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

CONTENTS

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:

5 MW Wind Power Project by Gokul Refoils and Solvent Limited
Version No: 07
Dated: 02/02/2011

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

Background:
Gokul Refoils and Solvent Limited is one of the largest manufacturers of edible oils in India. With a strategy of innovation in every aspect of business and aim of establishing a balance between social and environmental demand as a part of corporate responsibility, the industrial facility invested in eco- friendly and renewable energy technology for power generation.

Objective of the Project activity:
The project activity primarily aims at reducing Green House Gas emission and abates environmental pollution through deployment of cleaner technology for generation of electrical energy. The project proponent being a proactive business entity with a view to be in tune with the sustainable development priorities of the country, is promoting the project activity of generating sizable green power through tapping of wind energy in the existing barren land available in the windy site of Gujarat. The project activity through generation of electrical energy will help in bridging the demand -supply gap in the state.

Salient Feature of the Project Activity:
Before the project activity, project proponent was using electricity directly from the grid. Project participant establish the project activity because of associated environment benefits. The Project activity employs four number of Suzlon make with each having a capacity of 1250 kW, at Kutch district of Gujarat. The electricity generated for the project activity is wheeled to Gokul's industrial units at Sidhpur (Sidhpur Unit -1 and Unit 2) and Gandhidham using state electricity grid (GETCO) infrastructure. Through utilization of renewable power at the industrial premise, the manufacturing unit would be displacing equivalent quantum of grid electricity which would otherwise be generated from fossil fuel dominated grid.

Location details of WTGs[1]:

Location Number	WTG No.	Name of the location
W-2 (V5)	SEL/1250/05-06/0156	Motisindholi village (Tal:Abdasa, District: Kutch)
W-3 (V6)	SEL/1250/05-06/0157	Motisindholi village (Tal:Abdasa District: Kutch)
W-13 (M16)	SEL/1250/06-07/0224	Kadoli Village (Tal:Abdasa District: Kutch)
W-14 (M17)	SEL/1250/06-07/0225	Kadoli Village (Tal:Abdasa District: Kutch)

The project is expected to generate power of 105.36 lakh KWh per annum.

[1] Commissioning certificate of wind turbines

*Baseline scenario***:** Using power from the grid would be the most plausible option which is later on described in the section B.4.
The electricity generated from wind turbines will be wheeled to Gokul's industrial units at Sidhpur (Unit 1 and Unit 2) and Gandhidham.

Sanction loads[2]:

Unit Name		**Grid**		**DG sets**	**Turbine Generator**
		Sanction load	**Connection number**		
Sidhpur Unit 1	Kva	850	29217	2*625	
Sidhpur Unit 2	Kva	3000	29241	1*625	
Gandhidham	Kva	1500	31368	3*500	825 kW

In the pre project scenario, Primary source of electricity is state electricity grid with DG sets as a power backup option. An 825 kW coal based captive power plant is also used to meet electricity requirements of the Gandhidham unit. The coal based captive unit was commissioned in 2006.

Project Contribution towards Sustainable Development:

In accordance with the National CDM authority, Ministry of Environment and Forests, the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social Well Being - The project activity has resulted in generation of employment opportunities for professional, skilled and unskilled manpower for development, engineering, procurement, construction, operation and maintenance of wind turbine generator. The project activity has also contributed towards the Government objective of incremental share of renewable energy in the power generation mix. There implementation of project activity has also resulted in improvement of the general infrastructure in and around the project site which includes upgrading of the access road and improvement of the infrastructure quality in the general area.
Economic well being – The deployment of the project activity has contributed towards employment of local personnel during the land development and erection phase of the project activity. The setting up of electrical power supply system from project site to the nearest substation has resulted in local business opportunities for and will provide further scope for future business during the life of the project activity.

Environmental well being - The project activity resulting in generation of electricity through utilisation of wind energy, which will reduce green house gas emission associated with generation of electrical energy from combustion of fossil fuel in grid connected power plant. Such activity apart from reduction in green house gas emission will also reduce emission intensity of different pollutant like SO_x and suspended particulate matter from the combustion of fossil fuels, reduce average effluent intensity, average solid waste intensity, harmful pollutants like mercury and others. Incorporation of renewable energy technology will improve environmental quality.

[2] Electricity load sanction letter

Technological well being- Incorporation of the project activity would act as the cornerstone towards promotion of such technology and help in enhancing the technical know how about the project activity. The project activity would thus encourage other entrepreneurs irrespective of the sectors to adopt this technology and invest in wind energy. The above initiative would help in increasing the penetration of renewable power consumption in fossil fuel predominant grid power. Needless to mention that such initiative would assist in stimulating and accelerating the commercialisation of grid connected renewable energy technology. Such initiative would also help in stimulating the growth of wind power industry in India.

A.3. Project participants:

Name of the Party Involved (host indicates a host party)	Private and/or public entity(is) Project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	M/s. Gokul Refoils and Solvent Limited (Private Entity)	No

M/s. Gokul Refoils and Solvent Limited will be the sole owner of the CERs generated from the aforesaid project activity and detailed contact address of the above facility is provided in Annex I.

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

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

The project is located at Motisindholi village and Kadoli village in Abdasa Taluka of Kutch district of Gujarat.

A.4.1.1. Host Party(ies):

India.

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

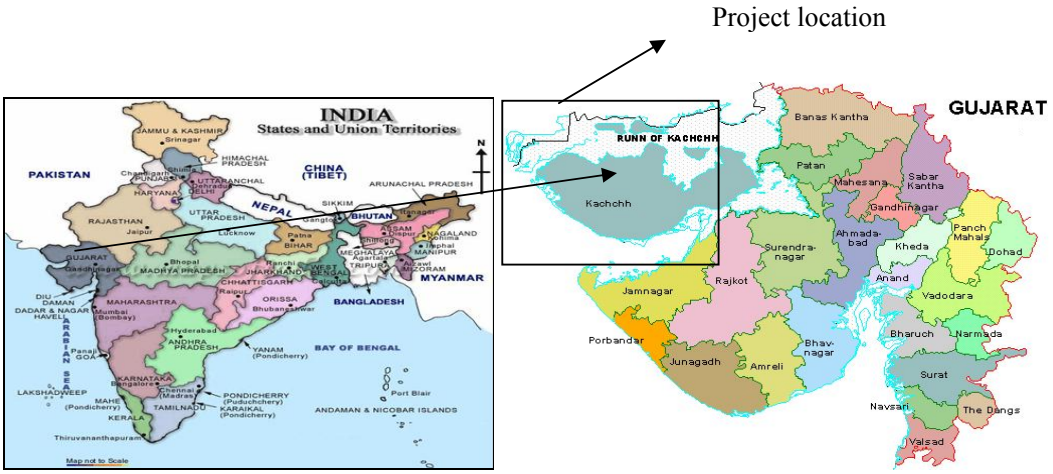
Gujarat.

A.4.1.3. City/Town/Community etc:

Motisindholi village and Kadoli village in Abdasa Taluka.

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

The wind mills are located at Motisindholi village and Kadoli village in Abdasa Taluka in Kutch District of Gujarat in India. The co-ordinates of the WTGs are provided in Annex 6.



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

According to Appendix B to the simplified modalities and procedure for small scale CDM project activities the category of the project is as follows:
Type –I Renewable Energy Projects
Category I.F. "Renewable Electricity generation for captive use and mini-gird".. Version: 1
Sectoral Scope Number 1: Energy Industries (Renewable/Non renewable).

The project activity incorporates installation of four number of 1250KW wind turbine generator of Suzlon Energy Limited. In wind energy based power generation, the kinetic energy of the wind is being converted to mechanical energy and subsequently to electric energy. The kinetic energy is converted into mechanical energy.. The wind blade supplies the mechanical energy to the generator thereby producing electricity.
The technical specification of the wind turbine is depicted below:

Specification of S – 70/1250 WTG:

Rotor

Diameter:	69.1m
Number of rotor blade:	3
Orientation:	Upwind/Horizontal axis
Rotational speed:	13.2 / 19.8 rpm
Rotational direction:	Clockwise
Rotor blade material:	GRP
Swept area:	3750 m^2
Hub height:	74 m
Regulation:	Pitch regulated

Operational data

Cut in wind speed:	3 m/s
Rated wind speed:	12 m/s
Cut off wind speed:	20 m/s

Gearbox

Type:	Integrated 3 stage 1 planetary and 2 Helical
Gear ratio:	1:77.848
Manufacturer:	Flender – Winergy
Nominal load:	1390 KW
Type of cooling:	Oil cooling system, Forced lubrication

Generator

Type:	Asynchronous 4/6 pole
Rotation speed:	1000/1515 RPM
Rated output:	250/1250 KW
Rated voltage:	690 V
Frequency:	50 Hz
Insulation:	Class "H"
Enclosure class:	IP 56
Cooling system:	Air cooled

Operating brakes:

Aerodynamic brake:	3 independent systems with blade pitching
Mechanical brake:	Spring powered disc brakes, hydraulically released, fail safe

Yaw drive:

Method of operation:	4 active electrical yaw motors
Bearing type:	Polyamide slide bearing

Control unit

- Microprocessor control with graphic backlit LCD display indicating operation conditions.
- Control includes thyristor switchgear watchdog for operation, log with real time, local control and servicing interface.
- Optional remote monitoring and operation.
- UPS back up system.
- Reactive Current compensation. Compensation: Dynamic and intelligent, with PF grater than 0.9

Safety systems

1. Brake systems: Automatic application by synchronous hydraulic control of the blade pitching in case of:
    a. Vibration and shock loading
    b. Over temperature of the gearbox or generation failure of the thyristors and control in the case of wind speed n excess of 25m/s
    c. Variation in rated voltage range
    d. Variations in frequency range
    e. Asymmetric phasing

f. Line interruption with automatic reconnection.

