



Voluntary Carbon Standard

Project Description

19 November 2007

(20 July 2009)

***As per the requirements of VCS 2007 standards, the following topics are covered in this document:***

- 1. Description of Project:***
- 2. VCS Methodology:***
- 3. Monitoring:***
- 4. GHG Emission Reductions:***
- 5. Environmental Impact:***
- 6. Stakeholders comments:***
- 7. Schedule:***
- 8. Ownership:***
- 9. Annexure 1:***
- 10. Annexure 2:***

**1.1 Project title:**

44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited.

Version: 01

Date: 16/09/2009

**1.2 Type/ Category of the project:**

The project activity falls into Sectoral Category 1, Energy industries (renewable- /non-renewable sources) adopted by CDM Accreditation Panel (CDM-AP), the project activity is grid-connected renewable power generation.

**Sector:** Energy industries (renewable/non-renewable sources)

**Type:** Renewable Energy Projects,

**Methodology:** ACM0002, Version 10 (Consolidated baseline methodology for grid-connected electricity generation from renewable sources)

As per the VCS standards, any combination of GHG projects or project categories that meets the requirements of the VCS 2007.1 can be registered as a grouped project. The project activity consists of 29 numbers of customers and Enercon India Limited is project proponent hence project activity is considered as grouped project.

**1.3 Estimated amount of emission reductions over the crediting period including project**

**size:**

**Crediting period:** The project participant has selected the fixed crediting period of 10 years starting from 1 April 2006 as per the requirements of VCS 2007.1.

**Estimated Emission Reductions:** The project is estimated to have average of 69833 tCO<sub>2</sub>e per year. The project activity fall under project size of “Projects” The estimated amount of emission reductions over the chosen crediting period are tabulated bellow:

| <b>Years</b>                                                                          | <b>Estimation of annual emission reductions in tones of CO<sub>2</sub>e</b> |
|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 01 April 2006 to 31 March 2007                                                        | 22107                                                                       |
| 01 April 2007 to 31 March 2008                                                        | 61260                                                                       |
| 01 April 2008 to 31 March 2009                                                        | 65415                                                                       |
| 01 April 2009 to 31 March 2010                                                        | 69815                                                                       |
| 01 April 2010 to 31 March 2011                                                        | 69815                                                                       |
| 01 April 2011 to 31 March 2012                                                        | 69815                                                                       |
| 01 April 2012 to 31 March 2013                                                        | 69815                                                                       |
| 01 April 2013 to 31 March 2014                                                        | 69815                                                                       |
| 01 April 2014 to 31 March 2015                                                        | 69815                                                                       |
| 01 April 2015 to 31 March 2016                                                        | 69815                                                                       |
| Total estimated reductions (tonnes of CO <sub>2</sub> e)                              | 637487                                                                      |
| Total number of crediting years                                                       | 10                                                                          |
| Average of annual estimated reductions over the crediting period (tCO <sub>2</sub> e) | 63748                                                                       |

**Emission reductions are calculated in order of commissioning dates of machines.**

#### **1.4 A brief description of the project:**

##### **Project activity:**

The purpose is development, design, engineering, procurement, finance, construction, operation and maintenance of bundled wind power project of 44 MW in the Indian state of Maharashtra to provide reliable, renewable power to the Maharashtra state electricity grid which is part of the NEWNE grid. The project considered has used the barren land at Satara, Sangli, Nasik, and Ahmednagar District in the state of Maharashtra. The project is helping in bridging the gap between demand and supply by using wind as a source of generating electrical energy.

##### **Purpose of the project activity:**

- To utilize renewable wind energy for generation of the electricity.
- To sell the generated electricity to Maharashtra State Electricity Board (MSEB) connected with the NEWNE grid comprising mainly fossil fuel based power plants.
- To contribute up to some extent in mitigating the climate change.

##### **Reduction of GHGs emissions due to the project activity:**

The use of wind as a renewable energy source for generating electricity involves the conversion of wind energy contained in masses of moving air into rotating shaft power. The conversion process utilises aerodynamic forces (lift and/or drag) to produce a net positive turning moment on a shaft, resulting in the production of mechanical power that is converted to electrical power.

The project activity consists of the 55 E-48 machines of 800 KW each totaling to the capacity of 44 MW. The Project considered harness renewable resources in the region, thereby displacing non-renewable natural resources and ultimately leading to sustainable, economic and environmental development.

The operation of WEC's is also emission free and hence no emissions are produced during the lifetime of the project activity. The project activity reduces anthropogenic emissions of greenhouse gases (GHG's) in to the atmosphere, which is estimated to be approximately 63748 tones of CO<sub>2</sub>e per year, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid.

Enercon (India) Ltd ("Enercon" or "EIL") is the equipment supplier and the operations and maintenance contractor for the Project.

As per the methodology the baseline scenario is the grid based electricity system, which is same as that of the pre-project scenario.

#### **1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:**

The Project is spread across Patan, Shirala, Sinnar and Akole Taluka of Satara, Sangli, Nasik and Ahmednagar Districts in state of Maharashtra. The location of the units is on the micro siting data to get optimum performance. The latitudinal & longitudinal as well as the unique identification details of individual machines are as given in the following table:

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| S.N<br>o. | Customers<br>Name               | Machine<br>Capacity<br>(MW) | Site        | Taluka | District | Latitude                                                                                                    | Longitude                                                                                                    |
|-----------|---------------------------------|-----------------------------|-------------|--------|----------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1         | G. B. Rubber Products           | 1.6                         | Kadvekhurd  | Patan  | Satara   | 17°33'15" to 17°33'56"                                                                                      | 73°55'28" to 73°56'51"                                                                                       |
| 2         | Atlas Tours & Travels Pvt. Ltd  | 0.8                         | Kadvekhurd  | Patan  | Satara   | 17°33'15" to 17°33'56"                                                                                      | 73°55'28" to 73°56'51"                                                                                       |
|           |                                 |                             |             |        |          |                                                                                                             |                                                                                                              |
| 3         | Shah Lulla Estate Developers    | 0.8                         | Kadvekhurd  | Patan  | Satara   | 17°33'15" to 17°33'56"                                                                                      | 73°55'28" to 73°56'51"                                                                                       |
| 4         | Liberty Oil Mills Ltd.          | 2.4                         | Kadvekhurd  | Patan  | Satara   | 17°33'15" to 17°33'56"                                                                                      | 73°55'28" to 73°56'51"                                                                                       |
| 4         | Liberty Oil Mills Ltd.          | 1.6                         | Varekarwadi | Patan  | Satara   | 17°11'47.6" to 17°11'51.2"                                                                                  | 73°59'12.7" to 73°59'13.5"                                                                                   |
| 5         | Paceman Sales Promotion P. Ltd. | 0.8                         | Bhambarwadi | Shirla | Sangli   | 17°8'36.5"                                                                                                  | 73°55'14.3"                                                                                                  |
| 6         | Delta Enterprises               | 2.4                         | Bhambarwadi | Shirla | Sangli   | 17°7'11.3" to 17°8'35.6" to 17°8'28.5"                                                                      | 73°56'5.7" to 73°55'2.8" to 73°55'21.7"                                                                      |
|           |                                 |                             |             |        |          |                                                                                                             |                                                                                                              |
| 7         | Shreem Capacitors Pvt. Ltd.     | 3.2                         | Bhambarwadi | Shirla | Sangli   | 17°8'52.1" to 17°8'58.2" to 17°9'2.8" to 17°9'34.8"                                                         | 73°55'10.1" to 73°55'6" to 73°55'5.4" to 73°55'6.1"                                                          |
| 8         | Kishor Food Products P. Ltd     | 0.8                         | Bhambarwadi | Shirla | Sangli   | 17°8'53.2"                                                                                                  | 73°54'57.7"                                                                                                  |
| 9         | Mahanagar Developers            | 7.2                         | Bhambarwadi | Shirla | Sangli   | 17°9'7.6" to 17°9'14.7" to 17°9'19.1" to 17°9'24.6" to 17°9'28.2" to 17°9'14.5" to 17°9'10.8" to 17°9'10.9" | 73°55'5.8" to 73°55'2.5" to 73°55'3.6" to 73°55'6" to 73°55'6.7" to 73°55'18.1" to 73°55'36.6" to 73°55'3.5" |

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|    |                                            |     |            |        |            |                                           |                                          |
|----|--------------------------------------------|-----|------------|--------|------------|-------------------------------------------|------------------------------------------|
|    |                                            |     |            |        |            | 17°8'10.9"                                | 73°56'0.5"                               |
| 9  | Mahanagar Developers                       | 0.8 | Panchpatta | Sinnar | Nasik      | 19°39'12.8"                               | 73°48'41.4"                              |
| 10 | Mr. J. P. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°45'53.4"                               | 73°50'32.8"                              |
| 11 | Mr. C. P. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°45'17.1"                               | 73°50'31.4"                              |
| 12 | Mr. V. V. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°44'58"                                 | 73°50'13.1"                              |
| 13 | Mr. J. V. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°45'12.7"                               | 73°50'29.2"                              |
| 14 | Mr. S. V. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°45'46.9"                               | 73°50'34.1"                              |
| 15 | Mr. V. L. Patel                            | 0.8 | Panchpatta | Sinnar | Nasik      | 19°44'33.5"                               | 73°50'29.2"                              |
| 16 | Laxmi Narayan Best Chiwda                  | 0.8 | Panchpatta | Sinnar | Nasik      | 19°45'2.9"                                | 73°50'12.6"                              |
| 17 | Om Shanti Wind Farms P. Ltd                | 0.8 | Aundhewadi | Sinnar | Nasik      | 19°45'7.7"                                | 73°50'12.8"                              |
| 18 | New Sahyadri Industries Ltd.               | 1.6 | Panchpatta | Akole  | Ahmednagar | 19°44'24.3"<br>19°44'28.2"                | 73°50'40.8"<br>73°50'35.7"               |
| 19 | Mr. P. L. Patel                            | 0.8 | Panchpatta | Akole  | Ahmednagar | 19°41'7.2"                                | 73°48'48.2"                              |
| 20 | Elpro International                        | 0.8 | Panchpatta | Akole  | Ahmednagar | 19°41'41.8"                               | 73°48'53.3"                              |
| 21 | Prachar Energy                             | 1.6 | Panchpatta | Akole  | Ahmednagar | 19°39'17.8"<br>19°39'22.7"                | 73°48'42.7"<br>73°48'47.5"               |
| 22 | Panama Wind Energy Pvt. Ltd.               | 1.6 | Panchpatta | Akole  | Ahmednagar | 19°41'16.6"<br>19°41'20.6"                | 73°48'53"<br>73°48'55.6"                 |
| 23 | International Conveyors Ltd.               | 0.8 | Panchpatta | Akole  | Ahmednagar | 19°41'37"                                 | 73°48'54.3"                              |
| 24 | Metalfab Hightech Private Limited          | 0.8 | Panchpatta | Akole  | Ahmednagar | 19°41'11.9"                               | 73°48'51.6"                              |
| 25 | Gargi Construction Co. Pvt. Ltd.           | 1.6 | Panchpatta | Akole  | Ahmednagar | 19°41'26.1"<br>19°41'31.1"                | 73°48'55.1"<br>73°48'54.5"               |
| 26 | Mohite & Mohite                            | 2.4 | Panchpatta | Akole  | Ahmednagar | 19°42'15.6"<br>19°42'20.5"<br>19°42'25.6" | 73°49'6.4"<br>73°49'15.9"<br>73°49'15.3" |
| 27 | Indiana Engineering Works (Bombay) P. Ltd. | 1.6 | Panchpatta | Akole  | Ahmednagar | 19°39'27.5"<br>19°39'32.4"                | 73°48'49"<br>73°48'49.8"                 |

|    |                          |     |            |       |            |             |             |
|----|--------------------------|-----|------------|-------|------------|-------------|-------------|
| 28 | Welpack Industries Ltd.  | 0.8 | Panchpatta | Akole | Ahmednagar | 19°39'7.9"  | 73°48'37"   |
| 29 | Sunilkumar Ramanlal Shah | 0.8 | Panchpatta | Akole | Ahmednagar | 19°44'38.6" | 73°50'22.5" |



**Figure 1: The location of the site in the project activity**

#### **1.6 Duration of the project activity/ crediting period:**

**Project Start date:** The Project start date is considered as 07/02/2006. (Date of commissioning of first WEC in the project activity). This date is considered due to the fact that the project activity began reducing GHG emissions from this date

**Crediting Period Start Date:** 01/04/2006 (This date is as per the requirements of VCS 2007.1)

**Duration of the Crediting period:** 10 Years (from 01/04/2006 to 31/03/2016).

## VCS Project Description Template

| Sr No. | Customer name                              | Site        | Sub Project Capacity | EIL Sub Station | EB Sub Station  |
|--------|--------------------------------------------|-------------|----------------------|-----------------|-----------------|
|        |                                            |             |                      |                 |                 |
| 1      | G. B. Rubber Products                      | Kadvekhurd  | 1.60                 | NA              | Satara MIDC S/S |
| 2      | Shah Lulla Estate Developers               | Kadvekhurd  | 0.80                 | NA              | Satara MIDC S/S |
| 3      | Liberty Oil Mills Ltd.                     | Varekarwadi | 1.60                 | NA              | Kale S/S        |
| 3      | Liberty Oil Mills Ltd.                     | Kadvekhurd  | 2.40                 | NA              | Satara MIDC S/S |
| 4      | Paceman Sales Promotion P. Ltd.            | Bhambarwadi | 0.80                 | Bhamberwadi     | Bhamberwadi S/S |
| 5      | Delta Enterprises                          | Bhambarwadi | 2.40                 | Bhamberwadi     | Bhamberwadi S/S |
| 6      | Mahanagar Developers                       | Bhambarwadi | 8.00                 | Bhamberwadi     | Bhamberwadi S/S |
| 7      | Kishor Food Products P. Ltd.               | Bhambarwadi | 0.80                 | Bhamberwadi     | Bhamberwadi S/S |
| 8      | Mr. J. P. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 9      | Mr. C. P. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 10     | Mr. V. V. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 11     | Mr. J. V. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 12     | Mr. S. V. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 13     | Mr. V. L. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 14     | Laxmi Narayan Best Chiwda                  | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 15     | New Sahyadri Industries Ltd. 01 02         | Panchpatta  | 1.60                 | Bhandardarawadi | Panchpatta S/S  |
| 16     | Mr. P. L. Patel                            | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 17     | Elpro International                        | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 18     | Prachar Energy                             | Panchpatta  | 1.60                 | Bhandardarawadi | Panchpatta S/S  |
| 19     | Panama Wind Energy Pvt. Ltd.               | Panchpatta  | 1.60                 | Bhandardarawadi | Panchpatta S/S  |
| 20     | International Conveyors Ltd.               | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 21     | Shreem Capacitors Pvt. Ltd.                | Bhambarwadi | 3.20                 | Bhamberwadi     | Bhamberwadi S/S |
| 22     | Metalfab Hightech Private Limited          | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 23     | Atlas Tours & Travels Pvt. Ltd.            | Kadvekhurd  | 0.80                 | NA              | Satara MIDC S/S |
|        |                                            |             |                      |                 |                 |
|        |                                            |             |                      |                 |                 |
| 24     | Om Shanti Wind Farms P. Ltd.               | Aundhewadi  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
| 25     | Gargi Construction Co. Pvt. Ltd.           | Panchpatta  | 1.60                 | Bhandardarawadi | Panchpatta S/S  |
| 26     | Mohite & Mohite                            | Panchpatta  | 2.40                 | Bhandardarawadi | Panchpatta S/S  |
| 27     | Indiana Engineering Works (Bombay) P. Ltd. | Panchpatta  | 1.60                 | Bhandardarawadi | Panchpatta S/S  |
| 28     | Welpack Industries Ltd.                    | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |
|        |                                            |             |                      |                 |                 |
| 29     | Sunilkumar Ramanlal                        | Panchpatta  | 0.80                 | Bhandardarawadi | Panchpatta S/S  |

|  |              |  |    |  |  |
|--|--------------|--|----|--|--|
|  | Shah         |  |    |  |  |
|  | <b>Total</b> |  | 44 |  |  |

### 1.7 Conditions prior to project initiation:

In spite of significant growth in electricity generation over the years, the shortage of power continues to exist in India primarily on account of growth in demand for power, outstripping the growth in generation and generating capacity addition. Therefore, in the absence of the project activity equal amount of electricity would have been generated from the operation of existing fuel mix in the grid comprising mainly fossil fuels<sup>1</sup> based power plants and future capacity expansion connected to the grid hence the project activity is considered as green field project.

