



LANCO KONDAPALLI POWER PVT LTD
(An ISO: 9001, ISO: 14001 & ISO: 18001 Certified Company)
LKPPL FUEL SWITCH PROJECT FOR GENERATION
OF
CLEANER POWER

MONITORING REPORT

VERSION 2 DATED 19 JULY 2007

FOR THE PERIOD
SEPTEMBER 10, 2001 TO JANUARY 10, 2007
(both days included)

Project Location

Kondapalli IDA, Krishna Dist
Andhra Pradesh, India

Registered Office

Lanco House, 141, Avenue # 8
LV Prasad Marg, Road No. 2
Banjara Hills, Hyderabad – 500034
Andhra Pradesh, India
Email: nagaprasad@lancogroup.com

Project details:

Lanco Kondapalli Power Pvt Ltd (LKPPL), 368 MW Gas based Power Plant is located at Kondapalli IDA, Krishna Dist, Andhra Pradesh, India. The purpose of the project activity is generation of electricity using clean fuel and exporting to the state grid. The plant was installed with intent to generate power with liquid fuel. The plant was operating on Naphtha as liquid fuel. In the project activity power plant (PAPP), Naphtha is replaced by natural gas (NG) as fuel for power generation. Combustion of natural gas for power generation emits less carbon di-oxide 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.

The project is situated around 250 kms from Hyderabad (capital of Andhra Pradesh state) at Kondapalli IDA. The project site elevation is 35 meters above the mean sea level. The mean ambient temperature is 32⁰C and the relative humidity range is between 40% to 75%. The Annual Average Rainfall is about 1000 mm Maximum. Climatic Conditions are tropical, hot and humid.

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

LKPPL has awarded EPC (Engineering, Procurement & Construction) Contract to Doosan Heavy Industries (Formerly known as HANJUNG), Korea on turnkey basis.

Doosan has placed orders on various manufacturers / Contractors for supply and installation of equipment. The details of major equipment installed at Plant are as below:

Gas Turbine Generator (GTG) 1 (GTG 1), S. No 500451, Make – GE Alstom

Gas Turbine Generator 2 (GTG 2), S. No 579057, Make – GE Alstom

Steam Turbine Generator (STG) 1, S. No 500451, Make – Alstom

Heat Recovery Steam Generator (HRSG) 1, S. No. AP 3525 / 3526 / 3527 (assigned by Director of Boilers, Andhra Pradesh), Make – Doosan (formerly HANJUNG), Korea

Heat Recovery Steam Generator 2, S. No AP 3528 / 3529 / 3530 (assigned by Director of Boilers, Andhra Pradesh), Make – Doosan (formerly HANJUNG), Korea

Cooling Tower, Make – Shriram Towertech Chennai

Switch Yard, Make – Alstom

DCS, Make – Siemens

Transformers, Make – Alstom

Water Treatment Plant, Make – Ion Exchange

Supplier for fuel switch activity:

LKPPL has awarded EPC (Engineering, Procurement & Construction) Contract for fuel switch activity also to Doosan Heavy Industries (Formerly known as HANJUNG), Korea on turnkey basis. The necessary equipment has in turn been supplied by Multitech Filtration Engineers.

Energy meters: Two numbers energy meters were found installed as “Main meter and Check meters (Tag no. GEC 03864 & GEC 03685)”. These meters are being used for recording of export of electricity to the grid by the project activity and import of electricity from the grid to the project activity during plant shutdown condition. The monthly readings are being recorded on 10th day of every month and these readings are jointly certified by APTRANSCO and LKPPL representatives. The certified monthly meter readings are used for raising the invoices by the PP. The details of the energy meters are as under:

Serial Nos: GEC 03864 & GEC 03685

Type: E3V021 (MWh, MVA_{rh}, MVA_h, MVA)

Name of the manufacturer: Secure Meters Limited, Udaipur

Static Meters: 3 Phase, 3 wire, 50 Hz, 220 kV/110V, 750/1 Amp

Power Factor: 1 to -1

Reference Temperature: 27°C

Year: 2001; Class: 0.2 S

Gas Flow meters (Tag No. FE 302): Gas flow meters are being used to quantify the gas supplied by Gas Authority of India Limited (GAIL, A government of India enterprises) to the project activity.