2. Brake system: Spring applied hydraulically released disk brake.

Tower systems

Type:	Free standing, lattice tower, hot dip galvanised
Tower height:	To suit hub height
Construction:	Bolted
Erection:	With crane
Design:	GL special class

Specification of S – 64/1250 WTG:

Rotor

Diameter:	64 m
Number of rotor blade:	3
Orientation:	Upwind/Horizontal axis
Rotational speed:	13.8 / 20.7 rpm
Rotational direction:	Clockwise
Rotor blade material:	GRP
Swept area:	3217 m^2
Hub height:	65 m
Regulation:	Pitch regulated

Operational data

Cut in wind speed:	3 m/s
Rated wind speed:	14 m/s
Cut off wind speed:	25 m/s

Gearbox

Type:	Integrated 3 stage 1 planetary and 2 Helical
Gear ratio:	1:74.917
Manufacturer:	Flender – Winergy
Nominal load:	1390 KW
Type of cooling:	Oil cooling system, Forced lubrication

Generator

Type:	Asynchronous 4/6 pole
Rotation speed:	1006/1506 RPM
Rated output:	250/1250 KW
Rated voltage:	690 V
Frequency:	50 Hz
Insulation:	Class “H”
Enclosure class:	IP 56
Cooling system:	Air cooled

Operating brakes:

Aerodynamic brake:	3 independent systems with blade pitching
Mechanical brake:	Spring powered disc brakes, hydraulically released, fail safe

Yaw drive:
Method of operation: 4 active electrical yaw motors
Bearing type: Polyamide slide bearing

Control unit

- Microprocessor control with graphic backlit LCD display indicating operation conditions.
- Control includes thyristor switchgear watchdog for operation, log with real time, local control and servicing interface.
- Optional remote monitoring and operation.
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Safety systems

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    c. Variation in rated voltage range
    d. Variations in frequency range
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2. Brake system: Spring applied hydraulically released disk brake.

Tower systems
Type: Free standing, lattice tower, hot dip galvanised
Tower height: To suit hub height
Construction: Bolted
Erection: With crane
Design: GL special class

Also life of each WTG is 20 years. The PLF is taken as 25.57% as per loan application to bank. The wind turbine generators are connected through substation through 33 KV overhead transmission line.

This is the first wind power project undertaken by Project participant.
The project activity uses environmentally safe and sound technology. The WTG confirms to the relevant code of safety and standards mandatory for setting up wind projects. Therefore the technology implemented is environmentally safe and sound. Moreover there has been no technology transfer involved in the project activity.

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

The project activity is being considered for fixed crediting period of ten years. The project activity is expected to wheel an average of 105.36 lakh kWh of electrical energy during each year of crediting period. The project activity is expected to reduce 9548 tonnes of Carbon dioxide emission annually.

Year	Annual Estimation of emission reductions in tonnes of CO2 e
2010-2011	9548
2011-2012	9548
2012-2013	9548
2013-2014	9548
2014-2015	9548
2015-2016	9548
2016-2017	9548
2017-2010	9548
2018-2019	9548
2019-2020	9548
Total estimated reductions (tonnes of CO_2 e)	95480
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	9548

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

There is no public funding in the project activities. There is no ODA involved in the project activity.

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

As per the annex 13 of EB 54, **Guidelines on assessment of de-bundling for SSC project activities (Version 03), 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:

1. The same project participants.
2. In the same project category and technology and measure.
3. Registered within the previous 2 years.

4. Whose project boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point.

Total installed capacity is 5 MW. This is a new activity for the project proponent as before this project activity and project participant had not undertaken any CDM project activity prior to this project.
There is no project activity with the project participant mentioned above in the same project category and technology or measure registered within the previous two years and whose project boundary is within one km of the project boundary of the proposed small scale activity at the closest point. Also, no request for registration has been made by project participant in the past.

Therefore this project is not a debundled component of a large 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:

Type: I Renewable energy project.
Category: I.F. ". Renewable Electricity generation for captive use and mini-gird" Version: 1
Sectoral Scope 01
Tools used:

1. Tool to calculate the emission factor for an electricity system (Version: 2)
2. Attachment A to Appendix B of the simplified modalities and procedure for small scale CDM project activities.
3. General guidance to SSC CDM methodologies (Version 12.1)

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

The total installed capacity of WTGs is 5 MW. It will remain same for the whole crediting period and hence for the whole crediting period it will remain under the threshold for Type I i.e. 15 MW.

In conjunction with guidelines of SSC CDM methodology Version 12.1, the project activity to be considered under Type I (Renewable energy project) and category I.F. (Renewable electricity generation for captive use and mini-grid) of small scale project activity should fulfil certain criteria as depicted under modalities and procedure of small scale project activity and the concerned methodology.

The applicability of the choice of the project activity under I.F can be justified as follows:

Applicability Criteria (For Category I.F.)	**Justification of choice**

Applicability Criteria (For Category I.F.)	**Justification of choice**
This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to user(s). The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit i.e., in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below: (a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant;1 (c) A carbon intensive mini-grid.	The project activity comprises of electrical energy generation using the wind energy. The power generated from the project activity is supplied/injected to the nearest grid. The project activity entails wheeling of power generated from the renewable sources to the industrial premise thereby replacing equivalent quantum of fossil fuel dominated grid power that's being used prior to the project activity. The project activity thereby fulfil the criteria of displacing electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. Hence, the project activity justifies this applicability condition.
For the purpose of this methodology, a mini-grid is defined as small-scale power system with a total capacity not exceeding 15 MW (i.e., the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.	The project activity uses state grid transmission distribution system wheeling power for captive use and it doesn't uses mini grid. Hence, this methodology is not applicable for project activity.
Project activities or project activity components supplying electricity to a grid shall apply AMS-I.D. Project activities for standalone off-the-grid power systems supplying electricity to households/users included in the boundary are eligible under AMS-I.A.	The electricity generated from project activity is wheeled using grid transmission distribution system for captive use. The project doesn't involve standalone off-the grid power systems. Hence, this condition is not applicable for project activity.
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project involves generation of electricity from wind energy and is not a hydro project. Hence, this condition is not applicable for the project.
For biomass power plants, no other biomass other than renewable biomass is to be used in the project	The project involves generation of electricity from wind energy and does not uses biomass as a fuel.

Applicability Criteria (For Category I.F.)	**Justification of choice**
plant.	Hence, this condition is not applicable for the project.
This methodology is applicable for project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition,(c) involve a retrofit of (an) existing plant(s); or (d) involve a replacements of (an) existing plant(s).	The project is a green-field project. The project activity involves installation of a new 5 MW Wind power plant. Hence, this condition is justified by the project activity.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The proposed project doesn't involve any addition of renewable energy generation to an existing renewable unit. This is a green field project. Hence, this condition is not applicable.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project activity is a green field project and doesn't seek to retrofit or modify an existing facility for renewable energy generation. Hence, this condition is not applicable.
If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.	It is a green field wind energy project and it is of less than 15 MW capacity and doesn't co-fire fossil fuel. Hence, this condition is not applicable.
Combined heat and power (co-generation) systems are not eligible under this category.	The proposed project activity involves only generation of electrical energy using Wind. It doesn't include co-generation systems. Hence, this applicability condition is not applicable
In case electricity produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the electricity will have to be entered into specifying that only the facility generating the electricity can claim emission reductions from the electricity displaced.	The windmills are owned by Gokul Refoils & Solvent Ltd. This can be verified from the commissioning certificates, Purchase orders and work orders issued, land lease documents and wheeling and banking agreement. The electricity is wheeled to three industrial units at Gandhidham, Sidhpur Unit-I and Sidhpur Unit-II. All the three industrial units where electricity is wheeled are owned by Gokul Refoils & Solvent. The two wheeling and banking agreement clearly states that the Gokul Refoils & Solvent Ltd has opted to wheel the electricity generated at the windfarm to its own manufacturing units, M/s

Applicability Criteria (For Category I.F.)	**Justification of choice**
	Gokul Refoils & Solvent Ltd, consumer no 29217 (Sidhpur Unit-I), Consumer no 29241 (Sidhpur Unit-II) and Consumer no 31368 (Gandhidham). It can also be verified from electricity bills of three respective units which are in the name of M/s Gokul Refoils & Solvent Ltd. The ownership of three units by M/s Gokul Refoils & Solvent Ltd is also seen from acknowledgement of memorandum of manufacture by Ministry of Commerce & Industry, Government of India The entire electricity is delivered to three units which are owned by Gokul Refoils and Solvent Ltd which are part of project boundary. Electricity is delivered using grid transmission and distribution network by signing a wheeling and banking agreement. No electricity is wheeled to any other consumer. In this project the supplier and consumer of electricity are same i.e. Gokul Refoils & Solvent Ltd. Thus no contract is required to be signed as emission reductions are claimed by Gokul Refoils & Solvent which are suppliers as well as consumers of electricity. .

Hence, the project meets the applicability condition of AMS 1.F. Version 1.

B.3. Description of the project boundary:

The spatial extent of the project boundary encompasses all the anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significantly and reasonably attributable to the project activity.
As per methodology, the physical, geographical site of the renewable generation source delineates the project boundary.
The project activity involves installation of two numbers of wind turbine generator 1.25 MW at Motisindholi village and two numbers of 1.25 MW wind turbine generator at Kadoli village that evacuate the power generated to nearest Grid. The power will be wheeled to Gokul industrial units at Gandhidham and Sidhpur (Unit 1 and Unit 2) thereby replacing equivalent quantum of grid power.

It is estimated that in the base line the primary source of green house gas emission will be CO_2 from combustion of fossil fuel in the conventional power generation systems. Emissions of other green house gas such as CH_4 and N_2O are excluded with conservative approach. The Methodology only takes into account leakage if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. The proposed project activity doesn't involve any transfer of equipment and hence there is no leakage as a result of project activity.

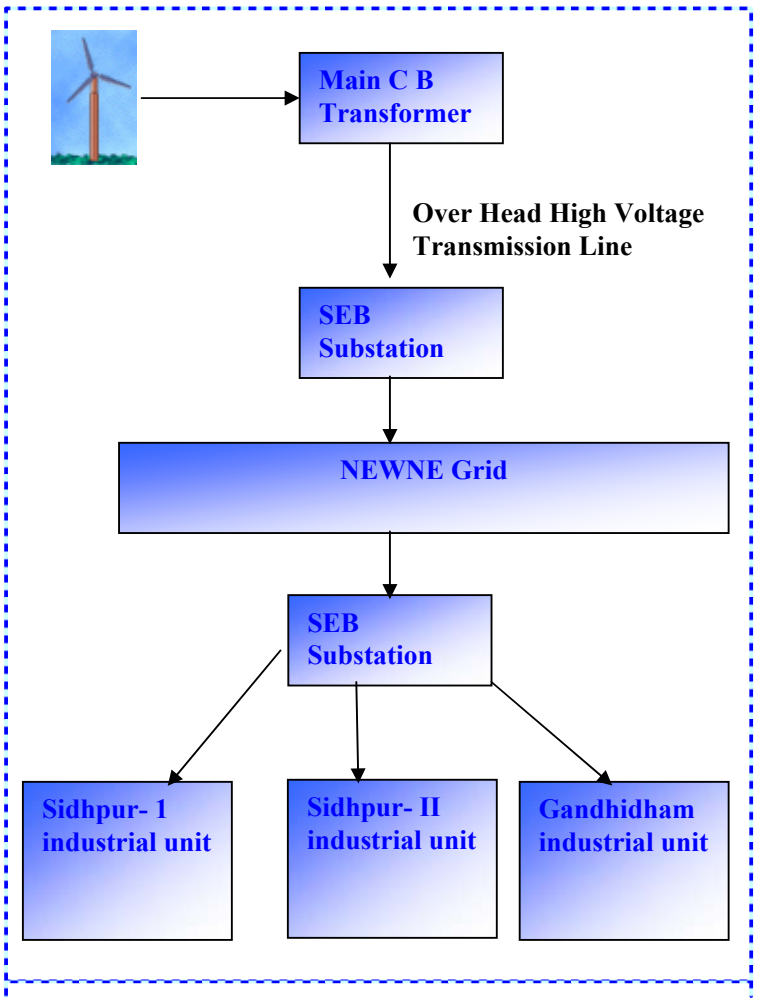
For the purpose of determining the baseline, as per Central Electricity Authority guidelines on grid emission factor[3], emission factor of the NEWNE grid is taken into consideration. The project activity being a renewable energy generating source precludes any sort of project emission.

