



Verified Carbon Standard

METHANE RECOVERY PROJECT HOUBENSTEYN YSSELSTEYN, LIMBURG, THE NETHERLANDS



Document Prepared by AENOR INTERNACIONAL S.A.U.

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Summary:

AENOR has carried out the verification of the “Methane Recovery Project Houbensteyn Ysselsteyn, Limburg, The Netherlands” (“The project” hereinafter). The project is a project implemented in Ysselsteyn, Limburg, southeastern part of the Netherlands. The geographical coordinates are N51°29’36” E5°54’27”. 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 decentrally used to substitute fossil fuels.

The project activity was put into operation in spring 2006. The Project has been verified for its first operation period from May 1st, 2006 to December 31st, 2007 in order to certify the correspondingly reduced GHG emissions by this project activity within this period. The project uses a fixed crediting period of 10 years which ends on 30th of April 2016.

The present verification Report certifies the emission reductions that have occurred from the end of the first monitoring period until the end of the project’s crediting period (01/01/2008 - 30/04/2016), with a quantitative monitoring of emission reductions for only the last 6 years of the project’s crediting period (01/05/2010 - 30/04/2016). For the period between 01/01/2008 and 30/04/2010, 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.

Therefore, the emissions reduction for the current monitoring period is 121215 tCO_{2e}.

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 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 observation (OBS) and 3 Non-Conformities (NC) 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 of 121215 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 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 of the project against the Verified Carbon Standard, the identified methodology, the validated PD and the “Request for 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 30/04/2016.

The objectives of this audit included a verification of the Project’s calculated reductions with the Verified Carbon Standard requirements for only the last 6 years of the project’s crediting period (01/05/2010 - 30/04/2016). 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 30/04/2010”, 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 4.1, 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 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 Ysselsteyn, Limburg, southeastern part of the Netherlands . The geographical coordinates are N51°29'36" E5°54'27". 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 decentrally used to substitute fossil fuels.

The project activity was put into operation in spring 2006. The Project has been verified for its first operation period from May 1st, 2006 to December 31st, 2007 in order to certify the correspondingly reduced GHG emissions by this project activity within this period. The project uses a fixed crediting period of 10 years which ends on 30th of April 2016.

The present verification Report certifies the emission reductions that have occurred from the end of the first monitoring period until the end of the project's crediting period (01/01/2008 - 30/04/2016), with a quantitative monitoring of emission reductions for only the last 6 years of the project's crediting period (01/05/2010 - 30/04/2016). For the period between 01/01/2008 and 30/04/2010, 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.

Therefore, the emissions reduction for the current monitoring period is 121215 tCO₂e.

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_v002_Houbensteyn_MR 2008-2016*” 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 emissions 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 emissions 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 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 the Non Conformities (NCs) and the observation (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
Pauline Kalathas	Project Manager at GES Energie
Martin Houben	Managing Director

Due to the COVID-19 pandemic situation, all interviews were carried out through videoconference or email, as explained in Section 2.4. The interviews were carried out 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 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 project activities 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 Non-Conformities (NC) 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 NC were fully closed. Specifically, 5 OBS and 3 NC 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

Two methodology deviations were applied during the monitoring and quantification of VCUs 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 the flow meter installed to measure the biogas volume is not calibrated. 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 last monitoring period in 2006/2007.

The factor 0.5 has been originally applied during the last monitoring on the total amount of emission reductions.

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 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

Nine 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 PD. 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 achieved 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 PD. 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 PD and not the one from waste management. Hence, the yearly estimated methane emissions reductions written down in the PD 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

from the last Monitoring in 2006/2007, the company of the Carbon Manager has changed from ARA Carbon Finance GmbH to GES Energie GmbH, but this company and its employees belong to the same company group as the ARA Carbon Finance 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. Biogas flow meter

No flow meter has been running during the present monitoring period. In the first years of operation of the biogas plant, during the first monitoring period, a flow meter was installed, as required in the monitoring plan in the PD. Practice during this period shown that the flow meter was unable to deliver reliable measurements, due to contaminations like moisture (condensation) or Sulfur (H₂S). 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 PD 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.

5. Methane content

Since the accuracy of the methane content measurements is not secured during the monitored years between 2010 and 2016, the methane content has been calculated based on the literature values, as it has been done for the biogas production and methane content from non-waste co-ferments. 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.

