QA/QC procedures to be applied:	The same is determined under standard test conditions by GAIL. This will be verified within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol.2 of the 2006 IPCC Guidelines on National GHG Inventories
Any comment:	

All the above data will be archived during the entire crediting period plus two years for any further verification.

B.7.2 Description of the monitoring plan:

>>

The Monitoring and Verification (M&V) procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and data interpretation techniques for monitoring and verification of GHG emissions with specific focus on technical performance parameters. It also allows scope for review, scrutiny and benchmarking of all this information against reports pertaining to M & V protocols.

The M&V Protocol provides a range of data measurement, estimation and collection options/techniques in each case indicating preferred options consistent with good practices to allow project managers and operational staff, auditors, and verifiers to apply the most practical and cost-effective measurement approaches to the project. The aim is to enable this project have a clear, credible, and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures would be to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes, greenhouse gas (GHG) emission reductions.

The project revenue is based on the units exported as measured by export meters (both main and check meters) installed in the plant . The monitoring and verification system would mainly comprise of these meters as far as electricity export and electricity import are concerned. Monthly meter readings are recorded on 10^{th} day of every month and these records are certified by the Representatives of the Company

and State Utility. The export of electricity certified is cross checked with the monthly invoices submitted by LKPPL. The invoices, based on meter readings are also covered in the regular finance audit.

The Natural Gas input is also monitored on daily basis by Representatives of the Company and GAIL . The measurement of the quantity of Natural Gas used will produce evidence that the energy is being generated with reduced CO_2 emissions as compared to selected grid emissions.

Emissions due to operation of the plant with higher intensity GHG fuel other than Natural gas shall also be included as project emissions while estimating the emission reductions.

The project employed latest state of art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Parameters monitored are quantity and quality of Natural Gas used, total power generated, power exported to the grid and imported from the grid, etc.. All monitoring and control functions are done as per the internally accepted standards and norms. LKPPL is certified for ISO 9001, 14001 and OHSAS 18001, hence all the records are maintained as per the approved procedures and formats.

The instrumentation and control system available comprises of microprocessor-based instruments of reputed make with desired level of accuracy. All instruments are calibrated and marked at regular intervals so that the accuracy of measurement can be ensured all the time.

The energy meters are tested and calibrated utilizing a standard meter at regular intervals. The standard meter shall be calibrated once in six months at the Government approved laboratory as per terms and conditions of supply. The tests of meters are jointly conducted by authorised representatives of both LKPPL and the State grid operator and the results and correction so arrived at mutually will be applicable and binding on both the parties. The energy meters shall not be interfered with, tested or checked except in the presence of representatives of company and the State grid operator. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced and no such case has been experienced till date from the inception of the plant. If during the test checks both the check meter and the main meter is found beyond permissible limits of error, both the meters shall be immediately replaced and the correction applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter. Corrections in exported energy shall be applicable to the period between the two previous monthly reading and the sate and time of test calibration in the current month when error is observed. If both the Main and check meters fail to record or if any of the PT fuses are blown out, the export energy will be computed on a mutually agreeable basis for the period of defect.

The quantity of emission reduction units claimed by the project will be only a fraction of the total generated emissions, which depends on the actual generation mix of the grid in a particular year. Required information about the performance of power generation units of Southern grid (which include both private and public sector generation units of the grid) is available in the yearly publication of Central Electric Authority (CEA) of India. Hence, authentic data related to the measurements, recording, monitoring and control of the generation mix of the Southern network will be ensured.

The CEA report contains all information regarding type of generation like hydro, thermal, nuclear, renewable etc., installed capacity, de-rated capacity, performance of generating unit, actual generation, capacity additions during the year, etc. which will be used for verification of generation mix and emission factors for baseline calculation for a particular year.

Identified Project GHG Sources:

a) Direct On-Site Emissions:

Direct on-site emissions of the project arise from the combustion of Natural Gas in the gas turbine. These emissions mainly include CO_2.

No other GHG emission will be taking place at the project activity site.

b) Direct Off-Site Emissions:

Direct off-site emissions are those emissions, which are significant and reasonably attributable to the project activity, but are not included in the project boundary. These emissions are also called as leakages. As per the boundary defined for the project, direct on-site emission arises during the transport of Natural Gas. However, in the baseline of power generation, fuel transport will take place, which has to be taken into account. On an average, the distance over which fuels have to be transported will be larger for fossil fuel-fired power stations, contributing to baseline emissions because of a large distance to Coal mines and ports. As against Natural Gas transportation (by pipeline) will contribute to negligible emission of CO_2 (due to operation of gas blowers at gas terminal point).Transport emissions of the baseline will be much more than the transport emissions related to the project activity. To provide a conservative estimate of the emission reductions, the reduction in transport emissions in the project compared to the transport emissions in the baseline is not taken into consideration for CO_2 emission reduction estimate of the project. Transport emissions are therefore not taken into account.

c) Indirect On-Site Emissions:

The indirect on site GHG source is the consumption of energy and the emission of GHGs involved in the conversion of project activity from Naphtha to Natural Gas.