### 1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The Project is wind based renewable power generation connected to the Maharashtra state grid, which forms part of the NEWNE electricity grid. The total installed capacity of the project activity is 44 MW equipped with 55 sets of WEC's with capacity of 800 kW each (model E48-800 kW) made by ENERCON.

Therefore, in the absence of the project activity, equal amount of electricity would have been generated from the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansion connected to the NEWNE grid.

### 1.9 Project technologies, products, services and the expected level of activity:

The Project involves 55-wind energy converters (WECs) of Enercon make (800 kW E-48) with internal electrical lines connecting the project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 22 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The other salient features of the state-of-art-technology are:

- Gearless Construction - rotor & generator mounted on same shaft eliminating the gearbox.
- Variable speed function – has the speed range of 18 to 33 rpm thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not required due to low speed generator that runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking Systems.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH and has established a manufacturing plant at Daman in

<sup>1</sup> <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm> ,see [Baseline Carbon Dioxide Emission Database](#)

India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

The expected electricity produced from the project under consideration can be calculated as follows:

Annual electricity supplied to the grid by the Project  
 = 44MW (Capacity) x 20% (PLF) x 8,760 (hours) / 1,000 GWh  
 = 77.088 GWh  
 = 77088000 kWh/year

Expected level of the project activity: 77088 MWh/year.

#### **1.10 Compliance with relevant local laws and regulations related to the project:**

The project activity is in compliance with all mandatory applicable legal and regulatory requirements as shown below:

- The implementation of the project activity is a voluntary initiative and it is not mandatory or a legal requirement.
- The Indian Electricity Act, 2003 does not restrict or empower any authority to restrict the fuel choice for power generation.
- The applicable environmental regulations do not restrict the use of wind energy for power generation.
- There is no legal requirement on the choice of a particular technology for power generation in India.

#### **1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:**

Following risks are involved with the project activity:

- The sensitivity analysis clearly shows, as presented in section 2.5 below, that project IRR (without VCS revenue) for the project activities is much less than the benchmark. The VCS revenue can only improve the project IRR up to some extent but still much below than the benchmark.
- MNRE, through Centre for Wind Energy Technology (C-WET), Chennai, mentioned in Draft New and Renewable Energy Policy Statement 2005, that, "wind electricity in the country has not reached the cost-competitiveness levels as attained in the US and EU, especially when fiscal incentives are available".

#### **1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction:**

The project activity generates clean energy through wind energy converters and does not create any GHG emissions. Therefore, the project activity was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

#### **1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).**

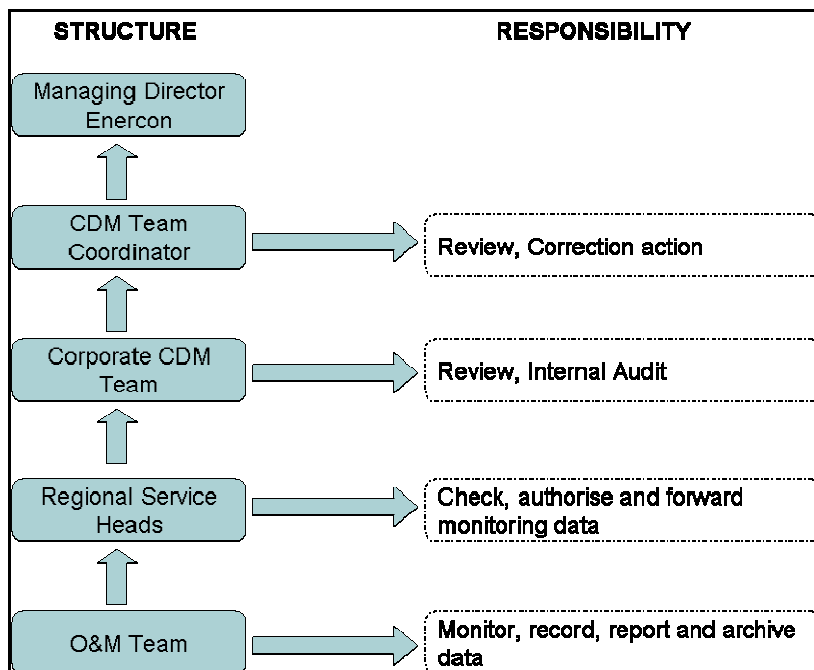
The project under consideration has been developed as per the modalities of Clean Development Mechanism of the Kyoto Protocol. The project has now been submitted for Validation with the DOE. It is hereby stated that the project has not created any other form of environmental credit.

**1.14 Project rejected under other GHG programs (if applicable):**

No, the project has not been rejected under any other GHG reduction schemes. However, the project is under CDM validation stage.

**1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:****Roles and Responsibility:**

The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



The Contact details are as follows:

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| Organization:   | Enercon (India) Limited                                     |
| Street/P.O.Box: | A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W) |
| Building:       | Enercon Tower                                               |
| City:           | Mumbai                                                      |
| State/Region:   | Maharashtra                                                 |
| Postfix/ZIP:    | 400 053                                                     |
| Country:        | India                                                       |
| Telephone:      | +91-22-6692 4848                                            |

|                  |                                                                                  |
|------------------|----------------------------------------------------------------------------------|
| FAX:             | +91-22 - 67040473 / 66921175                                                     |
| E-Mail:          | <a href="mailto:yogesh.mehra@enerconindia.net">yogesh.mehra@enerconindia.net</a> |
| URL:             | <a href="http://www.enerconindia.net">www.enerconindia.net</a>                   |
| Represented by:  |                                                                                  |
| Title:           | Managing Director                                                                |
| Salutation:      | Mr.                                                                              |
| Last Name:       | Mehra                                                                            |
| Middle Name:     |                                                                                  |
| First Name:      | Yogesh                                                                           |
| Department:      | Corporate                                                                        |
| Mobile:          | +91-98200 40301                                                                  |
| Direct FAX:      | +91-22-6692 1177                                                                 |
| Direct tel:      | +91-22-6702 2832                                                                 |
| Personal E-Mail: | <a href="mailto:yogesh.mehra@enerconindia.net">yogesh.mehra@enerconindia.net</a> |

**1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):**

- Estimated amount of emission reduction for crediting period of 10 years  
Refer Section 1.3 for details.
- **Legislative:** All the legal and regulatory requirements like statutory consents, consent for land to operate, etc were obtained for the project activity
- **Technical:**
  - ✓ The project exhibits India's technical progress with regards to wind energy turbine manufacturing, as the WECs used are latest technology available in the market, and have been manufactured by Enercon India Ltd.
  - ✓ The project activity consists of 55 nos. machines of Enercon make 800 KW wind turbines, totaling to a capacity of 44 MW.
  - ✓ The gearless technology with variable speed function is being used
  - ✓ Three independent braking systems along with incorporation of lightning protection system with generation of power at 2m/sec.
  - ✓ While increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future
- **Economic:**
  - ✓ The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities.

- ✓ The generated electricity will be fed into the NEWNE grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- **Sectoral:**
  - ✓ Increase in the electricity availability.
  - ✓ Shorter power cuts.
  - ✓ Optimum utilization of freely available natural resources.
- **Social:**
  - ✓ The project activity has led to the development of supporting infrastructure such as road network etc., in the wind park location, which also provides access to the local population.
  - ✓ The project activity leads to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
  - ✓ Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading increased energy security.
- **Environmental:**
  - ✓ The project activity involves use of renewable energy source for electricity generation instead of fossil fuel based electricity generation, which would have emitted gaseous, liquid and/or solid effluents/wastes.
  - ✓ Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.
- **Geographic:**
  - ✓ The project is located at Satara, Sangli, Nasik and Ahmednagar district of Maharashtra state. The location of the units is on the micro-siting data to get optimum performance.
  - ✓ The project involves 55 units of 800 KW out of which:
    - 9 Units are located at Pathan Taluka in Satara district
    - 18 Units are located at Shirala Taluka in Sangli district
    - 9 Units are located at Sinnar Taluka in Nasik district
    - 19 Units are located at Akole Taluka in Ahmednagar district

#### **1.17 List of commercially sensitive information (if applicable):**

There is no commercial sensitive information regarding the project activity. The project is using electricity for grid supply.

## **2 VCS Methodology:**

### **2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:**

Title of the approved baseline and monitoring methodology applied to the project activity:

“Consolidated baseline and monitoring methodology for “Grid-connected electricity generation from renewable sources”

Reference: Approved consolidated baseline methodology ACM0002 (Version 10, EB 47)

<http://cdm.unfccc.int/UserManagement/FileStorage/NF9EDA0V5K382HW0JR14GS7XYQUMCP>

The tools referenced in this methodology are:

1. Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion, version 02 (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>).
2. Tool to calculate the emission factor for an electricity system, version 01.1 (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf>).
3. Tool for the demonstrations and assessment of additionality, version 05.2 (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>).
4. Combined tool to identify the baseline scenario and demonstration of additionality. Version 2.2 (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf>)

The project uses UNFCCC Clean Development Mechanism program, which is approved under VCS. The project under consideration has capacity greater than 15 MW i.e. the threshold for small-scale projects under the UNFCCC CDM program; hence the project has adopted the approved consolidated baseline and monitoring methodology ACM0002 Version 10.

There is no methodology deviation from CDM methodology.

## 2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The justification of the choice of the methodology, ACM0002, and its applicability to the project activity is demonstrated as follows:

| Para No. | Applicability Conditions as per ACM 0002                                                                                                                                                                                                                                                                                                                                                                                                                                        | Applicability to this Project Activity                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1.       | <p>The project activity is the installation capacity addition, retrofit or replacement of a power plant/unit of one of the following types:</p> <ul style="list-style-type: none"> <li>• Hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir)</li> <li>• Wind power plant/unit,</li> <li>• Geothermal power plant/unit,</li> <li>• Solar power plant/unit,</li> <li>• Wave power plant/unit</li> <li>• Tidal power plant/unit.</li> </ul> | The project activity has installed wind power plant. Therefore, the project activity satisfies this applicability criterion. |
| 2.       | In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline                                                                                                                                                                                                             | This condition is not relevant, as the project activity does not involve capacity additions, retrofits or replacements.      |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |
| 3. | <p>In case of hydro power plants:</p> <ul style="list-style-type: none"> <li>• The project activity is implemented in an existing reservoir, with no change in the volume of reservoir.</li> <li>• 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<sup>2</sup>.</li> <li>• 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<sup>2</sup>.</li> </ul> | This condition is not relevant, as the project activity does not have hydro power plant.                                                                                                          |
| 4. | <p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>• Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</li> <li>• Biomass fired power plants;</li> <li>• Hydro power plants<sup>1</sup> that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m<sup>2</sup>.</li> </ul>                                                                                                 | The project activity does not involve any of the given criteria hence methodology is applicable for the project activity.                                                                         |
| 5. | In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.                                                                                                                                                                                                                                             | The project activity is a new wind power plant. Also no replacement, modification and retrofit measures are implemented here. Hence, this criterion is also not relevant to the project activity. |

The description provided in table above shows that the project activity satisfies the applicable conditions of the methodology, ACM0002.

As per the requirement of the applied methodology, ACM0002 for demonstrating and assessing the additionality the latest version –5.2 of the “Tool for the demonstration and assessment of additionality” is applied to the project activity.”

The project activity supplies the generated electricity to the grid. Hence, the latest version of the Tool “Tool to calculate the emission factor for an electricity system” is applied in order to

estimate the OM, BM and/or CM for the purpose of calculating baseline emissions for the project activity.

### 2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

- ✓ The sources, sinks and reservoir controlled by the project activity would be the mitigation of CO<sub>2</sub> which would have otherwise been liberated from the fossil fuel based power plants
- ✓ There are no sources, sinks and reservoir related to the GHG project
- ✓ There are no sources, sinks and reservoir affected by the GHG project

| Scenario         | Source                                                                           | Gas              | Included? | Justification/Explanation                                                                                                                                                      |
|------------------|----------------------------------------------------------------------------------|------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Baseline         | Electricity generation                                                           | CO <sub>2</sub>  | Yes       | The electricity is generated mostly from fossil fuels in Indian grids, which are carbon intensive; other gases are not considered by following a conservative approach.        |
|                  |                                                                                  | CH <sub>4</sub>  | No        |                                                                                                                                                                                |
|                  |                                                                                  | N <sub>2</sub> O | No        |                                                                                                                                                                                |
| Project Activity | Electricity generation                                                           | CO <sub>2</sub>  | No        | No GHG emissions take place by generating electricity from wind energy.                                                                                                        |
|                  |                                                                                  | CH <sub>4</sub>  | No        |                                                                                                                                                                                |
|                  |                                                                                  | N <sub>2</sub> O | No        |                                                                                                                                                                                |
|                  | Leakage due to transfer of energy generating equipment                           | CO <sub>2</sub>  | No        | The emissions from transportation of WECs are considered as negligible.                                                                                                        |
|                  |                                                                                  | CH <sub>4</sub>  | No        |                                                                                                                                                                                |
|                  |                                                                                  | N <sub>2</sub> O | No        |                                                                                                                                                                                |
|                  | Emissions through incremental transportation in the year “y”(tCO <sub>2</sub> e) | CO <sub>2</sub>  | No        | Once established, there is no further transportation of materials required besides those for repair and maintenance. These however are negligible and hence not accounted for. |
|                  |                                                                                  | CH <sub>4</sub>  | No        |                                                                                                                                                                                |
|                  |                                                                                  | N <sub>2</sub> O | No        |                                                                                                                                                                                |

### 2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

Baseline scenario is identified as per applied methodology, ACM0002/version 10.

The project activity involves installation, commissioning and operation of 55 no. of WECs, 0.8 MW each, make-Enercon, totally contributing 44 MW of power to the NEWNE grid. The project activity is the installation of a new grid-connected wind power plant and the generated electricity is being sold to Maharashtra State Electricity Board (MSEB). Hence, the baseline scenario is the following:

Electricity delivered to the NEWNE grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the subsequent section 4.1 as per the ‘tool to calculate the emission factor for an electricity system’.

#### Description of identified baseline scenario:

**Indian Power Sector: Installed Capacity and Electricity Grids<sup>2</sup>**

As a result of the impressive growth attained by the Indian Power Sector, the installed capacity has grown from mere 1,713 MW in 1950 to 144130.17 MW as on 31.03.2008, consisting of 91906.84 MW Thermal, 35908.76 MW Hydro and 4120 MW Nuclear. Sector-wise details of installed capacity are shown in Table 2.

*Table 2: Region wise installed capacity (MW) as on 30.11.2007*

| Region           | Hydro    | Thermal  |          |         |          | Nuclear | Renew-able | Total     |
|------------------|----------|----------|----------|---------|----------|---------|------------|-----------|
|                  |          | Coal     | Gas      | Diesel  | Total    |         |            |           |
| <b>State</b>     | 26086.76 | 42047.50 | 3834.22  | 604.61  | 46486.33 | 0.00    | 2200.04    | 74773.13  |
| <b>Central</b>   | 8592.00  | 29010.00 | 6638.99  | 0.00    | 35648.99 | 4120.00 | 0.00       | 48360.99  |
| <b>Private</b>   | 1230.00  | 4991.38  | 4183.00  | 597.14  | 9771.52  | 0.00    | 9994.53    | 20996.05  |
| <b>All India</b> | 35908.76 | 76048.88 | 14656.21 | 1201.75 | 91906.84 | 4120.00 | 12194.57   | 144130.17 |

It is evident from Table 2 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there is scope for reducing the CO<sub>2</sub> emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

Earlier, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table 3). Since August 2006, however, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids will be treated as a single grid and is being named as NEWNE grid from FY 2007-08 onwards for the purpose of the CO<sub>2</sub> Baseline Database. The Southern grid has also been planned to be synchronously operated with rest of all Indian Grids by early 12th Plan (2012-2017). Presently Southern grid is connected with Western and Eastern grid through HVDC link and HVDC back-to-back systems.