The audit team verified that the source of literature values is recognized in the sector and are conservative values. Additionally, the application of the conservativity factor of 0.5 indicated in the previous section of this report assess the deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions.

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.

6. Manure from own farm

All manure received in the biogas plant is exclusively from the project owner's farms, and as in the previous monitoring, it is not measured but calculated as the difference between the digestate sold (which is measured and recorded) and the co-ferment inputs (also measured and recorded). This deviation from the PDD description is considered to be very conservative, as the weight lost due to dissolved biogas it not taken into account. Therefore, this method leads to fewer emission reductions

Hence, this deviation does not suppose a overestimation of the quantity of emission reductions 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.

7. Heat use

The fossil fuel replacement for space heating and pre-heating piglet food is calculated according to the PDD Section D.2., point 3 (PDD p. 23) and is based on the historical average amount of annual natural gas consumption of 37.000 Nm³ (PDD p.30), instead of measured.

The PP provides in the spreadsheet "ER Heat" of the Appendix C a "Cross Check" of the measured and calculated amounts of external heat that demonstrates the calculation of the amount of external heat use is far below the measured amounts. Hence, the chosen method is a very conservative approach to calculating the amount of emission reductions.

Therefore, 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.

8. Emergency boiler

The emergency boiler has only been used in 2006 to heat the digester to launch the biogas process. After the successful warming up of the installation, the plant has used the own heat produced to keep

the digesters warm and the boiler has not been used during the monitoring period, and then, no project emissions have occurred.

The audit team verified that the boiler has not been used during all the monitoring period and consequently, no fossil fuel was used. Therefore, the deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions.

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.

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 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 methodologies 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 reductions 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 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

Public stakeholders have the possibility to contact directly and at any time company of Houbensteyn Milieu BV in case they feel directly or indirectly disturbed by the project. No complain or litigation has taken place during the entire crediting period of the project activity.

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 methodologies applied (AMS III.D, “Methane recovery in agricultural and agro-industrial activities” version 11 and AMS I.C, “Thermal energy for the user with or without electricity” version 09). 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, methodologies 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 methodologies, 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 following cases:

Manure management systems and agricultural/ food waste

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

$$GHG_{red, III D} = AF \cdot (BGP \cdot MC - \sum BGCO_i \cdot MCCO_i) \cdot D \cdot GWP_{CH_4}$$

With:

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

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 kg CH ₄ / Nm ³ CH ₄ according to ACM0001
GWP _{CH4}	is the Global Warming Potential of methane, set to 25 t CO _{2e} / 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 [m³]

EEP: Electricity energy produced [MWh]

ETACHP-el Electric efficiency of the CHP engines [%]

HVBiogas Caloric value biogas [kWh/m³]:

$$HV_{Biogas} = 0,01 \frac{MWh}{m^3} \cdot x_{CH4}$$

with:

x_{CH4} : = CH₄ volume content of biogas flow [%]

Replacement of fossil fuel for heating space and pre-heating piglet food

The formula described in the PDD in Section D.2. (page 23) has been used to calculate the fossil fuel displaced by the waste heat for heating space and pre-heating piglet food:

$$GHG_{red, IC_{Heat}} = Fuel_{Heat} \cdot H_{UNGas} \cdot D_{NGas} \cdot CEF \cdot FCO \cdot 44/12 \text{ t CO}_2 / \text{ t C}_{ox}$$

Where

$GHG_{red, IC_{Heat}}$ is the annual emission from the theoretical combustion of propane in the hygienization system, in t CO₂ = t CO_{2e}

$Fuel_{Heat}$ is the theoretical average annual consumption of natural gas in the needed to heat the stalls building and fuel the food pre-heating unit, in t. However, it is used the historic fuel indicated in the page 30 of the PDD in m³ (37000 Nm³/y),

H_{UNGas} is the lower heating value of natural gas set to 8.816 kWh/Nm³

D_{NGas} is the density of natural gas, but this value is not necessary because the consumption value used to the calculation is provided in Nm³.

