DET NORSKE VERITAS CERTIFICATION AS

DET NORSKE VERITAS
CERTIFICATION AS
International Climate Change Services
Veritasveien 1
NO-1322 Høvik
Norway
Tel: +47-6757 9900
Fax: +47-6757 9911
http://www.dnv.com
NO 945 748 931 MVA

UNFCCC Secretariat

Martin-Luther-King-Strasse 8
D-53153 Bonn
Germany

Attn: CDM Executive Board

Your ref.:	Our ref.:	Date:
CDM Ref 1424	MLEH/KCHA	26 February 2008

Response to request for review
Carhuaquero IV Hydroelectric Power Plant (1424)

Dear Members of the CDM Executive Board,

We refer to the requests for review raised by three Board members concerning DNV's request for registration of project activity 1424 "Carhuaquero IV Hydroelectric Power Plant" and would like to provide the following initial response to the issues raised in the requests for review.

Comment 1:

Further substantiation is required regarding the investment barrier; in particular as the costs of the alternatives are generic rather than specific in the Peruvian context and also that the investment costs alone are not an adequate means of comparison between thermal and hydro plants.

DNV Response:

The project proponent has used investment cost only for providing a comparative analysis of the capital required from an investor's perspective for a thermal power plant as compared to that for hydro power plant. The proposed project activity belongs to an international energy company which is considering investments into different technologies and different countries, hence, in our opinion, a comparison with generic costs of other investment options is thus appropriate. This costs analysis shows that cost of the project is higher than the highest cost reported for all other technologies. Hence, it is in our opinion fair to assume that the costs of the project are also higher than the costs of the alternatives in the Peruvian context. The barriers faced by the project are amplified owing to the:

- Low operational hours, with an estimated load factor of only 49%, of the project. As stated in the PDD, the project plant operates on the surplus water flow, after the water requirement of 24 m^3/s of the Carhuaquero main plant is met.

- The same was confirmed by DNV against the hydrology study of Chancay River and the average monthly flow (m^3/s) the Carhuaquero plant from the Cirato metering station, which is the lowest point of the project water intake. (Please see *Attachment I: IRR analysis for the Carhuaquero IV hydro project*, spreadsheet 2. electricity production estimation). Subsequently, the plant is able to operate for only about five months of the year, during the rainy season.

    - The proposed project depends on excess water in the reservoir, after meeting the requirements of the Carhuaquero main plant. The plant is thus able to operate at its maximum capacity only during the rainy seasons. Given that the lowest tariffs available in Peru are during the rainy season, due to full operation of all the power plants connected to the grid, the plant is able to cash in only the lowest tariffs available in Peru, further bringing down the revenues available to the project.

    - To add to the above mentioned concerns, at the given higher capital costs, and cash flows for amortization of a capital investment available for only during these five months of the year, the repayment period for the proposed project is long. This price difference coupled with the operational and other risk factors makes investing in hydro power less favourable in comparison with thermal technologies. Additionally, the thermal plants also benefit from significant revenues for their power capacity since they can guarantee energy production in any time of the year for almost their entire rated capacity, and can thus receive a capacity payment simply for being available, which is not the case for the proposed project.

Owing to the low plant load factor and the low tariffs enjoyed by the project, the project proponent has further carried out an IRR analysis to calculate the project IRR, which is compared to the discount rate of 12%, which is established by the government within the electric concession law to determine electric tariff and evaluate investments. DNV was able to confirm the same against a copy of the Law of Electric Concessions (The document provided is in Spanish and a copy of the same can be provided to EB on request). DNV would like to point out that the assumptions used in the IRR calculation, have not been validated by us completely due to time constraints. The tariff considered for the IRR calculations have been sourced from an estimation model "Spot Tariff Forecast using software used by the tariff regulator entity OSINERG and The dispatch center COES (Junin Model)" for the period 2008-2013 using the data available at 2006, as attached to this response as ***Attachment I: IRR analysis for the Carhuaquero IV hydro project*** *(see spreadsheet 1.tariff forecast)*

Hence, DNV is of the opinion that investment in hydro power project in Peru currently is not the most feasible option available to an investor.

Comment 2:

Further substantiation of the prevailing practice barrier is required, in particular further evidence is required to explain and substantiate the impacts of the gas discoveries on ongoing investment in hydro power.

