CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Construction of additional cooling tower cells at AES Lal Pir (Pvt.) Ltd. Muzaffar Garh, Pakistan
Version: 01
Dated: January, 2007

A.2. Description of the small-scale project activity:

Purpose & Activity:

AES is planning for improving the cooling tower performance at Lal Pir Power Station on both units (2x365 MW) which is located in Muzaffar Garh, Pakistan because the cooling tower has a large impact on the plant heat rate. Due to bad heat rate, more fuel burning occurs and in resultant CO2 emission increases.
Historically large utility cooling towers have been undersized when newly constructed and ignored as they degrade. Because the loss of performance is often spread out over long periods of time, this "chronic" loss of performance can have significant heat rate impacts. Even when the cooling tower is physically capable of performing well, they are often poorly configured resulting in a loss of cooling capacity and not performing according to its design. The "Cooling Tower Performance Improvement through cell addition" will focus on improving the heat rate and eventually less fuel burning & reduction in CO2 emission.
Each unit is equipped with seven cells, counter flow cooling tower designated in accordance with conditions provided below in table.

	Design Conditions	Actual Conditions
Hot water temperature	41 C	49 C
Cold water temperature	30 C	35 C
Inlet air wet bulb temp.	20 C	30 C
Cooling range	11 C	13 C
Circulation water rate	37,000 m3/h	33,500 m3/hr
Fan power (per fan)	190 kW	193 kW

The proposed CDM project will cover the improvement in energy efficiency and ultimate reduction in CO2 emission.

Project's contribution towards Sustainable Development:

The energy efficiency improvement initiative is one of the major steps taken up by the company in Keeping with its commitment as a responsible corporate citizen contributing towards sustainable development.
The project proponents believe that the project activity has contributed to sustainable development in following manners:

- Social well being
- Environmental well being
- Technological well being

Social well being

The social well being is assessed by contribution by the project activity to improvement in living standards of the local community. The project activity provides job opportunities initially on contract basis to the local population during erection and operation of the project contributing in poverty alleviation of the local community and development of basic amenities to community leading to improvement in living standards of the local population.
As an enlightened corporate citizen, AES Lal Pir is keenly aware of its social responsibilities, and besides providing education and health care facilities for its employees, their families and the community at large, the Group is involved in a number of philanthropic activities, also.
Thus the project activity has contributed to social well being.

Environmental well being

The project activity of energy efficiency corresponds to the reduced fossil fuel combustion, which implies reduced GHG emission, reduced emission of other wastes and reduced pollution load. Additionally, the project activity will contribute in the conservation of natural resources, too. The project activity is an environment friendly energy efficiency project with no significant impact on the environment. .
The following environmental benefits are derived from the project activity:

- Reduction in GHG emissions.
- Conservation in Natural Resources.
- Rural development as the project activity location
- Nil impact on the environment due to the project activity.

Technological well being

There is continuous research and development on the energy efficiency projects and new technologies are being introduced to do this, in which cooling tower is major part, which augurs well for the technological well being.
Also, the generated electricity from the project activity is connected to the grid. The project activity improves the supply of electricity with clean, energy efficiency while contributing to the regional/local economic development. Energy improvement plants provide local distributed

generation, and provide site-specific reliability and transmission and distribution benefits including:

- Improved power quality;
- Reduced fuel consumption;
- Power control;
- Mitigation of natural resources losses ,

All the above are the contributions of the project activity for the sustainable development.

A.3. Project participants:

((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)
AES Lal Pir	Private	No

AES Lal Pir will be the sole owner of the certified emission reduction generated by the project. In case of joining of any party, AES will inform UNFCCC with all details of the party as required.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

The project will be located near Muzaffar Garh, Pakistan

A.4.1.1. Host Party (ies):

Pakistan

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

Punjab

A.4.1.3. City/Town/Community etc:

Muzaffar Garh

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity:

A.4.2. Type and category (ies) and technology/measure of the small-scale project activity:

Using the categorization of Appendix B to the simplified modalities and procedures for small-scale CDM project activities, hereafter referred to as Appendix B (http://cdm.unfccc.int/methodologies/SSCmethodologies), and following the new amendments for the Simplified Modalities and Procedures for Small Scale project activities, the project fails in the category of Small scale, since it fulfils the eligibility criteria for type II activities:

TYPE II — Energy efficiency improvement projects: (b) Type II project activities or those relating to improvements in energy efficiency which reduce energy consumption, on the supply and/or demand side, shall be limited to those with a maximum output of 60 GWh per year (or an appropriate equivalent);

Version: 09

The proposed Project activity fulfils the eligibility criteria for type II activities because it is expected to generate savings in fossil fuel consumption through energy efficiency project of the cooling tower cell which reduces the energy consumption.

Technology:

The Addition of one cell on both units will be done on the basis of feasibility report submitted by Spig, Italy. New technology used in the Project includes:

1. **Distribution system** inside cooling tower will be based on ecojet type nozzles, this innovative nozzle is SPIG patented and it has been designed in order to reach the followings main goals;

- Large square water distribution area (approximately 1 m2) in order to avoid the

Overlapping of water distribution area each others
- Uniform specific water load in order to solve the air by-pass where the feed water is low.
- Self cleaning surface by means of rotating impeller
- Anti clogging

2. The **Film packing & Drift Eliminators,** made of slightly sloped waves and corrugated surfaces, self spacing, which mixing the external and internal layer of water, considerably improves the heat and mass exchange coefficients.
3. **Mechanical Equipment**; the fans are driven by an electric motor designed for severe Cooling Tower service. Motor supports are designed to transfer the dynamic loads to the cooling tower structure, minimizing vibrations and allowing easy maintenance and alignment. All the rotating parts outside the fan stack are protected by accidental interference in accordance with the most updated safety standard.
4. Fan is multiblade type and has the main function of ensuring the Cooling Tower design air volume necessary for cooling. The fan is placed on the high section of the cell, (fan deck) and it is directly coupled with the gear box.
5. The cooling tower is completed with the following items, designed in accordance with the most updated safety regulations to satisfy the plant standard; fan deck handrails, stair and ladder, inspection Hatch.

