ANNEX AN – THE GOLD STANDARD MICRO-PROGRAMME OF ACTIVITIES DESIGN DOCUMENT TEMPLATE

CONTENTS

Annexes

NOTE: At the time of requesting registration, this form must be accompanied by a VPA-DD applying a real case.

SECTION A. General description of micro-scale programme of activities (PoA)

A.1 Title of the micro-scale programme of activities (PoA):

Biogas PoA in Switzerland

Date: 10/04/2017

Version: 2

A.2. Description of the micro-scale programme of activities (PoA):

1. General operating and implementing framework of PoA

This Gold Standard Voluntary Micro Scale PoA will incorporate small scale agricultural biogas plants in Switzerland. These plants use manure from animal farms and co-substrates to produce renewable heat and electric energy (figure 1).

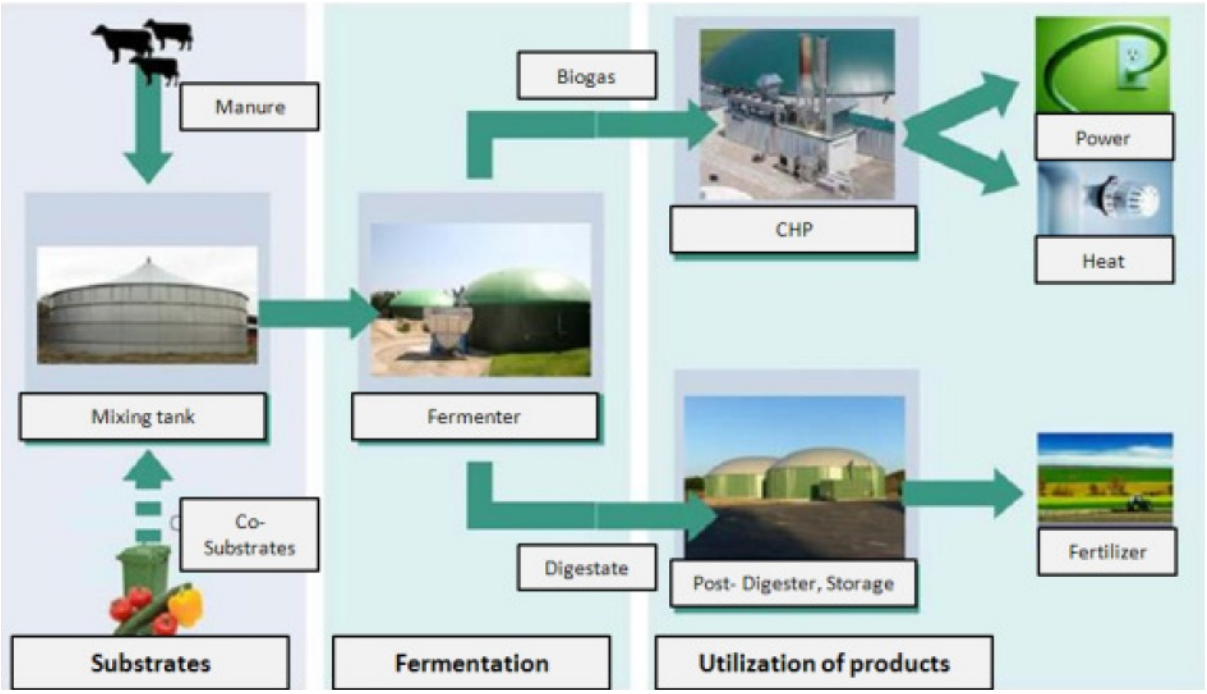

Figure 1: Process involved in biogas PoA (Source: GES Biogas GmbH)

These plants use manure from nearby animal farms and co –substrates (biogenic waste) to produce renewable heat and electric energy. The activity is technical production of biogas using manure that otherwise would emit uncontrolled methane into atmosphere during its storage. The collected biogas will be combusted and destroyed in a CHP. The electric energy produced by the CHP will replace an amount of electricity generated with conventional technology and will reduce emissions corresponding to the technology mix used for power generation in Switzerland.

The purpose of the PoA is to use carbon finance for scaling up this activity, as the investment cost is too high and individuals cannot afford this technology.