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

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

The Company has spent around 14370.55 Million INR (Approx. US\$ 350.50 Million, 1US\$ = 41INR) during the present monitoring period towards gas usage in the Plant.

Statement to what extent the Project has been implemented as planned

The Project has been completed as planned and described in the draft Project Design Document (PDD).

The Plant is in operation continuously since commissioning (with outages – forced & planned) during the present monitoring period.

Project's contribution to sustainable development

A brief description of the contribution of the project activity towards 'Sustainable Development of India' is discussed under.

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 APTRANSCO grid. This power generation substitutes the power generation by APTRANSCO which is predominantly operated with coal as fuel. Since the Carbon Dioxide (CO₂) emission due to combustion of Natural Gas is substantially less as compared to combustion of coal, lignite or Naptha, 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 coal and increasing its availability to other places where natural gas is not available.

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: 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 etc.,

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. It's a folk art which is becoming extinct. Soft wood and natural dyes extracted from locally available material are used in the process.

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 support LIGHT to run its various charity activities. So far LKPPL has donated 29.66 Million INR to LIGHT 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 400 bore wells in the villages. Till date, LIGHT has provided more than 1000 wheel chair, tri cycles for the physically challenged persons.

Apart from this donation to LIGHT, LKPPL is paying tax to local panchayat, which is being used for development of local region.

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 of about 360 MW of Power to APTRANSCO 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.

Monitoring Period

The present Monitoring period is chosen from 10th September 2001 to 10th January 2007, both days included partly.

Parameters not required to monitored and fixed for entire crediting period

For the Project, the following parameters are not required to be monitored on continuous basis and are fixed during the validation stage for entire crediting period:

Parameter:	EL_{his}
Data unit:	MWh
Description:	Electricity supplied to the electricity grid in the absence of the project activity
Source of data	Electricity meters at the project site
Measurement procedures (if any)	Electricity meter readings are recorded every month 10 th in the presence of officials from APTRANSCO and plant
Any Comment	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 more break downs, shut downs etc

Parameter:	η_{BL}
Data unit:	Fraction
Description:	Efficiency of the PAPP prior to the implementation of the project activity
Source of data	Based on measurement of efficiency of the PAPP using the fuel consumed and electricity generated data
Measurement procedures (if any)	
Any Comment	All measurements are conducted at an average load factor of the plant that is representative of the situation during the project activity

Parameter:	$EF_{FF,BL}$
Data unit:	tC/mass or volume unit
Description:	CO ₂ emission factor of Naphtha used in the PAPP prior to the implementation of the project activity
Source of data	IPCC default value is considered as there is no value provided by the supplier in invoices and there is no national or regional default values available

Parameter:	$NCV_{FF,BL}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of Naphtha used in the PAPP prior to implementation of the project activity
Source of data	Values provided by the fuel supplier in invoices
Measurement procedures (if any)	Measurements are undertaken in line with national fuel standards by fuel supplier

Parameter:	$EF_{CO_2,upstream,CH_4}$
Data unit:	tCH ₄ /TJ
Description:	Emission factor for upstream fugitive methane emissions from production of the fuel used in PAPP prior to project implementation
Source of data	Table 2 in the leakage section of the methodology

Parameter:	$EF_{NG,upstream,CH_4}$
Data unit:	tCH ₄ /TJ
Description:	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of natural gas
Source of data	Table 2 in the leakage section of the methodology

Parameter:	GWP_{CH_4}
Data unit:	tCO ₂ /tCH ₄
Description:	Global warming potential of methane valid for relevant commitment period
Source of data	IPCC
Measurement procedures (if any)	Default value for the first commitment period = 21 tCO _{2e} /tCH ₄

Parameters being monitored

For the Project, the following parameters are being monitored on continuous basis:

Data / Parameter:	Installed capacity and electricity generation
Data unit:	MW and MWh respectively
Description:	Installed capacity and Electricity generation of the project power plant
Source of data to be used:	Project site
Measurement procedures (if any)	The installed capacity of the power plant before and after the fuel switch is tested and documented.
Monitoring frequency	Plant Capacity is tested before and after the fuel switch. Power Generation is monitored on monthly basis.

