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Our ref.:
MLEH/WONGYS

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Validation opinion

Request for revision of monitoring plan for project activity 0673 “Darajat Unit III Geothermal Project”.

We refer to the procedure for revising monitoring plans adopted at EB 26. We herewith request a revision of the monitoring plan for project activity 0673 entitled “Darajat Unit III Geothermal Project” in Indonesia.

The project applies the approved consolidated methodology ACM0002 (version 06 of 19 May 2006) – “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*”.

The revision of the monitoring plan is related to the monitoring of the quantity of steam consumed during the year (project emissions), the fossil fuel used for the operation of the geothermal plant (counted as project emissions), the cross-over electricity supplied to Unit II by Unit III (counted as leakage), and the cross-over electricity supplied to Unit III by Unit II (counted as leakage). The revisions to the monitoring plan are described below.

Project emissions:

Quantity of steam consumed

The validated PDD and the underlying monitoring methodology for the project in question require the mass of steam consumed during a period of monitoring to be measured (m). To determine the amount of steam consumed by project activity, the steam flow is measured by a single venturi meter.

The objective of the proposed revision is to introduce an alternative procedure to calculate steam consumed in the project. A check procedure is necessary to confirm under all project operating conditions that the venturi steam flow meter is reading correctly, and if it is not reading at all, or is not reading correctly, a back-up method of calculating the steam flow is required.

This alternative approach will be exercised by calculating the steam flow using a known relationship between the design capacity and gross electricity generated. The detailed explanations are given in the revised monitoring plan. Check and back-up calculation methods are not mentioned in the validated PDD or ACM0002 version 6.

Quantity of fossil fuel consumed due to the project activity

The validated PDD and the underlying monitoring methodology have both stated explicitly that the fossil fuel consumption is to be measured. However, it became clear that an accurate determination of the fossil fuel consumed by the individual asset (project activity) could not be discerned using this method and in practice, proved to be difficult as fuel purchase for use at the Darajat asset is consumed both by existing geothermal operations (Unit I and II) and the project activity (Unit III). The fossil fuel purchase is gathered in the form of invoices for the whole asset. This includes fuel consumed for operational and maintenance activities and fuel consumed for well drilling and reservoir testing operations.

The methodology does not provide any guidance on how to apportion fuel consumption a CDM project when the measured quantities cover activities which are wider than the CDM project activity. With revision of the monitoring plan, the project participant will be able to calculate the total consumption of fossil fuel attributable to Unit III CDM project by pro-rating Darajat asset operated by CGI¹ fuel consumption on a unit-gross-capacity basis, i.e.

Installed gross generation capacity of Darajat Unit III

Total installed gross generation capacity at the Darajat asset operated by CGI¹

It appears that the project emissions due to fossil fuel consumption determined using calculations, as specified in the revised monitoring plan, is appropriate and is representing a conservative approach, as it does not allocate fossil fuel consumption to CGI's steam supply activities associated with Darajat Unit I (55MW).

Baseline emissions:

No changes have been made to the monitoring or calculation of baseline emissions.

Leakage:

The Darajat Unit III Geothermal Project has been added to a geothermal reservoir where two existing non-CDM electricity generating units (Units I & II) consume steam from the same reservoir and convert this to electricity delivered to the interconnected grid.

In the registered PDD monitoring plan, only the quantity of electricity supplied to the grid from Darajat Unit I or Unit II that are attributable to the project activity has been considered as leakage.

In this project, there are medium and low voltage connections between Unit III and the adjacent Unit II which is located in the same powerhouse building. It is possible for the electricity to cross-over between these two units. This would lead to a reduction or increase in baseline emissions depending on the direction of electricity being delivered (notation used is EGEx_{YII}) or imported (notation used is EGIm_{YII}). The project proponent has included these emissions in the revised monitoring plan.

For this project activity, the proposed revision made for the calculation of leakage is as follows:

¹ Chevron Geothermal Indonesia Ltd. (Unit II: 95MW and Unit III: 110MW).

- Unit III to supply electricity to Unit II (the quantum of which ($EGEx_{yII}$) is added to the net electrical energy delivered to the grid since it has led to a reduction in baseline emissions elsewhere); and
- Unit II to supply electricity Unit III (the quantum of which ($EGIm_{yII}$) is deducted from the net electrical energy delivered to the grid since it has led to an increase in baseline emissions elsewhere)

The cross-over electricity between the two units will be measured hourly using a bidirectional meter installed at each cross-over. Both monitoring devices will be subject to regular calibration, maintenance and testing regime to ensure accuracy. Until the meters are installed or during malfunction of the meters, the position of the cross-over circuit breakers will be monitored to estimate the cross-over electricity. Estimated electrical energy flow will be estimated from the connected loads and the period of closure.

(a) 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

- *Steam flow:* In addition to regular measurement of the steam flow as per the monitoring plan, the proposed alternative steam flow calculation provides an additional Quality Control to confirm under all project operating conditions that the venturi steam flow meter is reading properly or as a back-up method when malfunction of the venturi flow meter occurs.
- *Fossil fuel consumption:* It appears that the measurement of fossil fuel consumption attributable to the project activity is not possible as the fuel is not purchased or consumed separately for the project activity. With the revision of the monitoring plan, the fossil fuel will be monitored and apportioned according to the rated capacity which will further give better representation of the consumption of fossil fuel.
However, it must also be emphasized that although the fuel purchased is consumed by all 3 units in the Darajat asset, the pro-rated calculation only takes into account of units operated by CGI, as specified in the revised monitoring plan.
- *Cross-over electricity:* The monitoring of leakage, as specified in the revised monitoring plan, is appropriate and is representing a conservative approach compared to the registered monitoring plan by taking into account the emissions related to the cross-over electricity between Unit II and Unit III and vice versa.

(b) the proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity

- *Steam flow:* The proposed deviation in the monitoring plan does not change any formulae or steps involved in emission reduction calculation, but only provide an alternative steam flow calculation not explained in the registered PDD and validation report.
- *Fossil fuel consumption:* The methodology does not provide any guidance on how to apportion fuel consumption a CDM project when the measured quantities cover activities which are wider than the CDM project activity. The proposed revision of the monitoring plan will allow the project participant to calculate the total consumption of fossil fuel attributable to Unit III CDM project using conservative assumptions.
- *Cross-over electricity:* The measurement of cross-over electricity between the 2 units is not required by ACM0002, but it is counted for leakage for the sake of conservativeness.

(c) the findings of previous verification reports, if any, have been taken into account

DNV's verification activity for the project revealed inconsistency in the monitoring plan of the registered PDD. The findings will be taken into account in the first revised verification monitoring report.

Yours faithfully
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