CEF is the carbon emission factor for natural gas, set to 15.3 t C / TJ

FCO is the fraction of carbon oxidised, set to 1 t CO_x / t C according to IPCC

Replacement of fossil fuel for hygienization

The GHG emission reduction through the project activity with thermal energy produced and delivered to the stall building and for food pre-heating, where fossil sources have been displaced, has been calculated according to the small-scale Methodology AMS I C, as per the registered PDD Section D with the following equation:

$$GHG_{red, IC_{Hyg}} = Fuel_{Hyg} \cdot H_{UNGas} \cdot D_{NGas} \cdot CEF \cdot FCO \cdot 44/12 \text{ t CO}_2 / \text{ t C}_{ox}$$

Where

GHG_{red,IC_Hyg}	is the annual emission from the theoretical combustion of propane in the hygienization system, in $t\ CO_2 = t\ CO_{2e}$
$Fuel_{Hyg}$	is the theoretical average annual consumption of natural gas in the needed to heat the stalls building and fuel the food pre-heating unit, in t. However, it is used the historic fuel indicated in the page 30 of the PDD in m^3 (37000 Nm^3/y),
Hu_{NGas}	is the lower heating value of natural gas set to 33490 kJ/Nm^3
D_{NGas}	is the density of natural gas set to 0.7 kg/Nm^3 .
CEF	is the carbon emission factor for natural gas, set to 15,3 $t\ C / TJ$
FCO	is the fraction of carbon oxidised, set to 1 $t\ CO_x / t\ C$ according to IPCC

With

$$Fuel_{Hyg} = Manure \cdot Cap_{Heat} \cdot (T_{Hyg} - T_{Inlet}) \cdot 1 / Eff_{Hex}$$

Where:

$Fuel_{Hyg}$	is the average annual consumption of natural gas in the hygienization system, in Nm^3
Manure	is the annual manure excreted from the animals in kg
T_{Hyg}	is the needed hygienization temperature, set to 71 °C
Cap_{Heat}	is the heat capacity of the manure to be pre-heated, set to the capacity of water 4.18 $kJ/kg\ K$
T_{Inlet}	is the manure inlet temperature to the hygienization system, set to the average ambient temperature 10 °C
Eff_{HEX}	is the heat exchanger efficiency, set to 88 %

As the unit for the quantity of thermal energy used for the hygienization of manure ($Fuel_{Hyg}$) is already in TJ, the parameter Hu_{NGas} and D_{NGas} are not necessary to calculate the final emission reductions. The heat consumption has to be multiplied with the carbon emission factor of natural gas and the fraction of carbon oxidized and the result has then to be converted in $t\ CO_{2e}$

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 used on the plant's site, so that no emissions by this source of the project activity occurred during the actual monitored period.

The project emissions from transport of biomass due to the combustion of fossil fuels is not considered, since the manure treated in the biogas plant comes exclusively from the farm of the project owner.

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 PD section E.2., no leakage has to be considered.

Net GHG Emissions Reductions

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	10344	1730	0	8614
Year 2011	22506	2642	0	19864
Year 2012	25395	2705	0	22690
Year 2013	24399	2610	0	21789
Year 2014	23863	2595	0	21268
Year 2015	24212	2728	0	21484
Year 2016	6417	911	0	5506
Total	137136	15921	0	121215

The net anthropogenic GHG reduction due to the project activity for the monitoring period amount 121215 t CO₂e.

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 PD 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.