Project Technology Operation:

New technology will add in the performance improvement of the energy generation of the plant. Cooling tower cell will be used to cool the water with high efficiency and then condensing the steam in efficiently manner to increase the vacuum of condenser which will reduce the fuel consumption for the production of steam for turbine to generate electricity.
The vacuum is produced in the steam space of the condenser of the rapid and considerable change in the volume occupied by each pound of steam as it changes in water. To each this, either cooling tower or cooling pounds are used and in both methods, the warm water is cooled by exposure to the atmosphere, and subsequent evaporation of the water.
In case of cooling towers water is delivered to the top of the tower and falls by gravity over an arrangement of splash bars to a reservoir at the bottom, the air is caused to rise up through the falling water by mechanical induced draft fan.
In the induced draft type, the fan is located at the top of the tower and draws air in through louvers situated around the tower base. The air passes upwardly through falling water and passes through baffle type, drift eliminators, which separate any entrained moisture from the air. The air is then discharged at a relatively high velocity by fans. Moreover, a turbine shaft is supported on oil-lubricated bearing. In addition the speed governing mechanism is using oil from the same source. Temperature excursions will greatly disturb the viscosity of the rendering it unsuitable for use as lubricant or hydraulic fluid. Also oil may decompose and promote sludge/deposition problems that in the extreme may cause bearing and rotor damage as well as over speeding and sluggish control characteristics. For this reason oil is cooled in special heat exchangers in which the cooling fluid is circ. Water. Stator coolant temperature control is also affected by circ water supply. The condenser vacuum pumps also use seal water that heats up during operation so in order to cool the seal water, circulating water is used.

The circulating water after removing heat from these locations returns to the cooling tower where it rejects this heat by evaporation and sensible cooling. A chemical treatment is also done to keep the water chemistry within limits to avoid any scaling/corrosion in the system.
This all operation controlled through continuous monitoring of the system via digital control system as well as manually through area rounds.
The whole project will be monitored by the host company & cell with new technology will play important role in order to achieve the performance improvements targets & to reduce the GHG's emission in future.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The estimated amount of emission reduction during the crediting period shall be as follows:

Years	Annual estimation of emission reductions in tons of CO2e
2008	9,542.7
2009	9,542.7
2010	9,542.7
2011	9,542.7
2012	9,542.7
2013	9,542.7
2014	9,542.7
2015	9,542.7
2016	9,542.7
2017	9,542.7
Total estimated reductions (tons of CO2 e)	95,427.00
Total number of credits years	10
Annual average over the crediting period of estimated reductions (tons of CO2 e)	9,542
Approx. Price per tCO2 (unit CER price)	$10/tCO2

A.4.4. public funding of the small-scale project activity:

The implementation of this project is not dependent on any Official Development Assistance resources or other resources from international development funding agency. The project is not subsidized by any public funds and hence, there is no Public Funding involved in this project.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As per Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities -
"A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point."

The project activity is not a debundled component of a large project activity as -

There is no small scale CDM project activity or an application registered by CSL, in the same project category in the last two years within 1 km of the project boundary of the proposed small-scale project activity.

SECTION B. Application of a baseline and monitoring methodology

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

Title of the approved baseline methodology:

Type II – B: **"Supply side energy efficiency improvements – generation"**
Version: 09/ II.B
The project activity conforms to TYPE - IIB of Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities.
http://cdm.unfccc.int/methodologies/approved

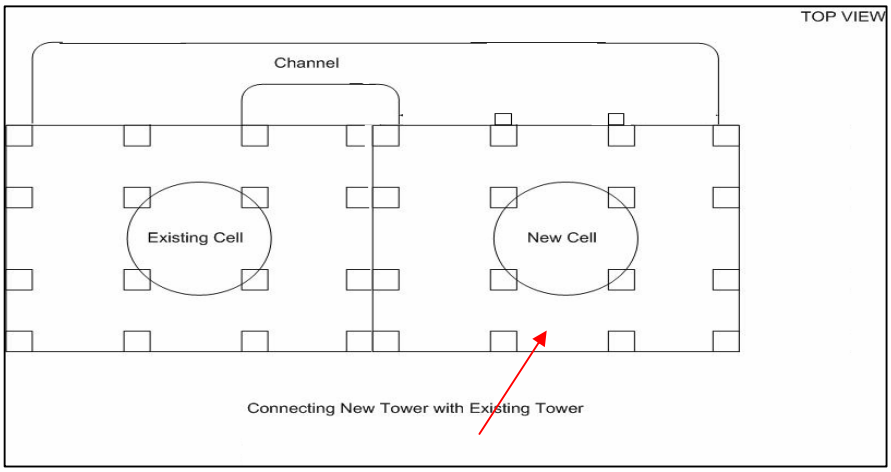
B.2 Justification of the choice of the project category:

