



METHANE RECOVERY PROJECT PRINCEPEEL WILBERTOORD NORTH BRABANT, THE NETHERLANDS



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Summary:

AENOR has carried out the verification of the “Methane Recovery Project Princepeel Wilbertoord, North Brabant, the Netherlands”. (“The project” hereinafter). The project is a project implemented in Wilbertoord, North Brabant, southeaster part of the Netherlands. The geographical coordinates are N51° 39’45 E5° 44’24”. The project is an agricultural biogas plant that produces renewable energy (electricity and heat) from different organic input materials. The project generates emissions reductions through avoided uncontrolled methane emission out of manure and organic wastes as well as the generation of renewable thermal energy descentrally used to substitute fossil fuels.

The project activity was put into operation in May 2007. The Project has been verified for 2 operation periods in order to certify the correspondingly reduced GHG emissions by this project activity within these periods. The first operation period was from 01/06/2007 to 31/12/2007 and the second one from 01/01/2012 to 31/12/2012. The project uses a fixed crediting period of 10 years which ends on 31/05/2017.

The present verification Report certifies the emission reductions that have occurred from the end of the first monitoring period verified previously until the start of the second one, it means, from 01/01/2008 to 31/12/2011, with an emissions reduction of 81,302 tCO₂e. According to the request to exempt the VCS project ID 337 (between others), although the monitoring period is from 01/01/2008 to 31/12/2011, the quantitative monitoring has been only applied from 01/06/2010 to 31/12/2011. For the period between 01/01/2008 and 30/05/2010, AENOR has verified that the project has reduced and not emitted GHG emissions in that period of time as it is required in the “Request for exemption from quantitative monitoring for the monitoring period from 01/01/2008 to 30/04/2010” submit by the PP on 20/07/2020 and approved by VCS on 21/07/2020. Consequently, no emission reductions are claimed in those years.

The purpose of the verification was to determine the conformance of the project with respect to the VCS Standard v4.1 and the validated PD and the assessment of the ex-post monitored anthropogenic GHG emissions reductions and/or removals that have occurred as a result of the project's activities.

The scope of the verification was to assess the conformance of validated project, once implemented, with the VCS requirements and requirements in the validated PD. The process was performed through a combination of desk review, interviews, and communications with relevant personnel.

During the verification 5 OBS and 4 NCs were raised. All these issues were appropriately closed by means of corrections, more clear explanations, and other supporting documents.

Once all issues detected were appropriately resolved, AENOR carried out this final verification report and deems with reasonable level of assurance that the project complies with all of the verification criteria. The assessment team has no restrictions or uncertainties with respect to the compliance of the project with the verification criteria, hence, the audit team concludes that the cumulative net GHG emissions reductions or removals of 81,302 tCO₂e over the monitoring period has been quantified in accordance with VCS rules.

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1 INTRODUCTION

1.1 Objective

The objective of the verification audit was to conduct an independent assessment of the project to determine:

- The extent to which methods and procedures, including monitoring procedures, have been implemented in accordance with the validated project description (PD), including the monitoring plan.
- The extent to which GHG emission reductions and removals reported in the monitoring report are materially accurate.

1.2 Scope and Criteria

The scope of the verification audit was to verify the emissions reductions and/or removals of the project against the Verified Carbon Standard, the identified methodology, the validated PD and the exemption from quantitative monitoring for the monitoring period from 01/01/2008 to 30/04/2010 (approved by VCS on 21-07-2020) throughout the monitoring period from 01/01/2008 to 31/12/2011.

The objectives of this audit included a verification of the Project's calculated reductions with the Verified Carbon Standard requirements for the last monitoring period of the project's crediting period (01/01/2008 - 31/12/2011). In addition, the audit assessed the project with respect to the validated baseline scenarios presented in the PD.

Further, according to the "Request for exemption from quantitative monitoring for the monitoring period from 01/01/2008 to 31/05/2010", the objectives of this audit included a verification of the Project has reduced and not emitted GHG emissions in that period of time and, no emission reductions are claimed in that period.

In accordance with Section 4.1.8 of the VCS Standard, the criterion for validation and verification was the VCS Version 4, including the following documents:

- VCS Standard v4.1
- VCS Program Guide v4.0

Unless otherwise indicated, the assessment was performed against the most recent version of the relevant VCS guidance document.

1.3 Level of Assurance

The assessment was conducted to provide a reasonable level of assurance of conformance against the defined audit criteria and materiality thresholds within the audit scope. Based on the audit findings, a positive evaluation statement reasonably assures that the project GHG assertions are materially correct and is a fair representation of the GHG data and information.

All the versions of the verification report were subjected to an independent internal technical review before being submitted to the client to confirm that all verification activities had been completed according to the pertinent AENOR instructions required. The technical review was performed by a technical reviewer(s) qualified in accordance with AENOR's qualification scheme for VCS validation and verification.

The threshold for materiality with respect to the aggregate of errors, omissions and misrepresentations relative to the total reported GHG emission reductions/removals was one percent (1%), as established for large projects by the VCS Standard.

1.4 Summary Description of the Project

The project is a project implemented in Wilbertoord, North Brabant, southeaster part of the Netherlands. The geographical coordinates are N51° 39'45 E5° 44'24". The project is an agricultural biogas plant that produces renewable energy (electricity and heat) from different organic input materials. The project generates emissions reductions through avoided uncontrolled methane emission out of manure and organic wastes as well as the generation of renewable thermal energy descentrally used to substitute fossil fuels.

The project activity was put into operation in May 2007. The Project has been verified for 2 operation periods in order to certify the correspondingly reduced GHG emissions by this project activity within these periods. The first operation period was from 01/06/2007 to 31/12/2007 and the second one from 01/01/2012 to 31/12/2012. The project uses a fixed crediting period of 10 years which ends on 31/05/2017.

The present verification Report certifies the emission reductions that have occurred from the end of the first monitoring period verified previously until the start of the second one, it means, from 01/01/2008 to 31/12/2011, with an emissions reduction of 81,302 tCO₂e, although the quantitative monitoring has been only applied from 01/06/2010 to 31/12/2011, according to the request to exempt the VCS project ID 337.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification was performed through a combination of document review and interviews with relevant personnel, as discussed in Sections 2.2 through 2.4 of this report. At all times, the project was assessed for conformance to the criteria described in Section 1.2 of this report. As discussed in Section 2.5, findings were issued to ensure that the project was in full conformance to all requirements.

A project specific Verification Plan was developed to guide the verification auditing process to ensure efficiency and effectiveness. The purpose of the Verification Plan was to present a risk assessment for determining the nature and extent of verification procedures necessary to ensure the risk of auditing error was reduced to a reasonable level. The Verification Plan methodology was derived from all items in our verification process stated above. Any modifications applied to the Verification plan were made based upon the conditions observed for monitoring in order to detect the processes with highest risk of material discrepancy.

The verification activities in which risks were assessed were the evaluations of the monitoring system (data flow, data control procedures, etc.) but mainly the quality of raw data as well as sources and the spreadsheet calculations. AENOR reproduced and verified 100% of data in the “*App C - Calculation_Emission Reductions_VCS_v003_Princepeel_MR 2010-2011*” for the monitoring period. The project boundary and project area for the monitoring period were checked using the evidence provided by the PP.

AENOR carried out a deep and meticulous review of the spreadsheets in order to verify the correct application of the methodology (formulae, equations.) and checked that data required calculating the GHG reductions were appropriately provided. Based on the assessment carried out, AENOR confirms with a reasonable level of assurance that the claimed emission reductions are free from material errors, omissions, or misstatements.