Data/Parameter monitored	Value		Assessment procedure and result																
Biogas produced (BGP)	<table border="1"> <thead> <tr> <th>Year</th> <th>m³</th> </tr> </thead> <tbody> <tr><td>2010</td><td>3304928</td></tr> <tr><td>2011</td><td>5040816</td></tr> <tr><td>2012</td><td>5105081</td></tr> <tr><td>2013</td><td>4941820</td></tr> <tr><td>2014</td><td>4915469</td></tr> <tr><td>2015</td><td>5153667</td></tr> <tr><td>2016</td><td>1702964</td></tr> </tbody> </table>	Year	m ³	2010	3304928	2011	5040816	2012	5105081	2013	4941820	2014	4915469	2015	5153667	2016	1702964		<p>As it is explained in the deviation 2 included in section 3.3. of this report the values of this parameter are higher than the estimated in the PD 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.</p> <p>Calculation reproduced. Correctly inputted in the calculation spreadsheets.</p>
Year	m ³																		
2010	3304928																		
2011	5040816																		
2012	5105081																		
2013	4941820																		
2014	4915469																		
2015	5153667																		
2016	1702964																		
Methane content of the biogas (MC)	<table border="1"> <thead> <tr> <th>Year</th> <th>Weighted average MC [%]</th> </tr> </thead> <tbody> <tr><td>2010</td><td>58.43</td></tr> <tr><td>2011</td><td>58.50</td></tr> <tr><td>2012</td><td>59.13</td></tr> <tr><td>2013</td><td>58.94</td></tr> <tr><td>2014</td><td>58.92</td></tr> <tr><td>2015</td><td>59.07</td></tr> <tr><td>2016</td><td>59.70</td></tr> </tbody> </table>	Year	Weighted average MC [%]	2010	58.43	2011	58.50	2012	59.13	2013	58.94	2014	58.92	2015	59.07	2016	59.70		<p>As it is explained in the deviation 5 included in section 3.3. of this report the values of this parameter are calculated based on the literature values because the accuracy of its measurements is not secured. The source of default values used to calculate have been checked and confirmed that it is recognized by the sector.</p> <p>Calculation reproduced. Value correctly estimated.</p>
Year	Weighted average MC [%]																		
2010	58.43																		
2011	58.50																		
2012	59.13																		
2013	58.94																		
2014	58.92																		
2015	59.07																		
2016	59.70																		
Fraction of time	Several values for CHP unit and year included in the spreadsheet.		<p>The values of this parameter are obtained from the operation manuals used by the operating staff of the plant.</p> <p>Values correctly inputted in the calculation spreadsheets.</p>																
Thermal energy production for external utilization (ETP). This parameter includes the thermal energy produced for space heating (ETPS) and the thermal energy produced for piglet food preheating (ETFP)	<table border="1"> <thead> <tr> <th>Year</th> <th>Total external heat used [kWh]</th> </tr> </thead> <tbody> <tr><td>2010</td><td>---</td></tr> <tr><td>2011</td><td>---</td></tr> </tbody> </table>	Year	Total external heat used [kWh]	2010	---	2011	---		<p>The thermal energy used externally is officially measured by heat counters since June 2012 and electronically recorded in the annual</p>										
Year	Total external heat used [kWh]																		
2010	---																		
2011	---																		

Data/Parameter monitored	Value		Assessment procedure and result
	2012	3752222*	measurement reports. The calibration is done regularly by authorized service providers. However, according to the PDD, theoretical values are used based on the actual amount of manure used in the biogas plant instead of the direct measurement of the heat displaced for hygienization. Concerning the fossil fuel replacement for space heating and pre-heating piglet food, it is calculated according to the PDD and is based on the historical average amount of annual natural gas consumption of 37.000 Nm ³ . The official measurements are used to cross check and prove that the calculated amounts of external heat consumption are plausible and conservative
	2013	7497222	
	2014	7632500	
	2015	7513056	
	2016	7432222	
	* From June to Dec.		
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	7241953	
	2011	11059074	
	2012	11319336	
	2013	10922467	
	2014	10861349	
	2015	11416939	
	2016	3812782	
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	800246	
	2011	1147201	
	2012	1173947	
	2013	1151806	
	2014	1140225	
	2015	1211940	
	2016	387380	

Data/Parameter monitored	Value	Assessment procedure and result
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.	The manure quantities are calculated as the difference between the amount of digestate sold and the amount of co-ferment inputs. The amounts of digestate and co-ferment inputs are measured and recorded daily in operation manual and in 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.

AENOR did not find inconsistencies between the PD technical annex 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 reductions 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 inventory data modeling results and carbon accounting. Quality assurance procedures are done to minimize and correct any potential data transcription calculation or formatting errors that may result in inaccurate carbon accounting 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. In order to facilitate project management and long-term accounting all primary data outputs supporting verification including the information is stored and maintained.

Roles and responsibilities are clearly identified in the MR. QA/QC procedures were developed by the PP for maintaining consistency and quality. Interviews with the PP and inspection of data and results demonstrated that the PP possess all 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.