The PoA is promoted by South Pole Carbon Asset Management Ltd. (SPCAM), a leading carbon project developer in the world. SPCAM is the Coordinating/Managing Entity (CME) and the developer of the program, who will collaborate with various local partners to implement the program, e.g.:

- National and local authorities
- International and local non-government organizations
- Community-based organizations
- International development agencies
- Companies

All selected activities need to be designed to sustainably use manure for production of heat and electricity.

2. Policy/measure or stated goal of the PoA

This PoA seeks to improve the manure management practices in Switzerland thereby, benefiting the society largely, by reducing methane emissions and solving the energy scenario in country.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

As there are no current rules in the country to handle the manure, this PoA aims at revolutionizing the manure management system in Switzerland, thus catering this huge problem. Therefore, the proposed micro-scale PoA is a voluntary action by the CME (Southpole Carbon Asset Management Ltd) and Oekostrom Schweiz.

A.3. Coordinating/managing entity and participants of PoA:

This PoA will be jointly managed by the South Pole Carbon Asset Management and Oekostrom Schweiz, though the CME will be South Pole Carbon Asset Management and the project implementer will be Oekostrom Schweiz.

Name of Party involved (*) ((host) indicates a host Party)	**Private and/or public entity(ies) project participants(*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Switzerland	Southpole Carbon Asset Management Ltd	No
Switzerland	Oekostrom Schweiz	No

A.4. Technical description of the micro-scale programme of activities:

>>

A.4.1. Location of the micro-scale programme of activities:

>> This PoA will be developed in the country of Switzerland

A.4.1.1. Host Party(ies):

>> Switzerland

A.4.1.2. Physical/ Geographical boundary:

The boundary for the PoA in terms of a geographical area will be the national boundary of country of Switzerland, within which all micro-scale programme activities (VPAs) included in the PoA will be implemented, taking into consideration the requirement that all applicable national policies and regulations of the country.

A.4.2. Description of typical micro-scale programme activity(ies):

>> A micro-scale programme activity is the technical production of biogas using manure that otherwise would emit uncontrolled methane into the atmosphere during its storage. In absence of oxygen bacteria in the manure will automatically begin to form methane. The longer the storage and depending on the storage type the more methane is formed.

During project activity the manure will be brought directly into the digesters of the biogas plant and the formed methane is captured in a gastight system. Together with other gases that occur during decay of the substrates it forms the biogas with a methane content of 50-75%[1]. The collected biogas will be combusted and destroyed in a CHP. Result of the combustion process is CO2. CO2 also is a greenhouse gas but those emissions can not be addressed as emissions caused by the project for two reasons: 1. The greenhouse gas potential of CO2 is 25 times less than the potential of the CH4 that is burned and destroyed in the CHP. 2. The Combustion process of biomass is considered to be CO2 neutral in the calculations following the IPCC principles. The amount of CO2 that is emitted by biomass combustion is the same amount that has been bound by

[1] http://www.biogas-renewable-energy.info/biogas_composition.html

the plant during its growth. The carbon cycle of (non-wood) biomass is short in contrast to fossil fuels which have been formed over decades. This does not mean that Biomass utilization does not cause Carbon emissions. This process will reduce the CH4 emissions from open storage of manure. As there is no obligation at the moment to change, this reduction can only happen by the proposed project activity.

The electric energy produced by the CHP will replace an amount of electricity generated with conventional technology and will reduce emissions corresponding to the technology mix used for power generation in Switzerland.

However, the net GHG mitigation from the electricity approach is neutralized in order to avoid conflicts with double counting (direct or indirect influence on installations under the EU ETS). Although Switzerland does not take part in the European Emission Trading System (EU ETS) there might be an indirect influence on installations with emission reduction obligations, because Switzerland is connected to the European electricity grid. The production of renewable energy could from the demand site cause less production in another installation. This activity would set free allowances and grant reduction certificates at the same time.

The thermal energy from CHP will in some cases be used for heating where a fossil fuel heating was used before. The avoided usage of fossil fuels can be addressed as emission reduction.