AENOR confirms that sufficient evidence was presented for the reported net anthropogenic GHG emission reductions and that there is a clear audit trail that contains the evidence and records that validate the stated figure in this verification report since:

- Sufficient evidence available: The project participant has provided the 100% of data used in the calculations to achieve the final amount of GHG emission reductions reported, or the source of data in case of default values, or conservative approaches in case of estimated values.
- Nature of evidence: The raw data were collected from reliable sources. They are detailed in the project documents and have been provided to the verification team and were checked during the interviews.
- Cross-checked evidence: AENOR cross-checked the collected information through interviews with stakeholders and reproducing calculations.

Hence, AENOR confirms that the stated figures in the monitoring report are correct and confirms that is able to certify net anthropogenic GHG removals based on verifiable and reliable evidence.

2.2 Document Review

A detailed review of all project documentation was conducted to ensure consistency with, and identify any deviation from the VCS program requirements, the methodologies applied (AMS III.D, “Methane recovery in agricultural and agro-industrial activities” version 11, AMS II.F, “Energy efficiency and fuel switching measures for agricultural facilities and activities” version 08 and AMS I.C, “Thermal energy for the user with or without electricity” version 09), and the validated PD. Initial review focused on the Monitoring Report (MR) and included an examination of the project details, implementation status, data and parameters, and quantification of GHG emission reductions. Documents reviewed included data from monitoring, calculation spread sheets, and responses to No Conformities (NCs) and Observations (OBS).

The verification included a review of the validated PD and MR, relative to the field conditions and interviews with project management staff and stakeholders.

For a listing of all documents received from the client for this verification, please see Appendix 1.

2.3 Interviews

Interviews were performed as part of the overall verification process which was additional to that provided in the project description, monitoring report and any supporting documents. The AENOR verification team met with individuals with various roles in the project. This included a series of interviews with in-country staff that support the mission of the project. In addition, interviews discussions were conducted with project members. The following table summarizes the interviews carried out during the process.

Name	Title/Organization/Community
Jos van Heugten	Commercial manager
Pauline Kalathas	Project Manager at GES Energie
Pieter Smits	Managing director

Due to the COVID-19 pandemic situation, all interviews were carried out through videoconference or email, as explained in Section 2.4 in different dates during the verification process.

2.4 Site Inspections

Due to the exceptional situation caused by the COVID-19 crisis and the travel restrictions established by governments for safety reasons, it was not possible to carry out a site visit as part of the verification process of the project.

In accordance with VERRA's COVID-19 Travel Guidance for Projects (dated 18 March 2020) and since that the VCS Programs does not explicitly mandate site visits, an exemption of the site was requested on the ground of the crisis situation and considering that a reasonable level of assurance was achievable by other means. AENOR as VVB proposed to carry out a remote verification audit that ensured the achievement of the assurance level required by VCS program.

The remote audit was based on the following auditing techniques:

- Document review and cross checks between the information provided in the MR, the PD and supporting information and evidence provided by the PP Emissions calculations and supporting information and evidence provided.
- Review, based on the selected methodologies, tools and the other applied methodological regulatory documents, of the appropriateness of formulae and accuracy of calculations.
- Telephone, teleconference and/or e-mail interviews for the implementation of the project activity and the elaboration of project's documents.
- Cross checks between information provided by interviewees to ensure that not relevant information has been omitted.

2.5 Resolution of Findings

All documentation provided by the PP was assessed against the applicable version of the relevant VCS guidance document. Several observations (OBS) and No Conformities (NCs) were raised and submitted to the PP, which addressed them either by providing to the audit team the requested information or by making the appropriate corrections. Updated versions of the documentation were submitted by the PP and the audit team reassessed them against the guidance documentation. This process was repeated iteratively until all OBS and NCs were fully closed. Specifically, 5 OBS and 4 NCs were raised.

All findings issued by the AENOR audit team during the verification process have been closed. In accordance with Section 4.1.13 of the VCS Standard, all findings issued during the verification process, and the inputs for their closure, are described in Appendix 2 of this report.

2.5.1 Forward Action Requests

No FARs were raised to the PP during the verification process.

2.6 Eligibility for Validation Activities

AENOR holds accreditation for validation for the relevant sectorial scope under which this project activity is classified.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The verification team is not aware of project involvement in other forms of environmental credits from its activities. The project has not been registered, and is not seeking registration, under any other GHG programs.

3.2 Methodology Deviations

Three methodology deviations were applied during the monitoring and quantification of VCU for this monitoring period although they were applied during the previous monitoring period too. A detailed description of the methodology deviations can be found below and in Section 3.2.1 Methodology Deviations of the MR:

1. Biogas production

The amount of biogas is not measured but calculated by the amount of electricity produced. The reason is that no flow meter is installed to measure the biogas volume that is utilized in the CHP. This calculation, based on a reference method described by the CCX Agricultural Methane Gas Project Guidelines, has already been assessed in the last monitoring period and estimated as a conservative way to calculate the amount of biogas produced.

The electricity measurement can be considered as very accurate because it is also the basis for the accounting with the utility. No negative influence on the amount of emission reductions can be expected as the calculated value is expected to be very close to the actual value as it was demonstrated in the previous verification process.

2. Conservativity factor

The application of an overall deduction factor of 0.5 on the emission reductions due to methane recovery. This conservativity factor covers the uncertainties due to the fact, that the project owner has to deal with a lot of organic waste streams of different type and only default values are used instead of local values for waste specific parameter. Furthermore, the project was developed at a time when the methodological approaches and guidelines were not yet mature. Following the conservativeness principle prescribed by

the VCS methodology as well as ISO 14064, the application of an additional security factor of 0.5 (conservativity factor) is appropriated to highly compensate the risk of an over-estimation of the emission reductions.

This factor has already been assessed and verified for the previous monitoring periods in 2007 and 2012.

The conservativity factor 0.5 in the current monitoring have been applied only on the emission reductions from methane recovery in order to stay consistent with the purpose of application of this factor on the source of uncertainties.

3. Methodologies

The methodologies AMS II.F and AMS I.C were not applied to the project during the actual monitoring period. This is due to the fact that the irrigation pump system has not been implemented as described in the PDD (AMS II.F) and no emission reductions are considered for the substitution from fossil fuel for the use of renewable heat (AMS I.C).

Therefore, due to all the information detailed before, the VVB considers that the deviations meet with the criteria and specifications for permitted methodology deviations stated by the VCS Standard v 4.1 because they are related to data and parameters monitored and do not negatively impact the conservativeness of the quantification of GHG emission reductions.

3.3 Project Description Deviations

Eight Project Description Deviations have occurred during this monitoring period are detailed below:

1- Increase of manure quantities

Higher amounts of manure generally and of manure with a dry matter content have been treated than initially planned and estimated in the validated PDD. This development is attributed to the higher manure surpluses that the Netherlands have been experiencing in the last decade and that could not have been anticipated.

The audit team has verified that the deviation does not impact to:

- a) The applicability of the methodologies applied because the project activity comprises:
 - methane recovery from manure and wastes from agricultural or agro-industrial activities,
 - the annual emission reductions achieve by the project activity are less than or equal to 60 kt CO₂.
 - Biomass-based cogenerating systems that produce heat and electricity.

- Generation capacity is less than 15 MW_{el} or 45 MW_{th}.
- b) Additionality, and the investment barriers are still valid, and the production of biogas is not an economically attractive business in the Netherlands.
- c) The appropriateness of the baseline scenario, because there are no legal requirements to change the current manure handling system in The Netherlands.

The deviation has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and VVB considers that the project remains in compliance with the VCS rules.

2- Amount of emission reductions

The amount of emission reductions is higher than the estimated amounts in the PDD. This is partly due to the larger amounts of manure that are processed in the biogas plant, as described above. But it is also due to the fact, that only the baseline methane emissions released from stored manure are calculated in the PDD and not the one from waste management. Hence, the yearly estimated methane emissions reductions written down in the PDD do not correspond to the entire methane emissions that are reduced through the project activity. Furthermore, the Global Warming Potential of CH₄ has been adapted from 21 to 25 according to the Fourth Assessment Report and VCS Requirements, which also leads to higher emission reductions.