Data / Parameter:	$EL_{aux,grid,y}$
Data unit:	MWh
Description:	Electricity used in the project power plant to serve auxiliary and back loads that is obtained from the grid, if any
Source of data to be used:	Electricity meters at the project site
Measurement procedures (if any)	Meter readings will be recorded every month on 10 th in the presence of officials from APTRANSCO and Plant.
Monitoring frequency	Monthly
QA/QC procedures to be applied:	Meters are calibrated as per APTRANSCO procedures once in six months with the help of Central Power Research Institute (CPRI)

Data / Parameter:	$EL_{PR,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid in a year, y of crediting period
Source of data to be	Electricity meters at the project site

used:	
Measurement procedures (if any)	Joint Meter readings will be recorded every month on 10 th in the presence of officials from APTRANSCO and Plant.
Monitoring frequency	Monthly
QA/QC procedures to be applied:	Meters are calibrated as per APTRANSCO procedures once in six months with the help of Central Power Research Institute (CPRI)

Data / Parameter:	$FF_{aux,i,y}$
Data unit:	Mass or volume units
Description:	Total amount of fossil fuel used in the project power plant to serve auxiliary and back-up loads in year y of the crediting period
Source of data to be used:	HSD consumption Records at the project site
Monitoring frequency	Monthly

Data / Parameter:	$EF_{elec,y}$
Data unit:	tCO ₂ /MWh
Description:	Emission factor for the grid in year, y
Source of data to be used:	Using ACM0002, CEA data (Refer http://cea.nic.in)
Monitoring frequency	As per ACM0002 procedures
QA/QC procedures to be applied:	As per ACM0002 procedures

Data / Parameter:	$EF_{NG,y}$
Data unit:	tC/mass or volume unit (used tC/TJ)
Description:	CO ₂ emission factor of the natural gas used in the PAPP in year, y
Source of data to be used:	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
Monitoring frequency	Any future revision of the IPCC guidelines will be taken into account

Data / Parameter:	$EF_{i,y}$
Data unit:	tC/mass or volume unit
Description:	CO ₂ emission factor of the fossil fuel (HSD), other than natural gas used in the PAPP to serve auxiliary and back-up loads in year, y
Source of data	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
Monitoring frequency	Any future revision of the IPCC guidelines will be taken into account

Data / Parameter:	NCV _{NG,y}
Data unit:	GJ/m ³ (or kcal/SCM)
Description:	Weighted average net calorific value of natural gas in year y
Source of data	Fuel supplier
Measurement procedures (if any)	The calorific value of the gas is provided by the supplier (GAIL) and recorded by the project participant
Monitoring frequency:	Monthly
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.

Data / Parameter:	NG _y
Data unit:	m ³
Description:	Total amount of natural gas used in the project power plant in year y of the crediting period
Source of data:	Fuel flow meter reading at project boundary, GAIL Certified joint meter readings
Measurement procedures (if any)	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 continuously and daily readings are being recorded. The gas flow meter is calibrated at regular intervals as per GAIL standards.
Monitoring frequency:	Monthly
QA/QC procedures to be applied:	Natural gas supply metering to the project is subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the gas company.

Emission Reduction Calculations

Baseline, project emissions and leakage are calculated as per the formulas mentioned in ACM0011.

Baseline emissions

Baseline emissions are calculated as per the formula given below:

$$BE_y = EL_{BL,y} \cdot EF_{elec,BL} \quad (1)$$

Where as

$BE_{elec,y}$ Baseline emissions due to the generation of electricity supplied to the electricity grid in year y of the crediting period (tCO₂)

$EL_{BL,y}$ Electricity supplied to the electricity grid in year y of the crediting period, not exceeding the supply in absence of the project activity (MWh)

$EF_{elec,BL}$ Emission factor for the baseline source of electricity supplied to the electricity grid (tCO₂/MWh)

The amount of electricity that would be supplied to the electricity grid in the absence of the project activity is quantified as the maximum historic annual amount of electricity over 10 months prior to implementation of project activity.