A.4.2.1. First technology or practice to be employed in the PoA and the eligibility criteria for inclusion of the technology or practice in the PoA:

>>

The project is an anaerobic wet fermentation setup with a grid connected Combined Heat and Power plant (CHP) attached. The source of biogas is a share of manure and a variety of co-ferments like vegetable wastes or wastes from the food industry.

The plants use very different types of substrates, mainly a mixture of a high share of manure and a variety of organic wastes.

This is a typical composition for biogas plants in Switzerland which is caused by the conditions for governmental support. The projects in this POA will use both, liquid and solid manure. To avoid high investment costs for digesters, co-ferments such as highly energetic substrates are added.

The biogas production starts with collection of manure in the mixing tank. Manure that comes from the own farm will be directly transported via pipeline.

From the mixing tanks the digesters are continuously fed with manure and co-substrates. In the anaerobic environment of the digesters methane bacteria metabolize the methane at a temperature of 32-42°C (mesophile) or 50-57°C (thermophile)[2] . The process is very complex and includes the sub steps hydrolysis, acidification, acetic acid generation, and methane generation.

Because of its complexity the process is very vulnerable to temperature changes and substrate composition. Result of this process is biogas with a methane content of ca. 50-75% depending on the methane building potential of the substrates. The biogas will be collected under a membrane top and directed from there to the CHP plant. The top can also serve as gas storage.

After processing (removal of sulphur and water) the biogas is burned in a gas engine. A Generator converts the mechanical energy to electric energy. The electricity will be directed to a transformer station and from there fed into the electrical grid, which in Switzerland is owned by Swissgrid.

About one third of the heat produced by the CHP is first used to run the digester at a constant mesophile or thermophile temperature during 365 days a year. The rest of the heat can be used for example to heat stables, residential buildings and drying of hey or woodchips.

The digestate will be either moved to a post digester or directly to the digestate storage, depending on the technical setup of the biogas plant.

The digestate is a good fertilizer because it still contains the nutrients that are necessary for plant growth but with a reduced amount of Carbon that has been converted to Methane and combusted.

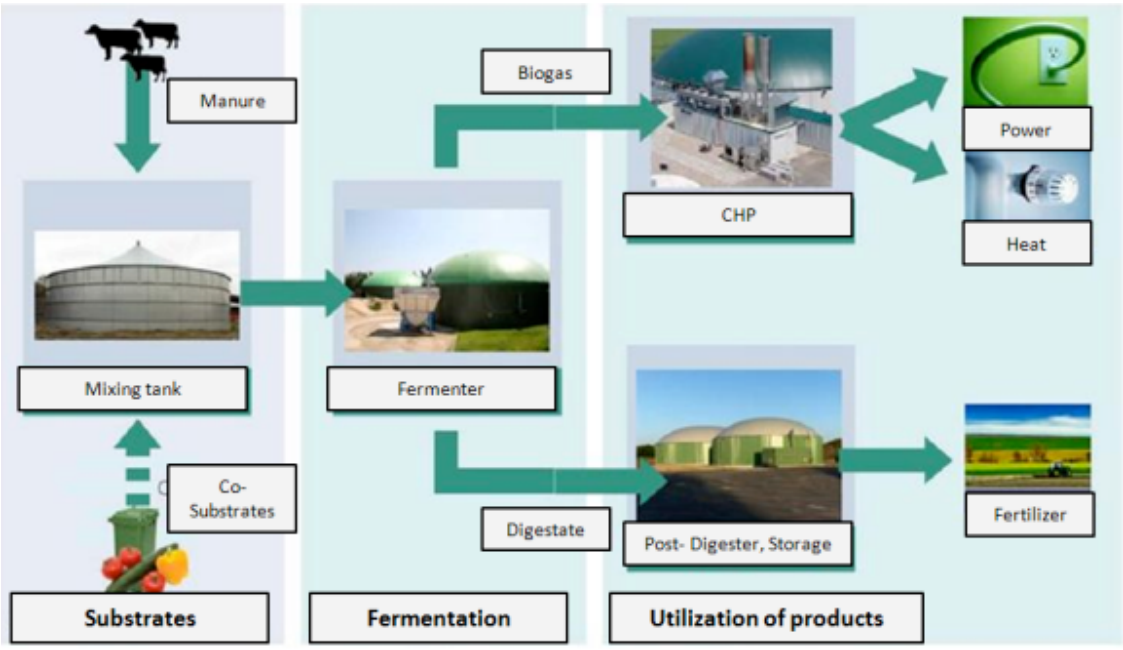

Figure 1: Biogas process scheme

[2] http://www.onmitan.de/landwirtschaft-und-anaerobe-fermentation/bakterien-und-temperatur.html

All of the plants in this programme follow the above shown schematic process of biogas utilization. The projects use a variety of different substrate types which means a challenge to the operation because the biology is more difficult to control with varying amounts of different substrates.