The audit team has verified that the deviation does not impact to:

- a) The applicability of the methodologies applied because the annual emission reductions achieved by the project activity are less than or equal to 60 kt CO₂.
- b) Additionality, and the investment barriers are still valid, and the production of biogas is not an economically attractive business in the Netherlands.
- c) The appropriateness of the baseline scenario, because there are no legal requirements to change the current manure handling system in The Netherlands.

The deviation has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and VVB considers that the project remains in compliance with the VCS rules.

3- Carbon Consultant

The company of the Carbon Manager has changed from GES Biogas GmbH to GES Energie GmbH, but this company and its employees belong to the same company group as the GES Biogas GmbH. This has no impact on the quality of the Monitoring Report and the resulting emission reductions, since the actual Carbon Consultant has big experience working in the carbon sector.

The deviation has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and VVB considers that the project remains in compliance with the VCS rules.

4. Heat meter

No heat meter has been installed to measure the heat used externally during the current monitoring period, so no emission reductions are claimed for the substitution of fossil fuel, and therefore, this deviation has no impact on the amount of emission reductions.

The audit team considers the deviation to be valid and has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and the project remains in compliance with the VCS rules.

5. Biogas flow meter

No flow meter has been running during the present monitoring period. Practice shows that the flow meter was unable to deliver reliable measurements, due to contaminations like moisture (condensation) or Sulfur (H_2S). Therefore, the measurements could not be used as accurate values for calculation the emission reductions.

Hence, the biogas flow has been calculated following a reference method described by the CCX Agricultural Methane Gas Project Guideline, based on the electric energy produced, the efficiency of the CHPs and the calorific value of biogas. The calculation of the biogas amount bases on the electricity production measured by an electric meter with an accuracy $<1\%$. Since the accuracy of the electric meter is highly precise and the method described by CCX is conservative, as it was already demonstrated in the previous monitoring report, using the CCX method have a conservative effect on the quantity of emission reductions.

The audit team has verified that the deviation does not impact to the applicability of the methodologies applied and the project still complies with all the applicability criteria, the investment barriers used to justify the additionality of the project are valid too, and the baseline scenario identified in the validated PDD is appropriated currently because there are no changes in the legal requirements of the current manure handling system in the country.

The deviation has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and therefore, VVB considers that the project remains in compliance with the VCS rules.

6. Irrigation pumps

The fuel switch from fossil fuels to biogas in the irrigation pumps has not been implemented during the monitoring period. This deviation has a conservative impact on the emission reductions since these are not claimed for the substitution of diesel fuel.

The deviation has been appropriately described and justify, and do not affect the applicability of the methodology, the additionality of the project nor the appropriateness of the baseline scenario. Thus, the

audit team considers the deviation to be valid and that the project remains in compliance with the VCS rules.

7. Manure from own farm

The amount of liquid manure coming from the own farm is calculated based on the amounts of manure transported by trucks instead of being measured, as required in the PDD. As required by law, the amount of manure coming from the own farm is based on animal numbers in case the manure does not have to be transported. Otherwise, it is based on truck transports. For the project Princepeel, each delivery is first listed on a document and then saved electronically. However, the emission reductions are calculated based on the total amount of CH₄ minus the amount of CH₄ from non-waste co-substrates. Therefore, the amount of manure has no significant impact on the amount of emission reductions. Hence, this deviation does not impact the accuracy and quantity of emission reductions.

8. Methane content.

The methane content was measured continuously, the gas analyzer was calibrated regularly, and the calibration documents were properly stored. Only the 2010 calibration report could not be found and submitted. Since the PDD's monitoring plan prescribes annual calibration of all devices to ensure accuracy, the missing document represents a deviation from the PDD requirements.

However, this deviation has no influence on the level and accuracy of emission reductions, since the biogas production is calculated based on the electricity production and the methane content in the biogas, so that the biogas production decreases proportionally with a higher methane content and vice versa.

The audit team has verified that the deviation does not impact to the applicability of the methodologies applied and the project still complies with all the applicability criteria, the investment barriers used to justify the additionality of the project are valid too, and the baseline scenario identified in the validated PDD is appropriated currently because there are no changes in the legal requirements of the calibration of the methane content monitoring system in the country and all other calibration certificates are correct and demonstrate that the monitoring system has worked correctly during the monitoring period.

The deviation has been appropriately described and justified by the PP in the MR and evidences provided to the audit team, and therefore, VVB considers that the project remains in compliance with the VCS rules.

3.4 Grouped Project

N/A. The project is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The MR provides in its Section 3.1 a detailed description of the activities implemented by the project since its start. During this verification process, AENOR has not detected project changes in regards of the project title, its purposes and objectives. As such, the project activity accurately reflects the proposed project which reduces the GHG emissions by reducing uncontrolled methane emissions out of manure and organic wastes, but also contributes to an improved ecological sustainability. Additionally, renewable energy is produced to be fed in the local power grid.

During the verification process, the audit team checked the actual implementation of the project activity through the analysis of evidences provided by the PP and through interviews to project staff. No discrepancies have been found between the gathered evidence and the implemented activities reported in the MR, as well between the MR and the planned activities in the PD, except to the methodology deviations and project description deviations detailed in the MR and in previous sections of this report.

After the review of the MR, spreadsheet calculations and the other document to support calculations, AENOR deems that project status is in compliance with applicable methodology and implementation is in support of the VCS principles of Conservativeness and Accuracy.

Related to the compliance with the Monitoring Plan, section 4.3 of the MR provides information about the monitoring plan and actions carried out for the current monitoring period. AENOR reviewed the procedures put in place to perform the different parameters and data monitored and deems that they are in accordance with the procedures described in the validated monitoring plan. AENOR checked the monitoring plan contained in the validated PD and compared it with the MR to verify whether there was any difference that would cause an increase in estimates of the GHG emission removals in the current monitoring period. AENOR has confirmed that all discrepancies between the actual monitoring system and the monitoring plan set out in the project description and the applied methodologies have been described and justified properly in sections 3.2. and 3.3. of the MR and do not impact to the applicability of the methodologies and the conservativeness of the quantification of GHG emission reductions. Also, the project proponent effectively monitors the required parameters to determine the project's emissions by sources as required by the monitoring plan and the applicable methodologies.

The parameters reported, including source, frequency and review criteria as indicated in the monitoring plan were verified to be correct and in line with the monitoring plan of the validated PD. Necessary management system procedures including responsibility and authority of monitoring activities have been verified to be consistent with the PD. Knowledge of personnel associated with the project activity was also found to be satisfactory.

Regarding leakage emission, they account 0. In this regard, AENOR has checked evidence provided which confirms the information included in the MR.

There is no evidence of double counting or that the project has participated nor been rejected under any other GHG programs. GHG emission reductions or removals generated by the project are not included in an emission trading program or any other mechanism that includes GHG allowance trading. The project has not received or sought any other form of environmental credit.

After a complete review of the different documents provided and the information gather through the remote audit process, AENOR is able to confirm that the project implementation is in accordance with the validated PD and the deviations described in the MR.

4.2 Safeguards

4.2.1 No Net Harm

The project has been formally and finally approved by the responsible regional authorities of the Netherlands in accordance to the Dutch building law “Wet op de Ruimtelijke Ordening”.

This act provides the set of rules which regulates the impact assessment of plants or projects on the environment. The approval covers the installation and operation of the biogas power plant including all components such as storage, feeders, fermenters, CHP modules, etc.

The project activity contributes to a significant higher ecological sustainability compared to a reference scenario without manure’s treatment by using biogas plants.

Hence, the project has no relevant negative environmental and socio-economic impacts and contributes positively by providing environment friendly power generation leading to sustainable development of the region.

