

**Response to request for review of the request for issuance of the CDM project activity
"Bionersis Project Thailand 1" (2514)**

Date: 24/12/12

Dear CDM Team

We refer to the request of review received in the context of the request for issuance for the CDM project activity "Bionersis Project Thailand 1" (2514).

Raised comment / reason for the request of review:

- 1) *The DOE is requested to further explain how it has verified that the flare has been adequately operating with temperature in the exhaust gas of the flare over 700°C. In doing so it should clarify how it verified that condition 2 of AM_CLA_0047 has been complied with (i.e., the methane composition throughout the sampling section is uniform). Please refer to AM_CLA_0047.*

PP response to the raised comment:

The proper operation of the flare has been assessed by the DOE in the verification report, paragraph 3.3.2, based on the manufacturer's statement that "The flare operates within the range of operating conditions, as long as the flare temperature is maintained at a minimum of 500°C." This statement was assessed by the DOE and listed in the references: /136/ "4638 KPS flare operation statement". In addition, the confirmation letter issued by the manufacturer –assessed by the DOE reference /137/ "5027 Flare operation confirmation" - also further confirms that this type of flare is operating adequately as long as the temperature is between 500 °C and 1,200 °C. It should be noted that the documents provided were from Dr. Robert Eden, the experts of the equipment and landfill gas flaring who was awarded under the competitive tender to prepare a consultation draft on "the guidance on landfill gas flaring" for the UK Environment Agency - the guidance in which the AM_CLA_0047 referred to. According to the communication with Dr. Eden, by design heat loss is minimised, so it is not possible that the exhaust temperature will drop as low as suggested of 700 °C in such a short time.

In addition, although the flare manufacturer's statement does not indicate the above limit for which the flare is not properly/adequately operating, but the technical specifications of the flare – also assessed by the DOE reference /139/ "CL2-Proper Flare Operation Document" - indicates that the combustion temperature is 1,000 °C. The flare specifications also indicates that the upper limit for which an alarm is triggered is an exhaust gas temperature of 1200°C, so we can then conclude that the flare is still operating adequately as long as the temperature is between 500°C and 1200°C.

From the documents and the visit to the site to witness the operation of the flare system, the DOE was able to confirm that the N type thermocouple, which is installed at the flare, can operate at temperature above 700°C and that the flare is being adequately operated when the flare temperature is above 700°C. This is consistent with clarification AM_CLA_0047 which further clarifies that temperature above 700°C can be observed in low height flares, i.e. less than 10 internal diameters, which is the case of the flare installed in the project activity.

Furthermore, the complete combustion of the methane is monitored continuously by a gas analyzer, which the sampling probe is located in the upper section of the flare where the exhaust gas is uniform. The exhaust gas quality is determined continuously by a sampling probe adequate to high temperature levels and a gas analyzer with high accuracy. The continuous monitoring of flare efficiency has proven an average combustion efficiency of 99.99% when the average temperature

measured by the N type thermocouple during the monitoring period is 827 °C. The homogeneity of the thousands of values recorded on a minute basis demonstrates that the methane composition is uniform throughout the sampling section. These measured values also further evidence that temperature above 700 °C indicates that the flare is adequately operating, allowing destruction of almost all the methane contained in the LFG. The document L-RE-4638-201212-1, enclosed herewith, issued by the flare manufacturer also further confirms the uniformity of the exhaust gas of the flare based on the technical specifications.

Provided the above information, it is the PP's strong opinion that the continuous monitoring of the exhaust gas quality on a minute basis throughout the year provides reliable information regarding homogeneity of the sample; therefore, the methane composition profile as per the condition 2 recommended in the clarification AM_CLA_0047 was not carried out during the monitoring period. However, in order to be conservative on the calculation of project emission reduction, during this monitoring period the PP will apply the default values for parameter $\eta_{\text{flare,h}}$, which is in accordance with the *Tool to determine project emissions from flaring gases containing methane*.

Regards,



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TO WHOM IT MAY CONCERN

I refer to the CDM clarification concerning the “Temperature of the exhaust gases at the sampling point inside the flare / AM_CLA_0047” dated 17 July 2007, on behalf of Organics Asia Co Ltd (<http://www.organics.com/>). I would like to issue the following statement:

Enclosed flaring (also known as high-temperature flare) is a state of the art technology for landfill gas combustion, employed throughout Europe and the USA. This type of flare is designed to comply with the requirements of the UK, German and US environmental agencies, which require a complete destruction of the combustible fractions of the landfill gas, as well as more difficult to combust trace gases.

Long-term experience and measurement of thousands of such enclosed flares has shown that with a minimum combustion temperature of 500°C to 900°C, dependent on the exact type of flare, with a minimum retention time of 0.3s, the combusted methane is virtually completely destroyed with no readily measurable trace fractions in the exhaust gas.

Concerning the particular case of the flare installed at the Kamphaeng Saen Landfill for Bionersis Project Thailand 1 (Nakhon Pathom, Thailand), type SC4,000 Nm³/h enclosed landfill gas flare system, we, as flare manufacturer, do hereby confirm that the following technical specifications of the flare allow a complete combustion of the methane contained in the exhaust gas:

- generation and retention of a constant combustion temperature between 500°C and 1,200°C (retention time > 0.3 seconds)
- homogeneous temperature distribution in the combustion chamber, prevention of cold zones in the combustion process, and minimum drop in temperature towards the outside wall. For this purpose the combustion chamber is lined with internal insulation made of 100mm ceramic blanket.
- control of the combustion air to achieve optimum excess air supply
- burner designed such that it maintains turbulent mixing of air and fuel

The complete combustion of the methane is monitored continuously by a gas analyser, for which the sampling probe is located in the upper section of the flare where the exhaust gas is uniform. The exhaust gas quality is determined continuously by a sampling probe, which is suitable for use with high temperatures and a gas analyser with high accuracy.

The homogeneity of the thousands of values recorded on a one-minute basis demonstrates that the methane composition is uniform throughout the sampling section.

Yours faithfully

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