



Bureau Veritas Certification had performed the 3rd verification of the CDM Project No. 0276 entitled 'Bundled wind power project in Chitradurga (Karnataka in India) managed by Enercon (India) Ltd'. Subsequently, there have been three requests for review. We thank the CDM RIT/Executive Board for giving us the opportunity to clarify about our considerations in verifying the said project. Our response to the query is given below:

Query: *It was noted that the electricity generated during the present monitoring period spanning more than two years was 8.55% higher than the estimated in the PDD, and this increase was also noted during the first monitoring period (the project generated 8.4% more electricity) and during the second monitoring period (the project generated 11.77% more electricity than estimated). The PP in the monitoring report explained that this was "due to a higher PLF" and the DOE in the verification report stated that the "average PLF during the monitoring period is about 31.81%". The PP/DOE should further explain if the project was operated as per the PDD given that the sensitivity analysis in the PDD was done considering a variation in the PLF in the range between 26 to 30%.*

Reply:

Based on the site visit to the project activity conducted on 29/01/2011 during third verification and document review of all the available documents, i.e. Power Purchase Agreements with State Electricity Utility (Reference 1), 'Form B' statements issued by State Electricity Utility (Reference 2) and the Invoices raised by the project promoters on the State Electricity Utility (Reference 3), the verification team assessed that there are total 28 WTGs. Out of which, 14 WTGs belong to M/s. Enercon Wind Farms (India) Ltd and the remaining 14 WTGs belong to M/s. Cepco Industries Ltd. Each WTG is of Enercon E-4 make having capacity of 600 kW each as described in the registered PDD. The electricity generated from the project activity is sold only to the grid and not used for any other purpose.

Assessment as per Annex 67 of EB 48, 'Guidelines on Assessment of different types of changes from the project activity as described in the registered PDD

Para No 5 of Section B of Annex 67/EB 48 (Changes which may impact the additionality of the project activity) states that the following are considered as changes to a project activity.

- (a) Changes in the effective output capacity due to increased installed capacity or increased number of units, or installation of units with lower capacity or units with a technology which is less advanced than that described in the PDD;*
- (b) Addition of component or extension of technology;*
- (c) Removal or addition of one (or more) site of a project activity registered with multiple-sites;*
- (d) Different values of those actual operational parameters relevant to determination of emission reduction which are within the control of project participant and which result in the IRR passing the benchmark as described in the registered PDD.*

Based on the site visit and review of all available documents, the verification team hereby confirms that:

- a) There is no change in the effective output capacity due to increased installed capacity or increased number of units, or installation of units with lower capacity or units with a technology which is less advanced than that described in the PDD. It is also confirmed that no modification or changes have been made on the existing WTGs.
- b) There is no addition of component or extension of technology
- c) There is no removal or addition of one (or more) site of a project activity registered with multiple-sites
- d) The only operational parameter relevant to determination of emission reduction of a wind power project is the electricity generation which is directly dependent on the Plant Load Factor (PLF):

The verification team reviewed the consideration of the PLF (29.30%) and the band width of sensitivity (26% - 30%) considered in investment analysis in the registered PDD.

Assessment of PLF and Sensitivity range considered in the registered PDD

The PP has provided us the following documents, which has been reassessed.

- PLF Estimation Report (Reference 4)
- Extract from NOAA (National Oceanic and Atmospheric Administration) (Reference 5)

Enercon, which is a leading manufacturer and supplier of Wind Turbine Generators of India, has its own in house infrastructure for conducting wind related studies. The estimated PLF of 29.30 % during decision making was arrived from the data provided by the Wind Resource Department (WRD) of project developer, which was

derived from the wind mast installed at the project site. The PLF was determined from the data available for the period ranging from October 1995 to September 2000, i.e. 5 years data prior to decision making (year 2000).

The data collected in this manner was the actual observed data at the site relating to the wind parameters. This data was further processed with the help of software known as Wasp. The Wasp software program enables the wind power density to be computed based on the mast readings taken over the observation period for which the wind speed data is collected and also the local terrain conditions that exist at the site

The wind power density (WPD) map created through Wasp software is further utilized along with information about the site topological conditions and technical details of the wind turbine generators proposed to be installed, to calculate the optimized generation that could be expected at the site. This is done by means of a software optimization tool. This eventually leads to an optimized value for estimation of the gross generation at the site after installation of all the proposed wind mills at the wind farm, at the specific micro siting locations.

The DOE confirms through its local and sectoral expertise that use of the Wasp software in the computation of the PLF is a common practice and has observed the same in a number PLF study reports prepared by third party assessment specialists in India.

In addition to the PLF Estimation Report (which is based wind mast data), the project developer also parallelly referred to the extracts from the then publicly available wind data of National Oceanic and Atmospheric Administration (NOAA) ranging from 1995-96 to 1998 – 99. NOAA is a scientific agency within the United States Department of Commerce focused on the conditions of the weather patterns across the globe. The NOAA extract provided by the PP has also been reviewed by the verification team. The NOAA website (<http://www.noaa.gov/about-noaa.html>) facilitates the downloading of historical information on wind speeds achievable in any location across the globe. The data is however available only in the raw form and has to be extrapolated to arrive at the actual profiles. An excel spreadsheet showing this extrapolated data is attached along with our response. From the information provided, for the period between 1995 to 1998-99 the variations of wind speeds have been noted. Hence the PP has considered a PLF of 29.30 % which was maximum known to them through their PLF report in the investment analysis.