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 Houbensteyn Ysselsteyn, Limburg, The Netherlands” follows the VCS Standard v4.1 and has been implemented in accordance with the validated PD and the project description deviations and methodology 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 the final of the first monitoring period until the end of the crediting period (01/01/2008 - 30/04/2016) the emission reductions have been quantified only for the last 6 years of the crediting period (01/05/2010 - 30/04/2016) whereas between 01/01/2008 and 30/04/2010 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-January-2008 to 30-April-2016 and verifies that calculated emission reductions were achieved during the monitoring period from 01/05/2010 to 30/04/2016 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 30/04/2010. Therefore AENOR is able to issue a positive verification opinion for the 121215 tCO₂e of VCU as reported in the Monitoring Report version 2 dated on 4 May 2021 for the current monitoring period (01/01/2008 - 30/04/2016) corresponds to the emission reductions achieved during the monitoring period from 01/05/2010 to 30/04/2016 as the following table:

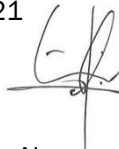
Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2008	0	0	0	0
2009	0	0	0	0
2010	10344	1730	0	8614
2011	22506	2642	0	19864
2012	25395	2705	0	22690
2013	24399	2610	0	21789
2014	23863	2595	0	21268
2015	24212	2728	0	21484

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)
2016	6417	911	0	5506
Total	137136	15921	0	121215

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 4.1 without any qualifications or limitations.

Date: 19 July 2021

Lead Auditor



Luis Javier Arribas Alonso

APPENDIX 1: LIST OF EVIDENCES PROVIDED

General documents

Monitoring report:

- Final version: VCS Monitoring Report_Sterksel_v002_2008-2016
- 20210308_VCS Monitoring Report_Houbensteyn_v001_2008-2016

Previous monitoring report:

- MONIT_REP_336_01MAY2006_31DEC2007, version 02 dated on 19 March 2008;

Previous verification report:

- VERIF REP 336 24FEB2009 dated on 24/02/2009

Project description:

- PD v4 on 2/07/2007

MONITORING PLAN DOCUMENTATION (Appendix D)

1. Filled questionnaire with project data, i.e. average methane content "20201028_VCS_Data Inquiry_Houbensteyn"
2. Inaccuracy of CHP runtime counters under "Runtime counter - Accuracy - Jenbacher"
3. Reports containing information about electricity (and heat) production, their technical description, the monitoring methods as well as calibration reports named "Meetprotocol elektriciteit en warmte Houbensteyn Milieu B.V."
4. Technical specification of gross and net power meters named "Photo - gross EP meter - WKK[no]_new" and "Photos - gross and net EP meters_old".
5. Computer based program to register the co-products entering the biogas plant named Optimad "Screenshot Optimad".
6. Annual co-ferment inputs in the biogas plant named "[year] coproducten"
7. Technical specifications of the weighing scale named "Technical specifications the weighing scale"
8. Folders of monthly records from Fudura of the daily electricity gross production rates for the year 2010 -2016 named "Gross EP Fudura 2010-2016 - EAN [no]"
9. Records of the monthly production rates for the year 2012 till 2016 certified by Fudura BV named "Meetrapport [year] Houbensteyn Milieu"
10. Email information about operation, maintenance and calibration of electric meters complying with MID according to Fudura adviser named "Fudura_Electric meters"
11. Monthly records of gross and net electricity production and calculated own electricity consumption as overview in excel file "Electricity production and consumption _2010 2016"
12. Overview of the operation hours of each CHP during the monitoring period 2010-2016 named "Overview runtime hours_2010-2016"
13. Calculated amounts of manure in excel files named "[year] mestafvoer HYS"
14. Electric efficiency of the CHPs under "Data sheet MAN LE 312"
15. "Meetrapport [year] - Houbensteyn Milieu - Heat"

REQUEST FOR EXEMPTION FROM QUANTITATIVE MONITORING FOR THE CREDITING PERIOD FROM 01/01/2008 TO 30/04/2010 (Appendix E)

