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CDM Executive Board

RESPONSE TO REQUEST OF REVIEW

"POA 2956 Uganda Municipal Waste Compost Programme"

AENOR had performed the validation of the Programme of Activities "**Uganda Municipal Waste Compost Programme**" No. 2956 located in Uganda. The request for registration was made on 11th September 2009.

Five requests for review have been issued on 11th February 2010, which are identical to each other.

We thank the CDM Executive Board and the Secretariat for giving us the opportunity to clarify about our considerations in validating the programme mentioned.

Please find below AENOR response to the issues raised by the request for review.

Request for review:

1. **The DOE is further requested to substantiate how it has validated: (a) the suitability and conservativeness for the price of sewage sludge when the product to be sold is compost; (b) a zero residual value after the 7th year of depreciation for the vehicles and equipment; and (c) that only 30% of the compost will be sold the first year in the market.**
2. **The DOE is requested to further substantiate how is has validated the technological and prevailing practice barriers.**
3. **The PDD and the VR should reflect that the ex-ante grid emission factor will be revised at the point of renewal of the crediting period of the PoA as it could be interpreted at present that it is intended that the emission factor will be fixed for the lifetime of the PoA.**

In order to provide and extend details about the validation of the issues mentioned on the request for review, AENOR has prepared the following clarifications.

1. **"The DOE is further requested to substantiate how it has validated: (a) the suitability and conservativeness for the price of sewage sludge when the product to be sold is compost; (b) a zero residual value after the 7th year of depreciation for the vehicles and equipment; and (c) that only 30% of the compost will be sold the first year in the market.**

(a) The suitability and conservativeness for the price of sewage sludge when the product to be sold is compost;

Currently, there is no organized market for organic compost in Uganda but the sludge generated at sewage treatment plants are in demand. Sludge is used as soil conditioner for land application which is the exact use for which the municipal waste compost is to be used. In terms of use and value to the farmers, sewage sludge and municipal waste compost are similar, although published reports indicate that sludge has better results than refuse compost (further described later). Hence sewage sludge is taken as proxy for municipal waste compost.

In the absence of any organized compost market in Uganda, assuming the price of sewage sludge for compost is considered suitable and reasonable on the following grounds:

- Both products have similar agronomic characteristics, although international experience and published reports indicate that those aspects such as degree of stabilization and granulometry, predictability of the nutrient content and productivity make the sludge option clearly preferred in the market *(*further explained below*)*.
- The production cycles with low levels of technological intensity, are similar in both products.
- In both cases the raw materials are waste products, and strongly linked to local production and acceptance.

The conservativeness of the price assumption is established by *(i)* comparing the quality of both the products, *(*ii*)* referring to price of compost in other countries in Africa as available in published reports, and *(*iii*)* analyzing the farmers' affordability and willingness to pay based on published data from various sources.

Published study[1]*:* on comparison of productivity arising from application of refuse compost and activated sludge indicates that application of refuse compost leads to lower productivity compared to sludge. Due to the variability of the composition of the input municipal solid waste, the predictability of nutrient content in refuse compost is expected to be lower than the nutrient content in sludge. Published reports[2] indicate that the predictability of nutrient content of yard waste compost is much lower than the nutrient content of sludge. Given the fact that yard waste has more uniform characteristics than municipal solid waste, predictability of nutrient content of refuse waste can be expected to be even lower than sludge.

A study[3] carried out on the sustainability aspects of municipal solid waste composting in South Africa, reports a price of 4U$D 10-22 per Tone of compost. This report confirmed that, based on the volumes and prices of compost and the operational costs, when sold in bags, compost gave incomes that covered the production costs, but not when sold in bulk, it rendered a lower price. However, it is important to emphasize that South Africa has different socio-economic profile than Uganda, and the market conditions are not exactly the same.