Considering the life cycle assessment of the total power generated and the emissions to be avoided in the life span of 15 –20 years, emissions from the above-mentioned source are too small and hence neglected.

No other indirect on-site emissions are anticipated from the project activity.

d) Indirect Off-Site Emissions:

The electricity generated, less the auxiliary consumption, will be exported to the southern grid through state grid to meet the increasing demand of electricity services, and there will be no creation of new activities or demand in other places / sites caused by the project.

Project Parameters affecting Emission Reduction:

Fuel Used

The major fuel to be used by the plant is Natural Gas.

The Natural Gas for the power generation is supplied at the plant boundary, through a dedicated pipeline. The following parameters will be monitored at the gas receiving station.

Calorific value of Natural Gas

Flow of Natural Gas to LKPPL

Southern region have ample reserve of Natural Gas to sustain the successful running of the plant.

Quantity of the fuel used in the Gas Turbine

Natural Gas is supplied through pipeline from gas wells up to the power plant boundary. Fuel gas supplier have the necessary pressure regulation, conditioning and tariff gas metering station at their gas supply terminal near power plant to ensure proper monitoring and quantification of gas intake in the power plant.

The Proprietary control system for gas turbine includes electronics required for data acquisition, processing and control, sequence starting of the equipment and comprehensive alarm indication. It would be possible to execute performance-monitoring functions in control system. Start-up, shutdown and normal operation would be possible from the GTG (Gas Turbine Generator) control system and would be monitored from the DCS. The system would be capable of measuring accurate gas fuel flow. The data will be recorded for further verification.

Natural Gas used in the gas Turbine

The main type of fuel used for the power generation is Natural Gas. The properties of Natural Gas like chemical composition, calorific value etc. varies from well to well. The performance of GTG will also depend on the properties of the Natural Gas used as fuel.

Operational Parameters of the Combined Cycle Power Plant

Total power generated:

The total power generated by the power project is measured in the plant premises to the best accuracy and will be recorded, monitored on a continuous basis. All measurement devices are microprocessor based with best accuracy and are calibrated at regular intervals. The parameter will substantiate the smooth operations of the project. During verification, the total power generated would be verified as compared to the power exported to the grid.

Power consumed by the plant auxiliaries:

The power consumed by plant auxiliaries is calculated as a difference between the electricity generated and the electricity exported to the grid.

Power exported to the grid (up to the baseline plant level and above the baseline plant level):

The project revenue will depend on net units exported to power off taker. All metering and check metering facilities are installed within the plant premises through which power will be evacuated to southern grid. The measurement will be recorded and monitored on a monthly basis. The actual net quantity of power exported is arrived at after joint recording of data by both LKPPL and the State grid operator.

Verification:

The performance of the Natural Gas based combined cycle power project leads to CO_2 emission reductions. In other words, if the power plant operates at high PLF and high efficiency and exports power to the grid, more emission reductions would be possible. The project control system will comprise of a sophisticated control and monitoring system for measuring and collecting the information about various process parameters, records, monitors and controls on a continuous basis.

The major activities and parameter that are to be verified are listed below:

Activities:

- Verification of various measurement and monitoring methods
- Verification of instrument calibration methods
- Verification of data generated
- Verification of measurement accuracy

Parameters:

- Quantity of the Natural Gas used
- NCV of the Natural Gas used
- Total power generation and captive power requirements.
- Power exported to the grid

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

Date of completion of baseline study and monitoring methodology: 20/07/2007

LKPPL has determined the baseline and monitoring methodology for the project activity. The entity is a project participant listed in Annex-I where the contact information has also been provided.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
14/02/2001

C.1.2. Expected operational lifetime of the project activity:

>>
The project activity is expected to be operational for a period of 30 years from the date of commencement of operations.