$$EL_{BL,y} = \begin{cases} EL_{PR,y} & \text{if } EL_{PR,y} < EL_{his} \\ EL_{his} & \text{if } EL_{PR,y} \geq EL_{his} \end{cases} \quad (2)$$

$EL_{PR,y}$ Total electricity supplied to the electricity grid by PAPP in the project case in year y of the crediting period (MWh)

$$EF_{elec,BL} = \frac{44}{12} \cdot \frac{3.6}{1000} \cdot \frac{EF_{FF,BL}}{NCV_{FF,BL} \cdot \eta_{BL}} \quad (3)$$

$EF_{FF,BL}$ CO₂ emission factor for the Naphtha used in the PAPP prior to the implementation of the project activity (tC/mass or volume unit)

$NCV_{FF,BL}$ Net calorific value of fossil fuel used in the PAPP prior to implementation of the project activity (TJ/mass or volume unit)

η_{BL} Efficiency of the power plant prior to implementation of the project activity

Project Emissions

Project Emissions due to usage of gas are calculated as per the formula given below:

$$PE_y = PE_{NG,y} + PE_{aux,y} \quad (4)$$

$PE_{NG,y}$ Emissions due to the combustion of natural gas for the production of electricity in year y of the crediting period (tCO₂)

$PE_{aux,y}$ Emissions due to the use of energy (fuel other than natural gas and/or electricity) in year y of the crediting period (tCO₂)

Emissions due to the combustion of natural gas for the production of electricity are calculated as:

$$PE_{NG,y} = [44/12] \cdot NG_y \cdot EF_{NG,y} \quad (5)$$

NG_y Total amount of natural gas used in the project power plant in year y of the crediting period (mass or volume units)

$EF_{NG,y}$ CO₂ emission factor of natural gas (tC/mass or volume)

For small amounts of other fossil fuels and/or the grid electricity used in project activity to serve auxiliary and back-up loads, corresponding emissions are accounted as follows:

$$PE_{aux,y} = \frac{44}{12} \cdot \sum_i (FF_{aux,i,y} \cdot EF_i) + EL_{aux,grid,y} \cdot EF_{elec,y} \quad (6)$$

$FF_{aux,i,y}$ Total amount of fossil fuel i used in the project power plant to serve auxiliary and back-up loads in year y of the crediting period (mass or volume units)

EF_i CO₂ emission factor of fossil fuel i (tC/mass or volume unit)

$EL_{aux,grid,y}$ Electricity used in the project power plant to serve auxiliary and back-up loads that is obtained from the grid, if any (MWh)

$EF_{elec,y}$ Combined margin emission factor for the grid electricity to which the project activity is connected calculated as per the latest version of ACM0002, using 50/50 OM/BM weight (tCO₂/MWh) – 0.860 tCo₂/MWh is used for the calculations

Leakage

The leakage emissions are calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{LNG,CO_2,y}$$

LE_y	Leakage emissions during the year y (tCO ₂)
$LE_{CH_4,y}$	Leakage emissions due to fugitive upstream CH ₄ emissions in the year y (tCO ₂)
$LE_{LNG,CO_2,y}$	Leakage 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 during the year y (tCO ₂)

There will be no liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system for the NG used in the project activity, so $LE_{LNG,CO_2,y}$ is considered as zero.

Fugitive methane emissions

For the purpose of determining fugitive methane emissions associated with the production - and in case of natural gas, the transportation and distribution of the fuels - project participants should multiply the quantity of natural gas consumed in the project power plant with a methane emission factor for these upstream emissions, and subtract, for all fuel types i which would be used in the absence of the project activity, the fuel quantities multiplied with respective methane emission factors, as follows:

$$LE_{CH_4,y} = NG_y \cdot NCV_{NG,y} \cdot EF_{NG,upstream,CH_4} - \frac{EL_{BL,y}}{100} \cdot NCV_{FF,y} \cdot EF_{FF,upstream,CH_4} \cdot GWP_{CH_4} \quad (8)$$

$L_{CH_4,y}$	Leakage emissions due to upstream fugitive CH ₄ emissions in the year y (tCO ₂)
NG_y	Total amount of natural gas used in the project power plant in year y of the crediting period (mass or volume units)
$NCV_{NG,y}$	Net calorific value of natural gas, referred to in the same basis (pressure and temperature) as NG _y (TJ/mass or volume units)
$EF_{NG,upstream,CH_4}$	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of natural gas (tCH ₄ /TJ)