An overview of all emission sources included in or excluded is depicted in the following table:

	Source	Gas	Included?	Justification / Explanation
Baseline	**Emission from combustion of fossil fuel in power plant for electricity generation**	CO_2	Included	This consists of the major source of Green house gas emission from combustion of fossil fuel.
		CH_4	Excluded	Excluded as they are minor emission sources
		N_2O	Excluded	Excluded as they are minor emission sources
Project Activity	**Electricity Generation from Renewable sources**	CO_2	Excluded	Power generation utilizing wind energy results in zero emission.
		CH_4	Excluded	Power generation utilizing wind energy results in zero emission.
		N_2O	Excluded	Power generation utilizing wind energy results in zero emission.

[3] Central electricity authority CO_2 baseline emission data, Version 4, http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

Project Boundary



The project boundary includes four WTGs, project site, feeders leading to the sub station, the physical extent of the NEWNE Grid and industrial units to where electricity is wheeled.

B.4. Description of baseline and its development:

Since the project activity is the installation of a new WTGs which replaces the electricity from grid, the baseline scenario is electricity delivered to the grid by the project activity. The proposed project activity involves wheeling of electricity from 5 MW Wind power plant to Gokul industrial units at Sidhpur (Unit 1 and 2) and Gandhidham.

Pre project Scenario

The electricity generated from project activity is wheeled to Gokul Refoils and Solvent Limited's three industrial units at:

1. Sidhpur unit 1
2. Sidhpur Unit 2
3. Gandhidham

The electricity generated from project activity is wheeled to industrial units. The grid electricity consumed by industrial units is replaced partially by proposed project activity. Hence, grid electricity is used as the baseline for the project.

The historical data of electricity consumption in Gokul Refoils and Solvent Limited's three industrial units also demonstrates grid as the baseline for the project. As per the methodology, three year historical data is required for establishing the baseline, but since operations at Gandhidham unit started on 13th of February 2004[4], hence only two year electricity consumption data of the same is available. Also, operations at Sidhpur Unit 2 began post board decision on 20th of April 2006[5]; hence no historical data is available for the unit.

Electricity consumption data:

Sidhpur Unit 1:
At Sidhpur unit-1 grid was the major source of electricity. Two diesel generators of 625 KW each were used as a backup option.

Year	**Grid**		**Diesel Generator**		**Power plant (Coal)**		**Total**
	GWh	% of total	GWh	% of total	GWh	% of total	GWh
March 2003 - February 2004	4.02	93%	0.00	0%	0.31	7%	4.33
March 2004- February 2005	3.14	58%	1.19	22%	1.09	20%	5.41
March 2005- February 2006	5.10	91%	0.51	9%	0.00	0%	5.60
Total	**12.26**	**80%**	**1.70**	**11%**	**1.40**	**9%**	**15.34**

[4] Load sanction for Gandhidham Unit

[5] Electrical inspection certificate

Expansions were planned at Sidhpur unit 1. As part of expansion plan, a Coal based power plant of capacity 825 KW was established to meet additional power requirements. Electrical inspection certificate for the same was issued on 23rd of December 2003[6].
However, due to financial constraints, plant was not expanded to initially planned levels. Hence, the electricity requirements of plant were not enough to utilise total capacity of power plant. Thus, it was decided to shift the power plant to Gandhidham unit and use grid electricity to meet the additional electricity requirements.
Henceforth, Gokul started the process of increasing its grid electricity sanction load and submitted application to Electricity board on 15th of July of 2004[7] to increase its electricity load by 150 KVa from 700 KVa to 850 KVa. Simultaneously process of decommissioning of coal based power plant was started and as a result the operations of Coal power plant were ceased in August 2004.
In the meantime, since it was imperative for Gokul to run its operations smoothly, hence the additional power requirements were met using Diesel generators.

Power consumption pattern for 2004-05: Sidhpur Unit 1

Month	**Grid (GWh)**	Diesel Generator (GWh)
Jan-04	0.321	0.000
Feb-04	0.240	0.000
Mar-04	0.504	0.000
Apr-04	0.299	0.000
May-04	0.171	0.000
Jun-04	0.265	0.000
Jul-04	0.232	0.000
Aug-04	0.322	0.026
Sep-04	0.175	0.197
Oct-04	0.334	0.223
Nov-04	0.255	0.140
Dec-04	0.306	0.232
Jan-05	0.150	0.131
Feb-05	0.122	0.243
Mar-05	0.311	0.165
Apr-05	0.323	0.190
May-05	0.347	0.118
Jun-05	0.522	0.003
Jul-05	0.552	0.003
Aug-05	0.411	0.000
Sep-05	0.356	0.010
Oct-05	0.417	0.006
Nov-05	0.331	0.004
Dec-05	0.561	0.002

[6] Electrical inspection certificate

[7] Application gird for increasing load

As shown in the power consumption pattern, electricity generation from Diesel generator was particularly high from August 2004 till May 2005 as during this period, operations of coal power plant were already stopped and electricity load was still not increased by State Electricity Distribution Company. Electricity load was increased on 25th of May 2005[8]. After electricity load was increased electricity generation from Diesel generators got reduced drastically as shown in the table: '*Power consumption pattern for 2004-05: Sidhpur Unit 1'*.
Thus it demonstrates Diesel generators are just used as a power back up option and are not a main source of electricity.

Sidhpur Unit 2

Operations at Sidhpur Unit 2 began post board decision on 20th of April 2006[9], hence no historical data is available for the unit. But, electricity from grid is major source of energy for the unit. Electricity generated from wind turbines is wheeled to unit through grid and the same is adjusted in unit's electricity bill. One diesel generator of 625 KW is used as a backup option.

Gandhidham

Grid was the major source of electricity. A coal based power plant of 825 KVa is also used for meeting electricity requirements of the unit. Three diesel generators of 500 KW each were used as a backup option.

Year	**Grid**		**Diesel Generator**		**Power plant (Coal)**		**Total**
	GWh	% of total	GWh	% of total	GWh	% of total	GWh
February 2004[10]	0.04	100%	0	0	0	0	0.04
March 2004-February 2005	9.18	98%	0.16	2%	0.00	0%	9.33
March 2005-February 2006	5.73	67.88%	0.12	1.44%	2.59	30.69%	8.45
Total	**14.95**	**83.90%**	**0.28**	**1.55%**	**2.59**	**14.54%**	**17.82**

As shown Electricity from grid is the prime source of electricity.

In 2005, Gandhidham plant underwent expansion and an 825 KW Coal based power plant, which was previously operating at Sidhpur Unit was shifted to Gandhidham. It started its operations at in July 2005[11] and is used to supplement grid as power source to meet existing and additional plant requirements. It supplies electricity to Gandhidham unit only.

[8] Load sanction letter

[9] Electrical inspection certificate

[10] Since the plant was commissioned in February, hence only one month data is available.

[11] Electrical inspection certificate

The first wind turbine of proposed project got commissioned in July 2006. Even after commissioning of proposed project the coal based power plant continues to operate at similar operating levels and there has been no change in its electricity generation levels due to wind project undertaken by Gokul.

As shown, even after the commissioning of proposed project, coal based power plant continues to generate electricity similar to pre commissioning levels.

Year	Electricity generated (GWh)
Pre-commissioning levels	
2005-06	2.59 (operated for only 8 months)
2006-07	3.32
Post-commissioning levels	
2007-08	3.81
2008-09	3.41

Hence, the proposed project replaces electricity from grid and has no effect on coal based power plant.

Post project scenario

The commissioning of all four wind turbines was completed on 22nd December 2006[12]. Post commissioning of wind turbines electricity from proposed project is wheeled to all three units using state grid. The electricity generated from wind turbines is adjusted in the monthly bills of the industrial units.

One year electricity consumption data for all three units post commissioning of wind turbines clearly demonstrate that grid (which includes electricity from wind turbines) has been the chief source of electricity for Gokul's three industrial units:

Electricity consumption data: January 2007 December 2007

Year	**Grid**		**Diesel Generator**		**Power plant (Coal)**		**Total**
	GWh	% of total	GWh	% of total	GWh	% of total	GWh
Sidhpur Unit 1	3.93	98%	0.10	2%	Nil	Nil	4.03
Sidhpur Unit 2	7.03	100%	0.03	0.4%	Nil	Nil	7.06
Gandhidham	6.28	60%	0.40	4%	3.76	36.00%	10.44
Total	**17.24**	**80%**	**0.53**	**2%**	**3.76**	**17.45%**	**21.53**

Conclusion

The historical and post project commissioning electricity consumption data of Gokul Refoils and Solvent limited's three industrial units clearly shows that grid has been the major source of electricity. It proves that Coal power plant continues to operate at similar operating levels even after commissioning of proposed project and hence the proposed project does not replace it as a source of electricity. It also

[12] Commissioning certificates of Wind turbines

demonstrates that Diesel generators are just used as a power back up option and are not a vital source of electricity at all the three units.

The grid electricity consumed by industrial units is replaced partially by project activity. The electricity supplied by WTGs is wheeled to three industrial units using state electricity grid and is adjusted from respective unit's electricity bills thereby replacing grid electricity. Hence, it is clearly demonstrated that the proposed project displaces grid electricity.
Thus, it is concluded that the electricity from grid is the baseline scenario for the proposed project activity.

As per para-14 of the methodology AMS I.F. (version 1), Baseline emissions for other systems are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,y}$$

Where,
BEy: Baseline Emissions in year *y*; t CO2
$EG_{BL,y}$: Energy baseline in year *y*; kWh
$EF_{CO2,y}$: Emission Factor in year y; t CO2e/kWh

As per para-14 of the methodology AMS 1.F (Version 1) emission factor of a grid shall be calculated as per the procedures provided in AMS-I.D
Hence, using para-11 of the methodology AMS I.D. (version 15): The Emission Factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin
(OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in kg CO_{2e}/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Calculations must be based on data from an official source (where available) and made publicly available.