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/01/2008
However PP will not start the crediting period prior to the date of registration

C.2.2.2. Length:

>>

10 Y- 0M

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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In order to obtain the required clearance from the Ministry of Environment & Forest (MoEF), Government of India (GoI), an EIA Report is a statutory prerequisite. Thus, the Rapid Environmental Impact Assessment (REIA) study is aimed at predicting the possible environmental impacts due to construction and operation of the project, suggesting environmental remedies/safeguards and formulating an effective Environmental Mitigation Plan to ensure an environmentally sustainable development.

The major environmental disciplines studied include geology, soils, surface and ground water hydrology, meteorology, land use, surface and ground water quality, air quality, terrestrial and aquatic ecology, demography and socioeconomics and noise.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The fuel switch project reduces GHG and SPM emission with insignificant negative impact on environment.

Host party regulations requires LKPPL to obtain environmental clearance in the form of "No objection Certificate" from Andhra Pradesh Pollution Control Board. The other condition is that the site of the project is to be approved from the environmental angle and that the Environmental Management Plans are to be prepared and submitted to the pollution control board. Environmental Impact Assessment has been conducted for the project activity and the study indicates that the impacts of the project are not significant. The assessment of environmental impact due to the project activity has been carried out to understand if there are any significant environmental impacts and a management plan has been prepared to minimise adverse environmental impact.

The various measures undertaken by LKPPL to mitigate the possible environmental impacts are outlined below:

Sl No	Component of environment	Possible Impact (Phase wise)		Measures taken by LKPPL
		Construction Phase	Operational Phase	
1	Soil	• Soil erosion • Decreased permeability	• Soil contamination from sludge discharge • Change in pH level of soil due to deposition of air pollutants	• Plantation of appropriate vegetation • Proper storage areas for hazardous material built at international standards. • Drying of sludge generated from the neutralization and settling tank on sludge drying beds. Use of sludge cake for landfill.
2	Water	• Discharge of untreated sewage would result in faecal contamination that could lead to development of waterborne diseases as cholera, typhoid etc	• The possible contamination of water due to effluent discharge in the river. • The possible groundwater contamination for improper disposal of sludge.	• Provision of neutralization tank for neutralizing the acidic and alkali effluent. Dilution of treated effluent with condensing water before discharge. • Utilization of the treated effluent and the filtrate along with the condenser cooling water for green belt development. • Treatment of sanitary waste water in oxidation ponds and utilization for green belt development • Provision of proper sanitation facilities for the workers during the construction phase. These were connected to a septic tank.
3	Air	• Suspended particulate matter generation because of various construction activities. • Air pollution because of exhaust from vehicular movements during the construction activities	• Air pollution from combustion of Natural Gas.	• During construction suitable dust suppression system through atomized sprinklers was installed at the major dust generation points. The plant area was watered from trucks through water sprays. • The pollution due to vehicular exhausts and other related activities during construction phase was negligible, when compared to dust. • Sufficient stack height, as per MoEF guidelines, for wider dispersal of pollutants, resulting in lower ground level concentrations.

Sl No	Component of environment	Possible Impact (Phase wise)		Measures taken by LKPPL
		Construction Phase	Operational Phase	
				• Low NOx burners would be used to limit NOx emissions to only 50 ppm.
4	Noise	• Noise pollution from heavy earth moving and construction machineries. • Noise pollution from blasting operation	• High noise generation from turbine generator and cooling tower	• The following steps were undertaken to control the noise levels during the construction phase and during the operational phase: a) Adequate spacing between noise sources and between sources & operators, b) Use of absorbent material on roofs and walls for reducing reflected noise, c) Planting of small and tall trees around the plant area, d) Exposure of workers to hih noise levels through job rotation.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>> The project uses Natural Gas as a fuel, which will be supplied by GAIL (India) Limited. The GHG emissions of the combustion process, mainly CO_2, will be substantially less as compared to any other fossil fuel based power plant. The fuel is clean, therefore there is no likelihood of suspended particulates in the stack gases.

The stakeholders identified for the project are as under.

- Elected body of representatives administering the local area (village *Panchayat*)
- APTRANSCO, the State grid operator
- APPCB (Andhra Pradesh Pollution Control Board)
- Employees of LKPPL
- Non-Governmental Organisations (NGOs)
- Consultants
- Equipment Suppliers
- Local community

Stakeholders list includes the government and non-government parties, which are involved in the project at various stages. LKPPL applied / communicated to the relevant stakeholders to get the necessary clearances.

All the identified stakeholders are invited by LKPPL through letters on 14th June 2007 explaining the purpose of the meeting. LKPPL has conducted a stakeholder consultation process in an open and transparent manner on 19th June 2007 at their Plant conference hall. They have invited all identified stakeholders explaining clearly about the project and sought their view on the project. The meeting was attended by the representatives of the identified stakeholders. The detailed report of stakeholder consultation will be made available to the validator on request.