4.2.2 Local Stakeholder Consultation

Since the biogas installation impacted positively the region on an economical, environmental and a social level, the stakeholders still give till today positive feedback and consider the project as an example that can motivate other communities to generate renewable energies using the local manure and reducing this way the GHG emissions as well as odor. No formal complains, or litigations have taken place during the entire monitoring period of the project.

No special meetings have been organized since the communication with the stakeholders takes place in the day-to-day life due to the neighborhood or a working relationship and the impact of the installation in operation on the stakeholders is only positive.

4.3 AFOLU-Specific Safeguards

N/A. The project is not an AFOLU project.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

Procedures for quantifying the baseline emissions were conducted in accordance with the methodology applied (AMS III.D, “Methane recovery in agricultural and agro-industrial activities” version 11). The verification team performed an intensive review of all input data, parameters, formulas, calculations, conversions, statistics and resulting uncertainties and output data to ensure consistency with the VCS documentation, methodology and associated documents, and the PD and MR. Further, the verification team reproduced calculations for selected samples to ensure accuracy of the results. Conversion factors, formulas, and calculations were provided by project proponents in spreadsheet format to ensure all formulas were accessible for review. The verification team recalculated subsets of the analysis to confirm correctness. Project proponent also provided a step-by-step overview of select calculations to ensure the verification team understood the approach and could confirm its consistency with the methodology, PD and MR. Where applicable, references for analysis methods or default values were checked against relevant scientific literature for best practice.

Baseline emissions

Section 5.1 of the MR and the calculation spreadsheet submitted to AENOR provide information related to the baseline emissions calculations. The total baseline emissions are due to the Manure management systems and agricultural/ food wastes.

The methane emission reduction through the project activity is calculated according to the small-scale Methodology AMS III D, as per the validated PDD Section D with the following equation:

$$GHG_{red, III D} = AF \bullet (BGP \bullet MC - \sum BGCO_i \bullet MCCO_i) \bullet D \bullet GWP_{CH4}$$

With:

$$AF = 1 - dm_{nw, i} / (dm_{manure} + \sum dm_{nw, i} + \sum dm_{w, j}) \bullet 0.1$$

Where:

$GHG_{red, III D}$	is the annual emission reduction through methane recovery, in t CO _{2e}
BGP	is the total annual biogas produced by the project activity BGP, in Nm ³
AF	is an adjustment factor, which ensures a conservative estimation of the realized emission
$dm_{nw, i}$	is the dry matter of the proceeded quantity of non-waste co-ferment i
dm_{manure}	is the dry matter of the proceeded quantity of manure

$dm_{w,j}$	is the dry matter of the proceeded quantity of waste co-ferment j
$BGCO_i$	is the annual biogas portion of the total biogas amount produced, caused by a digested non-waste co-ferment i if applied, to be determined by the appropriate input amount ($MCOFi$) and the specific gas productivity of the non-waste co-ferment i, in m^3
MC	is the average annual methane content in the biogas, in Nm^3 methane / Nm^3 biogas
$MCCO_i$	is the average methane content arising in the biogas through digesting a non-waste co-ferment i, in Nm^3 methane / Nm^3 biogas
D	is the density of methane, set to $0.7168 \text{ kg CH}_4 / Nm^3 \text{ CH}_4$ according to ACM0001
GWP_{CH_4}	is the Global Warming Potential of methane, set to $25 \text{ t CO}_{2e} / \text{t CH}_4$ according to UNFCCC

Since the biogas flow BGP could not be directly recorded, BGP is calculated following a reference method described by the CCX Agricultural Methane Gas Project Guidelines and used in different similar climate protection projects. The produced electricity and methane content of the biogas are used to calculate the biogas flow as follows:

$$BGP = \frac{EEP}{(ETA_{CHP-el}) * HV_{Biogas}}$$

with:

BGP:	Biogas produced [m^3]
EEP:	Electricity energy produced [MWh]
ETACHP-el	Electric efficiency of the CHP engines [%]
HVBiogas	Caloric value biogas [kWh/m^3]:

$$HV_{Biogas} = 0,01 \frac{MWh}{m^3} \cdot x_{CH_4}$$

with:

x_{CH_4} : = CH_4 volume content of biogas flow [%]

AENOR has checked the calculations provided and confirmed that the amount of baseline emissions is in conformance and have followed the methodology in the validated PD.

Project emissions

Section 5.2 of the MR describes the calculations for the project emissions.

The oil-fired emergency boiler has not been installed on the plant's site, so that no emissions by this source of the project activity occurred during the actual monitored period from 2008 to 2011.

The project emissions from transport of biomass due to the combustion of fossil fuels is not considered, since the emissions from transportation are below 1 % of total baseline emission by the project and do not exceed the criterion for significance as described in the PDD.

CH₄ emissions from physical leakage of biogas in the manure management systems, which includes production, collection and transport of biogas to the point of combustion or gainful use of the anaerobic digester have been considered and calculated in accordance with the CDM Methodology AMS III.AO "Methane recovery through controlled anaerobic digestion", Version 01, suggests estimating these project emissions using a default factor of 0.05 m³ biogas leaked/m³ biogas produced.

AENOR has checked the calculations provided and confirmed that this amount of project emissions is in conformance and have followed the methodology in the validated PD.

Leakage

As reported in Section 5.3 of the MR, according to the PDD section E.2., no leakage has to be considered.

Net GHG Emissions Reductions and Removals

As indicated in Section 5.4 of the MR, the following table summarized the GHG emissions of the project calculated for the current monitoring period.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2008	0	0	0	0
Year 2009	0	0	0	0

Year 2010	36479	4640	0	31839
Year 2011	56717	7254	0	49463
Total	93196	11894	0	81302

The net anthropogenic GHG reduction due to the project activity for the monitoring period amount 81302 t CO_{2e}.

AENOR reproduced the calculations to achieve the same results and deems they are depicted clearly and correctly in the provided sheets. AENOR verification team was able to trace calculations directly from the data sources of measurements. Formulae used are in compliance with MR, PD and methodology, like the default values used to determine the parameters, are appropriate. Thus, the net amount of VCUs to be issued is accurate and realistic.

AENOR verified for the parameters available at validation, the values reported or the references to the documents where they are used or explained by reviewing, reproducing and crosschecking the evidence provided by the PP. AENOR checked the values of these parameters to be appropriate and correctly used in equations. Data and parameters available at validation are the ones stated in section 4.1 of the MR.

The data and parameters monitored to calculate the VCUs to be issued are the ones stated in section 4.2 of the MR. AENOR checked that the list of parameters to be monitored was complete and consistent with information in the monitoring plan of the PD.

Regarding the accuracy of spreadsheet, formulae, conversions and aggregations and consistent use of data and parameters, the PP elaborated a complete procedure to assure the accuracy and appropriateness of data. During the verification process, AENOR not only verified the spreadsheet calculation, data and parameters but also the AENOR team could verify that the PP conducted a rigorous QC/QA procedure of its measurements and an assessment of uncertainty. Thus, AENOR deems the PP performed good practices in this assessment and concludes that GHG reductions were quantified correctly in accordance with the project description and applied methodology.

AENOR verified the consistency and accuracy of each parameter detailed in Section 4 of the MR by crosschecking the information in the MR with the information in PD as well as checking values and reproducing the calculations in the spreadsheet calculation package (see Appendix 1) and did not find inconsistencies. Therefore, AENOR deems that values reported for the parameters are accurate and consistent.

The following tables summarize the data and parameters used by the PP to calculate the GHG emission reductions, which has been assessed by AENOR.

Data/Parameter available at validation	Value	Assessment procedure and result
Density of Methane (D_{CH_4})	0.0007168	Value is consistent with validated PD. Correctly inputted in the calculation spreadsheets.
Global warming potential of methane (GWP_{CH_4})	25	The GWP value set in the PDD has been adapted to the second commitment period with value from the fourth assessment report according to UNFCCC and VCS Requirements. Correctly inputted in the calculation spreadsheets.