Regional Load Dispatch Centre (RLDC) manages power generation and supply within the regional grid. The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state meets its demand with its own generation facilities and also with allocation from power plants owned by the central sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the central sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. Moreover, there are also electricity transfers between regional grids, and small exchanges in the form of cross border imports and exports (e.g. from Bhutan).

*Table 3: Geographical scope of the two electricity grids*

| S.No. | Electricity Grid (Present) | Electricity Grid (Earlier) | Geographical Areas Covered |
|-------|----------------------------|----------------------------|----------------------------|
|       |                            |                            |                            |

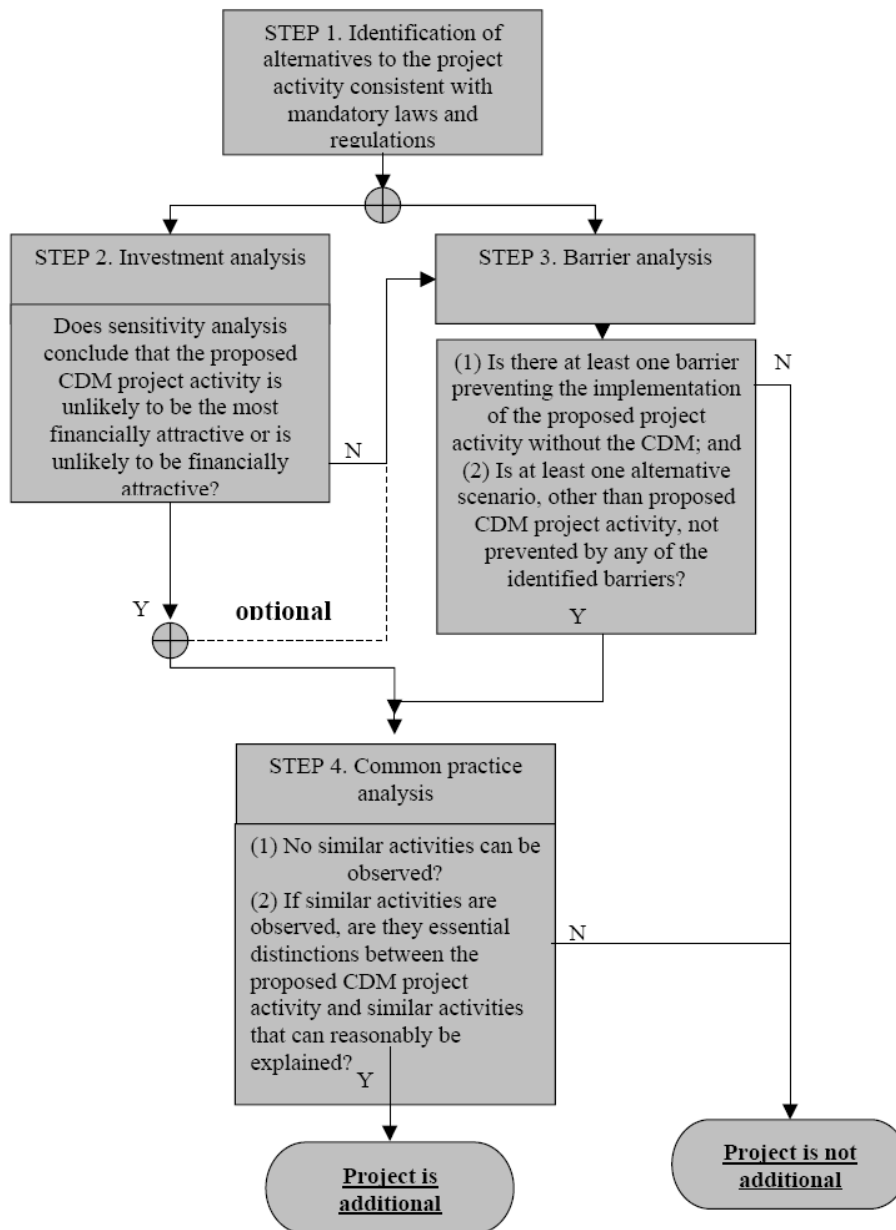
<sup>2</sup> . [http://www.cea.nic.in/planning/c%20and%20e/user\\_guide\\_ver4.pdf](http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf)

|    |                      |               |                                                                                                                |
|----|----------------------|---------------|----------------------------------------------------------------------------------------------------------------|
| 1. | <b>NEWNE Grid</b>    | Northern      | Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand |
|    |                      | Western       | Chhattisgarh, Gujarat, Daman & Diu, Dadar & Nagar Haveli, Madhya Pradesh, Maharashtra, Goa                     |
|    |                      | Eastern       | Bihar, Jharkhand, Orissa, West Bengal, Sikkim, Andaman-Nicobar                                                 |
|    |                      | North-Eastern | Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura                                       |
| 2. | <b>Southern Grid</b> | Southern      | Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry, Lakshadweep                                        |

The baseline emissions and the emission reductions from the project activity are estimated based on the quantum of electricity to be exported by the project activity to the NEWNE grid and the baseline emission factor of the NEWNE grid calculated in section 4.1 as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors.

**2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):**

The latest additionality tool i.e. Tool for the demonstration and assessment of additionality version 05.2 approved by CDM Executive Board in its 39<sup>th</sup> meeting is used to demonstrate project additionality.



### Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

#### Sub-step 1: Define alternatives to the project activity:

- (1) Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed VCS project activity. These alternatives are to include:
  - (a) The proposed project activity undertaken without being registered as a VCS project activity;

- (b) Other realistic & credible alternative scenario(s) to the proposed VCS project activity scenario that deliver outputs services (e.g., cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas; taking into account, where relevant, examples of scenarios identified in the underlying methodology;
- (c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken)

Accordingly, the realistic and credible alternatives to the project activity are:

- (a) The Project is not undertaken as a VCS project activity.
- (b) Equivalent amount of electricity being generated through operation of grid-connected power plants and addition of new generation sources
- (c) Continuation of the current situation where no project activity or any of the above Alternatives are undertaken would not be applicable as Western region under NEWNE Grid had maximum energy (MU) shortages of 38,945 mu or 15.8% and maximum peak shortages of 88,892 mw or 23.2%. (Source: <http://www.financialexpress.com/news/cea-projects-8.8-power-shortage-in-200809/350803/0>).

**Outcome of Step 1a:** Alternatives (a), (b) and (c) have been identified as realistic and credible alternative scenario(s) to the project activity

***Sub-step 1b: Consistency with mandatory laws and regulations:***

- 2. The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.)
- 3. If an alternative does not comply with all mandatory applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country. If this cannot be shown, then eliminate the alternative from further consideration.
- 4. If the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance, then the proposed VCS project activity is not additional.

There are no legal and regulatory requirements for this particular technology for power generation.

**Outcome of Step 1b:** Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

***Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both steps 2 and 3.)***

Determine whether the proposed project activity is not:

- (a) The most economically or financially attractive; or
- (b) Economically or financially feasible, without the revenue from the sale of Verified emission reductions (VERs).

To conduct the investment analysis, use the following Sub-steps:

***Sub-step 2a: Determine appropriate analysis method***

- 1. Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (Sub-step 2b). If the VCS project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

***Sub-step 2b: Option I. Apply simple cost analysis***

- 1. Document the costs associated with the VCS project activity and the alternatives identified in Step 1 and demonstrate that there is at least one alternative which is less costly than the project activity.

Option I – Simple cost analysis is not applicable as the project activity sells electricity to the grid and obtains economic benefits in the form of electricity tariffs.

***Sub-step 2b: Option II. Apply investment comparison analysis***

- 2. Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision-making context.

***Sub-step 2b: Option III. Apply benchmark analysis***

- 3. Identify the financial/economic indicator, such as IRR, most suitable for the project type and decision context.
- 4. When applying Option II or Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. Only in the particular case where the project activity can be implemented by the project participant, the specific financial/economic situation of the company undertaking the project activity can be considered.
- 5. Discount rates and benchmarks shall be derived from:
  - a. Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;
  - b. Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;
  - c. A company internal benchmark (weighted average capital cost of the company), only in the particular case referred to above in paragraph 5. The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark;
  - d. Government/official approved benchmark where such benchmarks are used for investment decisions;

- e. Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified

As per Guidance to investment analysis issued in EB 41 (paragraph 11), the weighted average cost of capital can be considered as appropriate benchmark for project IRR. The tool for demonstration and assessment of additionality [para-5, sub step 2(b)] states that in such cases (where the project has more than one potential developer) the benchmark can not be based on internal cost of equity or WACC and shall be based on parameters that are standard in the market, considering the specific characteristics of the project type. Hence, we have not used company or project specific parameters for the calculation of the benchmark (such as company WACC, project and company specific interest rates, etc.).

Accordingly, the weighted average cost of capital applicable to the project type has been considered. Weighted average cost of capital (WACC) is calculated as weighted average cost of equity and cost of debt.

#### **Weighted Average Cost of Capital:**

$$\text{WACC} = [D / (D+E)] * [\text{Cost of Debt}] + [E / (D+E)] * [\text{Cost of Equity}]$$

#### **Cost of Debt:**

Cost of debt is defined as the rate at which lenders agree to lend money to a project. The additionality tool and the guidance to investment analysis clarify that the benchmark for project with more than one potential developer should not be based on project specific parameters but should represent the standard in the market. Accordingly, the bank prime lending rate prevailing at the time of project start date has been considered as the cost of debt.

Interest costs are tax deductible, therefore in order to arrive at the post tax cost of debt, the cost of debt is multiplied with marginal tax rate. The marginal tax rate is considered as the corporate tax rate.

Considering a PLR of 10.5% the post tax cost of debt works out to:  $10.50\% * (1 - 33.66\%) = 6.97\%$  where 33.66% is the corporate tax rate at the time period investment decision.

#### **Calculation of Cost of Equity:**

The expected return on equity has been determined using the Capital Asset Pricing Model (CAPM)<sup>3</sup>. The CAPM economic model is used worldwide to determine the required/expected return on equity based on potential risk of an investment. The CAPM framework is the Nobel award winning work of financial economist Dr. William Sharpe.

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<sup>3</sup> The Capital Asset Pricing Model (CAPM) was published in 1964 by William Sharpe, for his work on CAPM Sharpe received the Nobel Prize in 1990. <http://www.investopedia.com/articles/06/CAPM.asp>

$$K_e = R_f + B \times (R_m - R_f)$$

where:

$K_e$  = Rate of return on equity capital;

$R_f$  = Risk-free rate of return;

$B$  = Beta;

$R_m - R_f$  = Market risk premium;

#### **Risk free rate:**

The risk free rate is understood as the rate of return on an asset that is theoretically free of any risks, therefore the rate of interest on government bonds are considered as risk free rates. Accordingly the risk free rate has been taken from long dated Indian government bond rates at the time of project decision which has been considered as it was in the year of investment (i.e. in that year, the company had the alternative of this long term risk free investment). The data on government bond rates is published by Reserve Bank of India.

#### **Risk Premium:**

The most common approach for estimating the risk premium is to base it on historical data, in the CAPM, the premium is estimated by looking at the difference between average return on stocks and average return on government securities over an extended period of history. It is preferred to use long term premiums, i.e. over a period of 25 years, since considering shorter time periods can lead to large standard errors because volatility in stock returns. It is also preferred to calculate the risk premium based on geometric mean of the returns since arithmetic mean overstates the risk premium. Geometric mean is defined as the compounded annual return over the same period.

Therefore the risk premium has been calculated as the difference in compounded annual return between the BSE 500 and the Government bond rates since the year of inception of BSE 500, i.e. 1 February 1999. The detailed calculations are presented in the attached excel sheet.

Source: BSE Stock Exchange ([www.bseindia.com](http://www.bseindia.com))

#### **Beta:**

Beta (B) indicates the sensitivity of the company to market risk factors. For companies that are not publicly listed, the beta is determined by referring beta values of publicly listed companies that are engaged in similar types of business. The project activity type is wind power generation; the approach therefore should be to base the beta for the project on the beta values of listed wind power generation companies in India. However, there was only one wind energy or renewable energy power generation company (BF Utility) listed on any stock exchange in India (both BSE-Bombay Stock Exchange and NSE-National Stock Exchange) in year 2006<sup>4</sup>. Therefore, in the absence of adequate data on companies which are exclusively into the exactly same type of business (i.e. wind power projects), the next best option for assessing the risk of these projects is to consider the data available on companies which are involved in similar businesses.

Therefore, we have considered beta values of all electricity generating companies in India. The group of companies considered includes renewable as well as conventional power generating companies. Investors demand a higher return from renewable energy projects than from conventional energy ones, given the higher risks in renewable, including risks of technology, risks from significantly varying and unpredictable resource availability (e.g. wind), and a lower established support base for such projects relative to that for conventional power (e.g. grid connections, bank finance, suppliers, etc.). The use of this Beta value is therefore considered conservative, as it does not add for the higher risk of non-conventional energy.

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<sup>4</sup> This can be verified from the database available at the web-link [www.securities.com](http://www.securities.com) (This website is owned by a Euromoney Institutional Investor Company and It delivers hard-to-get information on more than 80 emerging markets through its award-winning online Emerging Markets Information Service.)

The applicable Beta value has been determined on the basis of the Beta values of all power generating companies in India, which were listed on the stock exchange at the time of investment in project activity. Beta values of individual companies have been sourced from Bloomberg and screenshots are available with the excel sheets of WACC calculation in accordance to the investment time of different customers.

$$\text{WACC} = [D / (D+E)] * [\text{Cost of Debt}] + [E / (D+E)] * [\text{Cost of Equity}]$$

The WACC for different customers have been computed on the basis of above parameters, the WACC for different customers are listed below in the table:

| S.No. | Customers Name                     | Benchmark |
|-------|------------------------------------|-----------|
| 1     | G. B. Rubber Products              | 13.43%    |
| 2     | Shah Lulla Estate Developers       | 13.43%    |
| 3     | Liberty Oil Mills Ltd.             | 13.43%    |
| 4     | Paceman Sales Promotion P. Ltd.    | 13.04%    |
| 5     | Delta Enterprises                  | 13.04%    |
| 6     | Mahanagar Developers               | 12.91%    |
| 7     | Kishor Food Products P. Ltd.       | 13.60%    |
| 8     | Mr. J. P. Patel                    | 12.91%    |
| 9     | Mr. C. P. Patel                    | 12.91%    |
| 10    | Mr. V. V. Patel                    | 12.91%    |
| 11    | Mr. J. V. Patel                    | 12.91%    |
| 12    | Mr. S. V. Patel                    | 12.91%    |
| 13    | Mr. V. L. Patel                    | 12.91%    |
| 14    | Laxmi Narayan Best Chiwda          | 14.33%    |
| 15    | New Sahyadri Industries Ltd. 01 02 | 12.54%    |
| 16    | Mr. P. L. Patel                    | 12.91%    |
| 17    | Elpro International                | 13.12%    |
| 18    | Prachar Energy                     | 12.91%    |
| 19    | Panama Wind Energy Pvt. Ltd.       | 14.07%    |
| 20    | International Conveyors Ltd.       | 13.12%    |
| 21    | Shreem Capacitors Pvt. Ltd.        | 12.91%    |
| 22    | Metalfab Hightech Private Limited  | 13.12%    |
| 23    | Atlas Tours & Travels Pvt. Ltd.    | 13.43%    |
|       |                                    |           |
|       |                                    |           |
| 24    | Om Shanti Wind Farms P. Ltd.       | 14.33%    |

|    |                                            |        |
|----|--------------------------------------------|--------|
| 25 | Gargi Construction Co. Pvt. Ltd.           | 12.54% |
| 26 | Mohite & Mohite                            | 14.33% |
| 27 | Indiana Engineering Works (Bombay) P. Ltd. | 14.33% |
| 28 | Welpack Industries Ltd.                    | 13.62% |
|    |                                            |        |
| 29 | Sunilkumar Ramanlal Shah                   | 13.62% |

\*In these projects 100% equity is there hence cost of equity is the suitable benchmark for these projects.

***Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):***

1. Calculate the suitable financial indicator for the proposed VCS Project and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including *inter alia* subsidies/fiscal incentives, ODA, etc, where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.
2. Present the investment analysis in a transparent manner and provide all the relevant assumptions, preferably in the VCS PD, or in separate annexes to the PD, so that a reader can reproduce the analysis and obtain the same results. Refer to all critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital). Justify and/or cite assumptions in a manner that can be validated by the DOE. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions (e.g. insurance premiums can be used in the calculation to reflect specific risk equivalents).
6. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.
7. Present in the VCS PD submitted for validation a clear comparison of the financial indicator for the proposed VCS activity and:
  - (a) The alternatives, if Option II (investment comparison analysis) is used. If one of the other alternatives has the best indicator (e.g. highest IRR), then the VCS project activity can not be considered as the most financially attractive;
  - (b) The financial benchmark, if Option III (benchmark analysis) is used. If the VCS project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the VCS project activity cannot be considered as financially attractive.

The key assumptions used for calculating the benchmark Project IRR) are listed below since 32 customers are there in the bundle hence assumptions are different for each customer, for reference the assumptions for a customer Mohite & Mohite are listed below:

|                                    |                      |           |
|------------------------------------|----------------------|-----------|
| Mohite & Mohite                    |                      |           |
| Project: 2.4 MW Wind Power Project |                      |           |
| Location : Maharashtra             | <b>Reference No.</b> | <b>28</b> |
|                                    | Project IRR          | 10.30%    |

### Assumptions for Financial Model

|                                       |           |
|---------------------------------------|-----------|
| Project Capacity in MW                | 2.4       |
| Project Commissioning Date            | 30-Dec-06 |
| Project Cost per MW (Rs. In Millions) | 47.25     |

|                                                        |       |
|--------------------------------------------------------|-------|
| Operations                                             |       |
| PLF                                                    | 20%   |
| Insurance Charges @ % of capital cost                  | 0.18% |
| O&M Cost for 3 <sup>rd</sup> year @ % of capital cost  | 1.50% |
| O&M cost from 4 <sup>th</sup> year @ % of capital cost | 2%    |
| % of escalation per annum on O & M Charges             | 5.0%  |

|                                                   |                 |
|---------------------------------------------------|-----------------|
| Tariff                                            |                 |
| Base year Tariff (2006-07) - Rs./kWh              | 3.50            |
| Annual Escalation (Rs./kWh per Year)              | 0.15            |
| Tariff applicable after 13 years of commissioning | Cost+16%<br>RoE |

|                                                                                                                                                                             |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Project Cost                                                                                                                                                                | Rs Million |
| Land and Infrastructure, Generator & Electrical Equipments, Mechanical Equipments, Civil Works, Instrumentation & Control, Other Project Cost, Pre operative Expenses, etc. |            |
| Total Project Cost                                                                                                                                                          | 113.40     |

|                  |        |            |
|------------------|--------|------------|
| Means of Finance |        | Rs Million |
| Own Source       | 33.33% | 37.8       |
| Term Loan        | 66.67% | 75.6       |
| Total Source     |        | 113.40     |
|                  |        |            |

## VCS Project Description Template

|               |        |        |
|---------------|--------|--------|
| Terms of Loan |        |        |
| Interest Rate | 13.25% |        |
| Tenure        | 10     | Years  |
| Moratorium    | 6      | Months |

|                                                         |      |
|---------------------------------------------------------|------|
| Income Tax Depreciation Rate (Written Down Value basis) |      |
| On Wind Energy Generators                               | 80%  |
| On other Assets                                         | 10%  |
|                                                         |      |
| Book Depreciation Rate (Straight Line Method basis)     |      |
| On all assets                                           | 4.5% |
| Book Depreciation up to (% of asset value)              | 90%  |

|                       |     |
|-----------------------|-----|
| Income Tax            |     |
| Income Tax rate       | 30% |
| Minimum Alternate Tax | NA  |
| Surcharge             | 10% |
| Cess                  | 2%  |

|                               |  |
|-------------------------------|--|
| Working capital               |  |
| Receivables (no of days)      |  |
| O & m expenses (no of days)   |  |
| Working capital interest rate |  |

|                      |       |
|----------------------|-------|
| VER Revenues         |       |
| VER Price in \$      | -     |
| Exchange rate Rs./\$ | 49.00 |

\* RBI reference rate as of 17 April 2009

|                            |              |
|----------------------------|--------------|
| Crediting period starts    | 1 April 2006 |
| Length of Crediting period | 10           |

|                                                                 |        |
|-----------------------------------------------------------------|--------|
| Baseline Emission Factor for NEWNE grid (tCO <sub>2</sub> /GWh) | 905.89 |
|-----------------------------------------------------------------|--------|

**The project IRR against the benchmark for different customers is listed below:**

# VCS Project Description Template

| S.No. | Customers Name                             | Benchmark | Project IRR |
|-------|--------------------------------------------|-----------|-------------|
| 1     | G. B. Rubber Products                      | 13.43%    | 11.63%      |
| 2     | Shah Lulla Estate Developers               | 13.43%    | 11.83%      |
| 3     | Liberty Oil Mills Ltd.                     | 13.43%    | 11.14%      |
| 4     | Paceman Sales Promotion P. Ltd.            | 13.04%    | 11.28%      |
| 5     | Delta Enterprises                          | 13.04%    | 11.24%      |
| 6     | Mahanagar Developers                       | 12.91%    | 11.04%      |
| 7     | Kishor Food Products P. Ltd.               | 13.60%    | 11.35%      |
| 8     | Mr. J. P. Patel                            | 12.91%    | 10.49%      |
| 9     | Mr. C. P. Patel                            | 12.91%    | 10.55%      |
| 10    | Mr. V. V. Patel                            | 12.91%    | 10.55%      |
| 11    | Mr. J. V. Patel                            | 12.91%    | 10.49%      |
| 12    | Mr. S. V. Patel                            | 12.91%    | 10.32%      |
| 13    | Mr. V. L. Patel                            | 12.91%    | 10.49%      |
| 14    | Laxmi Narayan Best Chiwda                  | 14.33%    | 10.46%      |
| 15    | New Sahyadri Industries Ltd.<br>01 02      | 12.54%    | 10.59%      |
| 16    | Mr. P. L. Patel                            | 12.91%    | 10.71%      |
| 17    | Elpro International                        | 13.12%    | 11.21%      |
| 18    | Prachar Energy                             | 12.91%    | 10.93%      |
| 19    | Panama Wind Energy Pvt. Ltd.               | 14.07%    | 11.32%      |
| 20    | International Conveyors Ltd.               | 13.12%    | 11.06%      |
| 21    | Shreem Capacitors Pvt. Ltd.                | 12.91%    | 11.37%      |
| 22    | Metalfab Hightech Private Limited          | 13.12%    | 11.22%      |
| 23    | Atlas Tours & Travels Pvt. Ltd.            | 13.43%    | 11.79%      |
| 24    | Om Shanti Wind Farms P. Ltd.               | 14.33%    | 10.88%      |
| 25    | Gargi Construction Co. Pvt. Ltd.           | 12.54%    | 10.98%      |
| 26    | Mohite & Mohite                            | 14.33%    | 12.30%      |
| 27    | Indiana Engineering Works (Bombay) P. Ltd. | 14.33%    | 11.06%      |
| 28    | Welpack Industries Ltd.                    | 13.62%    | 10.64%      |
|       |                                            |           |             |
| 29    | Sunilkumar Ramanlal Shah                   | 13.62%    | 11.03%      |

It is clear from the above table that project IRR is much below then the benchmark rate for each customer hence the project activity is additional.

**Sensitivity Analysis:**

*There are two critical parameters to which the project activity is sensitive:-*

- *Plant Load Factor*
- *Operation and Maintenance cost*

***Plant Load Factor***

*The plant load factor for the project additionality is taken as 20% that was assumed by the investors at the time of decision making, this value is taken as per the recommendations of MERC. The Sensitivity Analysis of the IRR to the Plant Load Factor has been carried out considering variation of  $\pm 10\%$  (Min:18%, Max:22%) in the generation over the assumed PLF.*

*The IRR after sensitivity analysis in PLF is listed below in the table for different customers:*

| S.No. | Customers Name                        | Benchmark | Project IRR -10%<br>PLF | Project IRR<br>+10% PLF |
|-------|---------------------------------------|-----------|-------------------------|-------------------------|
| 1     | G. B. Rubber Products                 | 13.43%    | 10.08%                  | 13.19%                  |
| 2     | Shah Lulla Estate<br>Developers       | 13.43%    | 10.32%                  | 13.03%                  |
| 3     | Liberty Oil Mills Ltd.                | 13.43%    | 9.62%                   | 12.67%                  |
| 4     | Paceman Sales<br>Promotion P. Ltd.    | 13.04%    | 9.68%                   | 12.66%                  |
| 5     | Delta Enterprises                     | 13.04%    | 9.56%                   | 12.67%                  |
| 6     | Mahanagar Developers                  | 12.91%    | 9.61%                   | 12.48%                  |
| 7     | Kishor Food Products P.<br>Ltd.       | 13.60%    | 9.95%                   | 12.73%                  |
| 8     | Mr. J. P. Patel                       | 12.91%    | 9.08%                   | 11.91%                  |
| 9     | Mr. C. P. Patel                       | 12.91%    | 9.13%                   | 11.96%                  |
| 10    | Mr. V. V. Patel                       | 12.91%    | 9.13%                   | 11.96%                  |
| 11    | Mr. J. V. Patel                       | 12.91%    | 9.08%                   | 11.91%                  |
| 12    | Mr. S. V. Patel                       | 12.91%    | 8.92%                   | 11.72%                  |
| 13    | Mr. V. L. Patel                       | 12.91%    | 9.08%                   | 11.91%                  |
| 14    | Laxmi Narayan Best<br>Chiwda          | 14.33%    | 9.14%                   | 11.81%                  |
| 15    | New Sahyadri Industries<br>Ltd. 01 02 | 12.54%    | 9.21%                   | 11.95%                  |

## VCS Project Description Template

|    |                                            |        |        |        |
|----|--------------------------------------------|--------|--------|--------|
| 16 | Mr. P. L. Patel                            | 12.91% | 9.27%  | 12.15% |
| 17 | Elpro International                        | 13.12% | 9.79%  | 12.62% |
| 18 | Prachar Energy                             | 12.91% | 9.53%  | 12.31% |
| 19 | Panama Wind Energy Pvt. Ltd.               | 14.07% | 9.68%  | 12.49% |
| 20 | International Conveyors Ltd.               | 13.12% | 9.32%  | 12.28% |
| 21 | Shreem Capacitors Pvt. Ltd.                | 12.91% | 9.91%  | 12.85% |
| 22 | Metalfab Hightech Private Limited          | 13.12% | 9.54%  | 12.66% |
| 23 | Atlas Tours & Travels Pvt. Ltd.            | 13.43% | 10.13% | 12.98% |
|    |                                            |        |        |        |
|    |                                            |        |        |        |
| 24 | Om Shanti Wind Farms P. Ltd.               | 14.33% | 9.42%  | 12.14% |
| 25 | Gargi Construction Co. Pvt. Ltd.           | 12.54% | 9.59%  | 12.35% |
| 26 | Mohite & Mohite                            | 14.33% | 10.61% | 13.75% |
| 27 | Indiana Engineering Works (Bombay) P. Ltd. | 14.33% | 9.65%  | 12.43% |
| 28 | Welpack Industries Ltd.                    | 13.62% | 9.28%  | 12.00% |
|    |                                            |        |        |        |
| 29 | Sunilkumar Ramanlal Shah                   | 13.62% | 9.61%  | 12.44% |

*It is clear from the above table that even after increasing the PLF by 10% the project remains additional.*

- *Operation and Maintenance cost: In the financial analysis of the project activity we have taken the O&M cost as per the order of MERC and as per the rulings of MERC O&M cost for first 3 years of project commissioning is 1.5% of project cost and from 4<sup>th</sup> year it is 2% of capital cost with 5% escalation from 5<sup>th</sup> year onwards. In the project activity we have not considered any O&M cost for warranty period of 2 years.*

*By varying the O&M cost by 10% the project IRR has following value for different customers:*

| S.No. | Customers Name        | Benchmark | Project IRR -10% O&M | Project IRR +10% O&M |
|-------|-----------------------|-----------|----------------------|----------------------|
| 1     | G. B. Rubber Products | 13.43%    | 11.78%               | 11.49%               |

## VCS Project Description Template

|    |                                            |        |        |        |
|----|--------------------------------------------|--------|--------|--------|
| 2  | Shah Lulla Estate Developers               | 13.43% | 11.97% | 11.40% |
| 3  | Liberty Oil Mills Ltd.                     | 13.43% | 11.29% | 11.00% |
| 4  | Paceman Sales Promotion P. Ltd.            | 13.04% | 11.42% | 10.91% |
| 5  | Delta Enterprises                          | 13.04% | 11.38% | 11.09% |
| 6  | Mahanagar Developers                       | 12.91% | 11.18% | 10.90% |
| 7  | Kishor Food Products P. Ltd.               | 13.60% | 11.49% | 11.21% |
| 8  | Mr. J. P. Patel                            | 12.91% | 10.64% | 10.35% |
| 9  | Mr. C. P. Patel                            | 12.91% | 10.69% | 10.40% |
| 10 | Mr. V. V. Patel                            | 12.91% | 10.69% | 10.40% |
| 11 | Mr. J. V. Patel                            | 12.91% | 10.64% | 10.35% |
| 12 | Mr. S. V. Patel                            | 12.91% | 10.47% | 10.17% |
| 13 | Mr. V. L. Patel                            | 12.91% | 10.64% | 10.35% |
| 14 | Laxmi Narayan Best Chiwda                  | 14.33% | 10.60% | 10.32% |
| 15 | New Sahyadri Industries Ltd. 01 02         | 12.54% | 10.73% | 10.44% |
| 16 | Mr. P. L. Patel                            | 12.91% | 10.86% | 10.56% |
| 17 | Elpro International                        | 13.12% | 11.35% | 11.07% |
| 18 | Prachar Energy                             | 12.91% | 11.07% | 10.78% |
| 19 | Panama Wind Energy Pvt. Ltd.               | 14.07% | 11.46% | 10.95% |
| 20 | International Conveyors Ltd.               | 13.12% | 11.21% | 10.66% |
| 21 | Shreem Capacitors Pvt. Ltd.                | 12.91% | 11.51% | 11.23% |
| 22 | Metalfab Hightech Private Limited          | 13.12% | 11.37% | 10.85% |
| 23 | Atlas Tours & Travels Pvt. Ltd.            | 13.43% | 11.93% | 11.41% |
|    |                                            |        |        |        |
|    |                                            |        |        |        |
| 24 | Om Shanti Wind Farms P. Ltd.               | 14.33% | 11.01% | 10.54% |
| 25 | Gargi Construction Co. Pvt. Ltd.           | 12.54% | 11.12% | 10.84% |
| 26 | Mohite & Mohite                            | 14.33% | 12.44% | 11.92% |
| 27 | Indiana Engineering Works (Bombay) P. Ltd. | 14.33% | 11.43% | 10.92% |
| 28 | Welpack Industries Ltd.                    | 13.62% | 11.01% | 10.50% |

|    |                          |        |        |        |
|----|--------------------------|--------|--------|--------|
|    |                          |        |        |        |
| 29 | Sunilkumar Ramanlal Shah | 13.62% | 11.43% | 10.89% |

*It is evident from the above table that even after decreasing the O&M cost by 10% the project activity remains additional.*

### Step 3: Barrier analysis

Not Opted for.

### Step 4: Common Practice Analysis

#### **Sub step 4a: Analyse other activities similar to the proposed project activity:**

Unless the proposed project type has demonstrated to be first-of-its kind (according to Sub-step 3a), the above generic additionality tests shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region. This test is a **credibility check** to complement the investment analysis (Step 2) or barrier analysis (Step 3). Identify and discuss the existing common practice through the following Sub-steps:

#### **Sub-step 4a: Analyse other activities similar to the proposed project activity:**

1. Provide an analysis of any other activities that are operational and that are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis. Provide documented evidence and, where relevant, quantitative information. On the basis of that analysis, describe whether and to which extent similar activities have already diffused in the relevant region.

