TÜV NORD CERT GmbH • P.O. Box 10 32 61 • 45032 Essen • Germany

CDM Executive Board

TÜV NORD CERT GmbH
Langemarckstrasse 20
45141 Essen
Germany
Phone: +49 201 825-0
Fax: +49 201 825-2517
Info.tncert@tuev-nord.de
www.tuev-nord-cert.com

TÜV®

Our / Your Reference	Contact	Direct Dial	Date
	Rainer Winter E-Mail: rwinter@tuev-nord.de	Phone: -3329 Fax: -2139	11.10.2012

Initial Comments to Request for Review of project "Orosi Wind Power Project" (Ref. no. 6652)

Dear Honourable Members of the CDM Executive Board,

Please find below the response of the TÜV NORD JI/CDM Certification Program to the request for review for the above mentioned project No. 6652.

If you have any questions do not hesitate to contact us.

Yours sincerely,

TÜV NORD JI/CDM Certification Program

Rainer Winter

Question Raised by the EB	
1	1) 10% variation in the project revenue has lead the IRR (13.48%) to surpass the benchmark (12%). The PP has argued that the benchmark is very conservative and a 14% benchmark would better represent a real benchmark. As per VVM para 111(e), The DOE shall clarify how it assesed that such a varation is not lkely. Please refer to VVM 111(e), VVM 112(a).
Changes Made in/ Reference	
☐ **PDD**	None
☒ **FVR**	**BENCHMARK:** The UNFCCC default value as per paragraph 8 of the Appendix from the Guidelines on the Assessment of Investment Analysis, v.05, EB 62 Annex 5 has been used. It is important to mention that according to the Guidelines on the assessment of Investment Analysis. Version 05, EB 62, Annex 5: *¨In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term in the table below (UNFCCC's benchmarks table) to nominal values by adding the inflation rate.¨* The developer was at liberty to follow the relevant guidance and select a post-tax benchmark of 12% plus inflation (approximately 2%). Instead the PP chose to perform its analysis in real terms using a benchmark of 12% as set out by the EB in its guidance. It can be shown that this is a stricter and more conservative approach, since contractually only 20% of the energy price is subject to indexation, whereas O&M costs are expected to increase fully with inflation. **INTERNAL RATE OF RETURN (IRR):** The resulting IRR applying a fluctuation of +/-10% is as follow: • Net revenues (price / generation) - (+10%): 13.68%: the energy price paid by the ICE is fixed, with only 20% subject to indexation (US producer price index) (Source: PPA). As per the PPA, changes in price would only take place in exceptional circumstances after the PP justifies that the net financial return on the investment is significantly reduced as a result of an event that temporarily or permanently prevents it to comply with the Contract or forces it to incur into unexpected expenditures (PPA section 7.8.2.1). Therefore increments in tariff are very hardly to happen. Since there is almost no possibility to change the price, the only possible element that may give rise to increased revenues is an increase in the capacity factor. The actual capacity factor was determined by an independent and worldwide well known entity, Garrad Hassan. The PP chose to use the P50 net capacity factor of 49.41% as calculated by Garrad Hassan. However, according to the Green Rhino Energy web site (http://www.greenrhinoenergy.com/finance/modelling/revenue_uncertainties.php) "Typically, banks will apply the P90 or P95 level for their revenue forecast in order to determine if the interest cover is sufficient. Equity investors on the other hand may use the P75 or even P50 levels."

Energy generation considering P75 would be 206 Gwh/year and generation considering P50 would be 216 Gwh/year (almost 5% above the P75 estimate). Therefore using P50 is considered conservative, as it is clearly more aggressive in estimating the project´s generation potential. It is also worth considering that use of P75 estimates are common practice for wind power projects[1]. The latter link indicates that: "The base case has been calculated assuming a Probability of Exceedance of 75% (P75). For the scenario analysis two further cases have been considered: Best Case: Probability of Exceedance of 50% (P50); Worst Case: Probability of Exceedance of 90 % (P90)". This shows that P50 values are often used by developers in estimating the "best case" (optimistic) scenario in the economic analysis of wind energy projects.

In this context, it is also worth considering the average capacity factor of several wind power projects operating in Costa Rica applied in estimating electricity.

Plant	Capacity (MW)	Effective capacity factor (average 2006-2010) as per the Baseline CR – EF 2010 v3"	Effective capacity factor including year 2011[2]
MOVASA	20	36,5%	35,8%
Tejona (ICE)	19,8	41,2%	41,9%
PESA	19,8	43,9%	43,4%
Aeroenergía	6,4	47,8%	47,2%
Orosi Wind Power Project	**50**	**49.41%**	

The capacity factor of the Orosi project activity used by the PP is the higher capacity factor observed in Costa Rica. A permanent 10% increase in revenue would imply a capacity factor of 54.5%. It should be noted that the equilibrium capacity factor required to give a 10% increase in revenue would likely need to be even higher as increased generation would also lead to increased O&M costs. In conclusion, even under optimistic circumstances it is highly unlikely to see a permanent increase in electricity production during the plant's technical lifetime, sufficient to give rise to an increase in revenue such that the benchmark applied will be breached.

Moreover according to the cdmpipeline web site checked on 2012/10/05 the issuance success (the CERs issued divided by the CERs expected for the same period of time) is about 84%. This information provides a clear signal that CER´s estimates and by implication wind generation stated in registered PDD´s are generally over estimated by around 16% in all registered CDM wind projects. CER´s generation is directly correlated with initial energy generation estimates.

Furthermore the validation team has successfully verified several wind projects in Mexico, Nicaragua and Chile. In none of the wind projects verified has the energy

[1] See e.g. http://www.greenrhinoenergy.com/finance/modelling/revenue_uncertainties.php and https://energypedia.info/index.php/Economic_analyses_of_wind_energy_projects

[2] Source: Excel file "GEN_PRIVADA 2011". Available at: ARESEP statistics/EF/.

	generation been above the estimate stated in the PDD´s. For example it was assessed that in Nicaragua Amayo Phase II (CDM ref. #5305)[3] real information of energy production from the facility in year 2010 showed that the effective capacity factor presented in this period was of 24.7% (INE) significantly smaller than the 48.97% plant factor estimated by V-BAR in the PDD[4]. This shows that the revenue in 2010 has been less than expected. Based on these evidences, it seems unlikely that a permanent, +10% increases in generation will take place. Finally, the prospects for the project to consistently outperform by 10% are limited given the choice of a P50 value as opposed to P75. A choice of a P75 value would see a reduction in the equilibrium IRR for the project. The practice of using P75 estimates in the region is supported by available data on actual wind farm performance both on a global and a regional level.
☐ **Financial Models**	None
☒ **ER Sheet**	The Emission Factor calculation was updated (tab: Wind projects performance) regarding the capacity factor of several wind power projects operating in Costa Rica, including year 2011.
☐ **Additional Comment by PP**	
None	
☐ **Additional Comment by DOE**	
None	
☐ **Other/Additional documents**	
None	

[3] This project is relevant due to their proximity (some 90 km from Quebrada Grande, Guanacaste, where the Orosí project is located) and the fact that it is the most recent wind project in the region with performance data already available.

[4] http://cdm.unfccc.int/filestorage/5/B/T/5BT64MLAGYJVN1X7SID9K0FROZU3QH/5305%20PDD.pdf?t=SG18bWJmeXZofDBY9qCVXIPPKWDyUPcbWZAu