Estimation of Emission reduction resulting from Project Activity:
According to AMS I.F the emission reduction resulting from the project activity is estimated as a difference between the baseline and project emission. The methodology does not require the project proponent to consider any emission due to leakage unless the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity which is not so in the case of the project activity. The baseline emissions are quantified in line with the methodology:
Baseline emission:

The baseline emission factor has been worked out by Central Electricity Authority (CEA) CO_2 database version 4. This database is official source of information of Government of India and it based on CDM tools to calculate emission factor for an electricity system.

The Indian power sector is divided into two regional grids, namely NEWNE (North, East, West and North Eastern) and Southern grid. Each state in a regional grid meets their demand with their own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. There are also electricity transfers between regional grids, and small exchanges in the form of cross-border imports and exports. The state of Gujarat is part of NEWNE grid.

Project emission:
The project activity is a wind power project that supplies electricity to state grid. In line with the methodology the project emissions are considered as zero.

Leakage:
There is no transfer of WTGs. Hence, no leakage emission has been considered for the specific project activity.

Representation of key information and data used to establish the baseline scenario and project activity

S. No.	Key Information and Data used	Source of Information or Data
1	Baseline Emission	
1.1	Electricity generated from the wind project	Certificate of share of electricity generated by wind farm by GEDA. Wheeling charges will be deducted from Certificate of share of electricity generated by GEDA to calculate net electricity generated from the wind project.
1.2	NEWNE Grid Emission Factor	CEA CO_2 Baseline Database for the Indian Power Sector, User Guide Version 4.0, October 2008, Ministry of Power Central Electricity Authority.
2	Project Emission – Nil.	
3	Leakage – Nil.	

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 per Annex 22 of EB 49 Guidance on the demonstration and assessment of prior consideration of the CDM:

Gokul Refoils and Solvent Limited was introduced to Clean Development Mechanism (CDM) by Fuel Solutions on 6th of March, 2006. Subsequently, Gokul team requested Suzlon Energy Limited for a proposal on Wind Power project. On the basis of the proposal sent by Suzlon on 28th of March 2006 and in view of associated CDM benefits project proponent decided to establish 5 MW Wind Farm to meet its captive electricity requirement in its board meeting held on 30th of March, 2006. Hence, prior consideration of CDM is demonstrated by project as required by paragraph 6 of EB49 Annex 22.

Gokul signed a MoU with Fuel Solutions regarding selling of CERs accrued from its project on 13th of April 2006. Subsequently, Purchase order for 2 Wind Turbines (1.25 MW each) were placed with Suzlon Energy Limited on 15th April 2006.

Land lease for wind turbines (1st and 2nd) were signed on 12 and 13th of July,'06 respectively. Gokul was approached by Sanguine Management Services for providing CDM consulting for its project. On the basis of subsequent negotiations, Sanguine Management Services was appointed as a CDM consultant on 2nd of September, 2006.

First Wind Turbine of 1.25 MW got commissioned on 18th of July, 2006. Land lease agreement for 3rd and 4th wind turbines were signed on 28th of November 2006. Following this purchase order for 2 more Wind turbines (1.25 MW each) were placed with Suzlon Energy Limited which got commissioned on 22nd of December, 2006.

Gokul was dissatisfied with the progress made by Sanguine Management Services towards developing its CDM project. As a result Gokul sent an official notice to Sanguine Management Services regarding the same on 12th of June 2007. There was no response from Sanguine to the notice. Hence, its services were terminated by Gokul on 16th of October, 2007.

Gokul approached Verve Consulting Private Limited on 12th of November, 2007. Subsequent to discussions between Verve and Gokul, Verve was appointed as CDM consultant for its Wind farm project on 15th of February, 2008.

As a next step for the project, Stakeholder Meeting for the project was held on 10th of April, 2008 and BV Certification as a Validator was appointed on 4th of October, 2008. PDD was web hosted on UNFCCC for global stakeholder comment from 30th of December, 2008.

Date	Event	Source	CDM event	Project event
28-Mar-06	Proposal from Suzlon	Proposal	✓	✓
30-Mar-06	Board decision	Board decision	✓	✓
13-Apr-06	MoU with Fuel Solution regarding sales of CERs	MoU	✓	
15-Apr-06	Purchase Order for first set of Wind Mills (2.5 MW)	Purchase order		✓
18-Jul-06	Commissioning of first WTG (1.25 MW)	Commissioning certificate		✓
2-Sep-06	Contract with Sanguine Management Services for CDM consulting	Contract	✓	
7-Sep-06	Commissioning of second WTG (1.25 MW)	Commissioning certificate		✓
15-Sep-06	Purchase Order for Second Set of Wind Mills (2.5 MW)	Purchase order		✓
4-Oct-06	Wheeling agreement with GETCO for first set of Wind Mills (2.5 MW)	Wheeling agreement		✓
22-Dec-06	Commissioning of second set of two WTGs (1.25 MW each)	Commissioning certificate		✓

19-Mar-07	Wheeling agreement with GETCO for second set of Wind Mills (2.5 MW)	Wheeling agreement		✓
12-Jun-07	Notice to Sanguine Management Services for termination of contract	Notice	✓	
16-Oct-07	Termination of contract with Sanguine Management Services	Contract termination	✓	
15-Nov-07	Proposal by Verve to Gokul	Proposal from Verve	✓	
15-Feb-08	Contract with Verve for Consulting Pvt. Ltd. CDM consulting	Contract with Verve	✓	
1-Apr-08	Advertisement for Stakeholder meeting	Advertisement	✓	
10-Apr-08	Stakeholder meeting	Minutes of meeting	✓	
4-Oct-08	Contract with BVC	Contract	✓	
30-Dec-08 – 28-Jan-08	Web hosting of PDD for Global stakeholder comment		✓	
19-Mar-09	Presentation at MoEF for DNA	Notification	✓	
17 April-09	DNA approval from MoEF	Copy of approval	✓	
13-June-10-12-July-10	Re web hosting of the Pdd due to change in methodology.		✓	

As demonstrated above there is less than 2 years of a gap between two consecutive real actions towards securing CDM status for the project activity, Hence, as per paragraph 8 of Annex 22 of EB 49 Guidance on the demonstration and assessment of CDM awareness, continuing and real actions were taken to secure CDM status for the project activity;
Board resolution decisiveness demonstrates serious consideration for CDM.

As per Annex 15 of EB54, Guidelines for demonstrating additionality of renewable energy projects =<5 mw and energy efficiency projects with energy savings <=20 Gwh per year, Version 1, following guidelines are to used for demonstrating additionality of small ≤ 5 MW projects:

1. **Project activities up to 5 megawatts that employ renewable energy as their primary technology are additional if any one of the below conditions are satisfied:**

   (a) The geographic location of the project activity is in LDCs/SIDs or in a special underdeveloped zone of the host country identified by the Government before 28 May 2010;

   The project activity is located at Kutch district in Gujarat and is not located in a LDC/SID or in an underdeveloped zone of host country (India). Hence, this condition is not applicable for the project activity.

   (b) The project activity is an off grid activity supplying energy to households/communities (less than 12 hrs grid availability per 24 hrs day is also considered as .off grid. for this assessment);

The project activity is connected to grid NEWNE. The electricity generated from the project is wheeled to project proponent's industrial units using state electricity grid. Hence, this condition is not applicable for the project activity.

(c) The project activity is for distributed energy generation with both conditions (i) and (ii) satisfied (see below);

(i) Each of the independent subsystem/measure in the project activity is smaller than or equal to 750 kW electrical installed capacity;

(ii) End users of the subsystem or measure are households/communities/SMEs.

Although the end user of project activity is a SME but it involves installation of 4 number of 1.25 MW wind turbines. Hence, condition (i) of this condition is not satisfied by the project. Hence, this condition is not applicable for the project activity.

(d) The project activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country (conditions apply: The total installed capacity of technology/measure contributes less than or equal to 5% to national annual electricity generation).

There is no such recommendation by host country DNA for wind projects. Hence, this condition is not applicable for the project activity.

2. Energy efficiency project activities that aim to achieve energy savings at a scale of no more than 20 giga-watt hours per year are additional if any one of the below conditions is satisfied:

(a) The geographic location of the project activity is in LDCs/SIDs or special underdeveloped zones of the host country identified by the Government before 28 May 2010;

(b) The project activity is an energy efficiency activity with both conditions (i) and (ii) satisfied (see below);

(i) Each of the independent subsystem/measure in the project activity achieves an estimated annual energy savings of equal to smaller than 600 megawatt hours; and

(ii) End users of the subsystem or measure are households/communities/SME.

The project activity installation of 5 MW of wind power plant and is not an energy efficiency project. Hence, this condition is not applicable for the project.

Since, the no applicability condition for demonstrating additionality under Guidelines for demonstrating additionality of renewable energy projects =<5 mw and energy efficiency projects with energy savings <=20 Gwh per year, Version 1 is satisfied by the project activity. Hence, as per the guidelines Attachment A to Appendix B of simplified modalities and procedure of small scale CDM project is used to demonstrate additionality for the project.

The project activity is considered to be additional if anthropogenic emission of Green house gases by source are reduced below than those that would have occurred in absence of the CDM project activity. According to Attachment A to Appendix B of simplified modalities and procedure of small scale CDM project activities additionality of a project activities is established using investment barrier that is financially more viable alternative to the project activity would have led to higher emissions.

Investment Barrier

The benchmark analysis has been used to demonstrate investment barrier.