Since the quantitative monitoring has been only applied from 01/06/2010 - 31/12/2011, the annual values monitored in the year 2010 have been converted into a monitoring period of 7 months

Data/Parameter monitored	Value		Assessment procedure and result
Biogas produced (BGP)	Year	Biogas (m3)	As it is explained in the deviation 5 included in section 3.3. of this report, the values of this parameter are higher than the estimated in the PDD due to the increase of available manure. Moreover, as it is explained in the deviation 1 of section 3.2., the amount of biogas is calculated by the amount of electricity produced instead of being directly measured. Calculation reproduced. Correctly inputted in the calculation spreadsheets.
	2010	9354298	
	2011	14654990	
Methane content of the biogas (MC)	Year	Weighted average MC [%]	A gas analyzer is used to measure daily the amount of methane in the biogas. The gas analyzer used to monitor the parameter during the monitoring period is the Sewerin Ex-Tec SR2-DO with serial number 4701000064. The device has been calibrated annually, except to 2010, as it is indicated in the deviation 8 of section 3.3. of this report. Values correctly inputted in the calculation spreadsheets.
	2010	55.35	
	2011	55.24	

Data/Parameter monitored	Value		Assessment procedure and result
Fraction of time	Several values for CHP unit and year, included in the spreadsheet.		The values of this parameter are obtained from the maintenance reports of the provider. Values correctly inputted in the calculation spreadsheets.
Thermal energy production for external utilization (ETP)	This parameter is not used.		No heat meter has been installed on the biogas plant's site.
Thermal energy produced for hygienisation unit (ETHY)	This parameter is not used.		No heat meter has been installed on the biogas plant's site.
Electrical energy produced (EEP)	Year	kWh	The electric meters are sealed and maintained by the grid operator. Calibration is done by authorized service providers. Values correctly inputted in the calculation spreadsheets.
	2010	20454161	
	2011	31981001	
Electric energy imported (EEI)	Year	kWh	The electric meters are sealed and maintained by the grid operator. Calibration is done by authorized service providers. Values correctly inputted in the calculation spreadsheets.
	2010	1105907	
	2011	1892395	
Mass of each co-ferment i fed into the digester (MCOFi)	Annual value of each co-ferment is included in the spreadsheet.		Each co-ferment is weighed at delivery. The mass of the co-ferment is noted on the delivery receipt and recorded in the electronic database Values correctly inputted in the calculation spreadsheets
Volume of manure fed into digester (MANURE)	Annual value of each type of manure (pig or cattle) is included in the spreadsheet.		Manure is weighed like co-ferments when delivered on the weighing scale. Manure from the own farm is estimated based on the number of truck transports. The daily amounts of manure are recorded in the electronic database. Values correctly inputted in the calculation spreadsheets
Oil consumed in emergency boiler (OIL)	0		Emergency boiler has not been used during the monitoring years.
Diesel consumed in emergency generator (DIESEL)	0		No emergency generator was installed up to end of 2015.

Data/Parameter monitored	Value	Assessment procedure and result
Biogas used in irrigation pumps (GASPROP)	0	No fuel switch has been implemented during the monitoring years

AENOR did not find inconsistencies between the PD, monitoring report and spreadsheet calculation.

After a deep and thorough review and reproduction of calculations and the corresponding tracks to the other spreadsheets, AENOR deems the parameters monitored and available at validation are correct, reliable, and consistent. Information in the monitoring report is in compliance with the PD, the calculations provided and the applicable methodology. Then, the results showed in the monitoring report are reliable, consistent, and accurate.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The data and parameters used to determine GHG emission are listed in Section 4 of the MR.

During AENOR's verification, the evidence provided by the PP was enough in both quantity and quality to support the determination of GHG emission reductions reported by the project.

Quality assurance and control is an essential part of company procedures to assure the accuracy of data. Quality assurance procedures are done to minimize and correct any potential data transcription, calculation, or formatting errors that may result in inaccurate results.

In accordance with VCS, the PP is committed to storing all project data in a secure and retrievable manner for at least two years after the end of the project crediting period.

Roles and responsibilities are clearly identified in the MR. QA/QC procedures were developed by the PP for maintaining consistency and quality of information over time. Interviews with the PP and inspection of data and results demonstrated that the PP possess all of the competencies required for reporting of GHG emissions reductions on accurate way.

Data presented to the audit team were clear and coherent and processing steps could be traced to the corresponding sections of the methodology and monitoring plan with transparency.

Above procedures to ensure this are described in Section 4 of the MR, in terms of general QA/QC of the monitoring plan and specific QA/QC procedures applied to data and parameters monitored.

Throughout the verification, the PP demonstrated a commitment toward conservativeness and took all measures appropriate to ensure the reliability of evidence provided. Interviews conducted (oral evidence) are outlined in Section 2.4, and the final documents received from the PP supporting the determination of GHG reductions can be viewed in Appendix 1.

AENOR deems that the PP performed good practices in this assessment and concludes that GHG reductions were quantified correctly in accordance with the PD and applied methodology, and that the that evidence is sufficient in quantity and appropriate in quality to determine the GHG reductions of the project.

4.6 Non-Permanence Risk Analysis

N/A. The project is not an AFOLU project.

5 VERIFICATION CONCLUSION

AENOR has verified that the “Methane Recovery Project Princepeel Wilbertoord, North Brabant, the Netherlands” is in compliance with the VCS Standard v4.1 and has been implemented in accordance with the validated PD and the project description deviations.

However, as consequence of reasons explained in the “Request to exempt the VCS projects ID 334, ID 335, ID 336, ID 337 and ID 338 from the VCS requirements for rotation of Validation/Verification Bodies” submitted to VCS on 20/07/2020 and approved on 21/07/2020, although the monitoring period verified has been from 01/01/2008 to 31/12/2011, the emission reductions have been quantified only from 01/06/2010 to 31/12/2011, whereas between 01/01/2008 and 31/05/2010 has been subject to a verification by AENOR concerning the evidence, that the project has reduced and not emitted GHG emissions, and consequently, no emission reductions are claimed in that period.

As it has been explained above, the verification assessment covers the monitoring period from 01/01/2008 to 31/12/2011 and verifies that calculated emission reductions were achieved during the monitoring period from 01/06/2010 to 31/12/2011 with a reasonable level of assurance and confirms that the project has reduced and not emitted GHG emissions for the period between 01/01/2008 and 31/05/2010. Therefore, AENOR is able to issue a positive verification opinion for the 81,302 tCO₂e, as reported in the Monitoring Report version 3 dated on 7 June 2021, for the current monitoring period (01/01/2008 to 31/12/2011) corresponds to the emission reductions achieved during the monitoring period from 01/06/2010 to 31/12/2011, as the following table:

Year	BE (tCO ₂ e)	PE (tCO ₂ e)	LE (tCO ₂ e)	VER (tCO ₂ e)
2010	36479	4640	0	31839
2011	56717	7254	0	49463
Total	93196	11894	0	81302

AENOR is able to confirm that all deviations validated in this verification event complies with all validation criteria for projects set out in VCS Version 4 without any qualifications or limitations.