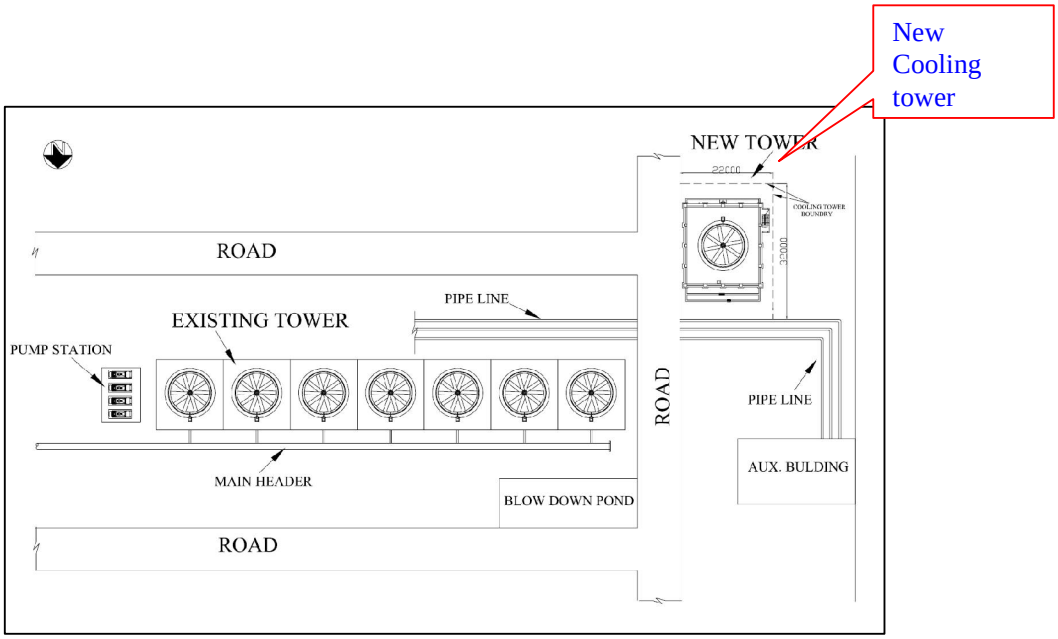
The proposed project activity aims to improve the efficiency of the generation system at the AES Power plant. Following the new amendments incorporated in Decision-/CMP.2 Further guidance relating to the clean development mechanism, for the Simplified Modalities and Procedures for Small Scale project activities:
TYPE II — Energy efficiency improvement projects: (b) Type II project activities or those relating to improvements in energy efficiency which reduce energy consumption, on the supply and/or demand side, shall be limited to those with a maximum output of 60 GWh per year (or an appropriate equivalent);

The proposed Project activity fulfils the eligibility criteria for type II activities because it will generate savings in fossil fuel consumption and grid electricity up to a total maximum of 12.702 GWh per year.
In choosing the methodology, and taking into account the type of Project and its scope, the immediate choice for the methodology is: TYPE II B - Supply side energy efficiency improvements – generation. The project fulfils the applicability criteria of this methodology:
This category comprises technologies or measures to improve the efficiency of fossil fuel generating units that supply an electricity or thermal system by reducing energy or fuel consumption by up to the equivalent of 60 GWhe per year. The technologies or measures may be applied to existing stations or be part of a new facility. A total saving of 60 GWhe is equivalent to maximal saving of 180 GWhth in the fuel input to the generation unit. The Total project cost would be approx. $1.6 million.

B.3. Description of the project boundary:

According to Annex B of the Simplified Modalities and Procedures for Small Scale Project Activities: The project boundary shall be limited to the physical project activity. Project activities that displace energy supplied by external sources shall earn certified emission reductions (CERs) for the emission reductions associated with the reduced supply of energy by those external sources.
Therefore the Project boundary is the physical and geographical site of power station unit affected by the efficiency measures and reductions can be claimed by the displacement of electricity from the grid.





B.4. Description of baseline and its development:

Following the methodology AMS-II B, for Energy efficiency improvement projects, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced.
Also, Energy efficiency projects, generation side baseline emission calculations carried out as stated in the "AMS-II B Energy Efficiency Improvement Project, baseline calculations." as stated 'The energy baseline is the technical losses of energy within the project boundary. In the case of retrofit measures, the energy baseline is calculated as the monitored performance of the existing Generating unit. The emissions baseline is the energy baseline multiplied by an emission coefficient for the fuel used by the generating unit.

In the context of the project:

- Baseline emissions are calculated based on the data of historical use of fuel oil
- The total amount of electricity generated after this project activity will be calculated as the difference between the historical amount of electricity generated from the plant and the generation once the project is implemented, which will be monitored in the context of the CDM project.

Key information and data used to determine the baseline scenario (variables, parameters, and data sources) are as follows:

Table 1. Baseline Data

Sr.	Key Information/Parameters	Average Values	Data Source
1	Fuel Oil Consumption	Ton/year	AES Reports
2	Plant Efficiency	36.29 %	AES Reports
3	Electricity Generation	MWh/yr	AES Reports
4	Fuel oil Emission Coefficient	0.011 tCO2/gal	Calculated from historical data
5	Electricity Emission Factor	0.70 tCO2/MWh	

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 small-scale CDM project activity:

As the project measures' implementation leads to increase the energy efficiency of the cooling tower system at AES Lal Pir Plant, there is a subsequent reduction in fuel consumption. Reduction in fuel consumption, i.e. RFO, there is obvious reduction in GHG emissions, primarily CO_2 from reduced combustion of RFO. In absence of these initiatives by AES Lal Pir Plant, there would have been excessive CO_2 emissions from the plants as was the case prior to the project implementation. There is no regulatory requirement under the laws of the country for the captive and cogeneration power plants to reduce emissions in terms of GHGs. This is a voluntary and proactive decision of AES to execute the project measures.
In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in Appendix B may be used if project participants can demonstrate that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in attachment A of Appendix B.