The post tax equity IRR is used as the appropriate financial indicator for the project activity. Gokul refoils has installed 5 MW Wind turbine. In the absence of proposed project activity the proponent would have taken electricity from the grid. Key assumptions used in calculating are as follows:

Project Assumptions

Project costs	**Total cost**		
Total costs	**2,539**		
Plant and Machinery	2,026.40	Lacs	Calculated using Suzlon proposal dated 28th of March 2006.
Civil Costs	359.17	Lacs	Calculated using Suzlon proposal dated 28th of March 2006.
Sub-station Charges (GEDA)	150.00	Lacs	Calculated using Suzlon proposal dated 28th of March 2006.
Processing charges (GEDA)	3.50	Lacs	Calculated using Suzlon proposal dated 28th of March 2006.
Number of WTGs	4		
Sources of fund			
Loan	1,777.22	70%	Gokul has undertaken only one new project, within 3 years prior to starting date of project activity. The new project was on plant expansion with Debt: Equity ratio as 60:40. Whereas for the proposed project debt: equity ratio considered at the time of taking a decision to implement the project is 70:30. Hence, for conservative values debt: equity ratio of 70: 30 is considered
equity	761.67	30%	
Long term loan			
Rate of interest	**%**	13%	In accordance with the guidelines of para 11 of Annex 58 of EB 51 on investment analysis. For plant expansion prior to project activity, a debt at 13% was raised by Project proponent in last three years prior to the project activity. Hence, same is considered as rate of interest
Moratorium period		6 months	As per terms and conditions of loan raised by project proponent prior to the project activity.
Payback		5 years (20	As per terms and conditions of loan

		equal quarterly instalments)	raised by project proponent prior to the project activity.
Working capital Loan			
Rate of interest	**%**	13.00%	Source: Same as long term loan interest rate
Receivables (Number of days)		60	Normative
Operation and maintenance (Number of days)		30	Normative
Income tax	**%**	**33%**	Source: As per IT Act
Surcharge on Income tax	%	3.0%	Source: As per IT Act
MAT	%	11.00%	Source: As per IT Act
Surcharge on MAT	%	3.00%	Source: As per IT Act
Operation and maintenance Costs			
Operation and maintenance costs of WTG including service tax and VAT	12.96	lacs/WTG	Source: Suzlon Proposal dated 28th of March 2006
Annual escalation	5.0%	III year onwards	Source: Suzlon Proposal dated 28th of March 2006
Insurance costs	1.2	lacs/WTG	Source: Suzlon Proposal dated 28th of March 2006
Annual land lease rental, substation maintenance and certification charges	1	lacs/WTG	Source: Suzlon Proposal dated 28th of March 2006
Unit cost of electricity	3.75	Rs.	Electricity bill of plants where electricity is wheeled, at the time of decision making.
Transmission losses	2%		Plf is measured at the Wind mill, whereas net exported electricity is measured at substation. Hence, transmission losses occur due to distance between Wind mill and Substation. Suzlon proposal mentions transmission losses as 4%, whereas the loan document mentions transmission losses of 2-3%. Hence, for conservativeness transmission losses of 2% are considered
Electricity generated	28.00	Lac units/WTG	Source: Loan application document submitted to bank (State bank of Travancore)
plf	25.57%		In line with Para 3(a) of Annex 11 of EB 48: Guidelines for the reporting and validation of plant load factor Version 1, plf is taken from Loan application document

			submitted to bank (State bank of Travancore).
Wheeling charges	4%		Source: Suzlon Proposal dated 28th of March 2006
Depreciation			
Depreciation rate as per IT Act	100%	WDV basis	Source: 80% depreciation as per IT Act with an additional depreciation of 20% WDV as per section 32 of IT ACT
Depreciation rate as per company's Act			
Plant and machinery	5.28%	SLM basis	Source: As company's Act
Civil	3.34%	SLM basis	Source: As company's Act

Basis for Input Parameters

Capital costs
The total capital cost of all four WTGs is considered as 2539 lacs. This cost has been taken from proposal of Suzlon Energy Ltd dated 28/03/2006 for WTG and it reflects value applicable at the time of decision making. This is in line with paragraph 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). The actual capital cost for the project activity as per the purchase order is 2340 lakhs. This is 8% less than the cost of WTGs considered at the time of decision making. Hence, a sensitivity analysis of ±10% variation has been carried out in section below.

Operation and maintenance costs
Operation and maintenance cost (O&M cost) is taken as 12.96 lacs per WTG (including service tax and VAT) from second year onwards. The O&M cost is taken from proposal of Suzlon Energy Ltd dated 28/03/2006 for WTG and it reflects value applicable at the time of decision making. This is in line with paragraph 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). Operation and maintenance agreement was awarded to Suzlon infrastructure by project proponent and as per the agreement the actual O&M cost is 12.49 lakhs per WTG (including service tax and VAT). This is 4% less than the O&M cost considered at the time of decision making. Hence, a sensitivity analysis of ±10% variation has been carried out in section below.

An escalation of 5% is considered in Operation and maintenance cost (O&M cost). The escalation in O&M cost is taken from the Proposal of Suzlon Energy Ltd dated 28/03/2006 for WTG and it reflects value applicable at the time of decision making. This is in line with paragraph 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). Operation and maintenance agreement was awarded to Suzlon infrastructure by project proponent and as per the agreement there is an annual escalation of 5% per annum in O&M cost per year.

Plant load factor
PLF is taken as 25.57% (Generation 2.8 million units per WTG). The plf considered is as per loan application submitted to State Bank of Travancore dated 10/04/2006 and Union Bank of India dated 10/04/2006. This is in line with the Guidelines for the reporting and validation of PLF's, EB 48 Annex 11 which stipulates that Plant load factors shall be defined ex-ante based on 'The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing. Hence, in line with EB 48, Annex 11 PLF is taken from loan application to bank while applying for project financing.

The PLF during 2007, 2008 and 2009 was 19%, 20% and 18% respectively. PLF of wind turbine decreases with time due to wear and tear of wind turbine. Tariff orders of some electricity regulatory commissions like Tamil Nadu Electricity Regulatory Commission (TNERC order dated 15/05/2006) considers de-rating of 1% every year after 10 years in generation units. In view of these, no escalation in PLF is considered in investment analysis. Sensitivity on ± 10% variation on PLF is also carried out in section below.

Tariff

Tariff considered is INR 3.75/kWh. The tariff considered is Import charges (energy charges) from Electricity bills at the time of decision making. The electricity is wheeled to three factory units of M/s Gokul Refoils & Solvent Ltd. The electricity import charges have been taken from electricity bills of the plants where the power generated from the project activity would be wheeled. The decision for the project activity was taken in March 2006.

Sidhpur unit II was started post decision making and hence no electricity bills were available for Sidhpur unit II at the time of decision making.

The energy charges (as per electricity bill) for the month of Dec 2005 for Gandhidham unit was INR 3.75/KWh. The bills prior to decision making such as for the months of May 2004, Nov 2004 and June 2005 also demonstrated tariff as INR 3.75/KWh.

The energy charges for Sidhpur Unit –I for Dec 2005 were INR 3.75/KWh. The bills prior to decision making such as for the months of Jan 2004, Oct 2004, Jan 2005 and June 2005 also demonstrated tariff as INR 3.75/KWh

Thus the import electricity charges available to project participant at the time of decision making was INR 3.75/KWh and same was considered in investment analysis. The tariff value is applicable at the time of decision making. This is in line with para 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). Since the energy charges in various months as stated above of 2004 and 2005 were INR 3.75/KWh, hence no escalation was considered in energy import charges. However, sensitivity has been carried out on ± 10% variation on tariff in section below.

Insurance costs

Insurance cost is taken as 1.2 lacs per WTG per annum. The total insurance cost considered for all 4 WTGs is 4.8 lacs per annum. The insurance cost is taken from the proposal of Suzlon Energy Ltd dated 28/03/2006 for WTG and it reflects value applicable at the time of decision making. This is in line with para 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). The actual insurance costs as per the insurance premium receipts of Oriental insurance and United India insurance is 4.96 lacs per annum. Hence, the insurance cost considered at the time of decision making is less than the actual insurance cost and hence conservative.

Transmission losses

Transmission loss of 2% is taken which is conservative as compared to 4% given in Suzlon proposal dated 28/03/2006 applicable at the time of decision making. The actual transmission losses as calculated from the difference in LCS data at the wind mill and net electricity exported to the grid at substation works out to be 4% during 2008 and 5% during 2009. Hence, the transmission loss considered at the time of decision making is conservative as compared to actual transmission losses.

Wheeling charges

Wheeling charges of 4% are taken from Suzlon proposal dated 28/03/2006. The electricity is wheeled to the factory units of Gokul Refoils & Solvent and wheeling charges of 4% are taken. These charges are as per Suzlon proposal dated 28/03/2006 applicable at the time of decision making. The actual wheeling charges as per the agreement signed with GETCO is also 4%.

Interest rate

Interest rate of 13% is taken as per debt taken by project proponent as per the Loan from Punjab National Bank for its another project prior to the decision making date. This is in line with Para 11 of EB 51 Annex 58 which states that interest rate may be taken as per recent debt acquired by project participant. Hence, the interest rate has been taken as per previous debt taken by project participant.

The actual loan agreement states that interest rate would be 1.5% + State Bank of Travancore PLR.

The State Bank of Travancore PLR was 11.5% at the time of loan agreement as was confirmed from the Corporate Statements that the bank has submitted to the National Stock Exchange [http://www.nseindia.com/marketinfo/companyinfo/eod/announcements.jsp?symbol=SBT] and hence the actual interest rate also is 13.00%.

Annual land lease rental, substation maintenance and other certification charges

Annual land lease rental, substation maintenance and other certification charges are taken as INR 0.1 million per WTG. The Annual land lease rental, substation maintenance and other certification charges are taken from the proposal of Suzlon Energy Ltd dated 28/03/2006 for WTG and it reflects value applicable at the time of decision making. This is in line with paragraph 6 of Guidelines on the Assessment of Investment Analysis (EB 51, Annex 58). The actual substation maintenance charges are 0.119 million per WTG per annum. Hence, the sub-station maintenance charges considered at the time of decision making is conservative as compared to actual parameter.

Capacity Demand Charges

There has been no savings due to capacity demand charges for any of three units where electricity is wheeled. The electricity generated from windmills is wheeled to the three industrial units using grid transmission and distribution network. The units draw electricity from grid and electricity units wheeled are adjusted in the monthly electricity bills of the three respective units. The electricity wheeled meets only the partial electricity requirements of the three units where electricity is wheeled and the units continue to draw remaining electricity from grid even after the commissioning of wind mills. The capacity demand charges are paid based on sanction load and there is no change in sanction load due to wheeling of electricity as verified from electricity bills for the period before and after commissioning of windmills.

Note: 10 lacs: 1 million

Financials incentives considered for the project:

1. Tax rebate of 10 consecutive years is awarded by Government of India for Wind projects: Project proponent is exempted from taxation from any 10 years out of first 15 years for income from renewable electricity generation projects in India under section 80IA of income tax. During this period project proponent need to pay only MAT (minimum alternative tax). The section 80IA is not applicable in the years when income after deducting carry forward losses showing losses. The income after adjusting carry forward losses is given only for the computing tax under Section 80IA of income tax act. To avail these deductions income has to be computed by taxing wind mill

on stand alone basis and considering that these tax depreciation are absorbed against the income from wind mill.

2. Accelerated IT Depreciation of 80% WDV has been considered for the project. Additional depreciation of 20% in the first year is also considered for the project activity under section 32 of IT act. IT act allows these benefits to be absorbed in wind mill project and other business of project proponent. Accordingly, project proponent has absorbed these depreciation benefits in its wind project and other businesses. Tax savings due to these benefits are added in the cash flows. Once depreciation benefits have been absorbed, losses can not be carry forward into subsequent years and hence income becomes taxable.