<ul style="list-style-type: none"> - Letter submitted by the PP to VCS with the request dated on 20/07/2020 - Approval of the request by VCS dated on 21/07/2020. - Appendix E_GES_Energie_Monitoring gap year_ID 334-335-336-337-338
Carbon Accounting
Spreadsheets: <ul style="list-style-type: none"> - App C - Calculation_Emission Reductions_VCS_v002_Houbensteyn_MR 2008-2016 - App C - Calculation_Emission Reductions_VCS_v001_Houbensteyn_MR 2008-2016
Technical evidences
<ul style="list-style-type: none"> - Technical features - Heat counters
Supporting documents
<ul style="list-style-type: none"> - Analyse of emission reductions amounts - The formal approval of the project according to the Dutch building law - Building permit “Hei 1 complete vergunningen 2010” including all permits for the structures built on site - Excel files “Gross EP Fudura 2010-2011 - EAN 346” and “Gross EP Fudura 2010-2011 - EAN 959” with the records of gross electricity production in 2010 and 2011 from Fudura monthly electricity production values of each CHP - The handwritten quarterly records of the power and heat generation of the plant as well as the runtime hours of the CHPs “kwartaalstaat biogas 2010,2011,2012,2014” and “kwartaalstaat biogas 2015
Remote Audit Evidences (Appendix S)
<ul style="list-style-type: none"> - Remote interview notes - Pictures of the main equipment of CHPs. - Picture_Place boiler removed - Picture_Substrate input - Picture_ weighing scale - Picture_ heat counter

APPENDIX 2: OBSERVATIONS AND NO CONFORMITIES REQUESTED

Observations (OBS)

OBS ID	01	Date: 26/04/2021
Description of OBS		
<p>The PP shall provide evidence of the following issues:</p> <ul style="list-style-type: none"> • 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 disconnection of the emergency boiler after the launching phase of the project. • Pictures and evidence of the technical features of the heat counters installed in the project. • The monthly gross electricity production for 2010 and 2011. • Picture of the weighing scales. • Operation manual which contains the input and output quantities of substrate (recorded daily) the power and heat generation of the plant (recorded quarterly) as well as the runtime hours of the CHPs (recorded quarterly). 		
Country participant response		Date: 27/04/2021
<ul style="list-style-type: none"> • The actual building permit was attached as “Hei 1 complete vergunningen 2010” and contains all permits for the structures built on site. • A picture of the place where the emergency boiler was installed to warm-up the substrate to launch the biogas process was attached as “Picture_Place boiler removed”. • The technical features of the heat counters are given on page 10 of App D - 3 - with the corresponding schema on page 6. An overview about the technical features was also attached as “Technical features - Heat counters”. The heat counters were removed in 2017 and replaced by 1 heat counter (please find a picture of the new heat counter attached as “Picture_New heat counter”). • The monthly gross electricity production for 2010 and 2011 were attached as “Gross EP Fudura 2010-2011 - EAN 346” and “Gross EP Fudura 2010-2011 - EAN 959”. • The weighing scale used during the monitoring period was removed. A new weighing scale was installed (see the picture of the new weighing scale “Picture_New weighing scale”). • The input and output quantities of substrate are recorded daily in excel files (see attached picture for actual substrate input “Picture_Substrate input” and App D - 13 - for substrate output). The corresponding sentence in the MR under section 4.3 was corrected since these values are recorded only electronically and not handwritten. The handwritten quarterly records of the power and heat generation of the plant as well as the runtime hours of the CHPs were attached as “kwartaalstaat biogas 2010201120122014” and “kwartaalstaat biogas 2015”. 		

Documentation provided by the Country Participant	
<ul style="list-style-type: none"> • “Hei 1 complete vergunningen 2010” • “Picture_Place boiler removed”. • “Technical features - Heat counters” • “Picture_New heat counter”. • “Gross EP Fudura 2010-2011 - EAN 346” • “Gross EP Fudura 2010-2011 - EAN 959” • “Picture_New weighing scale” • “Picutre_Substrate input” • “kwartaalstaat biogas 2010201120122014” • “kwartaalstaat biogas 2015” 	
VVB assessment	Date: 03/06/2021
<p>The additional information and evidence provided are considered enough and correct.</p> <p>Therefore, the observation has been clarified and closed.</p>	

OBS ID:	02	Date: 26/04/2021
Description of OBS		
<p>The PP shall provide additional information and evidence to clarify that the annual average of emission reductions achieved by the project due to Methane capture and waste heat usage 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).</p>		
Country participant response		Date: 28/04/2021
<p>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 2015” 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 L20-L22) it becomes clear that using the validated equation in the PDD most of the methane is emitted by waste substrates (around 66%) whereas only 20% of the methane comes from manure. This shows the strong impact of the total amount of emissions from waste disposal.</p>		