SouthPole Carbon Asset Management Ltd, as the micro-scale PoA coordinating entity, shall verify that eligibility conditions are met before allowing a micro-scale project activity to be included under this micro-scale PoA. The eligibility criteria for the inclusion of a micro-scale project activity in this micro-scale PoA, which shall be stated and confirmed in each micro-scale scheme project design document, are as follows:

No.	Eligibility criteria		Means of proof	Confirmation
	Description	Conditions to be met		
1.	Boundary and location of the Project activity	The project activity is located within the boundary of Switzerland	Location and boundary is defined in the specific VPA-DD.	Yes/No
2.	Project technology	- Information about compliance should be demonstrated by each VPA DD - Check if any EIA or no objection certificate is required for this technology or project - Project activity involves collection of Manure and co-substrate for Biogas production	- VPA DD mention whether the technology comply with national regulations if any or not - Each VPA DD to demonstrate building permission letter - Each VPA DD to demonstrate that manure /co-substrate is collected for biogas production	Yes/No

3.	Avoiding double counting	The project activity includes a means of uniquely identifying the project site. This would also ensure that there is no double counting of the VPA being implemented in any other POA or single project activity. Also a thorough analysis of available databases (GS, VCS, UNFCCC) to check whether the VPA is included in any other project or not	Coordinates of each project site to be distinctly mentioned in each VPA DD to avoid double counting. Analysis of databases.	Yes/No
4.	Micro-scale limit for VPAs	The aggregated annual emissions reductions for all the systems involved shall be not greater than 10,000tCO_2e	The maximum number of sites will be selected in such a way that over all emission reductions will be lesser or equal to 10,000 tCO_2e. If a VPA exceeds the applicable limit, the claimable emission reduction shall be capped based on 10,000 tCO_2e.	Yes/No
5.	Project activity crediting period does not exceed micro-scale PoA life	The duration of the crediting period of each project activity to be included in the micro-scale PoA shall not exceed the end date of the registered micro-scale PoA.	VPA-DD shall indicate the duration of the project activity crediting period, either for a single 10 year crediting period or a 7 year renewable crediting period. The final date for which ERs can be credited shall be no later than 28 years after the date of registration of the micro-scale PoA.	Yes/No

6.	Additionality	The micro-scale project activity is an emission reduction project in which each of the independent Subsystems /measures achieve annual emission reductions equal to or less than 600tCO_2 or annual energy savings equal to or less than 600 MWh or installed capacity is less than 1500 kW for households/communities	The VPA-DD shall demonstrate that the installed capacity is less than 1500 KW for each system.	Yes/No
7.	LSC	VPA may apply any of the following approaches a) Grouped LSC The project to be apply the group LSC shall comply with the following conditions: i) Must be from the same host country boundary, ii) they will apply the same technology iii) The VPAs should be implemented within 3 years from the date of grouped LSC approval. b) LSC at VPA level In case a VPA cannot apply grouped LSC, it needs to conduct LSC at project level c) Retroactive projects to go for SFR process	The VPA shall demonstrate that to qualify for a group LSC: i) The VPA is located in the same boundary as other grouped VPAs ii) Technologytype iii) Similar distribution channel is used, and implemented within the timeframe	
8.	Baseline/project activity	- Livestock is managed under confined conditions - Manure is left as liquid slurry or solid manure and is collected after some days.	Each VPA DD to demonstrate the baseline	Yes/No