A brief mention about the NOAA data and PLF Estimation Report has already been made in the Second Verification Report (Page 11).

Appendix 2 of the PLF report (Page 7/17) provides details on the 'Probability of Exceedance' at P-90, P-75, P-50 P-25 and P-10 levels as can be seen from the Table 1 below (also available in the PP's response)

Table 1	
Probability of Exceedance*	Estimated PLF
P-90	26.00%
P-75	27.60%
P-50	28.50%
P-25	29.60%
P-10	29.99%

**Exceedance probability is the probability that a certain value is going to be exceeded*

The table above indicates that the probability of achieving 26.00 % PLF was 90% and that the probability of achieving 29.99 % PLF was only 10 %. Therefore, sensitivity on PLF for the project activity was tested at P-10 and P-90 levels, i.e. at 30% and 26% respectively.

Since the PLF and sensitivity range considered during decision making process has been based only on the technical information explained above, it has been accepted by the verification team.

An independent third party PLF report by M/s. Ravi Enteck Ltd., Dt., 08/07/2011 (Reference 6) was also shared with the DOE and the report has estimated the average PLF to be 28.32% for the period October 1995 to September 2000, which is lower than the PP's original estimate of 29.30% and hence, this report also corroborates the PLF estimation of the PP. Ravi Enteck is an organization that offers consultancy involved in wind related studies and related services. It has provided third party PLF assessments for several other wind projects (which have been registered as CDM projects).

The verification team cross checked the first tariff order (Order on Non- Conventional Energy tariff dated 18/01/2005 ([http://www.kerc.org/order2005/Order%20on%20NCE%20Tariff%20\(FINAL\).doc](http://www.kerc.org/order2005/Order%20on%20NCE%20Tariff%20(FINAL).doc)))

released by the Karnataka Electricity Regulatory Commission (KERC) and observed in para 'b' (page 16 of the order) that the KERC considers a PLF of 26.5 % only, which is based on actual PLF achieved by wind power plants already in operation in the state of Karnataka. The verification team also cross checked the subsequent tariff order (Order dated 11/12/2009 (<http://www.kerc.org/nce%20tariff%202009/Order%20on%20NCE%20Tariff%20final%20dt11.12.2009.doc>)) released by the KERC and also observed in para 'b' (page 25 of the order) that the KERC again re-considers a PLF of 26.5 % only, which is also based

on actual PLF achieved by the wind power plants already in operation in the state of Karnataka.

Based on the explanation provided above, the verification team considers, the PLF used by the PP in the registered PDD as appropriate and conservative.

Actual observed PLF

Table 2 (also provided in the PPs response) below indicates the actual PLF achieved by the project activity during various monitoring periods (as published on UNFCCC website).

Table 2			
Monitoring¹	Period	Net generation (MWh)	Actual PLF
First Monitoring period	03/06/2002 to 30/06/2006	193,694	32.26%
Second Monitoring period	01/07/2006 to 30/06/2007	48,990	33.28%
Third Monitoring period (Current period)	01/07/2007 to 31/12/2009	117,021	31.81%
Fourth Monitoring period (monitoring report webhosted)	01/01/2010 to 31/03/2011	44,371	24.12%

As evident from the table, PLF observed for third and fourth monitoring periods has declined compared to previous monitoring periods. It may also be observed that PLF achieved for the fourth monitoring period is 24.12% which is 17.67% lower than that estimated in the PDD, the reason for which can be attributable to seasonal variation in wind.

CONCLUSION

Based on the assessment of the documents and other evidences provided by the PP and taking cognizance that the same information was used during the Validation and Registration of the project with UNFCCC, we are of the opinion that the information on wind availability studies which was available at the time of decision making was best possible information for a credible estimation of the PLF. The verification team considers the PLF applied in the Registered PDD including the PLF range applied for conducting sensitivity analysis has been appropriate.

¹ Monitoring reports are available (first to fourth) on the UNFCCC website at:
<http://cdm.unfccc.int/Projects/DB/DNV-CUK1140782658.34/view>

In accordance with the EB 48, Annex 67, Para -7 (Guidelines on Assessment of different types of changes from the project activity as described in the registered PDD - which states that 'The DOE shall assess how the affected data/information in the registered PDD have been derived, and validate if the assumptions underlying this original data/information is correct') we confirm that the assumptions on PLF underlying and impacting the generation of electricity that were made in the registered PDD are correct.

The increase or decrease in PLF is due to the seasonal and cyclical variation in wind characteristics, which is beyond the control of the project Proponent.

The DOE hereby concludes that the project is operated in accordance with the description provided in the registered PDD.

The Monitoring report and the Verification report have subsequently been modified to incorporate the explanation provided in this response. The revised Monitoring Report and the Verification report have been submitted along with our response.

We hope that we have been able to clarify on the review query raised above to the satisfaction of the RIT.



20/07/2011
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References

1. Power Purchase Agreements with the State Electricity Utility
2. 'Form B' statements issued by State Electricity Utility
3. Invoices raised on the State Electricity Utility
4. PLF estimation report of the project developer
5. Extract from NOAA, National Oceanic and Atmospheric Administration
6. Third party PLF Assessment report dt. 08/07/2011