Barrier analysis:
The implementation of the project measures faced the following barriers- .

Technological and prevailing practice barrier: - .
Though most of the technological changes associated with this project are not very uncommon, they were never tested before in the configuration of the cooling tower system existed in AES Lal

Pir. There was high degree of risk associated with each of these technological modifications, since:

- It was stretching the limits of the design of the equipment (reduction of blow down losses with a potential to cause a de-rating of the Cooling tower and infringe with other operating parameters),

- Introducing a totally new control logic for which there was no prior experience at AES and any failure in the control system, even during the stabilization period at full load when all the fans in service can disturb the cooling water process leading to heavy vacuum loss (new logic & in condenser cooling water to condense steam)

- Increasing the dependency on a totally new cooling tower system with new technology, where minor levels of electrical/mechanical error can impact the capacity of the entire system (cooling water).

For identifying and effectively implementing the project measures, the Climate Change group of AES Lal Pir unit had been dedicated. The team Climate Change comprises of group of employees who have been deployed to conduct research and bring in new development for process improvement and energy conservation.

Investment Barrier:

As in any energy efficiency improvement project, this project also predicted financial savings through the savings achievable in fossil fuel. However, the return expectation was fraught with perceptions of technological risks as described above. When the consequence of such technological failures and the impact on business loss were estimated, the investment attractiveness was diminished. Due to high capacity factor & unit will run continuous at full load which will lead to overburden the cooling tower system and in resultant failure of cooling fans which will loss major part of the heat rate.

The good intentions to mitigate climate change through in-house innovations in cooling tower were challenged by the possibility of these consequences and created an investment barrier. This perceived losses were way beyond the basic investment by AES in order to identify possibilities of energy efficiency measures in the energy generation process. AES Climate Change group, with staff dedicated for this purpose spent time to formulate and execute these innovations.

AES carried out Performance test and engaged various consultants for carrying out these measures. Climate Change group identified the possible ideas for energy efficiency improvement and implements those projects on priority basis which has minimal amount of investments. For AES, these low hanging fruits are the business as usual projects. The above mentioned project had considerable amount of initial investment requirement, which did not match the AES Climate Change Group criteria for implementation in the presence of above technological barriers.

The team faced several technological and other prohibitive barriers while implementing the measures as there is no guarantee from the Cooling tower manufacturer on the performances. Rather, the unit runs a risk of higher capacity factors continuously loss as, any breakdown in the cooling tower fan/ gear boxes which is the major part of this system, will lead to partial disruption in electricity generation. Hence, the activity carried out at AES Lal Pir is beyond the

business as usual requirement and would not have occurred in the absence of voluntary drive for climate change mitigation and expected CDM contribution.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The Project activity reduces GHG emissions as:

- Reducing fossil fuel (i.e. HFO) consumption at the Project site by the installation of new cooling tower cells of new technology. It has to be noted that, after the implementation of the project the energy efficiency will be optimized.

- Emission reductions by savings of fossil fuel used at the project site.

a) Emission reductions by savings of fossil fuel used at the project site:

The following formula is used here to determine the emission reductions by savings of fossil fuel used at the project site:

$$EB_{Cy} = FE_{FO} * C_{LBy} \quad (1)$$

Where

- EB_{Cy} = Emission reductions by savings of fossil fuel used at the project site
- C_{LBy} = Fuel oil consumption in the baseline (gal/year) in the year y
- FE_{FO} = Emission factor of Fuel oil (ton CO_2e/gal)

Data on historical consumption of fuel oil of the last three years before the implementation of the project is available, nevertheless, in the calculations done here, projections of the use of fuel that would have been combusted at the site without the implementation of the project have been used instead. This approach is conservative and also realist.

b) Project Emissions

After the implementation of the project the use of fossil fuel at the site will be reduced. The amount of fossil fuel used in the project activity will be monitored and its emissions calculated by multiplying the fuel quantity used and measured by the emission factor of the fossil fuel.

$$PE_{y} = FE_{FO} * C_{Py\ (real)}$$

Where:

FE_{FO} = Fuel emission factor (t CO_2e/gal)

$C_{Py\ (real)}$ = Fuel oil consumption in the project scenario (gal/year) in the year y

c) Leakage
There is no leakage associated to this project activity.

B.6.2.

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

Data / Parameter:	FE_{FO}
Data unit:	Ton CO2/gal fuel
Description:	Residual Fuel Oil
Source of data used:	Actual Baseline plant monitored data
Value applied:	0.0115
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**C_{LB}**
Data unit:	gal/year
Description:	Baseline fossil fuel consumption
Source of data used:	Actual Baseline plant monitored data
Value applied:	(Variable)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based in the projected availability of fuel & the technology used in the baseline.
Any comment:	

Data / Parameter:	**FE_R**
Data unit:	CO_2e/MWh
Description:	Emission Factor
Source of data used:	Obtained from the available historical data
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	C_{Py}
Data unit:	gal/year
Description:	Fossil fuel consumption in the project scenario
Source of data used:	
Value applied:	(variable)
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	EL_{CONLBy}
Data unit:	MWh/ year
Description:	Amount of electricity bought from the grid in the baseline scenario in year y
Source of data used:	
Value applied:	(variable)
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	EL_{CONPy}
Data unit:	MWh/ year
Description:	Amount of electricity bought from the grid in the project scenario in year y (MWh/ year).
Source of data used:	
Value applied:	(variable)
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The ex ante estimations of the emission reductions to be claimed by the Project activity has been explained in paragraph B.6.1. That will also be the procedure to follow yearly during the crediting period.