9.	Prior Consideration	Projects with start date before the registration of POA need to demonstrate the following - Prior consideration of Carbon revenues irrespective of LSC being done or not. - Submission of LSC (grouped LSC) to that project considered carbon revenues	Each VPA DD to demonstrate whether there is prior consideration for carbon revenues or not.	Yes/No
10.	Start Date of VPA	Documentary evidence on the start date of the VPA	Each VPA to clearly demonstrate the start date	Yes/No
11.	Applicability for AMS I.C	Emission reductions from a biomass cogeneration or trigeneration system can accrue from one of the following activities: (a) Electricity supply to a grid; (b) Electricity and/or thermal energy production for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b)	Electricity production and heat supply for consumption by other facilities	Yes

A.4.2.2. Second technology or practice to be employed in the PoA and the eligibility criteria for inclusion of the technology or practice in the PoA:

>> N.A

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by the technology or practice below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

In the following it is demonstrated that:

(i) The proposed PoA is a voluntary coordinated action;

The coordinating and managing entity is South Pole Carbon Asset Management. There is no legal obligation for manure management system in the Switzerland. Therefore all the activities undertaken are voluntary in action.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

See below for the demonstration of how the action would not be implemented in the absence of the micro scale PoA.

- The voluntary coordinated action would not be implemented in the absence of the PoA. According to Annex U "Micro Programme rules and procedures",

- All project activities Meeting criteria any of the criteria listed below can be termed deemed additional

. i. The project activity is located in a Least Developed Country (LDC), Small Island Developing States (SIDS) or a Land Locked Developing Country (LLDC). – Not Applicable

. ii. The project activity is located in a special underdeveloped zone of the host country identified by the Government before 28 May 2010. CME shall refer to the list published by the host country DNA. Not Applicable

. iii. The project activity is located in any host country different from the countries defined above but project participants can demonstrate that project implementation will essentially benefit poor communities. No specific definition of 'poor communities' is pre-established. The Millennium Development Goals-based long term National Development Strategy (NDS) can serve as the basis to assess the eligibility of the targeted communities. Project participants shall seek approval from The Gold Standard Foundation on the basis of a formal request providing detailed arguments as to how the activity will benefit the poor communities. Not Applicable

. iv. The project activity generates electricity:

a. a. As on-site generation, i.e. electricity generated at the point of use and no connection with any grid, OR b. Feeds into an existing or new local, low voltage isolated grid..

b. It may also feed into the regional or national high voltage grid if convincing evidence can be provided to demonstrate that the implementation of the project activity will significantly improve electricity access for the poor local communities, households or SMEs.

Not Applicable

v. The project activity employs specific renewable energy technologies or measures recommended by the host country DNA and approved by the CDM EB (project participants shall refer to the list published by the host country), OR approved by The Gold Standard Foundation. Not Applicable

vi. The project activity is an emission reduction project in which each of the independent subsystems or measures achieve annual emission reductions equal to or less than 600 tCO2 or annual energy savings equal to or less than 600 MWh or installed capacity is less than 1500 kW for households/SMEs or communities. The limits defined above apply to each subsystem or the measure implemented. YES

Since all the individual subsytems generate less than 600 tCO2 or annual energy savings less than 600

MWh or installed capacity is less than 1500 kW they can be termed deemed additional

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

This PoA is not implementing a mandatory policy.

(iv) If a mandatory policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable.

This micro-scale PoA reduces potential methane and CO2 emissions, which would have generated in absence of this activity.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

The detailed steps involved in the operational, management and monitoring plan for the proposed micro-scale PoA are described below.

A.4.4.1. Operational and management plan:

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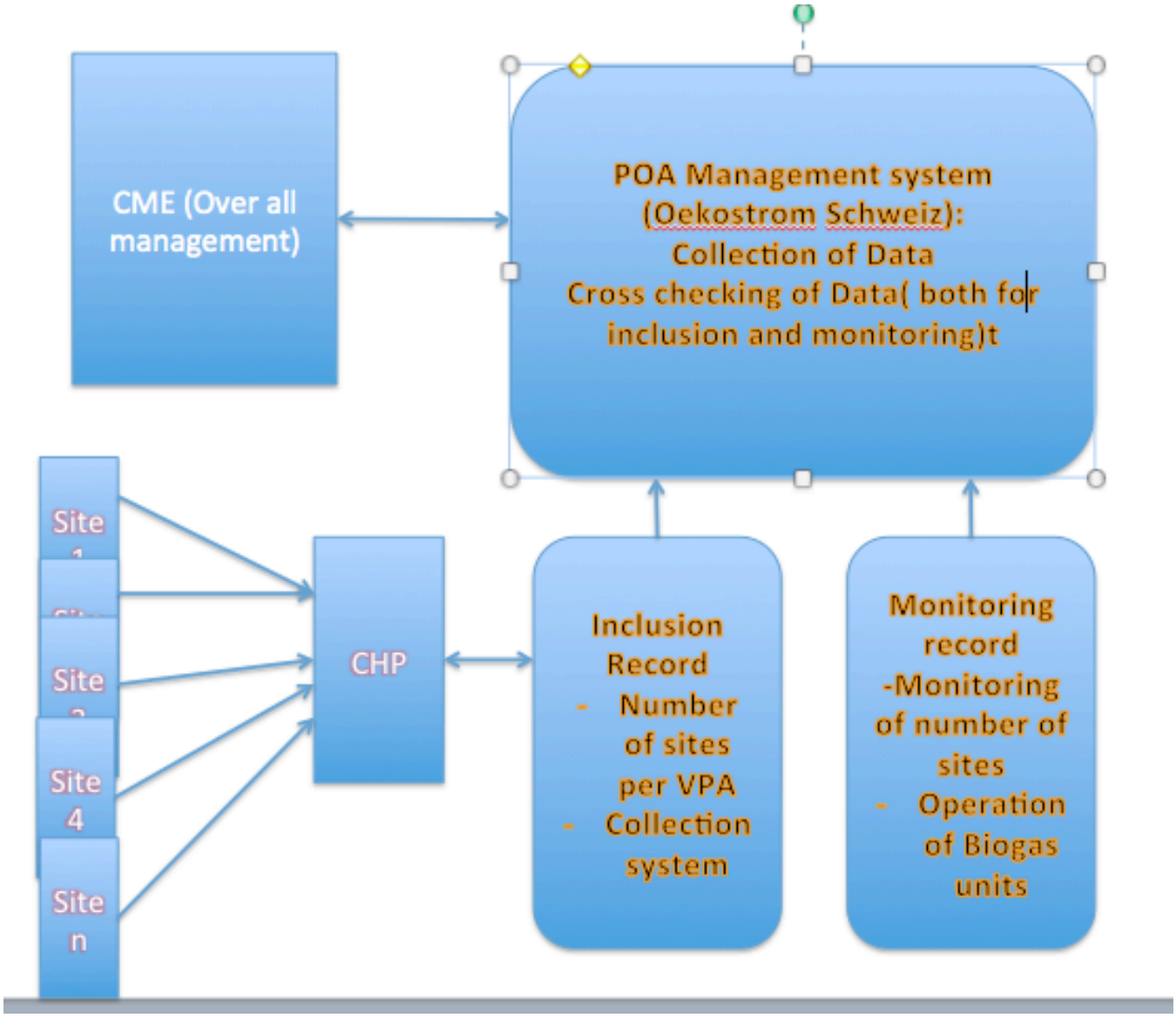

Figure: Showcasing the management structure of the PoA

Procedures for operation of this PoA

1. The CME will coordinate the activities to be undertaken by each VPA implementer involved in the micro-scale PoA. As part of the inclusion of a VPA under the micro-scale PoA, a legally-binding contractual agreement will be signed by the VPA implementer and Oekostrom and further between South Pole Carbon Asset Management and Oekostrom. Under the agreement, the roles and responsibilities of the South Pole Carbon Asset Management, Oekostrom and the VPA implementer will be clearly spelled out. Further, the VPA implementer will ascribe its activity to the micro-scale PoA as part of entering into this agreement. Any parties the VPA implementer contracts will also be required to enter into a contractual agreement, similarly ascribing their activities to the micro scale PoA. Suitable training will be conducted for VPA implementers taking part in new VPAs to make them aware of the GS rules and procedures with respect to micro-scale PoA and their requirements in terms of distribution and data collection. Guidance will be provided to each VPA implementer on the correct procedures to be followed during distribution. The

agreement will also define carbon ownership rights.