Date: 12 July 2021

Lead Auditor

Luis Javier Arribas Alonso



APPENDIX 1: LIST OF EVIDENCES PROVIDED

General documents

Monitoring report:

- Final version: VCS Monitoring Report_Princepeel_v03 dated on 07/06/2021
- 20201217_VCS Monitoring Report_Princepeel_v001_2008-2011
- VCS Monitoring Report_Princepeel_v002_2008-2011

Previous monitoring report:

MONIT_REP_337_01JUN2007_31DEC2007 version 02 (17/03/2008)

Previous verification report:

- VERIF_REP_337_24FEB2009_25MAY2009 dated on 24/02/2009

Project description:

- PD v5 on 18/08/2007

MONITORING PLAN DOCUMENTATION (Appendix D)

- Runtime hours from the CHPs recorded in the maintenance registers provided by the provider "Runtime hours 2009 - Jen3_Jen4_Jen5".
- 20200422_VCS_Data Inquiry_Princepeel_filled
- Monthly electricity production rates are recorded and evaluated in excel files named "Productie verdeling vergister.[year]"
- Monthly electricity production rates sent from CertiQ named "Electricity production 2010-2011_CertiQ"
- Email information about operation, maintenance and calibration of electric meters complying with MID according to Fudura adviser named "Fudura_Electric meters"
- Reports containing information about electricity (and heat) production, their technical description, the monitoring methods as well as calibration reports named "Meetprotocol elektriciteit en warmte - B.V. Landgoed de Princepeel - 2012" and "Meetprotocol elektriciteit en warmte - B.V. Landgoed de Princepeel - 2018"
- Runtime hours from Jenbacher CHP on maintenance invoices named "Runtime hours [year] - Jen3_Jen4_Jen5"
- Runtime hours from Waukescha CHPs named "Bedrijfsuren Waukescha 1 + 2"
- Daily records of methane content in excel files named "[year] Controle gasmetingen"
- Electronical records of co-substrates entering the biogas plant named "Produkten voor vergister [no] - 2010" and "Overzicht productleveringen Princepeel BV 2011"
- Manure records from external farms "Overzicht meestaanvoer [year] extern"
- Daily manure records from own farm "Mestaanvoer 'eigen bedrijven' [year]"
- Monthly manure records from own farm "Dossier administratie vergister [year]"
- Electricity production and consumption_2010 2011
- "Runtime hours 2010-2011"
- "20210114_VCS_Data Inquiry_Princepeel_FIN25-03-2021"
- "App D - 11c - Overzicht productleveringen Princepeel BV 2011_v2"
- "Mais eigen land 2010 en 2011"
- Aanvullende info 2010 + 2011"
- "Parameter MCFOi - Examples of values from evidence"
- "Mest aanvoer [year] extern"
- Overzicht meestaanvoer 2010 extern_pk"

Carbon Accounting

Spreadsheets:

- App C - Calculation_Emission Reductions_VCS_v003_Princepeel_MR 2010-2011
- App C - Calculation_Emission Reductions_VCS_v002_Princepeel_MR 2010-2011
- App C - Calculation_Emission Reductions_VCS_v001_Princepeel_MR 2010-2011

Technical evidences

- Nameplates of CHP 1-6.
- Inaccuracy of CHP runtime counters under “Runtime counter - Accuracy - Jenbacher”
- Accuracy of methane measurement devices “Prüfprotokoll SR2-DO”
- Annual calibration reports of gas analyzer named “Gas analyzer - Calibration reports_2010-2017”
- Accuracy of methane measurement device from Sewerin “Gas analyzer Sewerin_Prüfprotokoll SR2-DO”

Supporting documents

- Screenshot - Wincc - EP CHPs
- “Screenshot_Substrate list from Ökostrom Schweiz”
- “Appendix E_GES Energie_Monitoring gap year_ID 334-335-336-337-338”
- “PRC_24209_4_DB Revisievergunning BV Landgoed de Princepeel”
- “Omgevingsvergunning V57 29-06-2011”
- “Organization chart”
- “Adressen mest”
- “Analyse of emission reductions amounts”
- “Invoice flare”
- Final_Princepeel_VerReport_Update20180322
- 20200422_VCS_Data Inquiry_Princepeel_filled

Remote Audit Evidences

- Remote interview notes.
- Pictures of the main equipment of the project, such as CHPs, electrical meters, weighing scale, etc.

APPENDIX 2: OBSERVATIONS AND NO CONFORMITIES

Observations (OBS)

OBS ID	01	Date: 11/03/2021
Description of OBS		
The PP shall provide evidence of the following issues: • The appendix E of the MR. • The project has been formally and finally approved by the responsible regional authorities of the Netherlands in accordance to the Dutch building law “Wet op de Ruimtelijke Ordening”. • The fraction of time of the different CHPs. • Evidence that the annual values of the parameter EEP correspond to the sum of the monthly values of the AppD3. • Evidence of the net electricity productions and the calculation of the electricity consumed for own process based on the gross and net energy. • Evidence that the annual values of the parameter MCOFi indicated in the MR correspond to the values provided in the AppD11 • Evidences of the dry matter, organic DM and Biogas production from ODM values indicated in the App C. • Evidence of delivery notes of the manure from external farms provided by the transport companies. • Evidence that the annual values of the parameter MANURE indicated in the MR correspond to the values provided in the AppD12, AppD13 and AppD14. • The estimations of the manure from the own farm based on the current animal number and evidence of the animal numbers used to the estimations. • Distance from track transportation for manure indicated in table 5.		
Country participant response		Date: 17/03/2021
• The appendix E of the MR has been attached as “Appendix E_GES Energie_Monitoring gap year_ID 334-335-336-337-338” to this document. • The formal approval of the project according to the Dutch building law has been attached as “Omgevingsvergunning V57 29-06-2011”. • The fraction of time of the different CHPs has been put in an excel file as overview with the corresponding evidence (see “Runtime hours 2010-2011”). The runtime hours for CHPs 3,4 and 5 for the year 2010 were corrected in App C as well as in the MR under section 4.2. • The monthly values for gross electricity production in 2010 (from 01/06/2010 onwards) and 2011 were listed in the attached excel file “Electricity production and consumption in 2010-2011”.		

- The monthly values for net electricity production in 2010 (from 01/06/2010 onwards) and 2011 were listed in the attached excel file “Electricity production and consumption in 2010-2011” as well as the calculation of the electricity own consumption (Gross EP - Net EP = own consumption).
- The annual values of the parameter MCOFi for the year 2010 are listed in App D -11a- and -11b-. Each co-substrate delivery is dated and listed with weight. On the last column of both documents, the total amount of each co-substrate type delivered is noted, data which is transferred by the PP in the questionnaire (see attached “VCS_Data Inquiry_Princepeel_FIN25-03-2021” under spreadsheet “Data Input 2010”). The annual amount of all co-substrates is noted on the last page of both documents (24.421.426 kg and 9.929.918 kg = 34.351 t). The difference between the total amount of co-substrates in the Data Inquiry (44.841 t in C89) and in evidence App D -11- is the the “Sniijmais” (corn silage=10.490t) coming from the own farm, and not from external farms (44.841 t - 10.490 t = 34.351 t).
The annual values of the parameter MCFOi for the year 2011 are listed in App D - 11c- (the file was adapted for better comprehension as “App D - 11c - Overzicht productleveringen Princepeel BV 2011_v2”). In this file, there are the daily co-substrates deliveries (Daily CoS deliveries-Qx) as well as the total amount for each co-substrate delivered (Total CoS-Qx). In spreadsheet “Total CoS-Q4”, the manure has to be taken out from the total amount of co-substrates (22.036.560 - 10.690.500 = 11.346.060). The total co-substrate amount in 2011 is 29.603.588 + 11.346.060 = 40.949.648 kg (“Total CoS-Q1-Q3” + “Total CoS-Q4”). The amounts per co-substrate category are transferred in the Data Inquiry under spreadsheet “Data Input 2011”. Also, in 2011, a major part of corn silage (Sjinmais) is coming from the own farm (4.684.870 kg, see attached “Mais eigen land 2010 en 2011”). This amount has also been transferred in the questionnaire under “Data Input 2011”. Hence, the total co-substrate input in 2011 is: 40.949.648 + 4.684.870 = 45.634.518 kg.
The PP also explained per mail the source of differences between the evidence and the data in the questionnaire (see attached “Aanvullende info 2010 + 2011”).
- The values for DM, ODM, biogas production and methane content were mostly taken from the “Bayerische Anstalt für Landwirtschaft” (Lfl) as well as from Archea and from Ökostrom Schweiz, as explained in the MR under Section 5.1.1. In the attached document “Parameter MCFOi - Examples of values from evidence”, some substrates were taken as example to show how the values of each MCFO can be found on the internet website of Lfl or in the document of Archea. An example from the evidence from Ökostrom Schweiz has been attached as “Screenshot_Substrate list from Ökostrom Schweiz”.
- Delivery notes of the manure from external farms provided by the transport companies were attached as “Mest aanvoer [year] extern” to this document.
- The evidence for manure coming from external farms is App D - 12 - (excel file exported from the official program from RVO). The App D - 12a (for the year 2010) has been detailed and attached as “App D - 12a - Overzicht mestaanvoer 2010 extern_pk” to give more information to the VVB about the data. In the spreadsheet “Data”, the total annual external manure is listed for 2010. In the spreadsheet “Draaitabel”, the total manure per animal and manure category is given. The other spreadsheets are listing the amounts of manure per category (this can also be displayed in the spreadsheet “Data” using the filter function).