E.2. Summary of the comments received:

>> The stakeholders commented that the fuel switch activity will help in reducing the emissions. They also indicated that with Natural Gas is a clean fuel without any sulphur content, the SOx emissions are avoided. Also, compared to the other fuels like coal and naphtha, NOx emissions are also negligible. The office bearers of the local village also supported the project activity as it had helped in creating employment opportunities for the people residing in the nearby areas. The stakeholders also commended that LKPPL has helped in improving the standard of living for the local community by improving the per capita income. They also expressed their satisfaction with the various initiatives taken up by LKPPL for environment management, like setting up of an environmental committee, implementation of monitoring and control mechanisms, the fuel switch over project and mitigation of SOx and NOx. The stakeholders also referred to the various awards received by LKPPL like the TERI Award, SHE award, the CII award and the OHSAS certification as an indicator of the various efforts taken by LKPPL.

E.3. Report on how due account was taken of any comments received:

>> The comments received have been addressed in various appropriate sections of the PDD. No negative comments received from the stakeholders.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Lanco Kondapalli Power Private Limited
Street/P.O.Box:	141, Avenue #8, Banjara Hills
Building:	Lanco House
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500034
Country:	India
Telephone:	+91-40-2335-8542
FAX:	+91-40-2335-5681
E-Mail:	nagaprasad@lancogroup.com
URL:	www.lancogroup.com
Represented by:	
Title:	Representative
Salutation:	Mr.
Last Name:	Nagaprasad
Middle Name:	KV
First Name:	Kandimalla
Department:	Renewable Energy
Mobile:	+91-0-9849694410
Direct FAX:	+91-40-23355681
Direct tel:	+91-40-23358542
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding or ODA contribution is involved in the project activity.

Annex 3

BASELINE INFORMATION

Determination of grid emission factor of southern regional grid

The entire data to calculate the southern regional grid is based on the data published by Central Electricity Authority (CEA). The emission factor calculations for the same can be found at http://cea.nic.in

Annex 4

MONITORING INFORMATION

A. MONITORING PLAN

As mentioned in Section B.7.2.

Enclosure 1
Loan Interest details and NPV calculations

The loan interest details and NPV calculations are provided in attached excel sheet.

NPV Calculations for Fuel Switch at Lanco Kondapalli Fuel switch Project

	0	1	2	3	4	5	6	7	8	9	10
Old Capacity (MW)		360.788	360.788	360.788	360.788	360.788	360.788	360.788	360.788	360.788	360.788
New Capacity (MW)		368.144	368.144	368.144	368.144	368.144	368.144	368.144	368.144	368.144	368.144
Capacity Addition (MW)		7.356	7.356	7.356	7.356	7.356	7.356	7.356	7.356	7.356	7.356
Number of Operational Days		330	330	330	330	330	330	330	330	330	330
Hours of operation		24	24	24	24	24	24	24	24	24	24
PLF		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Additional Units Generated (KW)		52433568	52433568	52433568	52433568	52433568	52433568	52433568	52433568	52433568	52433568
Additional Revenue per kwh (Rs.)		1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Additional Income (Million INR)		59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19
Salvage Value (Million INR) (10%)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00
Cash Inflow (Million INR)		59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19	94.19
Interest		49.35	43.27	37.20	31.13	25.05	18.98	12.91	6.83	1.14	0.00
Net Flow (Million INR)		9.84	15.91	21.99	28.06	34.13	40.21	46.28	52.35	58.05	94.19
Present value of the Cashflow		8.57	12.09	14.55	16.18	17.16	17.61	17.67	17.42	16.83	23.79
Discounting Factor		14.75%									
Total Present value of Cashflow		161.86									
Capital Investment (Million INR)	350	0	0	0	0	0	0	0	0	0	0
Net Present Value (Million INR)		-188.14									

Impact Of CDM											
CDM Funds (Million INR)		64.72	64.72	64.72	64.72	64.72	64.72	64.72	64.72	64.72	64.72
Total Inflow (Million INR)		74.56	80.63	86.70	92.78	98.85	104.92	111.00	117.07	122.77	158.90
Present value of Inflow including CDM (Million INR)		64.97	61.23	57.38	53.51	49.68	45.96	42.37	38.94	35.59	40.14
Total Present Value (Million INR)		489.78									
Net Present Value (Million INR)		139.78									

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