The willingness to pay for compost among the Ugandan Farmers, is analysed based on the information provided in the paper titled "*Economic viability of fertilizer use in Uganda's agriculture*"[4] .The paper examined the viability of fertilizer use in Uganda, using the 2005/06 Uganda National Household Survey data, providing some useful information about the market and the potential willingness to pay of the farmers. According to this article, taking all the sample farmers into consideration, average expenditure on fertilizer was only UGX 700 per hectare *(*U$D 0.38 per hectare*)*, which was much less than their average expenditure on seed, hired labour or traction power. If a conservative compost use pattern of 5-15 tn/hectare, and a price of U$D 13 per tone are applied, the result is that the cost is between U$D 65-195 per hectare, what means that the price estimate is a conservative value, which is situated in a high-margin in relation to the Ugandan prototype farmer willingness to pay.

*(*b*)* A zero residual value after the 7th year of depreciation for the vehicles and equipment

The total investment of U$D 421,344 per compost plant, considered in this financial analysis, matches closely with the capital investments estimates contained in the document "*Promoting Solid Waste Composting in Uganda*", which forms the basis of this Program. The initial investment in equipment and vehicles represents 29% of the total initial investment.

The vehicles and equipment will depreciate completely over a period of 7 years due to reasons stated below. Therefore, new investments in equipments have been considered in the 8th year of operation of the plant, and the NPV has been calculated over a period of 15 years.

1 "Comparison of refuse compost and activated sludge for growing vegetables ".M. H. Wong, C. M. Mok and L. M. Chu, Department of Biology, The Chinese University of Hong Kong, Shatin, Hong Kong*)*.
[2] Reference : "Comparing yard waste and sludge compost", by Henry, Charles L., Harrison, Robert B. Publisher
[3] Composting of Municipal Waste in South Africa- sustainability aspects", by Lotten Ekelund and Kristina Nystrom
[4] http://mpra.ub.uni-muenchen.de/19428/

The depreciation rates for vehicles & earthmoving equipment is 35% (Schedule 6) on written down method, as per the provisions of the Income Tax Rules in Uganda. The residual values of the earth moving equipments (similar in nature to the equipment used in the project) after the end of 7 years turns out to be 2.63 % of initial asset value when the above depreciation rate is applied.

In this context, a zero residual value used in the project has been accepted by the DOE, taking into account some specific aspects of the activity of collecting and composting of municipal solid waste:

- The collection of municipal solid waste is a demanding activity for the engines of vehicles involving continuous start-stop cycles due to the characteristics of the urban collection.
- One of the main problems in composting and waste handling machinery is the inevitable erosion of its components and parts due to their exposure in any type of work, specific environmental conditions and in constant contact with all kinds of materials. The frequent wear of diverse pieces entails a significant reduction in equipment life.
- Solid wastes in developing countries like Uganda contain a high amount of present organic matter, and are constantly under degradation resulting in various forms of leachate and acids that affect the equipments
- Life of the equipments also depends heavily on how they are used. The construction industry is a traditional industry and skilled operators are already available who are fully familiar with operating procedures of earth moving operations compared to composting operations, where getting skilled operators is expected to remain a challenge , as it is anew activity that is being introduced in Ugandan intensive operation plan, involving maximum usage of the available equipments, has been designed by the Project Participant for vehicles and equipment, which would reduce the useful life of the equipments. Calculations for few equipments are presented below for demonstration purpose, as described below:

Equipment	Number	Use pattern	Situation after 7 years
Tractor with Front end loader and attachments	1	8 hours/day x 365 days x 7 years	20,440 working hours
Waste Sieving	3	4 hours/day x 365 days x 7 years	10,220 working hours
Truck (Transport of waste)	1	17 trips/day x 15* km/trips x 365 days x 7 years	651,525 km
Truck (Transport of compost)	1	2 trips/day x 100 km/trips x 365 days x 7 years	511,000 km

Source: Data from the project participant (spreadsheets submitted to the EB in the Request for Registration)

*Average distance to plants.

Taking into consideration the conditions of use of such equipment (climatological constraints, intensive use, conditions of infrastructures, etc) it can be concluded that the estimated residual value of zero is appropriate in attention of the situation at the end of defined period of useful life.