The evidence for manure coming from own farm is App D - 13 -. The manure comes from fattened pigs ("vleesvarkens") and sows ("zeugen"). The App D - 13a - (for the year 2010) is taken as example. • The estimations of the manure from the own farm are not based on the current animal number but on the amount of manure transported by trucks (please refer to PP's response under NC ID 03 of this document). • The average distance for the manure to be transported by trucks is noted in the document attached as "Adressen mest". Also, for each manure category, a web link with information about the supplier's manure has been added.	
Documentation provided by the Country Participant	
• „Appendix E_GES Energie_Monitoring gap year_ID 334-335-336-337-338“ • “Omgevingsvergunning V57 29-06-2011”. • “Runtime hours 2010-2011” • “Electricity production and consumption in 2010-2011” • “20210114_VCS_Data Inquiry_Princepeel_FIN25-03-2021” • “App D - 11c - Overzicht productleveringen Princepeel BV 2011_v2” • “Mais eigen land 2010 en 2011” • Aanvullende info 2010 + 2011” • “Parameter MCFOi - Examples of values from evidence” • Aanvullende info 2010 + 2011” • “Screenshot_Substrate list from Ökostrom Schweiz” • “Mest aanvoer [year] extern” • „App D - 12a - Overzicht mestaanvoer 2010 extern_pk”	
VVB assessment	Date: 19/04/2021
The values of the external manure values of the App C for 2011 are not consistent with the values of the “ApD12b Overz mest 2011 extern” Therefore, the NC is still open.	
Country participant response	Date: 07/06/2021
The values used in App C to calculate the emission reductions are based on a questionnaire prepared by the carbon consultant (CC) and filled by the project proponent (PP) (“20210114_VCS_Data Inquiry_Princepeel_FIN25-03-2021”). This document has been updated by the PP during the monitoring process in order to submit more accurate values. In the first questionnaire (see “20200422_VCS_Data Inquiry_Princepeel_filled”), the PP took the sum of manure quantities for pig and cattle and divided them into 40%-60% parts. After the CC requested more precise values for each animal category, the PP sent an updated version of the questionnaire accordingly. Finally, the CC forgot to update the new values in App C. That is the reason why the values of the App D - 12b and App C are not consistent.	

The CC has now updated the values for pig and cattle manure for the years 2010 and 2011 in App C and in the monitoring report.	
Documentation provided by the Country Participant	
“20200422_VCS_Data Inquiry_Princepeel_filled” Updated App C.	
VVB Assessment	Date: 14/06/2021
Evidence provided by the PP on the requested issues are considered enough and adequate, and the information provided is consistent with the one included in the MR and calculation spreadsheet App C. Therefore, the observation has been clarified.	

OBS ID:	02	Date: 11/03/2021
Description of OBS		
The PP shall provide additional information and evidence to clarify that the annual average of emission reductions achieved by the project are very higher than the estimated in the PDD due to the reasons described in section 3.2.2 of the MR (larger amount of manure, the baseline methane emissions considered and the different value of the GWP of CH₄).		
Country participant response		Date: 17/03/2021
The discrepancy between the quantity of emission reductions estimated in the PDD and the quantity achieved through the project activities is mainly due to the fact, that the baseline emissions from waste disposal were not calculated at all in the PDD. If one takes as example the spreadsheet “ER 2011” copied in the attached excel file named “Analyse of emission reductions amounts” and examines the “Methane potential from substrate [x]” (column L) or rather the methane production from non-waste, waste and manure (cells E25-E27), it becomes clear that, using the validated equation in the PDD, most of the methane is emitted by waste substrates (84%) whereas only 16% of the methane comes from manure. This shows the strong impact of the total amount of emissions from waste disposal. Accordingly, if the emissions from waste substrates were not calculated in the PDD even though they caused the largest share of emissions, a comparison of the estimated emissions from the PDD with the actual emission reductions is neither possible nor useful.		
Documentation provided by the Country Participant		

“Analyse of emission reductions amounts”	
VVB Assessment	Date: 19/04/2021
The additional information and evidence provided by the PP clarify that the annual average of emission reductions achieved by the project are very higher than the estimated in the PDD due to the reasons described in section 3.2.2 of the MR (larger amount of manure, the baseline methane emissions considered and the different value of the GWP of CH₄). Therefore, the observation has been clarified.	

OBS ID:	03	Date: 11/03/2021
Description of OBS		
The PDD indicates that the produced methane can be burned in a flare and that the biogas burned in the flare must be known. Please, clarify if the project has installed a flare and how the biogas burned is monitored.		
Country participant response		Date: 17/03/2021
A flare was purchased and installed in 2015 (see attached “Invoice flare”), because it became legally required. But during the current monitoring period, no flare was installed. However, on a biogas site with more than 1 CHP, it never happens that all CHPs are out of operation at the same time. Therefore, if 1 CHP for example is serviced and cannot process the biogas produced, the biogas will first be stored in the biogas membrane and then, in case of full storage, will be sent to another CHP on site. The value of biogas produced for the project owner is too high to be flared.		
Documentation provided by the Country Participant		
“Invoice flare”		
VVB Assessment		Date: 19/04/2021
The additional information and evidence provided by the PP are considered adequate and enough. Therefore, the observation has been clarified.		

OBS ID:	04	Date: 11/03/2021
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Description of OBS	
Clarify if the own electricity consumption is measured or is calculated as the gross energy minus the net production.	
Country participant response	Date: 17/03/2021
The electricity consumption is calculated as the gross electricity production minus the net electricity production, since both power productions are measured (see “Electricity production and consumption_2010 2011”)	
Documentation provided by the Country Participant	
“Electricity production and consumption_2010 2011”	
VVB Assessment	Date: 19/04/2021
The evidence provided is adequate, and the audit team has been able to check that the values of the electricity consumption calculated in the evidence as the gross energy minus the net production are consistent with the values indicated in the MR and used to calculate the emission reductions in the App C. Therefore, the observation has been clarified.	

OBS ID:	05	Date: 11/03/2021
Description of OBS		
Clarify if the manure is calculated based on the number of trucks or on the animal number.		
Country participant response		Date: 17/03/2021
The amount of animal manure coming from the own farm is calculated based on truck numbers, as can be seen for example from evidence App D -13a -: the 3 rd column gives the amount of manure transported (“Aantal kg” = Number kg).		
Documentation provided by the Country Participant		
App D -13a		
VVB Assessment		Date: 19/04/2021

The clarification is considered adequate and it has been identified clearly that the amount of animal manure coming from the own farm is calculated based on truck numbers.

Therefore, the observation has been clarified.

