



**Approved baseline and monitoring methodology/
methodological tool revision recommendation form
(Version 02.0)**

INFORMATION TO BE COMPLETED BY PANEL/ WG

Date and number of Panel/ WG meeting:	22–26 March 2021 / MP 84
Title/Subject of the request for revision:	Revision to include an option to use remote biogas monitoring in AMS-I.E., AMS-I.I. and AMS-III.R.
Reference number of the request for revision:	SSC_805
Exact reference (number, title and version) of the methodology or methodological tool to which the request for revision applies:	<p>AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user --- Version 11.0</p> <p>AMS-I.I.: Biogas/biomass thermal applications for households/small users --- Version 4.0</p> <p>AMS-III.R.: Methane recovery in agricultural activities at household/small farm level --- Version 3.0</p>

Summary of the request for revision:

Original text from Stakeholder:

Background and rationale

New technologies make it possible to monitor biogas digester performance accurately and reliably. The technology developed by Connected Energy, 'Smart Biogas', for example, allows for reliable quantitative biogas flow measurement, using calibrated pressure- and flow-sensors, integrated communications hardware, cloud-based data storage, and machine learning algorithms (<https://connectedenergy.net/smart-biogas>).

The methodology AMS-I.I v.4.0 and AMS-I.E v.11 include an approach to determine the quantity of thermal energy generated using the measured quantity of biogas. Digester functionality, or sometimes referred to as 'usage' however, can however, can currently only be determined using survey or other means in all three methodologies relevant to biogas:

In AMS-I.I v.4.0 the total number of systems operational has to be determined using survey means or on-going lease/lease payment or a recurring maintenance fee (paragraph 17):

"Emission reductions can only be applied to systems that are demonstrated to be operational and in compliance with manufacturer required maintenance procedures, at least once every two years (biennial) during the crediting period. After the inspection and acceptance testing at year of installation, the inspections can be done in years 3, 5, 7, etc. and the results of such inspections can be applied to crediting years 3 and 4, 5 and 6, 7 and 8, etc. On-going rental/lease payments or a recurring maintenance fee by users can be a substitute to actual site visits"

The approach is identical in paragraph 18 (b) of AMS-III.R v.3.0

In AMS-I.E (v.11.0) section 6.1 Data/parameter table 9 defines the number of units, parameter $N_{i,y}$, as number of project devices of type i functional in year y . The methodology does not provide explicit guidance on how functionality shall be monitored. However, in practice this is often monitored using survey means to establish the usage rate. The usage rate multiplied by the population of biogas digesters would then result in the number of project devices functional.

In addition to the guidance provided to determine technology usage (or functionality/operationality), it is also possible to determine the usage rate with biogas meters. Employing biogas meters for this purpose could improve accuracy as it possible to capture both non-usage and temporary non-usage. Physical visits on the other hand, can often only capture a snapshot of the technology status and not variation in usage.

Implementation

In this revision is it proposed that the parameter 'usage' is determined through a continuous measurement

campaign using biogas meters for at least 1 month among a representative sample of biogas plant as per “Standard for sampling and surveys for CDM project activities and programme of activities”.

The recommended monitoring campaign is the same in length as defined in AMS-I.I v4.0 table 1 item no.6 for determining the amount of thermal energy generated. However, in that table additional criteria are mentioned, such as installing the biogas meter at all the biogas types (e.g. 6 cubic metre or 8 cubic metre capacity, fixed dome or floating dome, region with high average ambient temperature or low average annual temperature). The applicability of those requirements to determine the usage rate are assessed here below:

Requirement AMS-I.I table 6 No.6	Relevance to determining the usage rate (yes/no)	Explanation and justification
Installing the biogas meter at all the biogas types (e.g. 6 cubic metre or 8 cubic metre capacity, fixed dome or floating dome)	No	No, cooking is a daily event independent on the type of biodigester. Less cooking may occur when small digesters are installed compared to large digesters, but cooking itself is independent on the type and scale of technology. Furthermore, as per guidance provided in the methodologies monitoring of the usage rate is among a representative sample of the whole biogas system population and does not take into account different digester types and sizes. See paragraph 7 in AMS-I.I v.4.0, AMS-III.R v.3.0 paragraph 12 (b) and AMS-I.E v.11.0 box 3 first sentence.
Installing meters at regions with high average ambient temperature or low average annual temperature	Yes	Seasonal variation has to be taken into account in situations where, due to low ambient temperatures or other reasons, there is non-usage of the technology.