In addition to the above arguments, the impact of 2.63% residual value of equipments after the end of 7 years has been studied to be relatively small in the financial analysis, and do not alter the premises on which the additionality of the project has been established. In the hypothetical

case of extending the useful life of equipment to 15 years (which is unrealistic), NPV would change from USD -433.855 to USD -345.520 In both cases, the Programme of Activities will be additional.

(c) that only 30% of the compost will be sold the first year in the market

The main uses of compost and market segments are Agriculture and Gardening. Some structural aspects in Uganda (and other markets), imply marketing of compost produced from MSW will be a key challenge since currently there is not a market for this product in Uganda. This problem is further aggravated by the perception of general public that the compost produced from waste is dirty and problematic and thus prefers the chemical fertilizers or other alternative products, such as manure or sludge. Market for compost in the developing world has been documented to be uncertain as elaborated in the PDD. For example, a majority of existing compost plants in India are facing problems in marketing of compost and the same is detailed in document "*Report of the Inter Ministerial task force on Integrated plant Nutrient Management*[5]" (Indian Government)

Similar experiences are also observed in Africa as given in the African Development Bank report quoted in the PDD.

Some structural aspects condition the development of a market for compost in Uganda:

Common problems in the market for compost

- Less than 10 % of the farmers use fertlizers in Uganda. There is a significant promotion required for promoting use of fertilizer. Use of organic fertilizer is negligible. Considering this a low initial penetration of sale is realistic.
- The compost has a high degree of dispersion on the qualities and confusion regarding technical specifications.
- Lack of information on the materials from which it comes.
- Presence of undesirable substances or products, for example seeds, which constitutes a significant disadvantage for the massive use of compost in industrial plantations such as coffee and tea plantations.
- Because of the lack of characterization of the products and the confusion of qualities and controls, the prices are hardly comparable.

Constraints in the Uganda's agricultural sector: (source PMA[6]*)*

- Very low proportion of farmers (10.2%) having technology awareness.
- Very low access to agricultural inputs (Only 10% of farmers used improved seeds).
- Low level of market access (40% farm households).
- Low level of access to irrigation outreach (29% of 202,000 hectares that are under irrigation).
- Over-dependence on hand hoe cultivation technology and backward agricultural development practices.
- Very small sized farms among the very poor subsistence farmers (less than two acres).
- Low returns to labour (less than one dollar a day), over dependence on hand hoe and backward farming practices.
- Low returns to land (less than 2 acres of landholding).
- Low levels of overall aggregate production and productivity (Low input – low output syndrome).

[5] www.bhavanibio.in/Main%20Report%20on%20IPNM.doc
[6] http://www.pma.go.ug/

• Disjointed food marketing with poor infrastructure, poor information flow and small added value (Market disintegration).

The use of fertilizers in Uganda is amongst the lowest in the world. According to the "*Uganda Fertilizer Strategy* 2006 *Draft Report*" it is estimated that between 1996 and 2000, fertilizer usage was 0.37kg fertilizer nutrients per hectare. This is compared to 4kg/ha in Mozambique, 6kg/ha in Tanzania, Malawi 16kg/ha, Kenya 31.6 kg/ha, South Africa 51kg/ha, USA 105kg/ha and 578 kg/ha in The Netherlands.

In the early 1960s, Ugandan farmers used 2,600 tones of fertilizers per year. This increased to 8,100 tones in the early 1970s. This dropped to almost zero from 1979 to 1984 due to political turmoil in the country. Official fertilizer imports are estimated at 25,000-30,000 tones annually.

The report includes reasons for the low fertilizer usage in Uganda such as the wrong perception that the country's soils do not need replenishment, and the fact that farmers have insufficient knowledge of the advantages of fertilizers and soil enhancers. The report also points to the high prices of fertilizers and the low level of their distribution in rural areas.

Given this scenario and taking into account the difficulties experienced by other markets of compost it can be seen that the forecast of selling 30% of the compost produced along the first year is reasonable and commensurate with the reality. The fact that from the 6th year is expected to sell 80% of the compost produced, presents an optimistic scenario that will continue until the end of the life of the project. In total, the market expects to sell 70% of the production, which is considered conservative.