No Conformities (NC)

NC ID:	01	Date: 11/03/2021
Description of NC		
The auditing team has found the following issues that are not consistent with the information of the previous monitoring periods and the PD: • The project was set into operation in May 2007 instead of June, when was the starting date of the crediting lifetime of the project. • The date of the PDD version 05 submitted by ARA Carbon Finance GmbH. • The total electric capacity installed of 6.1 MW and the number of CHPs installed and indicated in section 1.1. • The total capacity installed, the electric capacity of the CHP 5 and the electric efficiency of CHP1 and CHP 5 indicated in section 3.1.		
Country participant response		Date: 17/03/2021
• The date of operation was in May 2007 and has been corrected in the MR under sections 1.1, 1.5 and 3.1. • The date of the PDD version 05 has been corrected in the MR under section 1.1. • In section 1.1, the sentence with the total electric capacity of 6.1 MW and the number of CHPs installed describes the situation from the project start till now, and not only the project situation during the current monitoring period ("6 CHPs with a total electric capacity of 6.1 MW has been put into operation till now"). The project situation during the current monitoring period with corresponding total electric installed capacity and number of CHPs installed is described under section 3.1. • The total capacity installed, the electric capacity of the CHP 5 and the electric efficiency of CHP1 and CHP 5 were corrected in section 3.1 as well as in App C.		
Documentation provided by the Country Participant		
Updated MR		
VVB Assessment		Date: 19/04/2021

All information included in the updated monitoring report is already consistent with the information of the previous monitoring periods and the PD.

Therefore, the NC is closed.

NC ID:	02	Date: 11/03/2021
Description of NC		
According to the instructions for completing the MR template: - Section 1.8 shall provide the title, reference and version number of the methodology or methodologies applied to the project, but the methodologies AMS II.F and AMS I.C indicated in the PDD are not applied in the monitoring period. - Date of issue should be DD-Month-YY - The purpose of data indicated in tables of several parameters is not consistent with the information required by the instructions of the MR template.		
Country participant response		Date: 17/03/2021
- The information concerning the methodology deviation has been added under section 3.2.1 of the MR. - The date of issue was corrected in the MR. - The purpose of data was corrected in the parameter tables according to the information required by the instructions of the MR template.		
Documentation provided by the Country Participant		
Updated MR		
VVB Assessment		Date: 19/04/2021
All information included in the updated monitoring report is now in accordance with the instructions for completing the MR template. Therefore, the NC is closed.		

NC ID:	03	Date: 11/03/2021
Description of NC		
The information of some parameters is not correct:		

- The evidence provided is not of the annual calibrations of the gas analyser and it is only provided the calibration of the following years: 2011, 2013, 2014, 2016, 2017. At least, it is necessary to have the 2010 and 2012 calibrations to assess that the values monitored from 01/06/2010 to 31/12/2013 were correct, although it should be demonstrated that the parameter was monitored since the start of the monitoring period, on 01/01/2008.
- The frequency of monitoring/recording indicated for the parameter "Fraction of time" is daily, although the PD required a monthly frequency and the evidence provided annual data.
- The parameter ETHY of the PDD is not included in the MR.
- The manure from the own farm is estimated instead of measuring by scales as is required by the PD.
- For 2011, the annual value of the parameter EEP indicated in the file "ApD2b Productie VVergister2011" is different to the value indicated in "Biogas Production" sheet of the spreadsheet App C.

Country participant response
Date: 17/03/2021

- The PP cannot provide the calibration reports of the gas analyser from 2010 since the document cannot be found. The calibration report of the gas analyser for the year 2012/2013 were already provided to and assessed by the VVB during the last monitoring (see attached the Verification Report on page 8 "Final_Princepeel_VerReport_Update20180322"). However, since the biogas production is calculated based on the electricity production and the methane content in the biogas, the biogas production will decrease proportionally with a higher methane content, so that the amount of emission reductions keeps the same. Hence, the level of methane content in the biogas has no impact on the accuracy and amount of emission reductions.
- The fraction of time is viewed daily but recorded annually (or when the CHPs needs maintenance or repairs). The fraction of time was corrected from daily to annually in the MR under section 4.2. Since the runtime counters automatically record the number of hours that a CHP operates, the value increases continuously during lifetime. Hence, the evidence provided with the annual runtime hours of the CHPs can be used to control that the biogas produced were destroyed in the CHP engine. A monthly record of the runtime hours additional value and would not lead to a more accurate result.
- The parameter ETHY were included in the MR under section 4.2.
- The manure from the own farm is calculated based on the amounts of manure per truck transport. Each delivery is saved electronically as a daily list (see App D - 13) or as an annual overview (see App D -14). The accuracy of the manure amounts from the company's own farm, that are delivered to the biogas plant, can be specified as very precise, since the transport volume of the trucks is known. In addition, the company is keen to make as few transports as possible in order to save money and time. Therefore, transports without full manure tanks can be excluded.
As can be seen from other biogas projects, flow meters are never installed on a biogas plant just to measure the amounts of manure coming from their own farm. Since biogas projects

are usually hardly economically viable, investments in technologies that are of no use or not prescribed by law are avoided. Usually, the amount of manure coming from the own farm is based on animal numbers in case the manure does not have to be transported. Otherwise, it is based on truck transports. Here, the manure coming from own and external farms is mixed in a silo on weighing rods, that measure the input in kilograms. When the mixture in this silo is ready, it goes to a storage silo and then to the digester, where the quantities of manure are there measured with a flowmeter. The values of the electricity production in the excel calculation file App C differ from some values of App D - 2 - because the values of the electricity production used for the emission reduction calculation are based exclusively on the official measurements provided by CertiQ (see App D - 3 -), while the values in App D - 2 - are coming from the company's own records for daily business.	
Documentation provided by the Country Participant	
"Final_Princepeel_VerReport_Update20180322"	
VVB Assessment	Date: 19/04/2021
If the calibration frequency of the gas analyser has not been carried out with the frequency indicated in the monitoring plan, the project proponent shall describe the deviation to the monitoring in the monitoring report. The annual amount of biogas is not correct because the value of the efficiency had been calculated considering the thermal capacity installed instead of the electric capacity installed. Therefore, the NC is still open.	
Country participant response	Date: 07/06/2021
The deviation concerning the calibration frequency of the gas analyser has been added in the monitoring report under section 3.2. The calculation of the CHP efficiency was corrected in App C as well as in the monitoring report.	
Documentation provided by the Country Participant	
Updated App C and monitoring report	
VVB Assessment	Date: 14/06/2021
After updated App C and monitoring report, the information of all parameters is found correct and complete. Therefore, the NC is closed.	

NC ID:	04	Date: 11/03/2021
Description of NC		
The MR include some information that is not correct or complete: • The starting date of the monitoring period. • The contact telephone number. • Different information occurred after the end of the monitoring period is included. • The figure 1 identifies the CHP 6 and the meters GEN6-a, GEN6-b AND GEN6-c that were installed after the monitoring period. • The amount of manure indicated in table 5 of the MR is different from the values indicated in the spreadsheet "App C.		
Country participant response		Date: 17/03/2021
• The starting date of the monitoring period has been corrected in the MR. • The contact telephone number has been corrected in the MR. • Information that occurred after the end of the monitoring period has been deleted from the MR where the information is not needed as background information. • Figure 1 has been corrected in the MR under section 4.3 and taken over from App D - 5a - (measurement protocol from 2012, page 9). • The table 5 in the MR under section 5.2 has been adapted to the table indicated in the spreadsheet App C for consistency purposes. The distances from the manure supplier to the biogas plant were taken from the attached list "Adressen mest". Since the lorry category of 40 t for the year 2011 is known (see App D - 13b), the GHG emissions per tonne kilometer were adapted in the MR to the correct lorry category (24-40 t) with 123 g CO₂e/t km.		
Documentation provided by the Country Participant		
• "Adressen mest"		
VVB Assessment		Date: 19/04/2021
All information included in the updated monitoring report is correct and complete. Therefore, the NC is closed.		