DNV Response:

In DNV's opinion, it has been adequately demonstrated by the project proponent that the prevailing practice for the Peru is shifting from hydro power generation to natural gas based power generation. As stated in the PDD, the earlier ratio of 48% to 52% for thermal versus hydro

power in the region. However, this ratio is seeing a drastic change, with the proportion of hydro versus natural gas based power generation being 4% to 93% as confirmed by the latest data by OSINERG (the Peruvian electric regulator)[a].

On discovery of the large natural gas reserves, the Government of Peru, halted both the indefinite and the temporary concessions for hydropower generation through various laws issued, including Law 26980 issued in September 1998, Law 27133 issued in June 1999, and Law 27239 issued in December 1998. During this period, no concessions were granted for hydropower generation, till 1999, also indicating that this sectoral policy shift curtailed development of new hydropower development. This also added to the risks associated with hydropower generation in Peru, as perceived by local, as well as foreign investors.

In addition to this, the government also, issued favourable policies for natural gas based power generation to include:

- *Laws DS 019-2004 on 25 June 200410:* As per this law indicated that for 2 years after 25 June 2004, when the request for authorization is for natural gas-fired electricity generation, the guarantee required by article 66 of the ECL Rules will be reduced from 1% to 0.25% of total project budget, while the ceiling will be reduced from 500 UIT (Unidad Impositiva Tributaria) to 200 UIT.

- *DS 041-2004-EM on 24 November 2004* and DS *107-2004-EF on 5 August 2004*: to promote natural gas-fired electricity generation and to exempt the selective consumption tax for natural gas.

- The government also issued several decrees[b] that lay out the security measures and ownership requirements for gas pipeline installations, paving the way for new investments.

- At a public declaration in August 2005[c], the Minister of Energy and Mines asserted the need to encourage the use of natural gas in all activities including electricity generation in order to offset rising oil prices. For this purpose, the Council of Ministers created a commission to prepare a strategic plan proposing a series of measures to further promote the use of natural gas. As part of this strategy, on 29 December 2005, the Government issued the decree on cogeneration, DS N° 064-2005-EM, encouraging simultaneous generation of heat and electricity using natural gas

These above laws were aimed at making natural gas an even more competitive alternative for power generation, while bringing down the electric tariff, thereby making capital intensive projects such as hydroelectric less attractive. Duke Energy, the investor is a big international energy company, has several options to invest in power generation and thereby not making Carhuaquero IV hydro power project, the most feasible alternative, without the CDM revenues.

DNV was able to confirm against the official COES data that only two new hydro power plants have been in place since the first natural gas project (Camesia) was developed in 2004. Furthermore, both these hydro power plants are being developed considering CDM revenues. As

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[a] Source: OSINERG,"Estudio Técnico Económico de determinación de Precios de Potencia y Energía en Barras para la Fijación Tarifaria de Mayo de 2007 y 2008", http://www2.osinerg.gob.pe/gart.htm.

[b] Supreme Decree 038-2004 on 21 October 2004; Supreme Decree 016-2004-EM on 10 June 2004; and Supreme Decree 018-2004-EM on 16 June 2004.

[c] Source: Ministerio de Energía y Minas. Dirección General de Electricidad "Informativo DGE n° 8" August 2005, page 5. http://www.minem.gob.pe/archivos/dge/estadisticas/informativo/InformativoDGE-8.pdf

per the latest data by OSINERG (the Peruvian electric regulator)[d] shows that among the recently being built hydro power plants or projects under construction during the years 2006 to 2009, only 4% of installed capacity under construction is hydroelectric power generation, whereas the remaining 93% is natural gas-fired thermal generation. As can be seen from the list provided in the project proponent's response, all of the hydropower projects are seeking CDM registration.

Thus the project proponent has used the prevailing practice barrier to re-affirm the fact that, owing to the investment barriers, low tariff and the low plant load factor enjoyed by the project, the implementation of hydro-based power generation projects in the region would not be a possible without CDM revenues.

Hence, DNV is of the opinion that the favourable policies as enjoyed by the natural gas based power generators, has resulted in the switch of prevailing practice in the region from hydro to thermal based power generation in the recent years, while power generation utilising the renewable hydro resources faces additional risks as stated in discussions above and in the PDD.

We sincerely hope that the Board accepts our aforementioned explanations and we look forward to the registration of the project activity.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

Michael Lehmann
Technical Director
International Climate Change Services

Annexes:

- *Annex I:* *Annex I: IRR analysis for the Carhuaquero IV hydro project.*

[d] Source: OSINERG,"Estudio Técnico Económico de determinación de Precios de Potencia y Energía en Barras para la Fijación Tarifaria de Mayo de 2007 y 2008", http://www2.osinerg.gob.pe/gart.htm.