Biogas meters would collect the following information in a measurement campaign:

- Amount of biogas consumed
- Days without biogas consumption
- Number of days with gas consumption

The usage rate can then be calculated by dividing number of days with biogas consumption with the length of the measurement campaign. For example, if the number of days with gas consumption is 20 and the length of the campaign 30 days. The usage rate is $20/30 = 66.66\%$.

The calculated usage rate shall meet the requirements stipulated in “Standard for sampling and surveys for CDM project activities and programme of activities” or as specified in the applied specific methodology. In cases where survey results indicate that 90/10 precision or 95/10 precision is not achieved, the lower bound of a 90 per cent or 95 per cent confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision.

Applicability / hardware requirements

Biogas meters with a logging interval sufficient to capture cooking events; i.e. with a minimum temporal resolution of 300 seconds (5 minutes).

Additional information received from the stakeholder (01/03/2021)

(1) Please clarify how seasonal variation (e.g. due to ambient temperature) will be addressed if the monitoring campaign is to run for a month

Reply - Most domestic biogas plants are installed in developing countries where the average daily ambient temperature remains above 15 degrees Celsius throughout the year. As such, biogas production is sustained, as is its use for cooking. The amount of biogas might be reduced however, which is monitored as per AMS-I.I table 1 No.6 (Parameter BSk,y). However, in cases where the ambient temperature is too low for biogas production, the usage rate is also affected. Here, it is recommended that project developers measure the average length of the period without biogas production.

The usage rate is then calculated by dividing the period of biogas usage with the monitoring period, both in days. The period with biogas = monitoring period (in days) – the period (in days) without biogas usage (i.e. due to low ambient temperature, lack of feeding, technical issues, etc.)

(2) How will the meters be deployed at the project sites/locations; whether the meters will be installed at all the project sites/locations and the metered data will be sampled for monitoring purpose or meters will be installed only at the locations that are selected as samples from the sampling plan that includes all installations. For the latter option, further description on how randomness of sample selection will be addressed.

Reply - Meters will be installed only at the locations that are selected as samples from the sampling plan that includes all installations. The project developer shall follow the guidance provided in the methodology. In AMS-I.I this is per paragraph 11: *“A statistically valid sample of the residences where the systems are installed, with consideration, in the sampling design, of occupancy and demographic differences can be used to determine the percentage of systems operating, as per the relevant requirements for sampling in the “Standard for sampling and surveys for CDM project activities and programme of activities”. When biennial inspection is chosen, a 95% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter. On the other hand, when the project proponent chooses to inspect annually, a 90% confidence interval and 10% margin of error requirement shall be achieved for the sampling parameter.”*

Guidance in AMS-III.R and AMS-I.E is similar.

Thus, the parameter of interest, the usage rate, is to be determined at a 90/10 level of confidence and margin of error, or 95/10 in case of biennial sampling. The sampling frame is the total population of biodigesters in the CDM or CPA.

Recommended decision to the Board on the request for revision

- ☒ Approve the proposed revised methodology or methodological tool (“A case”)
☐ Reject the proposed revised methodology or methodological tool (“C case”)

Type of the revision if the recommendation is A case
<input checked="" type="checkbox"/> The revision is a major revision <input type="checkbox"/> The revision is a minor revision
Reasons for rejection if the recommendation is C case
-
Any other issues arising from the request for revision
-

- - - - -

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	18 July 2013	Revised to remove the row "Date and signature of the chair and vice chair of Panel/WG"
01.0	4 July 2013	Initial publication. This document supersedes and replaces the following documents: <ul style="list-style-type: none"> • Recommendation form for Small Scale Methodologies (F-CDM-SSCwg) (Version 01.1) • Recommendation Form for Small Scale A/R Methodologies and Procedures (F-CDM-SSC-AR) (Version 01.1)

Decision Class: Regulatory
 Document Type: Form, Recommendation
 Business Function: Methodology
 Keywords: applying methodologies and tools