a) Emission reductions by savings of fossil fuel used at the project site

$$EB_{Cy} = FE_{FO} * C_{LBy}$$

Table 2. Emission reductions by savings of fossil fuel used at the project site

Year	C_{LBy} gal/year	FE_{FO} tonCO2/gal	EB_{Cy} t CO2
2008	221,057,630.85	0.011 t CO2/gal	2,546,527.83
2009	221,057,630.85		2,546,527.83
2010	221,057,630.85		2,546,527.83
2011	221,057,630.85		2,546,527.83
2012	221,057,630.85		2,546,527.83
2013	221,057,630.85		2,546,527.83
2014	221,057,630.85		2,546,527.83
2015	221,057,630.85		2,546,527.83
2016	221,057,630.85		2,546,527.83
2017	221,057,630.85		2,546,527.83
Total crediting period			**25465278.34**

b) Project Emissions

$$PE_y = FE_{FO} * C_{Py\ (real)}$$

Table 3 Project emissions

Year	CPy (real) gal/year	FE_{FO} tonCO2/gal	PEy t CO2
2008	220,229,252.59	0.011 t CO2/gal	2,536,985.13
2009	220,229,252.59		2,536,985.13
2010	220,229,252.59		2,536,985.13
2011	220,229,252.59		2,536,985.13
2012	220,229,252.59		2,536,985.13
2013	220,229,252.59		2,536,985.13
2014	220,229,252.59		2,536,985.13
2015	220,229,252.59		2,536,985.13
2016	220,229,252.59		2,536,985.13
2017	220,229,252.59		2,536,985.13
Total crediting period			**25369851.3**

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

Table 4. Summary of Emission Reduction

Year	Estimation of project activity emissions (ton CO_2e)	Estimation of baseline emissions (ton CO_2e)	Estimation of leakage (ton CO_2e)	Estimation of overall emission reductions (ton CO_2e)
2008	2,536,985.13	2,546,527.83		9542.70
2009	2,536,985.13	2,546,527.83	-	9542.70
2010	2,536,985.13	2,546,527.83	-	9542.70
2011	2,536,985.13	2,546,527.83	-	9542.70
2012	2,536,985.13	2,546,527.83	-	9542.70
2013	2,536,985.13	2,546,527.83	-	9542.70
2014	2,536,985.13	2,546,527.83	-	9542.70
2015	2,536,985.13	2,546,527.83	-	9542.70
2016	2,536,985.13	2,546,527.83	-	9542.70
2017	2,536,985.13	2,546,527.83	-	9542.70
Total (t CO2)	**25369851.3**	**25465278.3**	-	**95427.0**

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

B.7.1 Data and parameters monitored:

The following variables will be monitored:

Data / Parameter:	$C_{Py\ (real)}$
Data unit:	gal/year real
Description:	Yearly consumption of fossil fuel after the implementation of the Project.
Source of data to be used:	
Value of data	
Description of measurement methods and procedures to be applied:	Direct monitoring of fuel consumed at the plant
QA/QC procedures to be applied:	
Any comment:	
Data / Parameter:	$EL_{CONPy\ (real)}$
Data unit:	MWh/ year
Description:	Electricity generation after the implementation of the Project
Source of data to be used:	
Value of data	
Description of measurement methods and procedures to be applied:	Direct monitoring of electricity generation
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	EL_{CONLBy}
Data unit:	MWh/ year
Description:	Calculation of the amount of electricity generation in the baseline scenario in year y (MWh/ year).
Source of data to be used:	
Value of data	(variable)
Description of measurement methods and procedures to be applied:	Based in the projected generation per year and the technology used in the baseline scenario.
QA/QC procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

Climate Change Group of AES Lal Pir will be the responsible of the collection and management of data. They will also carry out the analysis of the data collected, the documentation of the data and sources and the filing of all the information (monitored and calculated) needed for the crediting of the emission reductions to be claimed by the project activity.

- The monitoring equipment will allow automated and continuous recording and reporting of data.
- These readings will be checked for any anomalies before being filled for future reference.
- The data will be monitored and recorded by qualified persons according to the monitoring plan.
- The data will be electronically archived.

Proper management process and routine procedures are in place to ensure the quality of reports required by verification audits.
The data will be recorded and kept during the crediting period and another two years after the end of the crediting period. The maintenance team will periodically calibrate and maintain the monitoring equipment in accordance with the high standards of the company. The recording frequency for these equipments will be once in a month.
In nutshell, The QA and QC for the measured parameters shall be determined by the following:

- Recording frequency
- Measuring Instrument used
- Calibration of measuring instrument
- Reporting and record keeping structure for the parameters mentioned

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

Date of completing the final draft of this baseline section (DD/MM/YYYY): **21/01/2008**
Name of person/entity determining the baseline:

The project proponent (AES Lal Pir) itself prepared it in house & determined the baseline scenario and baseline emission calculation and estimations. Contact details as below.

Organization:	AES Lal Pir (Pvt) Ltd.
Street/P.O.Box:	Near Mehmood kot, Muzaffar Garh
City:	Muzaffar Garh
State/Province:	Punjab
Postcode/ZIP:	34200
Country:	Pakistan
E-Mail:	
URL:	www.aes.com
Represented by:	
Title:	Project Manager
Salutation:	Mr.
Last Name:	Javed
Middle Name:	
First Name:	Farhan
Department:	Climate Change
Mobile:	+92 300 8739951
Direct FAX:	+92 66 2422993
Direct tel:	+92 66 2422965
Personal E-Mail:	Farhan.javed@aes.com

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:

August 20, 2008

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

The project is expected to have an operating lifetime of **10 year.**

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:

>> Not applicable

C.2.1.2. Length of the first crediting period:

>> Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

September, 2008
The expected date of commissioning of the project activity is given as the starting date of the crediting Period. Should construction be delayed, the starting date of the crediting period will be delayed accordingly.