<p>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.</p>	
<p>Documentation provided by the Country Participant</p>	
<p>Spreadsheet “Analyse of emission reductions amounts”.</p>	
<p>VVB Assessment</p>	<p>Date: 03/06/2021</p>
<p>The additional information and evidence provided are considered enough and correct. Therefore, the observation has been clarified and closed.</p>	

<p>OBS ID:</p>	<p>03</p>	<p>Date: 26/04/2021</p>
<p>Description of OBS</p>		
<p>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.</p>		
<p>Country participant response</p>		<p>Date: 28/04/2021</p>
<p>There is no flare installed on the biogas site.</p> <p>However at 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.</p>		
<p>Documentation provided by the Country Participant</p>		
<p> </p>		
<p>VVB Assessment</p>		<p>Date: 03/06/2021</p>
<p>The additional information and evidence provided are considered enough and correct. Therefore, the observation has been clarified and closed.</p>		

OBS ID:	04	Date: 26/04/2021
Description of OBS		
<p>Clarify if there are different heat counters installed for each use of the thermal energy produced and for monitoring the parameters ETPS and ETFP.</p> <p>On the other hand the values of the total external heat used have not been found in the source indicated in App C "Data from Meetrapport 2012 2013 2014 2015 2016". Please detail the specific source of this data.</p>		
Country participant response		Date: 28/04/2021
<p>There are 3 heat counters installed to measure the heat used by the hygienization unit and for heating space as shown in App D - 3 - on page 6 as a schema as well as indicated in the "Meetrapport [year] - Houbensteyn Milieu - Heat" on page 3 (please refer to documentation provided under OBS ID 01 of the Finding Report).</p> <p>In the PDD the parameter ETPS represents the thermal energy produced for space heating since parameter ETFP represents the thermal energy produced for piglet food pre-heating. In the project both parameters are measured with only one heat counter: the one for space heating.</p> <p>The values of the total external heat used have been provided with the answer of NC ID 02 of the Finding Report.</p>		
Documentation provided by the Country Participant		
"Meetrapport [year] - Houbensteyn Milieu - Heat"		
VVB Assessment		Date: 03/06/2021
<p>The additional information and evidence provided are considered enough and correct.</p> <p>Therefore, the observation has been clarified and closed.</p>		

OBS ID:	05	Date: 26/04/2021
Description of OBS		
<p>Clarify the reason because the "biomass data" provided in "Meetrapport [year] - Houbensteyn Milieu" are not the same as the values indicated in the spreadsheet App C.</p>		
Country participant response		Date: 28/04/2021

The values of biomass indicated in the “Meetrapport [year] - Houbensteyn Milieu” are only approximate values to cross-check the biogas respectively electricity production measured by Fudura. It can be seen that the values of co-substrates were roughly rounded and correspond to the values indicated in App C or in App D -1-.

This is not the case for the values of manure which differ more widely. This is due to the fact that only the manure amounts entering the digester were accounted in the Meetrapport since the manure amounts entering the post-digester were not accounted. For example in 2015: in the Meetrapport only 35.000 t are listed since the total amounts of manure digested were 48.849 t.

Documentation provided by the Country Participant

VVB Assessment

Date: 03/06/2021

The additional information and evidence provided are considered enough and correct.

Therefore, the observation has been clarified and closed.

No Conformities (NCs)

NC ID:	01	Date: 26/04/2021
Description of NC		
According to the instructions for completing the MR template 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: 27/04/2021
The data of the different parameters indicated in tables were corrected in the MR according to the recommendations of the VVB.		
Documentation provided by the Country Participant		
MR version 2		
VVB Assessment		Date: 03/06/2021

All information included in the updated MR is now according to the instructions for completing the template.

Therefore, the non-conformity is closed.