Parameter	Equity IRR
Equity IRR without CDM benefits	11.12%
Equity IRR with CDM benefits	14.58%

Benchmark

The guidance to investment analysis used in EB51, Annex 58 states that in cases where benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Return on equity is appropriate benchmark for equity IRR and Capital asset pricing model (CAPM) is used for calculating it.

The tool for demonstration and assessment of additionality (para-5, sub step 2(b)) states that in cases where the project has more than one potential developer, the benchmark shall be used on parameters that we are standard in the market, considering he specific characteristics of the project activity. Accordingly the return on equity has been considered as the benchmark and is calculated using CAPM for the project type.

Benchmark return on equity was calculated as **14.41%**. A detailed calculation of the same is provided in Annex 5 of the PDD.

Sensitivity Analysis

According to paragraph 17 of Annex 58 of EB 51: Guidance on Investment Analysis, sensitivity analysis of

- Variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation
- Variations in the sensitivity analysis should at least cover a range of +10% and –10%

In view of the above guidance, Gokul refoils carried out sensitivity analysis of the project for:

Capital costs

As per the purchase order placed the actual capital cost of the project is 2340.3 lakhs which is 8% less than the cost as per the Suzlon offer. Hence, sensitivity analysis ±10% variation has been carried out.

Variable	Variation	Equity IRR
Capital costs	+10%	9.02%
	-10%	13.67%

Plf

Plf of a project is a critical factor. Hence, a sensitivity analysis ±10% variation has been carried out.

Variable	Variation	Equity IRR
Electricity generation plf	+10%	13.93%
	-10%	8.21%

Electricity tariff
Electricity generated from proposed project is wheeled to industrial units of Gokul and input charges have been considered as tariff. A sensitivity analysis ±10% variation has been carried out.

Variable	Variation	Equity IRR
Electricity tariff	+10%	13.93%
	-10%	8.21%

Operation and maintenance costs
As per the operations and maintenance agreement signed with Suzlon infrastructure the actual Operation and maintenance cost of the project is 12.49 lakh which is 4% less than the cost as per the Suzlon offer. A sensitivity analysis ±10% variation has been carried out.

Variable	Variation	Equity IRR
Operation and maintenance costs	+10%	10.62%
	-10%	11.61%

Equity IRR without CDM revenues for the project is less than benchmark. As shown, even after doing sensitivity analysis of the project, equity IRR does not cross benchmark for the project.
Thus, project without CDM revenues is not financially viable. Hence, the project is proven to be additional.

Equity IRR with CDM revenues comes out to be 14.58%. Thus the project is viable with CDM revenues.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to AMS I.F Baseline emissions for other systems are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor.

The baseline emission factor can be calculated as per the *Tool to calculate the emission factor for an electricity system*, , according to the methodology is:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the methodological tool. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered. OR
(b) The weighted average emissions (in kg CO_{2e}/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Combined margin emission factor (in tCO_2e/MWh from the most recent statistics available at the time of PDD submission) have been taken as the baseline emission co-efficient/emission factor.

Step 1: Identify the relevant electric power system.
For the purpose of determining the electricity emission factors, a *project electricity system* is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. Wind Power system is the project electricity system with NEWNE grid as per CEA CO_2 database version 4.

Similarly, a *connected electricity system*, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

As per tools, if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. In the present case, the Indian electricity system is divided into two grids, the new Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid as per CEA CO_2 database version 4. Wind Power system is the project electricity system with NEWNE grid as per CEA CO_2 database version 4.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional).

Off grid power plants are not included in the project electricity system.

Step 3: Select a method to determine the operating margin (OM)
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM

Any of the four methods can be used, however, the simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Electricity generation data of low-cost/must-run resources

Generation Source (Net Power Generation)	**Year 2002-2003**	**Year 2003-2004**	**Year 2004-2005**	**Year 2005-2006**	**Year 2006-2007**	**Total of the five most recent years**
Thermal Power (GWh)	164448	159780	170726	176003	185493	856450
Low cost/ Must run sources	13559	14516	14994	21085	25812	89966

(GWh)						
% of Low cost/ Must run sources	8.2%	9.1%	8.8%	12.0%	13.9%	10.4%

Source : http://www.cea.nic.in

This is evident from the table above that the percentage total grid generation by low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years. Hence Simple OM can be used for calculating the emission factor.

The emission factor is calculated using Ex-post option.
Ex-post option: The option requires emission factor to be updated annually during monitoring. In present project emission factor from Central Electricity Authority, ministry of power, Government of India is used. CEA updates the emission factor data annually hence Ex-post data vintage is used. (source for emission factor data : http://www.cea.nic.in)
Step 4: Calculate the operating margin emission factor according to the select method.
For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:
• Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period,

or

• Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout
all crediting periods.

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

Method adopted for Simple OM in the project activity:
The value of OM has been taken from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. This database is based on tool to calculate emission factor for an electricity system.

Year	Simple OM (including imports)
2005-2006	1.0195
2006-2007	1.0083
2007-2008	0.9992
Average (OM)	**1.0090**

Source:

Step 5: Identify the group of power units to be included in the build margin (BM)

Project participants can choose one of the following two options:
Option 1
Calculate the Build Margin emission factor $EF_{BM,y}$ **ex-ante** based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2
For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated ex-ante, as described in option 1 above. The sample group *m* consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Step 6: Calculate the build margin emission factor.
The value of BM has been taken from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. This database is based on tool to calculate emission factor for an electricity system.

Hence, BM=0.5977[13]

The above figures mentioned in Step 1 to Step 6 are from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. The figures are derived by CEA by using procedure mentioned in Step 1 to Step 6.

Step 7: Calculate the combined margin (CM) emissions factor.
Where:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$$

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO2/MWh).

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO2/MWh).
W_{OM} = Weighting of operating margin emission factor (%).
W_{BM} = Weighting of build margin emission factor (%).

Wind and solar power generation project activities: W_{OM} =0.75 and W_{BM} = 0.25 (owing to their intermittent and non-dispatch able nature) for the first crediting period and for subsequent crediting periods.
Result obtained by using above data is summarized below:

[13] http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip

OM or $EF_{grid, OM,y}$	1.0090
BM or $EF_{grid, BM,y}$	0.5977
CM or $EF_{grid, CM,y}$	**0.9062**

Estimation of Emission Reductions:
The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction ERy by the project activity during a given year y is the difference between baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly), as follows:

$$ER_y = BE_y - PE_y - L_y$$

Where the baseline emissions (BEy in tCO2) are the product of the baseline emissions factor ($EF_{CO2, y}$ in tCO_2/MWh), times the electricity supplied by the project activity to the grid ($EG_{BL, y}$ in MWh).

Project emission:
The project activity is a wind power project that supplies electricity to state grid. In line with the methodology the project emissions are considered as zero.

Leakage:
There is no transfer of WTGs. Hence, no leakage emission has been considered for the specific project activity.

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

Data / Parameter:	**$EF_{OM ,y}$**
Data unit:	tCO_2/MWh.
Description:	The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity.
Source of data used:	CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October 2008) by Ministry of Power Central Electricity Authority.
Value applied:	1.0090
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of EF_{OM} has been taken from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. This database is based on tool to calculate emission factor for an electricity system
Any comment:	

Data / Parameter:	**EF_{BM}**
Data unit:	tCO_2/MWh.
Description:	The build margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity.
Source of data used:	CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October

	2008) by Ministry of Power Central Electricity Authority.
Value applied:	0.5977
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of EF_{BM} has been taken from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. This database is based on tool to calculate emission factor for an electricity system.
Any comment:	

Data / Parameter:	**EF_{CM}**
Data unit:	tCO_2/MWh.
Description:	The combine margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity.
Source of data used:	CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October 2008) by Ministry of Power Central Electricity Authority.
Value applied:	0.9062
Justification of the choice of data or description of measurement methods and procedures actually applied :	The EF_{CM} is calculated based on EF_{OM} and EF_{BM} and using rates given in the Tools to calculate emission factor for an electricity system. The value of EF_{OM} and EF_{BM} has been taken from CEA CO_2 baseline database Version 4, which is an official source of data by government of India. This database is based on tool to calculate emission factor for an electricity system.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

NEWNE Grid Emission factor:

Operating Margin Grid Emission factor – 1.0090 tCO_2/MWh[14]
Build Margin Grid Emission Factor - 0. 0.5977 tCO_2/MWh
Combined Margin Emission Factor = (75% x 1.0090 + 25% x 0.5977)
= **0.9062 t CO_2/MWh**

Power Generated from the Project (MWh/year):

$EG_{BL,y}$ = Capacity * 365 days * 24 hours *plf * (1- transmission losses)*(1- wheeling charges)
= 5* 365*24*25.57% *(1-2%)*(1-4%)
= 10537 MWh

Baseline emissions (tons of CO_2):

[14] CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October 2008) by Ministry of Power Central Electricity Authority.

BE_y = Grid Emission Factor (tons of CO_2/MWh) * Power Generated from the Project (MWh/year)
= $EFco_2$ * $EG_{BL,y}$
= 0.9062 t CO_2/MWh * 10537 MWh p.a
= 9548 t CO_2

Project Emission (PE_y): PE_y=0

Leakage: (L_y): L_y= 0.

Emission reduction (ER_y):
$ER_y = BE_y - PE_y - L_y$ = 9548– 0 -0 = 9548 t CO_2 p.a.

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

Year	Project Emission (tCO2e /yr.)	Baseline Emissions (tCO2e /yr.)	Leakage (tCO2e / yr.)	Emission Reductions (tCO2e /yr.)
2010-2011	0	9548	0	9548
2011-2012	0	9548	0	9548
2012-2013	0	9548	0	9548
2013-2014	0	9548	0	9548
2014-2015	0	9548	0	9548
2015-2016	0	9548	0	9548
2016-2017	0	9548	0	9548
2017-2010	0	9548	0	9548
2018-2019	0	9548	0	9548
2019-2020	0	9548	0	9548
Total (tonnes of CO_2 e)				**95480**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{BL,y}$**
Data unit:	MWh
Description:	It refers to the net quantum of electricity supplied from the project activity to the grid.
Source of data to be used:	The monthly 'Certificate for share of electricity generated' issued by GEDA to project participant will be used to determine the value.
Value of data	10537
Description of	• Continuous monitoring of electricity with hourly measurement will be

measurement methods and procedures to be applied:	done. • A sealed meter is installed at each WTG by state electricity distribution company GETCO. • The meter reading at each WTG is recorded monthly by representatives from GETCO and project proponent. • Meter at substation measures total electricity from all the WTGs supplying electricity to it including those of project activity. • Based on monthly recordings at WTG and substation, GEDA does the apportioning of electricity and issues a certificate for share of electricity to project proponent. • Meter used is of accuracy of 0.5 s class
QA/QC procedures to be applied:	Calibration of meter at the substation and at WTG is carried annually. For further details refer Section B.7.2. The net electricity wheeled will be crosschecked from deductions made in electricity bill of Gokul's industrial units at Sidhpur (Sidhpur 1 and Sidhpur 2) and at Gandhidham.
Any comment:	Data will be archived for a period of two years after crediting period or last issuance which ever is later.