C.2.2.2. Length:

Ten (10) years.

SECTION D. Environmental impacts

There is no need for an environment impact assessment for the project mandated by local statutory Regulations. AES has also got Letter of consent to operate from National Environmental Protection Authority, EPA Pakistan for the project activity.
An internal environment appraisal however was carried out by AES for the project. In the study, AES accounted for environmental impacts the project made from pre-project activities, during the project i.e. erection and commissioning and post-project activities i.e. operation of the Project. The impact of project on air, water, soil & was studied. It was also studied for impacts on socio-economic health of the area.

It was found that project activity does not make any negative impact on the environment. The project activity also does not impact health of people in the nearby areas. The project has positive socioeconomic impact on the community.

Sr.No,	Factors	Remarks
1	Water	The effluent generated will be treated as per existing Effluent neutralization system, and will be disposed off in compliance with the National Environment Quality Standards (NEQS).
2	Noise	Noise level is almost negligible but even though it would be monitored as per standard.
3	Air Pollution	This project activity will decrease the air pollution and emission of SOx, Nox, CO & other gases will also be minimized. Reduction in fossil fuel combustion eventually reduces the emission. All the emission parameters will be monitored through Continuous emission monitoring system (CEMS) continuously. So, project activity has positive impact on the environment.
4	Social Benefits	The project will generate new local contract base jobs (approx. 20-30 numbers) and the staff at the plant will also receive some training courses on this system. This fact will clearly favor the professional development of the workers.
5	National benefits	The implementation of this new clean project, will set an example for other companies in the sector, and will help to increase awareness and responsibility towards the environment. The Project will allow the diversification of the energy national matrix.

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The host Party, i.e. Environmental Protection Agency EPA, Pakistan does not require Environmental Impact Assessment of small developmental projects within an industrial facility. However, the project proponent has undertaken a basic environmental analysis for the above mentioned project.
Following are the environmental benefits derived form the project's energy efficiency measures:

- Reduction in GHG emission from combustion of fossil fuel;
- Conservation of fossil fuel (natural resource of commercial energy) and Sustainable Development;
- Reduction of environmental deterioration and procurement of fossil fuel (poor ambient air quality)
- Reduction emissions off solid and liquid

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 Host Party, i.e. Environment Protection Agency (EPA), Ministry of Environment, Government of Pakistan, does not require Environmental Impact Assessment (LOI is provided below) of small developmental projects within an industrial facility.
However, the project proponent has undertaken a basic environmental analysis for the above mentioned project.
Following are the environmental benefits derived form the project's energy efficiency measures:

- Reduction in GHG emission from combustion of fossil fuel;
- Conservation of fossil fuel (natural resource of commercial energy)
- Sustainable Development
- Reduction emissions off solid and liquid

SECTION E. Stakeholders' comments

Identification of Stakeholders

The various stakeholders identified for the project activity are as under
• Industrial associates
• Consultants
• Equipment suppliers
• Employee representatives
• Community at large
Stakeholders list includes various government and non-government parties, which are involved directly or indirectly in the project activity at various stages.

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

>>
A notice was issued on October 02, 2007 on the project activity. Also invitation was sent to the all stakeholders/community people (Invitation attached in Appendix-II).
Stake holder's consultation meeting was held at AES Lal Pir – Conference room, on October 19, 2007 at 11.00 am.

E.2. Summary of the comments received:

>> **Details provided in Appendix I**

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

Stakeholders have raised the interest on the improvement of the air quality by the proposed project.AES has explained the effect of CO2 abatement and stakeholders pleasantly accepted the explanation.

Social Benefits: AES has explained that a portion of the revenue generated from the sales of CERs will be transferred in Social Fund which will be spent for the projects in schools, hospitals, infrastructure in the surrounding area.

Economic Benefit: AES will receive part of the revenue generated from the sales of CERs which will improve the income of the major job providers of the region. There will be additional jobs created in the local area during installation of the project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

There is no participant of AES Lal Pir in this project activity.

Organization:	AES Lal Pir (Pvt) Ltd.
Street/P.O.Box:	Near Mehmood Kot
Building:	
City:	Muzaffar Garh
State/Region:	
Postfix/ZIP:	34200
Country:	Pakistan
Telephone:	+92 66 2442967
FAX:	+92 66 2422993
E-Mail:	
URL:	www.aes.com
Represented by:	
Title:	Project Manager
Salutation:	Mr.
Last Name:	Javed
Middle Name:	
First Name:	Farhan
Department:	Climate Change
Mobile:	+92 300 8739951
Direct FAX:	+92 662422993
Direct tel:	-
Personal E-Mail:	Farhan.javed@aes.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

THERE WILL NOT BE ANY PUBLIC FUNDING FOR THE PROPOSED PROJECT.

Annex 3

BASELINE INFORMATION

I. DETERMINATION OF EMISSION FACTOR

a) Required information

A summary of the information sources of the variables and parameters used for the calculation of the Baseline Emission Factor is shown below.

