



Validation opinion for post registration changes

Title of project activity:		
Pakarab Fertilizer Co-generation Power Project		
CDM reference number:	DNV project No.:	
2687	PRJC-225088-2010-CCS-JPN	
Date:	Validation of the changes were conducted:	
07 August 2012	☐ Prior to the commencement of a verification of the project activity ☒ When performing a verification of the project activity	
Work carried out by:	Work verified by:	Approved by:
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1 Overview of post registration changes

Type of post registration change	Is prior approval by CDM EB required? (refer to Appendix 1 of CDM Project Standard)	
Temporary deviations from the registered monitoring plan and/or monitoring methodology (refer to section 3)	☐ Yes ☐ No ☒ Not applicable	
Corrections (refer to section 2)	☐ Yes ☐ No ☒ Not applicable	
Changes to the start date of the crediting period (refer to section 4) <i>Prior approval by the CDM EB is not required in case of (a) bringing forward the start date up to one year earlier or (b) postponing the start date by up to one year (by up to two years for project activities in LDCs).</i>	☐ Yes ☐ No ☒ Not applicable	
Permanent changes from the registered monitoring plan or applied methodology (refer to section 5)	☐ Proposed revision only includes the request by the CDM EB ☒ Proposed revision includes not only the request by the CDM EB but also additional revisions proposed by the PP/DOE ☐ Proposed revision includes revisions proposed by the PP/DOE	☒ Yes ☐ No ☐ Not applicable
Changes to the project design of a registered project activity (refer to section 6)	☐ Notification of changes from project activity as described in the registered PDD (i.e. changes do <u>not</u> raise any concerns with regard to i) additionality, ii) the scale of CDM project activity	☐ Yes ☐ No ☒ Not applicable

	and/or iii) the applicability and application of baseline methodology ☐ Request for approval of changes from project activity as described in the registered PDD	
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2 Corrections

Not applicable

3 Temporary deviations from the registered monitoring plan and/or monitoring methodology

Not applicable

4 Changes to the start date of the crediting period

Not applicable

5 Permanent changes from the registered monitoring plan or applied methodology

5.1 Description of the revision of the monitoring plan

This revision of the monitoring plan includes two components

- 1) Change following the incomplete messages received for the 1st and 2nd issuance request.

The incomplete message dated 13 March 2012 stipulates:

The monitoring plan requires the measurement of the Cogeneration system electricity output (CEO) while the monitoring report indicates that this parameter is calculated. Further information is required how the DOE verifies the monitoring of CEO as per the monitoring plan.

The requirement from the registered PDD was as follow:

The net electric energy supplied to the fertilizer complex excluding own electricity consumption of the cogeneration power plant will be metered and recorded.

In practice, the plant includes 3 gas turbine generator units (GTG) and each GTG is equipped with an electricity meter monitoring the gross electricity generation (meters C4, C10 and C16 on figure 11 of the revised monitoring plan). In addition, 2 electricity meters are installed for measurement of the auxiliary consumption of all the three the GTGs (meters C6 and C14 on attached diagram). The net electricity is thus calculated as the difference of the total electricity generation (C4+C10+C16) and the auxiliary consumption (C6+C14).

The monitoring plan is therefore revised in accordance with the actual practice implemented by the project entity, which was verified by DNV during the site visit of the 1st and 2nd verification period.

- 2) Change requested by the PP/DOE for monitoring of the NCV of natural gas.

The registered monitoring plan indicates that the Net Calorific Value of natural gas (NCV_{NG}) will be sourced from the invoices of the gas supplier (SNGPL).

In practice, the invoice from the gas supplier only provides the Gross Calorific Value (GCV_{GS}) (annex 1), so that the project entity (Pakarab Fertiliser Limited, PFL) needs to perform additional measurements in order to determine NCV_{NG}, as follow:

$$NCV_{NG} = GCV_{GS} \times (NCV_{PFL} / GCV_{PFL})$$

Where;

NCV_{NG} = Net Calorific Value of natural gas to be used in calculation

GCV_{GS} = Gross Calorific Value of natural gas from monthly invoices of gas supplier

GCV_{PFL} = Gross Calorific Value of natural gas from laboratory measurement by PFL (monthly average value from daily measurements)

NCV_{PFL} = Net Calorific Value of natural gas from laboratory measurement by PFL (monthly average value from daily measurements)

The invoices from SNGPL and measurement reports from PFL have been verified during the site visit, and DNV can confirm that this monitoring practice is correctly applied by the project entity.

It shall be noted that this monitoring practice is in accordance with the intention of the registered monitoring plan, since the supplier's invoice remains the main source of value. Both first and 2nd verification reports have been subject to UNFCCC's information and reporting check, and only issue 1) above was considered not in compliance with the monitoring plan. The intention of this change is to describe the additional measurements performed by the project participant and thus increase the completeness of the monitoring plan.

5.2 Assessment of the revision of the monitoring plan

The proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions

For CEO, the PDD specified the accuracy level of the meters as 0.2%. The correct calibration and accuracy of the meters was confirmed during site visit of the 1st and 2nd verification, and the accuracy was confirmed in accordance with the PDD.