2. "The DOE is requested to further substantiate how it has validated the technological and prevailing practice barriers".

As it has been detailed, the project participants have used the investment analysis reinforced using the barrier analysis in order to demonstrate the additionality of the project. The Programme of Activities applies the Attachment A of Appendix B – the Simplified Modalities and Procedures for Small Scale CDM project to identify the barriers. These barriers presented in the POA-DD are:

- Technological barriers.
- Prevailing practice barriers.

The assessment team checked first if any barrier has a clear impact on the financial returns which can be expressed with reasonable certainty in monetary terms. The POA-DD does include only barriers without such impact on the financial returns.

Technological Barrier:

The Technological Barrier has been assessed based on interviews with representatives of DNA in Kampala, representatives of NEMA (Environmental National Agency) and researchers of Makerere University. They confirmed to the validation team the non existence of any organised solid waste composting activities. The composting activities proposed under the Programme will imply:

1. Formation of windrows of specific dimensions
2. Regular turning of the windrows and,
3. Final removal of composted material from the windrows at the end of the composting/maturation cycle for screening.

The facility would be covered with a roof to avoid run-off and excess leachate generation due to rainwater percolation through the wastes. The leachate from the waste would be collected in tank and used for wetting the windrows.

These technological developments although sound simple, are not practiced in Uganda. Failure or underperformance the solid waste processing technologies have been widely reported in

published reports leading to low acceptance of any such technologies particularly in the developing world like Uganda.

The result of this assessment shows clearly that the barrier presented in the PDD can be considered real. Furthermore, this barrier does prevent the project activity and would not prevent at least the baseline scenario, and this can be confirmed based on the documentation review, interviews and local and sectoral expertise of the assessment team.

Prevailing practice barrier:

There are no regulations to manage landfills in Uganda as it was confirmed with the Environmental Competent Authority (NEMA) during the on site visit. The common practice in the country is to depose the wastes in unmanaged landfills. In order to check the real situation about the wastes management, the validation team visited Jinja Landfill and made interviews with the people in charge of the landfill of Jinja who have the expertise and knowledge of the situation of their country. The only "managed" landfill is the Mpererwe, and it is in process of validation to be registered as CDM project activity (using other technology since the gas will be captured).

In addition, the "prevailing practice barrier" has been assessed against the following documents and sources:

- Cooperation Agreement signed between NEMA and the municipalities, confirming that each CPA will be the first of its kind in the municipality.
- Interviews with various representatives of NEMA during the on-site audit, confirming that the programme is the first of its kind and the first CDM project in Uganda in this sector.

Furthermore, the validation team have checked that there are only two registered CDM projects in Uganda, but none of them are included in sectoral scope 13 ("Waste Management"):

- "West Nile Electrification Project" (0775).
- "Uganda Nile Basin Reforestation Project No.3" (1578).

This barrier does prevent the project activity and would not prevent at least the baseline scenario. This issue could be confirmed based on the documentation review, interviews and local and sectoral expertise of the assessment team.

Taking into account the description of the validation of the barriers presented above, the assessment team can confirm, with reasonable certainty, that the barriers are credible and correctly presented to demonstrate the additionality of the project.

3. "The PDD and the VR should reflect that the ex-ante grid emission factor will be revised at the point of renewal of the crediting period of the PoA as it could be interpreted at present that it is intended that the emission factor will be fixed for the lifetime of the PoA."

The emission factor of the grid is not fixed during the lifetime of the POA. The POA-DD states in Section E.6.2 (page 22 and page 23) and Table 4.1, parameter 1.6 (page 49) that the emission factor of the grid will be calculated in an annual basis and yearly monitored. This option is in accordance with the methodology AMS.I.D (version 13) applied in order to calculate the emission factor of the grid as it is stated in methodology AMS.III.F (version 06).

Nevertheless, during the second crediting period, each CPA-DD shall be updated using the valid version of the methodology at that moment. Thus, the emission factor of the grid will be calculated using the new algorithms published at that moment. In order to reinforce this issue, the validation report (Section 3.5.3) has been accordingly modified and submitted as annex to this response.