Table 5

Variable	Unit	Source
Name	-	
Fuel Consumption by power plant	Fuel Oil (ton per year) & Gallon per year	AES Data sheet
Electrical Generation	MWh/year	AES Data sheet
Fuel Characteristics (density, carbon content, CV, etc)	Kg/liter, percentage, Btu/lb Etc.	Fuel MSDS

The following values used in order to calculate the fuel emission factor;

Combustible	**Density** (kg/liter)	**Emisión factor** (tCO_2/gal)	**Calorific Value** (but/lb)	**Emisión factor** (tCO_2/ ton)
Fuel oil	0.94	0.0115	38103	3.012

Table 6 Emission Factor Baseline data

Year	Generation	HFO Consumption	Fuel	CO2 Emission	t CO2/MWh	t CO2/ton	t CO2/gallon
Units	**MWh**	**ton**	**Gallon**	**ton**			
2003	827619	207117.94	55381536.1	637981.2	0.771	3.080	0.011520
2004	1536242.8	373283.1	99812655.0	1149816.5	0.748	3.080	0.011520
2005	1272551.35	301341.78	80576171.6	928217.1	0.729	3.080	0.011520
2006	2720544.64	627885.45	167891109.5	1934063.0	0.711	3.080	0.011520
2007	3648447.22	826719.595	221057630.8	2546527.8	0.698	3.080	0.011520

Annex 4

MONITORING INFORMATION

APPENDIX-I

Stake holder's comments

Stakeholder Consultation Meet on
Clean Development Mechanism (CDM)
Initiatives of AES Lal Pir, Thermal Power plant, Muzaffar Garh.

Dated: October 19, 2007

Venue: AES Lal Pir –Admin. Building Conference room, Muzaffar Garh
Time: 10:00 AM

Identified stakeholders are the local community people, AES employees, Suppliers of fuels/ services etc. Attendance of the attendees of the meeting was taken and is attached as with PDD.
The meeting was initiated by Mr. Farhan Javed, Project Manager Climate Change AES Lal Pir. He addressed the people in local languages –Urdu/Punjabi. In the initial speech he gave a brief to the people on the meetings importance and CDM. He requested the gathering to elect the chairman of the meeting among the people present in the hall. Two nominations were received from audience. Mr. Allah Bux and Mr. Abdul Hameed. Voting took place and majority of the people voted for Mr. Abdul Hameed. Hence, he was elected as the chairman for the meeting.
Mr. Farhan Javed invited the elected Chairman on to the stage along with officials of AES Lal Pir - Mr. Zahid H.Chaudhary (Director HR & Personnel), Mr. Hafiz Shahid (Manger Social Responsibility) and Mr. Amjad Sheikh (Manager Operation).
Mr. Abdul Hameed (Chairman of the session) thanked the audience for electing him the chairman. The agenda of the meeting was presented by Mr. Amjad Javed, Coordinator - EMS and the chairman approved it. The agenda of the meeting was:

- General Presentation on CDM and Kyoto Protocol
- Presentation on the CDM initiatives of AES
- Discussion on the projects (stakeholder comments, suggestions and concerns)
- Approval from the Chairman
- Vote of Thanks by Mr.Zahid H.Chaudhary

The presentations are attached as with PDD and available at site.

The floor was thrown open for any issues, comments and concerns of the people related to the project. Following are the issues and concerns expressed and answered by Mr. Farhan Javed of AES.

Sr. No,	Issues / Concerns Expressed	Response from AES	Stakeholder expressing the Concern /Issue
1	GHG reduction how does it help?	Because of these gases the temperature keeps increasing world wide this leads to the change in climate cycle. In 1972, Stockholm convention took place from where the whole process and effort to recognize the issues and improve the environment. Later from 1992 onwards, efforts in a more organized way and at wider level started taking place.	M.Ismail
2	The project that AES is carrying out can affect the health of the people?	Since, this project is related to the very existence of human being, it obviously directly or indirectly improves not only the air but also the environment around us. But there will be no negative effect.	Nadeem Abbas
3	What will be the effect of this project on the community?	This project is not mandatory or a primarily necessary for the basic functioning of AES. However, it has been done for larger cause i.e. welfare of the community and long term sustainability.	Farid Ahmad
4	This effort being taken by AES must be taking place else where in the world also?	It is true that some of these activities are being carried out by people in the world. Also these initiatives are taking place in other Pakistani industries also but may not be in similar process. And today stakeholder consultation is to inform others also about CDM.	M. Munir
5	By these activities will other pollutants like gases and liquids will also be released. Will it affect us?	CDM is mainly for the 6 GHG's which have the maximum effect on the environment. AES project do not affect the emission of liquid fluids. It also does decrease the solid & gaseous emission.	Ibrahim
6	Is it that some controlling authority working on it. Is it	This is not compulsory. It is being done voluntary. However, there is a	

	like, making it necessary to do this project? Is it compulary?	mechanism to see its fair development and a clean development mechanism of Pakistan Environment Protection Agency, EPA. Ministry of Environment which gives its approval from its side.	Abdul Rahim
7	GHG effect the ozone layer?	In Stockholm there was a conference where people started thinking of all issues related to the environment. Ozone shield is being destroyed due to which some of the rays of sun harmful to the people reach the earth. These are known as CFC's. However, GHG reduction due to CDM and Ozone depletion are two different issues and not affecting each other directly.	Safdar Abbas
8	What are the direct benefits of these activities?	Directly this project does not have any advantage for AES. But AES is a corporate citizen, and its well being is related to the environment and community. The project has a big advantage of being able to develop a sustainable environment and also to the society of which AES is a part. However, there is an indirect effect like the CDM benefits which help in recovering a part of the investment risk.	Karam Din
9	If AES is compared with other Power plants, is it more energy efficient?	AES is a multinational group working all over the world. Here AES has implemented different high level standards to maintain the Health, safety & Environment standards for employees as well as community welfare. AES very conscious about its social responsibility at all levels.	Asghar Ali
10	Is there any employment generation expected?	The project directly does not affect the employment in AES. However, there might be an indirect economic benefit.	Abdul Shakoor
11	In Muzaffar Garh district are other industries/power plants also doing such activities?	The process related energy efficiency measures taken up are mostly unique due to different processes of	Aamir Khan