Data / Parameter:	**EG_{weg}**
Data unit:	MWh
Description:	Electricity generated as measured by WTG controller
Source of data to be used:	Weekly Report with daily generation data provided by Suzlon to the PP.
Value of data	11200
Description of measurement methods and procedures to be applied:	This parameter is measured using a controller available in the control panel of the WTG at the site. The LCS located at the WTG measures electricity continuously. The LCS is installed by Suzlon. The daily readings of the generation are sent to project proponent every week by Suzlon. The LCS installed can not be calibrated. Current transformer provides the input to LCS through a multi function relay. The current transformer is checked annually by the operation and maintenance team. Continuous monitoring of electricity with hourly measurement will be done.
QA/QC procedures to be applied:	The controller at WTG is a programmable logic controller (PLC). These meters have built in logic where in case of discrepancy of the recording of the electricity generation by the WTG, it shuts down the WTG and stops any further generation. In case of any inconsistency or error notifying at the Controller, it will be rectified or replaced completely by the WEG supplier.
Any comment:	Data will be archived for a period of two years after crediting period or last issuance which ever is later.

B.7.2 Description of the monitoring plan:

As per paragraph 21 of AMS 1.F. Version 1, Monitoring shall consist of metering the net electricity supplied by the project activity to the grid. Measurement results shall be cross checked with records for sold electricity. Hourly measurement and monthly recording are carried out.

Data Monitoring

The project activity essentially involves generation of electricity utilising wind energy. Hence, the monitoring plan involves measurement of electricity generated from the wind turbine based electricity generation unit.

The electricity generated from the project is measured by a sealed Gujarat Energy Transmission Corporation Limited (GETCO) meter installed at the WTG site. The electricity reading from this meter is taken every month by representatives of project proponent through Operation and maintenance contractor namely Suzlon Infrastructure private limited. Set up by Gujarat State government, GETCO is a transmission company with on objective to lay, operate, and manage Power System network and associated Sub- Stations, across the state of Gujarat.

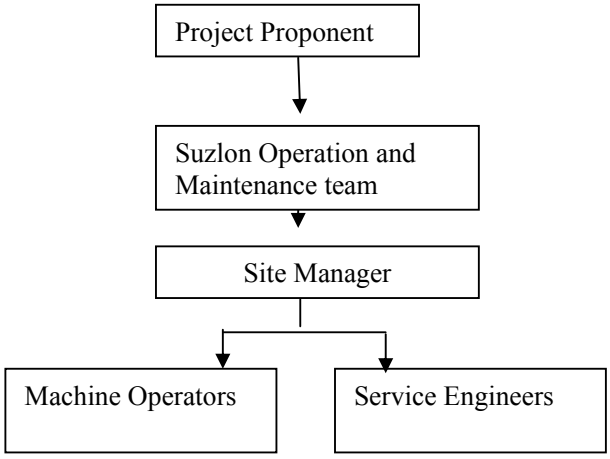
Metering is also done at the substation which has a main meter and measures electricity generated by all wind turbines connected to the substation including those of project activity. This meter is tri-vector meter with accuracy of 0.5 s class and is capable of measuring import and export. Monthly reading is taken on the meter at substation by GETCO representatives of project proponent through Operation and maintenance contractor. This reading gives net electricity exported to grid by all WTGs connected to substation.

Based on monthly recordings at WTG and substation, Gujarat Energy Development Agency (GEDA) does the apportioning of electricity and issues a certificate for share of electricity to project proponent. GEDA is the Nodal Agency of the Government of Gujarat for promotion and popularization of Renewable Energy and Energy Conservation in the state of Gujarat, India. GEDA is not involved in manufacturing or marketing of Renewable Energy Devices & Systems

As per AMS 1.F. grid emission factor needs to be monitored. Para-14 of AMS 1.F refers to methodology AMS 1.D for procedures for calculating grid emission factor. AMS 1.D. in-turn refers to 'Tool to calculate the emission factor for an electricity system' for calculation of grid emission factor. Hence, using this 'Tool to calculate the emission factor for an electricity system (Version: 2)' ex-ante value for grid emission factor is considered for calculating grid emission factor.

Roles and Responsibility

Operation and maintenance is carried out by Suzlon which are highly experienced and trained in carrying out the same. The monitoring recording and reporting is carried out by Suzlon. Generation report from LCS controller is sent by Suzlon to project participant. The PP reviews the data.



Frequency of meter reading
The meter reading at individual WTG and GETCO substation are recorded on monthly basis.

Data archiving
Data will be archived electronically. The data would be archived two years after crediting period or last issuance whichever is later.

Calibration of Meters
The meter located at the WTG and at substation will be calibrated once in a year. The calibration of the meters will be done as per procedures of GETCO.

Procedures to deal with uncertainties in monitored data

During the annual calibration if the meter at WTG is found to be outside the permissible limit of error then the meter will be replaced immediately. The error will be applied to the monitored data from the date of last calibration.
During the annual calibration if the meter at substation is found to be outside the permissible limit of error then the meter will be replaced immediately. The error will be applied to the monitored data from the date of last calibration.

Apportioning of electricity

In case date of registration doesn't match with the date of 'Certificate of share of electricity generated' then apportioning will be carried out based on ratio of generation data using LCS.
The emission reductions of that particular period (from the date of registration of the project till the end of the month) will be calculated based on percentage generation of that particular period at WTG using LCS data multiplied with the total units generated in the month as per sharing certificate issued by GEDA.
The sample calculation is furnished below:

Generation at WTG (MWh) = A
(From the date of registration to the end of month using LCS data)

Total generation at WTG (MWh) = B
(Total generation of particular month)

% Generation from the date of registration to the end of the month = C = (A/B)*100

Generation as per GEDA (MWh) = D
(Sharing Certificate)

Generation used for calculation of emission reduction Calculations (MWh) = (D * C/100)

Adjustment in monthly bills for wheeled electricity

The net electricity exported to grid is the monitored parameter. Wheeling charges are deducted from electricity exported to grid, and remaining electricity is wheeled to Gokul's industrial units. The net electricity wheeled is adjusted in electricity bills of Gokul's industrial units at Sidhpur (Sidhpur 1 and Sidhpur 2) and at Gandhidham.
The net electricity wheeled will be crosschecked from deductions made in electricity bill of Gokul's respective industrial units.

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):

10/06/2010

Gokul Refoils and Solvent
&
Verve Consulting Pvt. Ltd.
11, Brahmeshwar Bagh
Bhubaneswar
Tel:+91-674-2434342
Fax: +91-674-2430651

Only Gokul Refoils and Solvent is the project participant whose details are provided in Annex-1

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:

15/04/2006. This is the date on which purchase order for first set of wind mills were placed by Gokul.

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

20 years 0 months

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

Project activity has chosen fixed crediting period.

C.2.1. Renewable crediting period

Not applicable

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:

01/09/2010 or date of registration whichever be later

C.2.2.2. Length:

10 years 0 months

SECTION D. Environmental impacts

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

Wind based power generation is one of clean source of energy generation. There is no significant impact due to the project. There are no trans-boundary impacts. Solid and oily waste disposal is being carried out by Operation and Maintenance contractor as per applicable requirements.

EIA notification was published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry Of Environment And Forests dated 14th of September, 2006[15]. It is mentioned in the notification that the Central Government hereby directs that on and from the date of its publication the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Central Government. Wind energy projects are not mentioned in any of the categories of the schedule to the above mentioned notification.

EIA is not required for wind projects in India.

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:

No significant impact on environment is caused from project activity.

SECTION E. Stakeholders' comments

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

Gokul Refoils and Solvents organized a Stakeholders consultation meeting to take the views and suggestion from the concerned stakeholders regarding implementation of CDM project. Advertisement for the same was published in 'Kutch Mitra' news paper on 1st April, 2008. The stake holder's consultation meeting was held on 10th April, 2008 at Aarikhana Village, Abdasa District Kutch State Gujarat, India.

Invitations for stakeholder meet were sent by project proponent: to following government representatives

1. Representative from the local community
2. Representative from CDM Cell, Ministry of Environment & Forest, Government of India.
3. Representative from CDM Cell, Ministry of Environment & Forest, Government of Gujarat.
4. Representative from Ministry of New & Renewable energy, Government of India.
5. Representative from Gujarat Energy Development Agency.
6. Representative from Gujarat Urja Vikas Nigam Limited.

Meeting was attended by:

1. Suzlon officials

[15] http://envfor.nic.in/legis/eia/so1533.pdf

2. Local villagers
3. Project participant
4. CDM consultant

The consultation was provided in an open and transparent manner. Participants were allowed reasonable time to review the project and were actively encouraged to express their views or comments about the project.

The village panchayat encouraged the initiative by commenting that the barren land does not decrease the agrarian land in the region and does not result in migration of people from the village. They also added that that the project activity would result in generation of jobs.

Statutory bodies involved in the project are Gujarat Energy Development Agency or GEDA and Gujarat Electricity Transmission Corporation Limited or GETCO. GEDA has permitted the project proponent to set up wind farm of 2×1.25 MW at village Motisindholi and of 2×1.25 MW at Kadoli in Kutch district of Gujarat in accordance with the provisions of the wind power generation policy 2002. GETCO a government company registered under Companies Act 1956 and functioning as State Transmission Utility is agreeable to wheel the power on behalf of the company in accordance with the policy.

E.2. Summary of the comments received:

The overall response from the stakeholders' meeting was encouraging. The response of all the stakeholders present was very positive towards the project activity. They appreciated that the project would help the environment. They also appreciated the benefits of the project in terms of the social and economic developed of the area.
The salient points of the discussion are as follows:

Representative, Gokul Refoils and Solvents Ltd. welcomed the gathering and gave a brief introduction of the project. Technical insights were given by Mr. Dwijal Mamtora, Technical representative of SUZLON and CDM aspects were discussed by CDM consultant.

Mr. Dwijal Mamtora, gave the details of the vast resource of the wind energy in the region and described about the technology involved in the extraction of that energy and utilization for electricity generation. He described this electricity as green electricity as it does not pollute the environment. CDM consultant further added that electricity that was generated from the conventional power plants uses fossil fuel that increases the green house gas content in the atmosphere which is a prime cause of climate change and global warming.