2. The CME will keep a record of the entire site involved in each VPA together with the implementer. This will enable cross-checking of the individual units claiming credits during the proposed micro scale PoA, thus helping to avoid double counting and improve accountability.

3. The VPA implementer will be responsible for the implementation of the collection of manure and co substrates from each site and delivering it to the biogas station.

4. During the collection, each VPA implementer shall make sure that necessary data is correctly obtained from the customer and recorded in the VPA collection sheets, firstly to avoid double counting and secondly to enable tracking of data for monitoring purposes. This data will include and contained in the sale receipt:

   - **Name/Identification of each site that will be having biogas plant and the sites from manure and co-substrate is collected**
   - **Geographical location of each site**, which could be determined by a fixed address/location if applicable, or by using GPS data.
   - **Lifetime of biogas plant**

   Additional information will be recorded in the case of each individual VPA if deemed necessary to ensure effective tracking of data, accurate emissions reduction calculations and effective monitoring procedures under the particular circumstances of that VPA (for example, where applicable a phone number will also be collected).

5. The VPA implementer is responsible for ensuring that the data contained in each individual VPA collection Record is provided in the correct format and is complete and accurate.

6. The VPA implementer will provide a VPA collection sheet or report in form of data (Excel sheet) to the CME on a regular basis. The VPA implementer will maintain archives of past VPA collection records for all the years during a crediting period.

7. The CME will perform cross-checks on the collection information received from each VPA implementer. The CME will be responsible for maintaining a secure database, the micro-scale PoA database, covering the VPAs within the micro-scale PoA.

Procedures for the monitoring of emissions reductions

8. SP will coordinate all ex-post monitoring activities in the micro-scale PoA. It will be responsible for implementing the monitoring plan, ensuring the quality of data obtained and the use of this data for emissions reduction calculations. However, the actual field measurements to be conducted during monitoring will most likely be performed by third parties. In the case of using contractors, however, SP will still be responsible for setting the procedures and providing oversight and training to the contractors.

9. Monitoring activities will involve selecting a collection site/biogas units from the micro-scale PoA database and visiting the premises where the activities are located to monitor the required parameters as part of the micro-scale PoA following the guidelines.

10. During monitoring, the individuals carrying out the monitoring activities (either the VPA implementer or a third party) on behalf of the CME will follow the instructions provided during training, to check and record the monitoring parameters.

11. The CME will perform cross-checks on the data provided from monitoring. This data will be contained in a secure database that will form part of the micro-scale database, which will be maintained by the CME.

12. The Database will provide the necessary data for emissions reduction calculations and will provide the outputs which will form the basis of the Monitoring Report to be produced by the CME at the end of each monitoring period. The data contained in the database will be made available to the DOE during verification.

A.4.5. Public funding of the programme of activities (PoA):

>> *Annex D will be submitted*

SECTION B. Duration of the micro-scale programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

>> 2 years prior to PoA registration at Gold Standard

B.2. Length of the programme of activities (PoA):

>> 28 years

SECTION C. Stakeholders' comments

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C.1. Summary of stakeholder comments on the PoA design:

Note: Refer to the PoA Design Consultation Report for a full report on stakeholder comments on the design of the PoA.

C.2. Please indicate the level at which local stakeholder consultation is conducted. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at VPA level ■

>> If local stakeholder consultations (LSCs) are conducted at the VPA level, this information shall be provided in the respective VPA-DDs.

C.3. Brief description how comments by local stakeholders have been invited and compiled:

>> *In process*

C.4. Summary of the comments received:

>> *In process*

C.5. Report on how due account was taken of any comments received and on measures taken to address concerns raised:

>> *N.A*

C.6. Discussion on continuous input/grievance mechanism:

>>

Discuss the Continuous input/grievance mechanism expression method and details, as discussed with

local stakeholders.

	Method Chosen (include all known details e.g. location of book, phone, number, identity of mediator)	Justification
Continuous Input / Grievance Expression Process Book		
Telephone access		
Internet/email access		
Nominated Independent Mediator (optional)		

The Continuous input / grievance mechanism should be implemented for all activities within the PoA as per feedback received during PoA LSC. All issues identified at the activity level (VPA) during the crediting period through any of the Methods shall have a mitigation measure in place that should be added to sustainability monitoring plan in the VPA-DD.