		industries/power plants and they cannot be similar for all industries/power plants.	
12	In CDM project new equipments are installed, is this likely to have any change in noise?	In 1997 AES was established in Mehmood Kot, Muzaffar Garh and today in 2008 the standards have changed. Also there are regulations by which generally equipments have their noise levels mentioned on it. Thus, the new technology creates very less noise pollution below than its standards.	M.Akhtar
13	Will the projects increase the water requirement?	No increase in the water requirement.	Ijaz Ahmad
14	The unusual rains seen in the world are due to these GHG's?	Due to the GHG's the climate is changing globally. At some places there is an increase in temperature whereas at other places the sea level is increasing. Thus, the rain pattern is an effect of these gasses and can be controlled by reducing the gaseous emission.	Rafiq Ch.

People were informed that any further information can be sought from AES.
Mr. Hafiz Shahid thanked for the interest of people and asked the Chairman to summarize the day's events and express his view on the Stakeholder consultation.
The chairman appreciated AES Lal Pir (Pvt) Ltd. for its initiatives and the efforts made in informing the people about them and granted approval for the projects proposed by AES.
The meeting was concluded by the vote of thanks proposed by Mr.Zahid H.Chaudhary and asked people cooperation for such projects. He also asked them to keep giving suggestions for carrying out future projects.

(Mr. Abdul Hameed)
Chairperson

(Mr.Zahid H. Chaudhary)
Director HR & Personnel

(Mr. Amjad Sheikh)
Manager Operations

(Mr. Hafiz Shahid)
Manager Social Responsibity

APPENDIX-II

Invitation Letter to Stakeholders.

AES Lal Pir (Pvt) Ltd. Muzaffar Garh. Pakistan

Meeting on CDM Project – Invitation

Dear Stak holder(s),

AES Lal Pir Thermal Power Station, Near Mehmood kot, Muzaffar Garh, is pleased to call you in public meeting on October 19, 2007 at 1000 A.M in AES Lal Pir Mehmood Kot premises, for public comments/discussion on **Clean Development Mechanism (CDM)** Project of AES Power Plant for Environment Improvement.
CDM Project will leave the positive impact on Environment by reducing the CO2 (carbon dioxide) emission to make our Environment more friendly.

You are requested to make it convenient to attend this meeting.

Thanks,

Project Manager

Climate Change Division,
AES Lal Pir (Pvt) Ltd.

Dated: October 02, 2007

Address: AES Lal Pir Thermal Power Station, Near Mehmood Kot, Muzaffar Garh.Pakistan.
Tel: +92 66 2422967 & Fax: +92 66 2422993

APPENDIX-III

'Letter of Intent' from National Environment Protection Agency (EPA), Pakistan

No. F-37-06/326/DD(S)/EPA
GOVERNMENT OF THE PUNJAB
ENVIRONMENTAL PROTECTION AGENCY
HOCKEY STADIUM LAHORE

Dated Lahore, the November 24, 2007

To

Mr Farhan Javed,
Environmental Coordinator,
AES Lal Pir Thermal Power Plant,
Mehmood Kot, Muzaffar Garh.

Subject: - **ENDORSEMENT FOR CONSTRUCTION OF ADDITIONAL COOLING TOWERS AT AES LAL PIR THERMAL POWER PLANT.**

Please refer to your application dated November 8, 2007 on the subject cited above. The proposal for construction of additional cooling tower contained in the application has been reviewed. The project is targeted to reduce the Carbon Dioxide emission in the order of 4800 tons per annum. This project will reduce the production of green house gases at national as well as global level; therefore, EPA Punjab endorses the project technically and has no objection as such to construct the additional cooling tower for the purpose mentioned above.

(DR. SHAGUFTA SHAHJEHAN)
DIRECTOR (SOUTH / ML&I)

APPENDIX-IV

'Letter of Endorsement' from Host Country DNA, Pakistan

Tel: 92- 51- 9205510
Fax: 92- 51- 9207425
Email: cmdcellpakistan@gmail.com

F. No. 9 (01)-CDM/ 2006

GOVERNMENT OF PAKISTAN
MINISTRY OF ENVIRONMENT
4th Floor, ENERCON Building,
off Ataturak Avenue,
Sector G- 5/ 2, Islamabad, PAKISTAN.
****

Clean Development Mechanism Cell

Islamabad, the 8th November 2007

Subject: **Letter of Endorsement for Clean Development Mechanism (CDM) Project Idea Note (PIN) for Additional Cooling Towers Constructed at the AES Lal Pir and Pak Gen Thermal Power Plants, Muzaffargarh, Pakistan.**

The Project Idea Note for the subject mentioned projects has been reviewed by the Experts in the Clean Development Mechanism Cell and has the following comments:

i. AES Lal Pir and Pak Gen are expected to generate reliable, cost effective clean electricity for Pakistan.
ii. The project will improve energy efficiency will reduce sufficient amount of carbondi- oxide emissions.
iii. This activity is expected to bring sustainable development benefits including, technology transfer and other environmental benefits.
iv. The project is eligible to be converted into a feasible CDM project.

2. The project will be considered for grant of Host Country Approval once the completed Project Design Document (PDD) according to prescribed format of UNFCCC- CDM Executive Board is received by the Designated National Authority (DNA)- Pakistan.

(Saadullah Ayaz)
Head, CDM Cell

Mr. Naveed Ismail
CEO. AES- Pakistan.