NC ID:	02	Date: 26/04/2021
Description of NC		
<p>The information of some parameters is not correct:</p> <ul style="list-style-type: none"> • The value of the hours of operation in 2010 is for the whole year instead of the monitoring period from April to December. • The value for 2012 and 2016 of the total external heat used. • From 2012 to 2016 the value of amount of co-ferment inputs indicated in the App C is not consistent with the values indicated in “[year] mestafvoer HYS”. • For 2015 the amount of manure indicated in the App C is not consistent with the value indicated in “[year] mestafvoer HYS”. 		
Country participant response		Date: 27/04/2021
<ul style="list-style-type: none"> • The operation hours of the CHPs are recorded quarterly so that the value of the hours of operation on 2010 May 1st 2010 (start of the monitoring period) cannot be provided. This is the reason why the PP decided to use the value for the whole year for the overview in App C under spreadsheet “CHP” and provided the VVB with the evidence of the quarterly records. This ensures that the values given are accurate. • The evidence for the heat use from 2012-2016 was inadvertently not provided to the VVB and is now attached as “Meetrapport [year] - Houbensteyn Milieu - Heat” to the Finding Report. The values of heat use are indicated in the reports in Gj and were converted in kWh in App C under spreadsheet “Heat” (for cross checking reasons). The heat use was recorded from June 2012 on as can be seen in the evidence provided (page 2). The values for the year 2012 and 2016 were corrected in the MR under section 4.2. • In the year 2012 the total amount of co-ferment inputs indicated in the evidence App D - 13c - is 18.801 t. This amount corresponds to the total amount of co-ferments listed in the “Data Inquiry” (App D - 1 -). As for the other biogas projects the amount of iron sludge (IJzerwater vloeibaar”) is deducted from the total amount of co-ferments since iron sludge is only used for biogas desulphurization to reduce the sulphur dioxide emissions and to protect the technology used. This is the reason why in 2012 we have: $18.801 - 512 = 18.289$ t of co-ferment input. This amount corresponds to the quantity of co-ferments in App C. This calculation applies to each year of the current monitoring and accordingly also to 2016. • For 2015 the amount of manure was corrected in the App C according to the evidence provided App D -13f -. 		
Documentation provided by the Country Participant		

<ul style="list-style-type: none"> • “Meetrapport [year] - Houbensteyn Milieu - Heat” • Updated MR and App C. 	
VVB Assessment	Date: 03/06/2021
All information included in the updated MR is now correct. Therefore, the non-conformity is closed.	

NC ID:	03	Date: 26/04/2021
Description of NC		
The MR include some information that is not correct or complete: <ul style="list-style-type: none"> • The title of the project. • The date of the validation of the project by TÜV Rheinland Group. • Section 1.2. does not include the sectoral scope 13 “Waste handling and disposal”. • The electric capacity and efficiency indicated in the table 1 is not consistent with the values provided by the source identified “Meetprotocol elektriciteit en warmte - Houbensteyn Milieu”. • Deviation of the methodology number 2 does not identify that the factor 0.5 is not applied on the total amount of emission reductions as in the previous monitoring period and it is applied only on the emission reductions from methane recovery”. • Several references to propane instead of natural gas. • The emission reductions must be rounded conservatively without decimals in the tables 5 and 7 of the MR. • Some values of the table in section 5.4. 		
Country participant response		Date: 27/04/2021
<ul style="list-style-type: none"> • The title of the project was corrected in the MR. • The date of the validation of the project by TÜV Rheinland Group was corrected in the MR under section 1.1. • The sectoral scope 13 “Waste handling and disposal” was added to section 1.2. of the MR. • The electric capacity and efficiency indicated in the table 1 were taken from the Data Sheet of the CHP (provided to the VVB as App D - 14) and correspond to the values indicated in App C and the MR. The source of the data was added in the MR under the corresponding table. • Additional information concerning the factor 0.5 applied only to the emission reductions from methane recovery was added in the MR under section 3.2.1. • The references to propane have been corrected in the MR into natural gas. • The emission reductions indicated in the tables 5 and 7 of the MR have been rounded conservatively without decimals (also in App C). 		

<ul style="list-style-type: none"> The values of the table in section 5.4 of the MR were corrected. 	
<p>Documentation provided by the Country Participant</p>	
<p>Updated MR and App C</p>	
<p>VVB Assessment</p>	<p>Date: 03/06/2021</p>
<p>The information requested has been updated in the reviewed MR and App C and both files are now correct or complete</p> <p>Therefore, the non-conformity is closed.</p>	