The investment decision for most of the customers in the project activity was taken in the time duration of 2005 to 2006 and commissioned in the time duration of 2006 to 2008 . At the time of investment decision the total installed wind power capacity in Maharashtra was 1,001 MW and at the time of commissioning the installed capacity in Maharashtra was 1756.38 MW. We want to submit that even at the time of commissioning our project was not part of the common practice. We present the following analysis to clarify this: The table below presents the year wise capacity addition of wind installations in the state of Maharashtra.

| S. No. | Year           | Wind Project Installation (MW) |
|--------|----------------|--------------------------------|
| 1      | Upto 1992      | 1.10                           |
| 2      | During 1992-93 | -                              |
| 3      | During 1993-94 | -                              |
| 4      | During 1994-95 | 1.50                           |

|    |                |         |
|----|----------------|---------|
| 5  | During 1995-96 | -       |
| 6  | During 1996-97 | 2.77    |
| 7  | During 1997-98 | 0.23    |
| 8  | During 1998-99 | 23.34   |
| 9  | During 1999-00 | 50.35   |
| 10 | During 2000-01 | 118.67  |
| 11 | During 2001-02 | 196.54  |
| 12 | During 2002-03 | 2.00    |
| 13 | During 2003-04 | 6.30    |
| 14 | During 2004-05 | 48.80   |
| 15 | During 2005-06 | 545.10  |
| 16 | During 2006-07 | 483.6   |
| 17 | During 2007-08 | 276.075 |

(Source: <http://www.windpowerindia.com/statyear.html>).

The projects are considered similar if they take place in a comparable environment. Till the year 2002-03, wind power developers in Maharashtra enjoyed sales tax benefits of Rs. 10 million per MW per year for a period of 5 years from the date of commissioning (Source: Maharashtra wind power policy 1998, MERC order dated 23 November 2003; page-5 (2.3.1)), making investment in wind attractive on a stand alone basis. The sales tax benefits were withdrawn in March-2002. Therefore wind capacity additions before March 2002 have not been considered.

Also, projects can be considered similar if they rely on a broadly similar technology and are of a similar scale. Our project is a large scale project activity (>15 MW). Therefore in accordance with the guidance, we have analysed wind projects of more than 15 MW capacities. During the period 2002-2008 a total of 476 MW was added from wind projects with more than 15 MW size. We would like to submit that the entire 476 MW is under CDM. We shall provide the spreadsheet with CDM links of all these projects to the DoE.

As can be seen, all comparable projects have come up only with the benefit of CDM/ VCS. Hence our project without VCU benefits is not a common practice.

The above analysis shows that:

Wind power project development is insignificant when compared to the total installed generating capacity of the power sector as well as in terms of realization of the total wind potential.

**Sub-steps 4a is satisfied and 4b is not required as no similar activities are observed. It is very clear that project activity is not a financial attractive option and not a common practice in the region. Hence project activity is additional.**

### 3 Monitoring:

#### 3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

Title: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

Reference: Approved consolidated baseline and monitoring methodology ACM0002 (version 10).

<http://cdm.unfccc.int/UserManagement/FileStorage/NF9EDA0V5K382HW0JR14GS7XYQUMCP>

The approved consolidated baseline and monitoring methodology ACM0002 is the choice of the baseline and monitoring methodology because:

- The project represents electricity capacity additions from wind sources;
- The project is a green field electricity generation from wind sources;
- The geographical and system boundaries of the grid can be clearly identified and information on the characteristics of the grid is available.

There are no specific methodological choices for monitoring in ACM0002 Version 10.

#### 3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

a) Purpose of monitoring: The main purpose of the monitoring is to check the electricity generation from the project under consideration.

b) Types of data and information to be reported, including units of measurement:

EG<sub>export, y</sub>, EG<sub>import, y</sub>, EG<sub>y</sub>

c) Origin of the data: Electricity supplied by the project activity to the grid as per energy generation certificates given by Maharashtra State Electricity Distribution Co. Ltd (MSEDCL)

d) Monitoring, including estimation, modelling, measurement or calculation approaches:

- *Estimation*: Annual expected electricity supplied to the grid by the Project
  - = 44 MW (Capacity) x 20% (PLF) x 8760 (hours)
  - = 77088 MWh
- *Measurement or Calculation Approaches*:
  - o The generated electricity is measured through a two step procedure wherein the first metering is carried out at the controller of the machine with on-board meter. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system. The system consists of a state- of- the- art controlling and monitoring and well trained staff personnel of O&M contractor, Enercon India Limited, are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance. EG<sub>gross, y</sub> is the electricity generated from an

individual wind turbine measured through its panel meter. The summation of total Electricity exported and imported from wind turbine of the project proponent from individual meters (panel meter) in MWh is presented as

$$\sum_0^n EG_{\text{gross export, y}} \text{ and } EG_{\text{gross import, y}}$$

and the summation of total Electricity exported and imported (panel data) from the other wind turbines attached to the common MSEDCL meter at the sub-station in MWh is presented as

$$\sum_0^n EG_{\text{total import}} \text{ and } EG_{\text{total export}}$$

A ratio based on these two set of measured values would be used for apportioning the net electricity supplied to the NEWNE grid by the project activity. The second metering is carried out at grid interconnection point (sub station) wherein the Joint Meter Reading (JMR) is carried out on last day of every month in presence of the representatives of the project proponent & the state electricity utility (MSEDCL). This JMR is used for calculation of the amount of electricity supplied to the grid against which the utility makes the payment to the project proponent. The JMR gives both the “export” ( $EG_{\text{JMR, export}}$ ) and “import” ( $EG_{\text{JMR, import}}$ ) of the electricity to/ from the NEWNE grid. There is a single meter which gives both the export and import values, this metered reading would give value net of line losses and auxiliary consumption. Further, as there is a common MSEDCL joint meter for multiple project proponents, the joint meter reading (JMR) is taken every month by MSEDCL personnel reflects the cumulative monthly generation for all wind turbines connected to this MSEDCL meter. The apportioning of electricity generated from the various wind turbines is done by EIL, based on the power generation from the individual wind turbines connected to this MSEDCL meter. EIL O&M personnel prepare a monthly report on generation and consumption. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected. This apportioned value is then used by the project proponent to raise invoice from MSEDCL.

$EG_{\text{export}}$  the electricity supplied to the grid by the project activity is calculated as follows:

$$EG_{\text{export}} = EG_{\text{JMR, export}} \times \frac{\sum_0^n EG_{\text{gross export, y}}}{\left( \sum_0^n EG_{\text{gross export, y}} + \sum_0^n EG_{\text{total export, y}} \right)}$$

$EG_{\text{import}}$  the electricity drawn from the grid by the project activity is calculated as follows:

$$EG_{\text{import}} = EG_{\text{JMR, import}} \times \frac{\sum_0^n EG_{\text{gross import, y}}}{\left( \sum_0^n EG_{\text{gross import, y}} + \sum_0^n EG_{\text{total import, y}} \right)}$$

$EG_y$ , the net electricity supplied to the grid by the project activity, is calculated as follows:

$$EG_y = EG_{\text{export}} - EG_{\text{import}}$$

The meters located at the grid sub-station are sealed, maintained and calibrated by the state electricity utility. The meters are tested and maintained as per the Metering Code for Maharashtra. Additionally, each wind turbine is equipped with an integrated electronic meter. The electricity generated is recorded 24 hours.

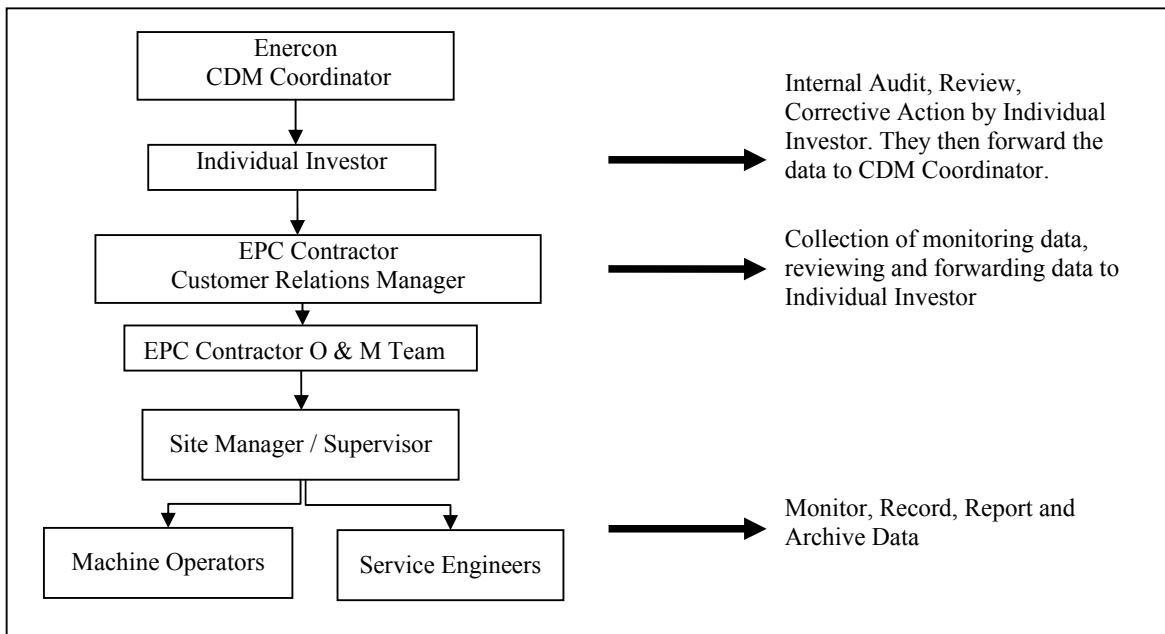
Net electricity supplied to the grid will be measured by the two-way export trivector meter. The Net electricity is recorded as following:

$$(Net\ Electricity = Net\ Export - Net\ Import)$$

The procedures for metering and meter reading will be as per the provisions of the wheeling and banking arrangement.

e) Monitoring times and periods, considering the needs of intended users: The Net electricity supplied to the grid is recorded monthly by taking a Joint Meter Reading (JMR) in the presence of officials from off-taking Utility (MSEDCL) and Enercon as O&M contractor, on behalf of project sponsor. The Joint meter reading contains the value of energy imported and exported and the net export to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of utility and by Enercon Officials.

f) Monitoring roles and responsibilities: The sole parameter for monitoring is the electricity supplied to the grid. The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



g) Managing Data Quality:

Data management is as per the ISO certification standards.

1. The data collection is ongoing process.

2. Two-way meter will be calibrated on regular basis (as per the requirement stipulated by SEB). Project Head would be responsible for regular calibration of the meter.
3. SCADA system connected to individual WECs for online monitoring.
4. The invoices are cross-checked with invoices raised to the MSEDCL.

### 3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

| <b>Data / Parameter:</b>                                                          | <b>EG<sub>Gross,y</sub></b>                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data unit:                                                                        | MWh                                                                                                                                                                                                                                                                                                                          |
| Description:                                                                      | Total electricity generation by the wind mills during the year y                                                                                                                                                                                                                                                             |
| Source of data to be used:                                                        | Controller attached with each WEC.                                                                                                                                                                                                                                                                                           |
| Value of data applied for the purpose of calculating expected emission reductions | 77088 MWh                                                                                                                                                                                                                                                                                                                    |
| Description of measurement methods and procedures to be applied:                  | This data is the controller data. The values of actual generation from individual WEC's can be verified from the website of Enercon (India) Limited.                                                                                                                                                                         |
| QA/QC procedures to be applied:                                                   | QA/QC procedures will be as implemented by Maharashtra state utility. The meters used are calibrated annually to ensure accuracy of data.                                                                                                                                                                                    |
| Any comment:                                                                      | The data (Total electricity generation by the wind mills) will be archived on electronic media as well as on paper. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later<br>-Not used for emission reduction calculation |

| <b>Data / Parameter:</b>                                               | <b>EG<sub>Export,y</sub></b>                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data unit:                                                             | MWh/year (Mega-watt hour/year)                                                                                                                                                                                                                                                                                                                                                                |
| Description:                                                           | Electricity exported to the grid by the project activity in year y                                                                                                                                                                                                                                                                                                                            |
| Source of data to be used:                                             | Electronic meter owned & calibrated by MSEDCL, Monthly certificates issued by MSEDCL                                                                                                                                                                                                                                                                                                          |
| Value of data                                                          | Annual electricity exported to the grid by the Project<br>= 44 MW (Capacity) x 20% (PLF) x 8760 (hours)<br>= 77088MWh                                                                                                                                                                                                                                                                         |
| Brief description of measurement methods and procedures to be applied: | The Energy generated at the wind farm will be metered and measured by MSEDCL on monthly basis at the sending end sub-station of the Wind Farm. The monitoring of 'electricity exported to the grid' would be as per the details provided in PPA.                                                                                                                                              |
| QA/QC procedures applied:                                              | Every month these meter readings are jointly recorded by MSEDCL representative and plant personnel. The meters at the sub station are the two-way meters and are in the custody of MSEDCL. Since the readings are taken at the point of supply of power to the grid, the transmission and distribution losses and the minimum reactive power consumption has already been taken into account. |
| Any comment:                                                           | Apportioned values are calculated                                                                                                                                                                                                                                                                                                                                                             |

| <b>Data / Parameter:</b> | <b>EG<sub>import,y</sub></b>   |
|--------------------------|--------------------------------|
| Data unit:               | MWh/year (Mega-watt hour/year) |

|                                                                        |                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description:                                                           | Electricity imported from the grid                                                                                                                                                                                                                                                                                                                                                            |
| Source of data to be used:                                             | Electronic meter owned & calibrated by MSEDCL, Monthly certificates issued by MSEDCL                                                                                                                                                                                                                                                                                                          |
| Value of data                                                          | 0 MWh (assumed)                                                                                                                                                                                                                                                                                                                                                                               |
| Brief description of measurement methods and procedures to be applied: | The Energy received at the wind farm will be metered and measured by MSEDCL on monthly basis at the sending end sub-station of the Wind Farm.                                                                                                                                                                                                                                                 |
| QA/QC procedures applied:                                              | Every month these meter readings are jointly recorded by MSEDCL representative and plant personnel. The meters at the sub station are the two-way meters and are in the custody of MSEDCL. Since the readings are taken at the point of supply of power to the grid, the transmission and distribution losses and the minimum reactive power consumption has already been taken into account. |
| Any comment:                                                           | Apportioned values are calculated                                                                                                                                                                                                                                                                                                                                                             |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                                                          | <b>EG<sub>y</sub>, net</b>                                                                                                                                                                                                                                                                                                             |
| Data unit:                                                                        | MWh (Mega-watt hour)                                                                                                                                                                                                                                                                                                                   |
| Description:                                                                      | Net electricity supplied to the grid by the Project                                                                                                                                                                                                                                                                                    |
| Source of data to be used:                                                        | Calculated from EG <sub>export</sub> and EG <sub>import</sub> as (EG <sub>export</sub> – EG <sub>import</sub> )                                                                                                                                                                                                                        |
| Value of data applied for the purpose of calculating expected emission reductions | Net electricity is calculated as following:<br>= 77088-0<br>= 77088 MWh                                                                                                                                                                                                                                                                |
| Description of measurement methods and procedures to be applied:                  | Net electricity supplied to the grid will be calculated by the values of import and export from the common meter. The Net electricity is recorded as following:<br>(Net Electricity = Net Export – Net Import)<br>The procedures for metering and meter reading will be as per the provisions of the wheeling and banking arrangement. |
| QA/QC procedures to be applied:                                                   | QA/QC procedures will be implemented pursuant to PPA agreement.                                                                                                                                                                                                                                                                        |
| Any comment:                                                                      |                                                                                                                                                                                                                                                                                                                                        |

### 3.4 Description of the monitoring plan:

Approved monitoring methodology ACM0002 / Version 10 Sectoral Scope: 1, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

The monitoring includes collection, monitoring, recording, reporting and archiving of data. The applied methodology requires monitoring of electricity exported from wind farm and electricity imported to the wind farm, the net electricity supplied to the grid is calculated based on these two values. The values of grid emission factors are fixed ex-ante and remain same throughout the crediting period.

Enercon India limited is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon India limited follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

Adhering to the calibration and testing procedure as described in Power Purchase Agreement ensures the accuracy of monitoring parameter. The project adheres to all the mandatory regulatory and statutory requirements at the state as well as national level.

The operational and organizational chart for monitoring is described in section 3.2 above.