Regarding the NCV, the measurement accuracy was not specified in the registered PDD. The GCV provided by the supplier is used as basis for invoices and it is not under the control of the project entity. Thus the accuracy of the value provided by the supplier is not known.

The net and gross calorific values determined by PFL are calculated according to the recognized international standard ISO6976, which specifies a method for the calculation of the calorific values when the composition of the gas is known. The composition of the natural gas is determined by PFL in laboratory by gas chromatography. Gas chromatography is a technique for gas analysis widely used in the industry. Although the accuracy of the gas chromatograph is not provided on supplier's specification (annex 2), the accuracy of the result is ensured by calibration of the gas chromatograph. PFL performs internal calibration with standard gas monthly which is a good practice. During calibration, the concentration of a standard calibration gas is measured by the gas chromatograph, and a calibration factor is calculated as the ratio of the actual concentration of the standard gas by the GC measured concentration. This calibration factor is then multiplied with the concentrations of the test gas components determined by the chromatograph to obtain the correct concentration (thus calibration factor for each component of natural gas is determined and applied). This is confirmed by the procedure for measurement and calibration provided by the project participant (annex 3), which was verified by DNV. Thus, performing regular calibration with

a standard gas and applying the calibration factor to the measured value ensures that the results are accurate.

In case of delayed calibration of the gas chromatograph, a conservative approach as defined in the guidance EB52 Annex 60 may be adopted:

- (a) Applying the maximum permissible error of the instrument to the measured values, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or
- (b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.

The maximum permissible error for the gas chromatograph is not provided by the instrument's manufacturer. Furthermore, the outcome of the gas chromatograph, ie the composition of natural gas, is not used directly in the CER calculations. The gas composition is used to calculate the NCV and GCV of the natural gas, then only the ratio NCV/GCV is used in the project emissions calculations. Therefore it is not possible to apply the guidance EB52 Annex 60 to the gas chromatograph measurements, as the effect of a correction to the gas composition to the final emission calculations can hardly be identified. Instead, DNV proposes to apply the following conservative approach in case of delayed calibration: for the days of delayed calibration, the highest NCV/GCV ratio (ie the value used for project emissions) measured during the relevant monitoring period would be applied. This approach would result in clearly identifiable reduction of emission reductions, and is the most conservative approach to replace missing or faulty NCV/GCV ratio values. This is in line with VVS requirements and DNV believe that this is a suitable approach to replace data in case of delayed calibration when the guideline EB52 annex 60 can not be applied.

It should be noted that the project participant has ordered a new, state of the art gas chromatograph in 2012. The performances of the new gas chromatograph are defined as follow: area repeatability <1%, chromatographic performance 0.008%. In addition the calibration function will be determined automatically. Thus the calibration procedure will be updated to follow the recommendation for the new instrument. The same approach as defined above will still be applicable in case of delayed calibration.

In any case, any deviation in the gas composition measurements would affect the NCV and GCV value in the same way, so that the error would be levelled out when calculating the NCV/GCV ratio. The accuracy of the main GCV value from the supplier is therefore not reduced when multiplied by the ratio NCV/GCV. In fact, the PFL measurements may also be of better accuracy than the supplier's value, and GCV_{PFL} data can serve as a cross check of GCV_{GS} . Thus, using a combination of both ensure that the final value is the most representative and accurate.

It should also be noted that PFL measurements are done on a daily basis, compared to the monthly value from the supplier. Thus the completeness of the monitoring is significantly increased compare to the original monitoring plan, while the accuracy is not reduced.

The proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity whilst ensuring the conservativeness of the emission reductions calculation

Regarding the electricity supply (CEO), the monitoring methodology AM0014 (version 04) specify that the electricity is to be measured. By definition, the electricity supply is the

difference of the electricity generation and auxiliary consumption. In some cases this can be measured by the same meter (bi-directional meter). However, due to the specific plant configuration (ref. figure 11 of the revised monitoring plan), the electricity generation and auxiliary consumption are measured by different meters at different locations. Since the electricity generation of the 3 gas turbines generators and the auxiliary consumption are measured, the resulting electricity supply is considered as a measured value.

The methodology AM0014 has no particular requirement regarding the NCV measurement, nor refers to a specific tool. Nevertheless, DNV considers the proposed monitoring in accordance with the principle and order of preference generally specified in UNFCCC methodologies and tools, which is:

- 1) Value provided by the supplier
- 2) Value measured by the project participant
- 3) National default value
- 4) IPCC default value

In this case the alternative 1) is used in combination with alternative 2), which is the best alternative available for the project participant, considering the NCV is not provided by the supplier directly.

In conclusion, the proposed revision of the monitoring plan is in accordance with the approved monitoring methodology AM0014 (version 4), and has no impact on the conservativeness of emissions reductions

The findings of previous verification reports, if any, have been taken into account

There is no finding from previous verification reports which need to be taken into account in the revision of the monitoring plan

6 Changes to the project design of a registered project activity

Not applicable

7 Validation opinion

DNV recommends the approval of the revised monitoring plan included in the PDD version 3* dated 13 July 2012 submitted by the project participants.

Note *: the previous PDD dated 24 May 2012 was wrongly numbered as version 12, instead of version 2. Thus the latest PDD version is version 3.

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