He also added that Gokul Refoils and Solvents has chosen a barren land located at the extreme end of the village for installation of the wind energy. This does not affect the agrarian land in the region and does not have any adverse effect on the village.

Mr. Haresh and other local representatives added that this has helped in development of infrastructure in the region as well as generated employment in the villages which has decreased the migration of people to the cities.

Queries and responses from the proponent and the stakeholders

1. ***Mr. Haresh Maheshwari, Villager (Kadoli) asked: What are the benefits to the stakeholders?***
   Response: Wind Power Projects helps in creating employment opportunities, reducing the shortage of electricity supply and also helps in earning good amount by selling the Uncultivable Land. Wind farms helps in Economic Well being of the Society through Various Job Opportunities i.e. Civil Construction, Drivers, Security Personnel, Technicians, Casual Labours etc.

2. ***Mr. Ghanubha Chandubha, Villager (Kadoli) asked: Does the project affect the grazing of cattle?***
   Response: It does not affect the cattle Grazing as, wind farms are located which is far away from Village.

3. ***Mr. Bhikhubha Jadeja, Teacher (Motisindholi) asked: Has the project affected the Ground water level?***
   Response: No, wind project does not affect either Ground water Level or Drinking water quality of nearby area of the project.

4. ***Mr.Manubha Khetubha, Villager (Motisindholi) asked: Has Electricity Supply improved, since Installation of the project?***
   Response: Power supply has resulted in to well being of the villagers.

5. ***Mr.Vanrajsinh Khetubha, Villager (Kadoli) asked: What is the life-span of these machines?***
   Response: The estimated life-span is 20 to 22 years

6. ***Mr. Sumra Ali Mamad, Teacher (Motisindholi) asked: How does the turbine generate electricity & how is it pollution free?***
   Response: The Suzlon employees explained that Wind creates pressure on the rotor blades forcing them to rotate and the rotor is connected to a generator which produces electricity & as there is no consumption of fuel which emits gases so the energy produced is pollution free.

There was no negative comment received about the project activity during the meeting.

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

The project activity has received the necessary clearance from the government for setting up of the project activity. No negative comments were received from the stakeholders. Therefore there was no requirement to take up due account..

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Gokul Refoils and Solvent Limited
Street/P.O.Box:	Navrangpura
Building:	Gokul House, 43-Shreemali Co-op. Housing Society ltd., Opp. Shikhar building
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State/Region:	Gujarat
Postfix/ZIP:	380 009
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E-Mail:	cfo@gokulgroup.com
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Represented by:	Mr. Prakash Agarwal
Title:	CFO
Salutation:	Mr.
Last Name:	Agarwal
Middle Name:	
First Name:	Prakash
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There has been no public funding against the project activity.

Annex 3

BASELINE INFORMATION

The baseline emission has been estimated based on the quantum of power generated from the WTG during a period of one year. The quantum of power generated by WTG multiplied by the combined margin emission factor of the NEWNE region estimates the amount of baseline emission that would have occurred in absence of the project activity. The selection of baseline emission factor has been carried out in accordance to the guidelines mentioned in AMS I.F. The combined margin emission factor has been used to estimate the baseline emission.

Central Electricity Authority has developed Baseline Carbon Dioxide Emissions from Power Sector with an objective to obtain uniformity of approach in the country based on detailed authenticated information obtained from all the operating Power Stations in the country. The Indian electricity system is divided into two regional grids, viz. the Indian electricity system is now divided into two grids, the new Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighbouring countries like Bhutan and Nepal.

The Combined margin emission factor is being estimated as per 'Tool to calculate the emission factor for an electricity system (Version:2)' with operating margin and build margin at 75% and 25%, respectively. This is as per 'Tool to calculate the emission factor for an electricity system (Version:2)' which allows to weigh the operating margin and build margin at 75% and 25%, respectively for wind and photovoltaic project owing to there intermittent and non dispatchable generation. The operating margin and build margin data is taken from CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October 2008) by Ministry of Power Central Electricity Authority.

The operating margin and the build margin emission factor as published by Central Electricity Authority in User Guide Version 4.0 December 2008 is being used for estimation of Combined margin emission factor.

Combined Margin Emission Factor:

The Combined Margin emission factor is estimated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$). The Baseline emission factors is estimated as a summation of 75% operating margin and 25% build margin emission factor. The Operating margin[16] of 1.0 tCO_2/MWh and Build margin of 0.60 tCO_2/MWh is used to estimate the combined margin emission factor.

$$\mathbf{EF_y = w_{OM}\, EF_{OM,y} + w_{BM}\, EF_{BM,y}}$$

$$\mathbf{EF_y = 75\% \times 1.0090 + 25\% \times 0.5977}$$

$$\mathbf{= 0.9062\ t\ CO2/MWh}$$

Baseline Emission

[16] CO_2 Baseline Database for the Indian Power Sector" (Version 4.0, October 2008) by Ministry of Power Central Electricity Authority.

http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

Baseline emission is being determined as a product of the power generated from the WTG that would have otherwise been procured from the grid and the baseline mission factor.
The total power generation from the WTG is being estimated at 10537MWh p.a.

Baseline Emissions = Grid Emission Factor * Power Generated from the Project
= Grid Emission Factor (tons of CO2/MWh) * Power Generated from the Project (MWh/year)
= 0.9062 t CO_2/MWh * 10537MWh p.a
= 9548 t CO_2

Annex 4

MONITORING INFORMATION

As per paragraph 21 of AMS 1.F. Version 1, Monitoring shall consist of metering the net electricity supplied by the project activity to the grid. Measurement results shall be cross checked with records for sold electricity. Hourly measurement and monthly recording are carried out.

Data Monitoring

The project activity essentially involves generation of electricity utilising wind energy. Hence, the monitoring plan involves measurement of electricity generated from the wind turbine based electricity generation unit.
The electricity generated from the project is measured by a sealed GETCO meter installed at the WTG site. The electricity reading from this meter is taken every month by representatives of state electricity utility and project proponent.
Metering is also done at the substation which has a main meter and measures electricity generated by all wind turbines connected to the substation including those of project activity. This meter is tri-vector meter with accuracy of 0.5 s class and is capable of measuring import and export. Monthly reading is taken on the meter at substation by GETCO. This reading gives net electricity exported to grid by all WTGs connected to substation.
Transmission losses are calculated by state electricity utility people using monthly recorded readings from meter located at each WTG and substation meter readings. Based on monthly recordings at WTG and substation, GEDA does the apportioning of electricity and issues a certificate for share of electricity to project proponent.
As per AMS 1.F. grid emission factor needs to be monitored. Para-14 of AMS 1.F refers to methodology AMS 1.D for procedures for calculating grid emission factor. AMS 1.D. in-turn refers to 'Tool to calculate the emission factor for an electricity system' for calculation of grid emission factor. Hence, using this 'Tool to calculate the emission factor for an electricity system (Version: 2)' ex-ante value for grid emission factor is considered for calculating grid emission factor.

Roles and Responsibility
Operation and maintenance is carried out by Suzlon which are highly experienced and trained in carrying out the same. The monitoring recording and reporting is carried out by Suzlon. Generation report from LCS controller is sent by Suzlon to project participant. The PP reviews the data.

Procedures to deal with uncertainties in monitored data

During the annual calibration if the meter at WTG is found to be outside the permissible limit of error then the meter will be replaced immediately. The error will be applied to the monitored data from the date of last calibration.
During the annual calibration if the meter at substation is found to be outside the permissible limit of error then the meter will be replaced immediately. The error will be applied to the monitored data from the date of last calibration.

Detailed monitoring plan has been provided in Section B.7 of the PDD.

Annex 5
Benchmark calculations

Benchmark for the project is return on equity and it is calculated using Capital Asset Pricing Model (CAPM)

CAPM (K_e): $R_f + \beta * (K_m - R'_f)$
Where:
R_f: Rate of a "risk-free" investment
β: Measure of an investment's volatility, relative to an appropriate asset class
K_m: Return rate of a market benchmark, like the BSE
R'_f: Average rate of return from risk free investment

Average Risk free rate – The average risk free rates have been taken as the Interest rate on Central Government Securities made available by the Reserve Bank of India (RBI).
The average risk free rate considered is Weighted Average yield on Government Securities given on Page 155, Annual Report 2004-05, Reserve Bank of India. The annual report was published on 29th of August 2005 and was the latest annual report by Reserve bank available at the time of decision making[17].

Year	Central Government Securities			
Year	S. No.	Range	Weighted Average	Compounded Return
1996-97				100.0
1997-98	1	10.85-13.05	12.01%	112.0
1998-99	2	11.10-12.60	11.86%	125.3
1999-00	3	10.73-12.45	11.77%	140.0
2000-01	4	9.47-11.70	10.95%	155.4
2001-02	5	6.98-11.00	9.44%	170.0
2002-03	6	6.57-8.62	7.34%	182.5
2003-04	7	4.62-6.35	5.71%	192.9
2004-05	8	4.49-8.24	6.11%	204.7
2005-06 (till 12th of August 2005)	9	6.91-7.98	7.28%	

Table: Weighted Average yield on Government securities

Average rate of return from Central Government since 1996-97 till 2004-05 is considered:

R'_f: 9.37%

Risk free rate: Rate of return from government securities in 2005-06, applicable at the time of taking the investment decision. As per the latest RBI's Annual report (2004-05, published on 29th of August 2005) available at the time of decision making, the latest rate of return on government securities for 2005-06 (till 12th of August 2005) is used.
R_f: 7.28%

[17] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/65516.pdf

Beta: Measure of market volatility
It is calculated using average beta over a period of about five years of Indian power companies.

Company	Average Beta over a period of about five years.[18]
Bharat Forge utilities limited	0.95
TATA Power	1.055
NLC	1.104
GIPCL	1.122
JP Hydro	0.796

For conservativeness, minimum beta is considered.
Hence, beta: 0.796

K_m: Return rate of a market benchmark, like the BSE

It is calculated using return rate of BSE from 1979 till December 2005.
K_m: 18.3%

Hence,
CAPM: 7.28% + 0.796 *(18.3% - 9.37%)
14.41%

[18] Source: Bloomberg

Annex 6
Coordinates of Wind Turbines

Location	Longitude	Latitude
WTG 1 (Motisindholi village)	$68^0$19’12” E (68.3200)	$22^0$30’36” N (22.5100)
WTG 2 (Motisindholi village)	$68^0$19’10” E (68.3194)	$22^0$30’38” N (22.5106)
WTG 3 (Kadoli village)	$68^0$50’38.3” E (68.8440)	$23^0$03’56.75” N (23.0658)
WTG 4 (Kadoli village)	$68^0$50’35” E (68.8431)	$23^0$03’54” N (23.0650)