#### 4 GHG Emission Reductions:

##### 4.1 Explanation of methodological choice:

Applied methodology: ACM0002/version 10/ Sectoral scope 1/ EB 47.

In the absence of the project activity, equal amount of electricity would have been generated from the plants connected to the grid that gets power from most of the fossil fuel based plants. Hence, displacing the grid power by wind power is actually saving equivalent amount of GHGs emissions that can be estimated based on the grid emission factor.

The emission reductions from the project activity will occur directly from exports of electricity to the grid. Electricity is generated from wind energy, which is the cleanest renewable source of energy. A renewable source of energy is one, which gets replenished and does not undergo depletion due to its use. Electricity generation from project activity does not lead to any GHG emissions.

The energy supplied by project activity to the state grid would reduce anthropogenic GHG emissions as per the combined margin carbon intensity of the NEWNE grid, which is mainly dominated by fossil fuel based power plants.

##### Baseline emissions due to displacement of electricity by the project activity:

Baseline emissions in the year  $y$  (in  $\text{tCO}_2$ ),  $\text{BE}_y$ , due to displacement of grid-electricity are the product of the baseline grid emission factor for the year  $y$ ,  $\text{EF}_{\text{grid},y}$  (in  $\text{tCO}_2/\text{MWh}$ ) and the net electricity supplied by the project activity to the grid in the year  $y$ ,  $\text{EG}_{y,\text{net}}$  (in  $\text{MWh}$ ), over the crediting period as given below:

$$\text{BE}_y = \text{EG}_y * \text{EF}_{\text{grid},y}$$

Where:

$\text{BE}_y$  = Baseline emissions of the project activity in the year  $y$  ( $\text{tCO}_2$ )

$\text{EG}_y$  = Net electricity supplied to grid in year  $y$  ( $\text{MWh}$ )

$\text{EF}_{\text{grid},y}$  = Baseline emission factor of the grid in the year  $y$  ( $\text{tCO}_2/\text{MWh}$ )

The project activity is located in states of Maharashtra falls under NEWNE grid.

Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'. Calculation of Combined Margin (CM) is done in accordance with the following three steps:

##### Step 1: Calculating the Operating Margin emission factor ( $\text{EF}_{\text{OM},y}$ )

The tool 'Tool to calculate the emission factor for an electricity system' provides four options for calculating the operating margin, and guidance for how to choose which options for the corresponding project activity. The options are:

- a) Simple OM, or
- b) Simple adjusted OM, or

- c) Dispatch Data Analysis OM, or  
d) Average OM.

The simple adjusted OM and dispatch data analysis OM cannot be currently applied in India due to lack of necessary data<sup>5</sup>. The choice of other options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

The percentage share of power generation from low cost / must run power plants for the latest three years in the NEWNE is as follows<sup>6</sup>:

| Share of power generation from low cost/must run resources (% of Net Generation) |         |         |         |
|----------------------------------------------------------------------------------|---------|---------|---------|
|                                                                                  | 2005-06 | 2006-07 | 2007-08 |
| NEWNE                                                                            | 18.0%   | 18.5%   | 19.0%   |
| India                                                                            | 20.1%   | 20.9%   | 21.0%   |

The average percentage of power generation by low cost / must run plants in the NEWNE grid for latest three years is just 18.48%. As low cost / must run resources constitute less than 50% of total power generation the average OM method cannot be applied and the Simple OM option can be used for the proposed project activity. The Simple OM emission factor can be calculated using either of the two following data vintages for year (s) y:

- *Ex ante* option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the VCS-PD 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.

For the proposed project activity the Simple OM emission factor has been calculated as *ex-ante* based on the full generation-weighted average for the most recent 3 years for which data are available at the time of VCS-PD submission to DOE for validation.

Simple OM: The simple OM emission factor ( $EF_{OM,y}$ ) is calculated as the generation weighted average emissions per electricity unit (tCO<sub>2</sub>/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants:

$$EF_{OM, simple, y} = \frac{\sum_{i,j} FC_{i,j,y} * NCV_{i,y} * EF_{CO2,i,y}}{\sum_j EG_{j,y}}$$

Where:

$EF_{OM, simple, y}$  = Simple operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

<sup>5</sup> [http://www.cea.nic.in/planning/c%20and%20e/user\\_guide\\_ver4.pdf](http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf)

<sup>6</sup> <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

|                 |                                                                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| $FC_{i,j,y}$    | = Amount of fossil fuel type i consumed by power plant / unit j in year y (mass or volume unit)                                                  |
| $NCV_{i,y}$     | = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)                                                |
| $EF_{CO_2,i,y}$ | = CO <sub>2</sub> emission factor of fossil fuel type i in year y (tCO <sub>2</sub> /GJ)                                                         |
| $EG_{j,y}$      | = Net electricity generated and delivered to the grid by power plant / Unit j in year y (MWh)                                                    |
| i               | = All fossil fuel types combusted in power plant / unit j in year y                                                                              |
| j               | = All power plants / units serving the grid in year y except low-cost / must-run power plants / units                                            |
| y               | = Three most recent years for which data is available at the time of submission of the VCS-PD to the DOE for validation ( <i>ex ante</i> option) |

The Simple OM emission factor ( $EF_{OM, simple, y}$ ) is calculated separately for the most recent three years and an average value has been considered as the OM emission factor for the baseline ( $EF_{OM,y}$ ).

Step 2: Calculating the build margin ( $EF_{BM,y}$ )

The sample group of power unit's j used to calculate the build margin consists of either:

- (a) The set of five power units that have been built most recently, or
- (b) The set of power 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 the set of power units that comprises the larger annual generation. In India, the latter approach generally yields the larger sample and hence followed<sup>7</sup>.

The build margin emissions factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units j during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{BM,y} = \frac{\sum_j EG_{j,y} * EF_{EL,j,y}}{\sum_j EG_{j,y}}$$

Where:

|               |                                                                                                           |
|---------------|-----------------------------------------------------------------------------------------------------------|
| $EF_{BM,y}$   | = Build margin CO <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh)                          |
| $EG_{j,y}$    | = Net quantity of electricity generated and delivered to the grid by power plant / unit j in year y (MWh) |
| $EF_{EL,j,y}$ | = CO <sub>2</sub> emission factor of power unit j in year y (tCO <sub>2</sub> /MWh)                       |
| j             | = Power units included in the build margin                                                                |
| y             | = Most recent historical year for which power generation data is available                                |

In terms of vintage of data, project participants can choose between one of the following two options:

*Option 1.* For the first crediting period, calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group j at the time of VCS-PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting

<sup>7</sup> [http://www.cea.nic.in/planning/c%20and%20e/user\\_guide\\_ver4.pdf](http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf) (page 42)

period should be used. This option does not require monitoring the emission factor during the crediting period.

*Option 2.* For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex-ante*, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

As project participant can use any of above two options, here option 1 has been adopted. The BM emission factor will be calculated *ex-ante*, for whole crediting period, based on the most recent information available on plants already built for sample group j of NEWNE grid at the time of PD submission. The sample group j consists of the 20 % of power plants supplying electricity to grid that have been built most recently, since it comprises of larger annual power generation. Further, none of the power plant capacity additions in the sample group have been registered as CDM/VCS project activities.

### *Step 3: Determining the combined margin*

As per the “Tool to calculate the emission factor for an electricity system” version 01.1, EB 35, the combined margin is calculated based on the weighted average of the operating margin emission factor and the build margin emission factor as follows:

$$EF_{CM,y} = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

Where:

|             |   |                                                                                       |
|-------------|---|---------------------------------------------------------------------------------------|
| $EF_{CM,y}$ | = | The combined margin CO <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh) |
| $EF_{BM,y}$ | = | Build margin CO <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh)        |
| $EF_{OM,y}$ | = | Operating margin CO <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh)    |
| $w_{OM}$    | = | Weighting of operating margin emissions factor (%)                                    |
| $w_{BM}$    | = | Weighting of build margin emissions factor (%)                                        |

The project activity is the wind power generation; therefore, default values of  $w_{OM}$  and  $w_{BM}$  are taken as 0.75 and 0.25 respectively (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.

$EF_{OM,y}$  Operating margins of the NEWNE is calculated *ex-ante* using three years vintage data (2005-2006, 2006-2007, 2007-2008) obtained from CEA database on CO<sub>2</sub> baseline for Indian Power Sector.  $EF_{BM,y}$  Build margin of the NEWNE Grid is calculated *ex ante* using NEWNE grid contributing 20% of grid generation during 2007-2008 obtained from CEA database on CO<sub>2</sub> baseline for Indian Power Sector.

The CEA has calculated the baseline emission factors using the tool “Tool to calculate the emission factors for an electricity system”, for the regional grids (NEWNE and Southern) in India. As this is the most authentic information available in the public domain, the baseline emission factor used in the calculation of baseline emissions for the project activity is being calculated from the same for transparency and accuracy<sup>8</sup>.

To evaluate the emission factors for NEWNE Grid the equations mentioned above are used as follows:

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<sup>8</sup> <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

$$EF_{CM,y} = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$$

$$EF_{CM,y} = 0.75 * EF_{OM,y} + 0.25 * EF_{BM,y}$$

The  $EF_{OM,y}$  is calculated as average of latest three years values of OM emissions factors for the NEWNE Grid as follows based on latest CEA data<sup>9</sup>:

Operating margin for NEWNE Grid

$$EF_{OM, (2005-06)} = 1.01948 \text{ tCO}_2 / \text{MWh}$$

$$EF_{OM, (2006-07)} = 1.00834 \text{ tCO}_2 / \text{MWh}$$

$$EF_{OM, (2007-08)} = 0.999174 \text{ tCO}_2 / \text{MWh}$$

Net generation in operating margin

$$2005-06 = 359,271 \text{ GWh}$$

$$2006-07 = 379,471 \text{ GWh}$$

$$2007-08 = 401,642 \text{ GWh}$$

Simple operating margin for NEWNE grid:

$$EF_{OM,y} = (1.01948 * 359271 + 1.00834 * 379471 + 0.999174 * 401642) / (359271 + 379471 + 401642) = 1.008626217 \text{ tCO}_2/\text{MWh}$$

The value of  $EF_{BM,y}$  has been taken from CEA data (Version 4) <sup>19</sup> as latest value (2007-08) of build margin for NEWNE Grid is calculated as follows:

Build margin for NEWNE Grid

$$EF_{BM,y} = EF_{BM, (2007-08)} = 0.597712 \text{ tCO}_2/\text{MWh}$$

Now,

Combined margin for NEWNE grid

$$EF_{CM,y} = 0.75 * 1.008626217 + 0.25 * 0.597712 = 0.9058975 \text{ tCO}_2/\text{MWh}$$

The grid emission factor,  $EF_{grid,y} = 0.90589759 \text{ tCO}_2/\text{MWh}$

The emission factors calculated *ex-ante* will remain same throughout the crediting period.

Net electricity supply to grid is calculated as:

$$EG_y = EG_{\text{export}} - EG_{\text{import}}$$

Where:

$EG_{\text{export}}$  = Electricity exported to the grid by the project activity in year y (MWh)

$EG_{\text{import}}$  = Electricity imported (consumed) by the project activity in year y (MWh)

This generated electrical energy will displace an equivalent amount of electricity that would be generated by the NEWNE grid mix. Without the project activity, the same energy load would have been taken up by power plants of the project electricity system and equivalent  $\text{CO}_2$

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

emissions would have been occurred due to fossil fuel combustion. The net electricity exported to the grid is considered for estimation of emission reductions.

**Project Emissions:**

As per the ACM0002/version 10, there are no project emissions related to this project, therefore,  $PE_y = 0$ .

**Leakage:**

As per the ACM0002/version 10, no leakage emissions are considered the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected therefore  $LE_y = 0$ .

**Emission Reductions:**

The project activity reduces carbon dioxide emissions through displacement of grid electricity generation with fossil fuel based power plants by renewable electricity. The emission reduction  $ER_y$  due to project activity during a given year  $y$  is estimated as the difference between baseline emissions ( $BE_y$ ), project emissions ( $PE_y$ ) and emissions due to leakage ( $L_y$ ), as per the formulae given below:

$$ER_y = BE_y - PE_y - L_y$$

Where,

$BE_y$  = Baseline emissions in the year  $y$  in  $tCO_2$

$PE_y$  = Project emissions in the year  $y$ .

$L_y$  = Emissions due to leakage in the year  $y$ .

Here,

$PE_y = 0$  for the project activity as per the methodology.

$L_y = 0$  for the project activity.

Therefore,  **$ER_y = BE_y$**

#### **4.2 Quantifying GHG emissions and/or removals for the baseline scenario:**

##### **Combined Margin Emission Factor**

To evaluate the emission reductions the equations mentioned in section 4.1 are used as follows:

$$ER_y = BE_y$$

$$BE_y = EG_y * EF_{grid, y}$$

$$EF_{grid, y} = EF_{CM, y}$$

##### **Estimation of net electricity generation from 44 MW Capacity WEC's:**

Capacity of each WEC = 0.8 MW

No. of WECs = 55

Total capacity = 44

Plant Load Factor (PLF) = 20 %

Total no. of operating hours annually =  $24 * 365 = 8760$  Hours

##### **Net generation**

$$= 44 * 20\% * 8760$$

Estimated value of  $EG_y = 77088 \text{ MWh}$

Therefore, baseline emissions ( $BE_y$ ) =  $EG_y * EF_{\text{grid}, y} = 77088 * 0.90589 = 69833 \text{ tCO}_2$  (approx)

Project emissions = 0

Leakage = 0

Therefore,  $ER_y = BE_y$ ,

Estimated emission reductions per year =  $69833 \text{ tCO}_2$

#### 4.3 Quantifying GHG emissions and/or removals for the project:

##### **Project Emissions:**

As per the ACM0002/version 10, there are no project related emissions, therefore,  $PE_y = 0$ .

##### **Leakage:**

As per the ACM0002/version 10, no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected therefore  $LE_y = 0$ .

#### 4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

##### **Emission Reductions:**

The project activity reduces carbon dioxide emissions through displacement of grid electricity generation with predominantly fossil fuel based power plants<sup>10</sup> by renewable electricity. The emission reduction  $ER_y$  due to project activity during a given year  $y$  is estimated as the difference between baseline emissions ( $BE_y$ ), project emissions ( $PE_y$ ) and emissions due to leakage ( $L_y$ ), as per the formula given below:

$$ER_y = BE_y - PE_y - LE_y$$

Where,

$BE_y$  = Baseline emissions in the year  $y$  in  $\text{tCO}_2$

$PE_y$  = Project emissions in the year  $y$  in  $\text{tCO}_2$

$LE_y$  = Emissions due to leakage in the year  $y$  in  $\text{tCO}_2$

Here,

$PE_y = 0$  for the project activity as per the methodology.

$LE_y = 0$  for the project activity.

Therefore,  $ER_y = BE_y$

| Years                          | $BE_y$ | $PE_y$ | $L_y$ | $ER_y$ |
|--------------------------------|--------|--------|-------|--------|
| 01 April 2006 to 31 March 2007 | 22107  | 0      | 0     | 22107  |
| 01 April 2007 to 31 March 2008 | 61260  | 0      | 0     | 61260  |
| 01 April 2008 to 31 March 2009 | 65415  | 0      | 0     | 65415  |
| 01 April 2009 to 31 March 2010 | 69815  | 0      | 0     | 69815  |

<sup>10</sup> [http://www.cea.nic.in/power\\_sec\\_reports/general\\_review/0304/tables.pdf](http://www.cea.nic.in/power_sec_reports/general_review/0304/tables.pdf)

|                                                                                           |        |   |   |        |
|-------------------------------------------------------------------------------------------|--------|---|---|--------|
| 01 April 2010 to 31 March 2011                                                            | 69815  | 0 | 0 | 69815  |
| 01 April 2011 to 31 March 2012                                                            | 69815  | 0 | 0 | 69815  |
| 01 April 2012 to 31 March 2013                                                            | 69815  | 0 | 0 | 69815  |
| 01 April 2013 to 31 March 2014                                                            | 69815  | 0 | 0 | 69815  |
| 01 April 2014 to 31 March 2015                                                            | 69815  | 0 | 0 | 69815  |
| 01 April 2015 to 31 March 2016                                                            | 69815  | 0 | 0 | 69815  |
| Total estimated reductions (tonnes of CO <sub>2</sub> e)                                  | 637487 | 0 | 0 | 637487 |
| Annual average of the estimated reductions over the crediting period (tCO <sub>2</sub> e) | 63748  | 0 | 0 | 63748  |

**Emission reductions are calculated in order of commissioning dates of machines.**

### 5 Environmental Impact:

Environmental Impact Assessment (EIA) of this project is not an essential regulatory requirement, as it is not covered under the categories as described in EIA Notification of 1994 or the Amended Notification of 2006. However, Enercon conducted the EIA to study impacts on the environment resulting from the project activity.