$EL_{elec,BL,y}$	Electricity supplied to the captive consumer/electricity grid in year y of the crediting period up to the level of baseline supply (MWh)
$\eta_{BL,y}$	Efficiency of the power plant in the baseline as function of the load factor of the project activity power plant in year y of the crediting period
$NCV_{i,y}$	Net calorific value of fossil fuel i (TJ/mass or volume units)
$EF_{i,upstream,CH_4}$	Emission factor for upstream fugitive methane emissions from production of the fuel type i (a coal or petroleum fuel type) (tCH ₄ /TJ)
GWP_{CH_4}	Global warming potential of methane valid for the relevant commitment period

The default values used in the project activity, which are fixed for throughout crediting period are as follows:

S No	Parameter	Default Value	Remarks
1	Emission factor for fugitive CH ₄ upstream emissions for Oil (Naphtha)	4.1 tCH ₄ /PJ	As per the Table 2 of the methodology. This value includes for oil production, transport, refining and storage.
2	Emission factor for fugitive CH ₄ upstream emissions for Natural Gas	160 tCH ₄ /PJ	As per the Table 2 of the methodology, 296 tCH ₄ /PJ is applicable for rest of the world and 160 tCH ₄ /PJ is for USA and Canada. However, the US/Canada value is used as the system element (gas production and / or processing/transmission / distribution) is predominantly of recent vintage and built and operated to international standards. GAIL is maintaining all its processing plants and gas transmission lines matching the international standards and are of recent vintage. GAIL also formulating a guidelines for the pipelines along with the BIS for development of uniform standards for high-pressure oil and gas transmission pipeline systems. Also GAIL conducts the regular safety audits to maintain the international safety standards with some reputed international firms.

Emission Reductions:

To calculate the emission reductions the project participant had applied the following equation:

$$ER_y = BE_y - PE_y - LE_y \quad (9)$$

Where:

ER_y Emission reductions during the year y (t CO₂/yr)

BE_y Baseline emissions during the year y (t CO₂/yr)

PE_y Project emissions during the year y (t CO₂/yr)

LE_y leakage emissions during the year y (t CO₂/yr)

Monitoring Data

Year-wise data on Electricity Generation, Electricity supplied to grid, electricity import from grid to serve auxiliary and back loads, natural gas consumption, NCV and Emission Reductions is given below for the present monitoring period:

Electricity Generation, Export, Import, Natural Gas Consumption, Gas Analysis & HSD Consumption details

Period Parameter	10 Sept 01 - 10 Jan 02	10 Jan 02 - 10 Jan 03	10 Jan 03 - 10 Jan 04	10 Jan 04 - 10 Jan 05	10 Jan 05 - 10 Jan 06	10 Jan 06 - 10 Jan 07	TOTAL
Electricity Generation, MWh	737087.00	2569211.65	2324756.49	2260586.44	2241331.37	1729612.49	11862585.44
Electricity supplied to electricity grid, MWh	717944.00	2510300.10	2270461.00	2205669.00	2185571.00	1686724.00	11576669.10
Electricity Import from grid to serve auxiliary and back loads, MWh	572.12	1030.15	996.29	1185.19	936.25	960.19	5680.19
NG Consumption, MMSCM	152.430816	532.682715	486.417482	468.675951	466.734734	389.651352	2496.593050
Avg NCV of NG, Kcal/SM3	8613	8426	8497	8597	8678	8639	8575
HSD Consumption, Lit	122.13	355.73	590.70	37.00	2941.60	7546.90	11594.00

Month wise details of all the above parameters are given in separate excel spread sheet.
The emission reductions for the monitoring period are as given below:

Summary of emission Reductions

Period Parameter	10 Sept 01 - 10 Jan 02	10 Jan 02 - 10 Jan 03	10 Jan 03 - 10 Jan 04	10 Jan 04 - 10 Jan 05	10 Jan 05 - 10 Jan 06	10 Jan 06 - 10 Jan 07	TOTAL
Electricity supplied to grid, MWh	717944.00	2510300.10	2270461.00	2205669.00	2185571.00	1686724.00	11576669.10
NG Consumption, MMSCM	152.430816	532.682715	486.417482	468.675951	466.734734	389.651352	2496.593050
Baseline Emissions, tCo2	420999.95	1421034.45	1360775.31	1313044.43	1305510.90	1006433.20	6827798.23
Project Emissions, tCo2	308041.99	1053746.96	969769.84	945911.06	950437.48	791179.17	5019086.50
Leakages, tCo2	17947.98	61465.47	56505.10	55120.01	55411.91	46206.84	292657.32
Emission Reductions, tCo2	95009.97	305822.02	334500.37	312013.36	299661.51	169047.19	1516054.42

Measures to ensure the Results / uncertainty analysis

Parameters monitored are quantity and quality of gas consumed, Electricity generated, Electricity supplied to the grid, electricity imported from grid for the project, etc. All monitoring and control functions are done as per the internally accepted standards and norms.

Electricity generation from the plant is monitored continuously by the DCS available in the Central Control Room (CCR).

As per the Power Purchase Agreement, the electricity supplied to the Grid is recorded from two independent meters viz., Main Meter and Check Meter. Both the meters are of 0.2 class of accuracy and readings of both the meters are compared monthly. However readings of main meter is used for billing purpose. Both the meters, Main and Check meters are being calibrated half yearly intervals as per APTRANSCO requirement. In the event of main meter not in operation / fails, the reading of the check meter shall be used for Billing.

Electricity supplied to the grid and imported from the grid is monitored from energy meters installed at metering station, on 10th day of every month. A joint meter reading for the electricity exported to the Grid and import from the grid is recorded by representatives of APTRANSCO and Company and the readings are jointly signed by both the parties as a proof of export of electricity to the grid from power plant and import of electricity from grid by the power plant. These meter readings are the basis for the invoices raised by LKPPL.

Natural gas 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 near the Power Plant to ensure proper monitoring and quantification of gas intake to the Plant. Quantity of gas intake to the Power Plant shall be measured with the help of Gas Flow meter continuously and daily readings shall be recorded accordingly in the gas tickets and these daily gas tickets shall be jointly certified by the representatives of GAIL and LKPPL. The gas flow meter shall be calibrated at regular intervals as per GAIL standards.

Average calorific value of the gas intake shall be monitored and recorded in the joint gas ticket as furnished by GAIL.

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

The Project is certified for ISO 9001, ISO 14001 and ISO 18001. Hence all the parameters are being monitored and documented as per the requirement and as part of standard internal procedures.

Electricity Generation, supplied to grid and gas consumption are being recorded daily and the same are being verified by Operations Dept, reviewed by Vice President and approved by the Director.

Roles & Responsibilities

A CDM Committee has been formed for the Project Activity for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of the Company and as per PDD. Qualified and trained people are monitoring the parameters and emission reductions.

In the complete implementation and monitoring Plan, the Company is the sole agency responsible for implementation and monitoring.

Abbreviations:

APTRANSCO	Transmission Corporation of Andhra Pradesh
CCPP	Combined Cycle Power Plant
CCR	Central Control Room
CDM	Clean Development Mechanism
CO ₂	Carbon Dioxide
CPRI	Central Power Research Institute
DCS	Distributed Control System
GAIL	Gas Authority of India Ltd
GHG	Green House Gases
GTG	Gas Turbine Generator
HRSG	Heat Recovery Steam Generator
INR	Indian National Rupees
ISO	International Organization for Standardization
kW	Kilo Watt
LIGHT	LANCO Institute of General Humanitarian Trust
LKPPL	Lanco Kondapalli Power Pvt Ltd
MW	Mega Watts
MMSCM	Million Standard Cubic meter
NG	Natural Gas
NCV	Net Calorific value
ONGC	Oil and Natural Gas Commission
O&M	Operation & Maintenance
PAPP	Project Activity Power Plant
PDD	Project Design Document
SCM	Standard Cubic Meter
STG	Steam Turbine Generator
SO ₂	Sulphur Dioxide
UNFCCC	United Nations Framework Convention on Climate Change