Enercon appointed Care sustainability to conduct a Rapid EIA in the Districts of Satara, Sangli, Nashik and Ahmadnagar where the project is located, to assess the impact of the project on the local environment.

The EIA study included identification, prediction and evaluation of potential impacts of the CDM activities on air, water, noise, land, biological and socio-economic environment within the study area. The ambient air concentrations of Suspended Particulate Matter, Respirable Particulate Matter, Oxides of Nitrogen, Sulphur dioxide and Carbon Monoxide were monitored and were found under limits as specified by Central Pollution Control Board (CPCB), India. The noise levels were observed through out the study period and were found to be in the permissible range as specified by the state pollution control board and National Ambient Air Quality Standards. Water quality monitoring studies were carried out for determination of physico-chemical characteristics of bore wells. The pH level for groundwater was found to be between 6.4 – 7.5 indicating alkaline nature and surface water (6.8 – 7.8) which was found to be in specified limits.

The study area represents part of Sangli, Nasik, Ahmednagar and Satara district in Maharashtra. The terrain comprises hilly areas which are sparingly populated, the hills are generally covered with shrubs and grass and trees are not found on the hilltops. Moreover the project area doesn't fall under any protected land for wildlife and it has no adverse ecological impacts on the surroundings, flora and fauna found in the vicinity of the project area. The wind-farms do not affect the path of migratory birds.

### 6 Stakeholders comments:

The comments from local stakeholders were invited through four local stakeholder meetings conducted on 13- November-2006 at Satara District, 14- November-2006 at Sangli District, 15- November-2006 at Ahmednagar District and 16- November-2006 at Nashik District. The four advertisements regarding the Public Stakeholder Meetings were Placed in a local newspaper were placed in 'Sarvmat' on 29th-October- 2006 inviting the local stakeholders for the meetings.

The local stakeholder consultation meeting had representatives from the nearby villages, representatives of Enercon. The minutes of the meeting are set out in Appendix III.

## 7 Schedule:

Chronological plan for the date of initiating project activities, date of terminating the project, frequency of monitoring and reporting and the project period, including relevant project activities in each step of the GHG project cycle.

The detail chronological order of the project activity is provided as Annexure I.

## 8 Ownership:

### 8.1 Proof of Title:

The title of the project activity is '44 MW Bundled Wind Power Project in Maharashtra managed by Enercon India Limited.' As per the VCS 2007.1 guidelines 'documents demonstrating the project proponent's right to the GHG emission reductions or removals and the ownership of the project' represents the ownership of the project.

All the customers in bundled project has authorized Enercon India Ltd as project proponent and the undertaking from EIL is being submit to DOE as a proof of title. Authorisation letters from al the customers being submitted to DOE for reference.

### 8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

There are no compliance/binding limits of emission reductions in the host country so the point is not applicable.

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**Annexure I****Chronology of Events:**

| <b>S.No.</b> | <b>Customer's Name</b>          | <b>Date of Purchase order</b> | <b>Date of Commissioning</b>           | <b>Date of Stakeholders meeting</b> | <b>Date of signing PPA</b> | <b>Date of appointing DOE for VCS validation and verification</b> |
|--------------|---------------------------------|-------------------------------|----------------------------------------|-------------------------------------|----------------------------|-------------------------------------------------------------------|
| 1            | G. B. Rubber Products           | 01/07/2005                    | 14/02/2006                             | 13/11/2006                          | 15/02/2006                 | 17/11/2008                                                        |
| 2            | Shah Lulla Estate Developers    | 06/07/2005                    | 14/02/2006                             | 13/11/2006                          | 15/02/2006                 | 17/11/2008                                                        |
| 3            | Liberty Oil Mills Ltd.          | 12/07/2005                    | 08/02/2006                             | 13/11/2006                          | 15/02/2006                 | 17/11/2008                                                        |
| 3            | Liberty Oil Mills Ltd.          | 12/07/2005                    | 07/02/2006                             | 13/11/2006                          | 15/02/2006                 | 17/11/2008                                                        |
| 4            | Paceman Sales Promotion P. Ltd. | 07/09/2005                    | 22/03/2006                             | 14/11/2006                          | 31/07/2006                 | 17/11/2008                                                        |
| 5            | Delta Enterprises               | 23/09/2005                    | 22/03/2006<br>15/06/2006               | 14/11/2006                          | 31/07/2006                 | 17/11/2008                                                        |
| 6            | Mahanagar Developers            | 08/02/2006                    | 05/01/2007<br>06/03/2007<br>28/02/2007 | 14/11/2006<br>16/11/2006            | 21/05/2007<br>06/06/2007   | 17/11/2008                                                        |
| 7            | Kishor Food Products P. Ltd.    | 03/08/2006                    | 10/12/2008                             | 14/11/2006                          | 20/12/2008                 | 17/11/2008                                                        |
| 8            | Mr. J. P. Patel                 | 04/02/2006                    | 29/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 9            | Mr. C. P. Patel                 | 04/02/2006                    | 31/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 10           | Mr. V. V. Patel                 | 04/02/2006                    | 31/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 11           | Mr. J. V. Patel                 | 04/02/2006                    | 29/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 12           | Mr. S. V. Patel                 | 04/02/2006                    | 29/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 13           | Mr. V. L. Patel                 | 04/02/2006                    | 29/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 14           | Laxmi Narayan Best Chiwda       | 27/03/2006                    | 29/03/2007                             | 16/11/2006                          | 30/05/2007                 | 17/11/2008                                                        |
| 15           | New Sahyadri Industries Ltd.    | 19/01/2006                    | 27/01/2007                             | 15/11/2006                          | 21/05/2007                 | 17/11/2008                                                        |
| 16           | Mr. P. L. Patel                 | 04/02/2006                    | 06/02/2007                             | 15/11/2006                          | 21/05/2007                 | 17/11/2008                                                        |
| 17           | Elpro International             | 07/12/2005                    | 30/12/2006                             | 15/11/2006                          | 07/05/2007                 | 17/11/2008                                                        |
| 18           | Prachar Energy                  | 20/02/2006                    | 03/03/2007                             | 15/11/2006                          | 06/06/2007                 | 17/11/2008                                                        |
| 19           | Panama Wind Energy Pvt. Ltd.    | 22/08/2005                    | 30/12/2006                             | 15/11/2006                          | 30/04/20 07                | 17/11/2008                                                        |

## VCS Project Description Template

|    |                                            |                          |            |            |            |            |
|----|--------------------------------------------|--------------------------|------------|------------|------------|------------|
| 20 | International Conveyors Ltd.               | 07/12/2005               | 30/12/2006 | 15/11/2006 | 30/04/2007 | 17/11/2008 |
| 21 | Shreem Capacitors Pvt. Ltd.                | 20/02/2006<br>09/03/2006 | 10/12/2008 | 14/11/2006 | 20/12/2008 | 17/11/2008 |
| 22 | Metalfab Hightech Private Limited          | 29/12/2005               | 06/02/2007 | 15/11/2006 | 06/06/2007 | 17/11/2008 |
| 23 | Atlas Tours & Travels Pvt. Ltd.            | 13/07/2005               | 07/02/2006 | 13/11/2006 | 15/02/2006 | 17/11/2008 |
| 24 | Om Shanti Wind Farms P. Ltd.               | 21/03/2006               | 31/03/2007 | 16/11/2006 | 30/05/2007 | 17/11/2008 |
| 25 | Gargi Construction Co. Pvt. Ltd.           | 18/01/2006               | 30/12/2006 | 15/11/2006 | 30/04/2007 | 17/11/2008 |
| 26 | Mohite & Mohite                            | 17/03/2006               | 30/12/2006 | 15/11/2006 | 20/03/2007 | 17/11/2008 |
| 27 | Indiana Engineering Works (Bombay) P. Ltd. | 27/03/2006               | 03/03/2007 | 15/11/2006 | 06/06/2007 | 17/11/2008 |
| 28 | Welpack Industries Ltd.                    | 25/07/2006               | 28/02/2007 | 15/11/2006 | 06/06/2007 | 17/11/2008 |
| 29 | Sunilkumar Ramanlal Shah                   | 17/07/2006               | 30/03/2008 | 15/11/2006 | 03/07/2008 | 17/11/2008 |

Some common events for all the customers are summarized below:

1. Project start date: 07/02/2006 (the date of commissioning of first WEC in the project activity)
2. Project termination date: 06/02/2026 (as per 20 years life time of the WEC's)
3. Crediting period start date: 01/04/2006 (This date is as per VCS 2007.1 guidelines)
4. Duration of crediting period: 10 years (01/04/2006 to 31/03/2016)

## **Annex II**

### **Public Stake Holder Consultation Meeting Held at District Satara, Maharashtra**

Date: 13.11.06

Time: 4:00 pm

Venue: Enercon India Ltd, Satara District, Thosegar Site Office

#### **Participants from Gramsanstha**

1. Mr. Ramesh Kharat
2. Mr. Mohan Pawar
3. Mr. Sahebrao Pawar
4. Mr. Laxman Jarag
5. Mr. D.K.Kharat
6. Mr. Balu Java
7. Mr. Bapu Kharat
8. Mr. Shirang Kharat
9. Mr. Pandurang Javerg
10. Mr. Shankar Mane
11. Mr. D. Shedge
12. Mr. H. Thorath
13. Mr. Kulkarni
14. Mr. M. Salunke
15. Mr. Anand Mane
16. Mr. Shedge

#### **Participants from Enercon India Limited**

1. Mr. Vivek Sen
2. Mr. Satish Patil
3. Mr. Manjunath
4. Mr. Ramesh Nikam
5. Mr. Prakash Jharag
6. Mr. Laxman
7. Mr. Manoj Pathak

#### **Agenda of the Meeting**

1. Welcome Address and Introduction
2. Project Profile, CDM Environmental and Social Issues
3. Suggestions and Opinions
4. Queries and Responses from the Stakeholders and Co. Authorities respectively.
5. Vote of Thanks

#### **Welcome Address by Mr. Prakash:**

Mr. Prakash, working as a security personnel in Enercon India Ltd welcomed the villagers who were present at Gramsanstha. On behalf of Enercon India Ltd he expressed his thankfulness to all the members of Gramsanstha who devoted their time and effort to attend this meeting.

#### **Project Profile, Environmental and Social Issues:**

Mr. Satish Patil (Service In charge) gave information related to Windmill Project in brief to Gramsanstha. He explained to the villagers how the windmills function and how is wind energy important in conserving the natural state of the environment and the role it plays in the development of the nation. He said that Enercon India Ltd has been building projects in this region and would like to have the support of the local people in future also. He also explained the villagers about CDM in brief. He said that we are equally concerned about the development of the local population and would like to contribute in every possible sense.

#### **Meeting's proceedings:**

Mr. Satish Patil (Service In charge) continued the meeting's proceedings and gave information related to Windmill Project in brief to Gramsanstha. he said that company would like to ask the stakeholder some simple questions so as to know how the local people feel about the project. The questions related to project was put up before Gramsanstha. They put light on the development of particular project in their area (enlisted in separate session).

#### **Suggestions and opinions of the Local stakeholders:**

The local stakeholders were of the view that wind energy is generating energy without disturbing or destroying the environment. The villagers were happy that youth from villages have been employed during the construction stage and also some of them have been recruited in the security staff. They questioned about the possibilities of the youth being permanently employed in Enercon. Responding to this Mr. Satish Patil said that eligible candidates are available Enercon can always hire them.

While answering to Gramsanstha question regarding employment opportunities provided by Enercon India Ltd to the local people Mr. Patil said that the company employs anybody who is capable of doing the job. He thus stressed on the need to educate the children. By taking a proper degree he/she can join our project and other departments of Enercon India Ltd.

The other issues on which the villagers expressed concern were.

1. Tree Plantation so that the area becomes greener.

Mr. Patil said that Enercon India Ltd has cut down very few trees to build this wind farm and has already compensated for the loss by planting trees, which the villagers are aware of. In near future Enercon will plant more trees in the area to make it greener.

2. They requested Windmill Company to help them to develop their village. In this regard Mr. Patil assured that he will speak to higher authorities but for that villagers should provide their expectation through Gram Panchayat with full details and documents to the Company.

#### **Vote of Thanks:**

At last Mr. Ramesh Nikam from Enercon India Ltd thanked all the stakeholders for attending the meeting. He said their inputs are valuable for the company to and thanked them for devoting their time and efforts for this meeting. All Gramsanstha members also thanked Enercon India Ltd for arranging this meeting.

#### **Questionnaire (Clean Energy Project)**

Questions asked to the Stakeholders

|      |                                                                                |
|------|--------------------------------------------------------------------------------|
| Q.1  | After coming this project what are the progress in your area?                  |
| Ans. | Development of Roads, Increased frequency of Buses and got employment          |
| Q.2  | Will you encourage this kind of Project?                                       |
| Ans  | Yes                                                                            |
| Q.3  | Will this kind of project affect environment?                                  |
| Ans  | No. It will not affect environment.                                            |
| Q.4  | While developing Wind Energy Project what kind of help expected from village?. |
| Ans. | Food and Water is provided from Villagers.                                     |
| Q.5  | How was the behaviour of the Project Officers with you?                        |
| Ans  | Good                                                                           |
| Q.6  | Any Employment opportunity because of this project?                            |
| Ans. | Yes                                                                            |
| Q.7  | Any road development because of this project?                                  |
| Ans  | Yes                                                                            |
| Q.8  | Is Wind Energy is satisfactory compare to any other Energy Project?            |
| Ans. | It is environment friendly.                                                    |
| Q.9  | How does this project related to your day to day life?                         |

|      |                                                                                     |
|------|-------------------------------------------------------------------------------------|
| Ans. | We are using company road for going from one village to another for animal feeding. |
| Q.10 | Any Blade sound disturbance?                                                        |
| Ans. | No.                                                                                 |
| Q.11 | Due to Water drainage any problem to land?                                          |
| Ans. | No.                                                                                 |
| Q.12 | Any problem for animal feeding?                                                     |
| Ans. | No.                                                                                 |
| Q.13 | Any effect on harvesting?                                                           |
| Ans. | No.                                                                                 |
| Q.14 | Have you seen any of the Project Officer cutting jungles?                           |
| Ans. | No.                                                                                 |
| Q.15 | Any problem of dust due to this project?                                            |
| Ans. | No.                                                                                 |

**Public Stakeholder Consultation Meeting held at District Sangli, Maharashtra**

Date: 14.11.06

Venue: Enercon India Limited, Sangli Site Office, Bhambarwadi.

Time: 04:15 pm

**Participants from Gramsanstha**

- a. Mr. Sakharam Durge
- b. Mr. Chandrakant K. Katkar
- c. Mr. Namdeo K. Patil
- d. Mr. Laxman Patil
- e. Mr. Maruti B. Patil
- f. Mr. Kisan S. Patil
- g. Mr. Laxman A. Patil
- h. Mr. Santosh N. Ghadyal
- i. Mr. Shankar B. Shikare
- j. Mr. Hemant R. Jadhav
- k. Mr. Pradeep D. Pawar
- l. Mr. Rajaram C. Jadhav
- m. Mr. Gajanan Pandurang Koralkar
- n. Mr. Uttam B. Salunke
- o. Mr. Rajaram Patil

**Participants from Enercon India Limited**

- a. Mr. Vivek Sen
- b. Mr. Satish Patil
- c. Mr. Gajanan Gaikwad
- d. Mr. Sharad Dubey
- e. Mr. Prakash Jharag
- f. Mr. Rahul Nalawade

**Agenda of the Meeting**

- a. Welcome Address and Introduction
- b. Project Profile, Environmental and Social Issues
- c. Suggestions and Opinions
- d. Queries and Responses from the Stakeholders and Co. Authorities respectively.
- e. Vote of Thanks

**Welcome Address by Mr. Gajanan:**

Mr Gajanan working as an engineer in Enercon India Ltd welcomed the villagers who were present at Gramsanstha. he started the meetings proceeding by briefing them about the wind energy.

**Project Profile, Environmental and Social Issues:**

Mr. Satish Patil (Service In charge) gave information related to Windmill Project in brief to Gramsanstha. He explained to the villagers how the windmills function and how is wind energy important in conserving the natural state of the environment and the role it plays in the development of the nation. He said that Enercon India Ltd has been building projects in this region and would like to have the support of the local people in future also. He also told the villagers about the benefits of energy from wind. He also explained the villagers about CDM in brief. He said that we are equally concerned about the development of the local population and would like to contribute in every possible sense.

The questions related to project was put up before Gramsanstha. Mr. Patil said that there is an urgent need for the villagers to educate their children. By taking a proper degree he/she can join our project.

**Suggestions and opinions of the Local stakeholders:**

The local stakeholders were of the view that wind energy is generating energy without disturbing or destroying the environment. The villagers were happy that youth from villages have been employed during the construction stage and also some of them have been recruited in the security staff. They questioned about the possibilities of the youth being permanently employed in Enercon. Responding to this Mr. Satish Patil said that is eligible candidates are available Enercon can always hire them. He persuaded upon the villagers to provide their children education so that their job prospects are increased. He said youths with adequate technical qualification are not available and thus cannot be hired on a permanent basis in the technical functions.

The other issues on which the villagers expressed concern were.

- a) Tree Plantation so that the area becomes greener.

Mr. Patil said that Enercon India Ltd has cut down very few trees to build this wind farm and has already compensated for the loss by planting trees, which the villagers are aware of. In near future Enercon will plant more trees in the area to make it greener.

- b) Hospital facility.

This session was followed by question-answer round between the project officials and the villagers. The main objective was to know was how the whether the project is having any adverse affects on the life of the local people.

**Questions to the villagers by the project officials:**

|      |                                                                                                        |
|------|--------------------------------------------------------------------------------------------------------|
| Q.1  | After commencement of this project what are the progress in your area?                                 |
| Ans. | Development of Roads, employment opportunity increased and also business opportunities have increased. |
| Q.2  | Will you encourage these kinds of Projects?                                                            |
| Ans  | Yes                                                                                                    |
| Q.3  | Will wind energy project affect environment?                                                           |
| Ans  | No.                                                                                                    |
| Q.4  | While developing Wind Energy Project what kind of help is provided from the village?                   |
| Ans. | Food and Water is provided from Villagers.                                                             |
| Q.5  | How was the behavior of the Project Officers with you?                                                 |
| Ans  | Good                                                                                                   |
| Q.6  | Any Employment opportunity because of this project?                                                    |
| Ans. | Yes. Got Job in Security C/L.                                                                          |
| Q.7  | Any road development because of this project?                                                          |

|      |                                                                                                        |
|------|--------------------------------------------------------------------------------------------------------|
| Ans. | Yes                                                                                                    |
| Q.8  | Is Wind Energy is satisfactory compare to any other Energy Project?                                    |
| Ans. | Yes                                                                                                    |
| Q.9  | How does this project related to your day to day life?                                                 |
| Ans. | We are using company road for going from one village to another for grazing our animals.               |
| Q.10 | Any disturbance caused due to the noise from the Blade?                                                |
| Ans. | No.                                                                                                    |
| Q.11 | Is there any problem of water logging or drainage to the land?                                         |
| Ans. | No.                                                                                                    |
| Q.12 | Any problem of animal grazing?                                                                         |
| Ans. | No.                                                                                                    |
| Q.13 | Have you noticed any effect on harvesting?                                                             |
| Ans. | No.                                                                                                    |
| Q.14 | Have you seen any of the Project Officer cutting jungles?                                              |
| Ans. | While Foundation stage small trees cut but they have done plantations to compensate the loss of trees. |
| Q.15 | Any problem of dust particles due to this project?                                                     |
| Ans. | No.                                                                                                    |

**Vote of Thanks:**

At last Mr. Rahul Nalawade (EIL Engineer) thanked the Gramsanstha for attending the meeting. He said Enercon values the support from the local people and is grateful to all those who have supported Enercon. He again thanked all those who were present at the meeting for the time they have devoted towards this conversation.

**Public Stake Holder Consultation Meeting – District Nasik, Maharashtra**

Venue: Enercon Site office, Shikhare, Nasik

Date: 16.11.06

Time: 2pm to 4 pm

**Participants of the Meeting:**

A meeting and discussions were held in connection with Environment/Renewable Energy Projects on 16.11.06 in the afternoon from 2 to 4 pm at Enercon Site office, Shikhare, Nasik between Villagers and Enercon. About 15 persons from nearby villages were present to attend the meeting. Enercon India Ltd was represented by Shri Mahesh Bag (Admin), Mr. Vivek Sen (Corporate) Mumbai, Shri. Bhatiya, Shri. Sunil Raje Saheb, Shri. Prashant Patil Saheb, Shri. Shridhar Golambe.

**Stakeholders:**

1. Bana Saheb Bhopad Ghorpade
2. Nivriti Vitthal Bamble
3. Navsa Hari Jadhav
4. Bambta Bamble
5. Uttam Soma Wadekar
6. Suresh Roaji Madge
7. Uttam Masu Gode
8. Dilip Prabhakar Gayakwad
9. Gyaneshwar Madhav Kadam
10. Kisan Pilaji Fodese
11. Bhausahab Bhaurao
12. Jayram Pandurang Kadam
13. Dev ram Poonja Jadhav
14. Bana Nivriti Jadhav

15. Hosiyam Khandu Jadhav
16. Ramdas Soma Jadhav

**Welcome Address:**

The meeting began at the stipulated time and Shri. Mahesh Bag Saheb from Enercon side welcomed all Villagers from Shikhare and nearby villages who devoted their time and effort to attend the meeting.

The main objective of this meeting was to discuss the doubts related to Wind Energy and its effects on the Environment. Several points were discussed in details between the participants of the meeting were discussed and cleared to the stakeholder who had attended the meeting.

**Proceedings:**

Mr. Vivek Sen from Enercon explained regarding development of Wind Energy and Advantages of Renewable Energy and basics of Clean Development Mechanism to the stakeholders and answered the questions asked by Stakeholders to their satisfaction.

**Address By the Chief Guests:**

Chief Guest Shri. Balasaheb Ghorpade, Sarpanch of Takade village explained in his speech the advantages of Wind Energy to the participants. He continued by emphasizing on the need for development of alternative and clean sources of energy due to shortage of energy in the future and development of villages due to the installation of wind energy. Shri. Ramdas Jadhav, a villager from Tirade also in his speech explained about the Wind Energy and its advantages and answered the question asked by villagers to their satisfaction.

Shri. Bhatiya, Shri. Sunil Raje Saheb, Shri. Prashant Patil Saheb, Shri. Shridhar Golambe were present during the meeting and discussions.

**QUESTIONS ASKED BY VILLAGERS:**

1. Does Wind Energy Converters affects the rainfall?

The questions were answered by Shri. Bag Saheb stating that there is log of difference between the heights of installed Wind Energy Machines and Clouds. There is no relation between Wind Energy Machine and Fall of rain. Rain is natural and no one stop it and thus he persuades the minds of villagers.

2. Does the earthing of Wind Energy Machines affects / disturbs domestic animals or people residing nearby area?

Shri. Bhatiya Saheb answered the question stating that the current pas through earthing in the land / fie and as such it will not disturb animals or people while crossing the installed area.

3. How the villagers can take advantage of the developments made in the area by the company?

Shri. Bhatiya answered the question stating that due to this company, road development took place and transportation increased, Govt. buses are running in interior areas. During rainy season some roads were used to be closed due to heavy rains, but company has developed the roads and all ways are open 12 months and employment opportunities have also developed due to commencement of the project in the area.

**OTHER QUESTIONS (QUESTIONS ASKED TO THE VILLAGERS):**

1. What developments took place after Wind Energy project came up in the area?

Ans. There are number of developments like Road, Transportation, Employment, running of State Buses etc.,

2. Should we promote such Projects?

Ans. Yes. We should promote projects, which will develop roads, transportation, employment etc.,

3. As per your views, how does this project affect Environment or livelihood?

Ans. The project will not affect livelihood or rainfall.

4. While developing Wind Energy Project what kind of help can we (Enercon India Ltd) expect from the villagers?

Ans. Villagers can provide the project persons with Drinking water, Eatables etc., on time.

5. Do the project personnel and authorities maintain good relations with villagers?

Ans. Yes, we do have very good relations with competent authorities of this project.

6. Does this project has employment opportunities?

Ans. Yes. There are employment opportunities.

7. Has this project has developed Transportation / road developments etc.,

Ans. Yes. Road and Transportation has developed

8. Is Wind Energy the cheapest when compared to other source of energy development?

Ans. Yes. Wind Energy is cheapest source of developing energy because it is developed with the wind which is freely available. So wind is very cheap when compared to other sources of energy. Also it does not cause any pollution and thus does not affect the environment.

9. How does this project relate to your life?

Ans. We use the road constructed at the site. Also we do take our domestic animals near the constructed site area where our domestic animals eat the grass grown near the site.

10. Does sound of blades disturb your lives?

Ans. No.

11. If the field / land got damaged due to water drainage caused by the construction of the project?

Ans. No such nuisance has occurred.

12. Is there any difficulty (prohibition by the project officials) to take the domestic animals for grazing?

Ans. No.

13. Is there any affect on the yield of the grains from your fields?

Ans. No.

14. Did you find the Project officials cutting the trees on the forest land?

Ans. No. We haven't found any project officer cutting down forest.

15. Is there any dust related problem from the project? If any dust arises, how does it affects?

Ans. No. No there is no such affect of dust.

#### **Expectations of Villagers and response of the Enercon Authorities:**

1. Plantation: Villagers will do for Villagers the plantation.

#### **Concluding Session:**

The representatives from Enercon India Ltd thanked all the Villagers (Stakeholders) who devoted their time and Effort to attend the meeting. They requested the villagers to continue extending their support and cooperation as they have done in the past so that Enercon can contribute towards the development of the nation

**Public Stake Holder Consultation Meeting – District Ahmednagar, Maharashtra**

Venue: Ahmednagar, Enercon Site Office

Date: 15.11.06

Time: 2 pm to 4 pm

**Participants of the Meeting:**

A meeting and discussions were held in connection with Environment/Renewable Energy Projects on 15.11.06 in the afternoon from 2 to 4 pm at Enercon Site office, Sata Colony, Ahmednagar between Ahmednagar Villagers and Enercon. More than 20 persons from nearby villages were present to attend the meeting. Enercon India Ltd was represented by Shri Mahesh Bag (Admin), Mr. Vivek Sen (Corporate) Mumbai, Mr. Sandeep Bhinde Enercon Ahmednagar., Mr. Shridhar Golambe Enercon Ahmednagar.

Stakeholders present for the meeting:

1. Bhausahab Gade
2. Kashikale Khumaji Karale
3. Gangadhar Sakat
4. Ramdas Keshav Shinde
5. Shivaji Mohan Shinde
6. Gayn Dev Laxman Vaman
7. Ashok Mohan Shinde
8. Tukaram Vitthal Karale
9. Bhausahab Gangadhar Sakat
10. Adinath Laxman Shinde
11. Mohan Laxman Shinde
12. Radhaji Gundu Shinde
13. Thakaji Khumaji Karale
14. Popat Ambadas Karale
15. Jagannath Namdev Gayakwad
16. Ramesh Bhakuji Karale
17. Hanmant Karbhari Karale
18. Balasaheb Ranganath Gayakwad
19. S. G. Kulkarni
20. Shivaji Punja Karale
21. Tukaram Baburao Vagule

**Welcome Address:**

The meeting began at the stipulated time and Shri. Mahesh Bag (Admin) on behalf of Enercon India Limited welcomed all Villagers from Ahmednagar and nearby villages who devoted their time and effort to attend the meeting.

The main objective of this meeting was to discuss the doubts related to Wind Energy and its effects on the Environment. Several points were discussed in details between the participants of the meeting were discussed and cleared to villagers of Ahmednagar.

**Proceedings:**

Mr. Vivek Sen from Enercon explained regarding development of Wind Energy and Advantages of Renewable Energy and Clean Development Mechanism and answered the questions asked by Villagers to their satisfaction.

**Address By the Chief Guests:**

Chief Guest Shri. Tukaramji Vaghule, Sarpanch of Ratalgaon Village explained in his speech the advantages of Wind Energy to the participants. He continued by emphasizing on the need for development of alternative and clean sources of energy due to shortage of energy in the future and development of villages due to the installation of wind energy. Shri. Shivajirao Karale,

Sarpanch of Aagadgaon also in his speech explained about the Wind Energy and its advantages and answered the question asked by villagers to their satisfaction.

Shri. Sanddeep Bhinde, Vivek Sen, Shridhar Golambe were present during the meeting and discussions.

**QUESTIONS ASKED BY VILLAGERS:**

1. Does the Wind Energy Machines affects the rainfall?

Ans. The questions were answered by Shri. Bag Saheb stating that there is lot of difference between the heights of installed Wind Energy Machines and clouds, which cause rain. There is no relation between Wind Energy Machine and rainfall. Rain is natural phenomenon and is not affected or stopped by windmills.

2. Will the Sound/Noise produced from the Wind energy converters cause problems to humans and animals living in the nearby areas?

Ans. Shri. Bag Sahed answered the question stating that the blades will not make any noise and they are on 56 m height. The design of machine is so that it will produce very less sound and will not disturb animals or people while crossing the Project Area.

**OTHER QUESTIONS (QUESTIONS ASKED TO THE VILLAGERS):**

Q1 What developments took place after Wind Energy project came up in the area?

Ans. There are number of developments like Road, Transportation, Employment, running of State Buses etc.,

Q2 Should we promote such Projects?

Ans. Yes. We should promote projects, which will develop roads, transportation, employment etc.,

Q3 As per your views, how does this project affect Environment or livelihood?

Ans. The project will not affect livelihood or Environment.

Q4 While developing Wind Energy Project what kind of help can we (Enercon India Ltd) expect from the villagers?

Ans. Villagers can provide the project persons with Drinking water, Eatables etc., on time.

Q5 Do you maintain good relation with personnel and authorities of this project ?

Ans. Yes, we do have very good relations with competent authorities of this project.

Q6 Does this project provide any employment opportunities?

Ans. Yes. The project has provided some employment opportunities.

Q7 Does this project has developed Transportation / road developments etc.,

Ans. Yes. Road and Transportation has improved due to the project activity.

Q8 Is Wind Energy cheaper when compared to other source of energy development?

Ans. Yes. Wind Energy is developed with the wind, which is freely available. So wind is the cheapest compared to other sources of energy. Also it does not cause any pollution and thus does not affect the environment.

Q9 How do projects relate to your life?

Ans. We use the road constructed at the site. Also we do take our domestic animals near the constructed site area where our domestic animals graze.

Q10 Does sound of blades disturbs your lives?

Ans. No. the sound of windmill operation is less and does not affect us.

Q11 If the field / land got damaged due to water drainage caused by the construction of the project?

Ans. No such nuisance has occurred.

Q12 Is there any difficulty (prohibition by the project officials) to take the domestic animals for grazing?

Ans. No.

Q13 Is there any affect on the yield of the grains from your fields?

Ans. No.

Q14 Did you find the Project officials cutting the trees on the forest land?

Ans. No. We haven't found any project officer cutting down forest.

Q15 Is there any dust related problem from the project? If any dust arises, how does it affects?

Ans. No. No there is no such affect of dust.

**Expectations of Villagers:**

The meeting proceeded and Enercon officials asked the villagers about their expectations from the company. The villagers expressed following expectations:

1. Plantation of trees in the area: Enercon will certainly do plantations in the area and will engage villagers for the purpose of plantation.

**Ending Note:**

The meeting ended on a positive note with Shri Mahesh Bag Thanking all the participants who devoted their time and effort to make this meeting possible. The villagers expressed their satisfaction and gratitude for making them a part of the project.