C.7. Report on stakeholder consultation feedback round at the PoA level:

>> Stakeholder consultation to be done at each VPA level.

SECTION D. Application of an existing baseline and monitoring methodology or of a new methodology submitted as part of this micro-programme of activities

D.1. Title and reference of an approved baseline and monitoring methodology, or full description of a new methodology, applied to technologies or practices included in the PoA:

>> Methodology used is: AMS III.D , and AMS.I .C

Methane Recovery in animal manure management systems, Version 20.1 – Recovery of methane

Thermal Energy production with or without electricity Version 20.0 – for substitution of fossil fuels of heat.

D.1.1 Justification of the choice of the methodology and why it is applicable to a considered technology or practice (s):

>>

Methodology Applicability requirement	**This micro-scale PoA justification**
Methodology is applicable to livestock population in the farm is managed under confined conditions	The VPA under the micro-scale PoA will demonstrate that the livestock population is managed under confined conditions.
Manure or streams obtained after treatment are not discharged into natural water recourses	Manure obtained after treatment is not discharged into natural water resource
The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5 deg c	Annual average temperature is above 5 Deg C

In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month and if anaerobic lagoons are used in the baseline their depts areat least 1 m	The manure is managed in a storage pit as slurry and extracted only after 1 month either in the form of wet slurry or dry slurry.
No methane recovery and destruction by flaring or combustion for gainful use takes place in baseline scenario	No methane recovery takes place in baseline scenario

D.1.2 Justification of the choice of the methodology and why it is applicable to another considered technology or practice:

>> NA

(*Copy this section if there are more technologies or practices implemented within the PoA)*

D.2. Title and reference of another approved baseline and monitoring methodology, or full description of a new methodology, applied to technologies or practices included in the PoA:

>> AMS I.C Thermal energy production with or without electricity

Version 20..0

D.2.1 Justification of the choice of the methodology and why it is applicable to a considered technology or practice:

Methodology Applicability requirement	**This micro-scale PoA justification**

Emission reductions from a biomass cogeneration or trigeneration system can accrus from one of the following activities a) Electricity supply to a grid b) Electricity and/or thermal energy generation production for on site consumption or for consumption of other facilities c) Combination of a and b	This project generates electricity and heat both, however PP will not claim any emission reductions from electricity generation.
Total installed thermal energy generation capacity of project equipment less or equal to 45MW thermal	The total installed capacity (electric) proposed is 7 MW and thermal power would be around 10 MW.
If electricity and/or thermal energy produced by the project activity is delivered to a third party i.e another facility or facilities within the project boundary a contract between supplier and consumer of that energy will have to be entered to ensure no double counting of emission reductions.	Written declarations from the third party have been entered into in order to make it clear who owns the emission reductions

D.2.2 Justification of the choice of the methodology and why it is applicable to another considered technology or practice:

>> NA

(*Copy this section if there are more methodologies applicable to the PoA)*

D.3. Description of the sources and gases included in the VPA (s) boundary

>>

D.3.1 Description of the sources and gases included in the technology or practice boundary

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The project boundary is the geographical area of Switzerland.

The table below illustrates the GHG emissions sources included:

Source		GHGs	Included?	Justification/Explanation
Baseline	Manure management system	CO_2	Yes	Important source of emissions
		CH_4	Yes	Important source of emissions
		N_2O	No	Minor source of emissions

D.4. Description of how the baseline scenario is identified and description of the identified baseline scenario for technology(ies) or practice(s):

>>

D.4.1 Description of how the baseline scenario is identified and description of the identified baseline scenario for each type of technology or practice:

>>

In the absence of the project activity, the manure when kept in pits are open to the atmosphere will undergo anaerobic fermentation and release greenhouse gases (methane, CO2 and N2O) to the atmosphere.

If agricultural biogas plants use co-substrates (biogenic waste) from industrial, private or state origin such as lop, those materials were prior usually applied in composting. As composting is an anaerobic biological process, GHG such as methane will end up uncontrolled in the atmosphere. By using those materials in agricultural biogas plants, both advantages were used at the same time: the production of green energy and the prevention of GHG from the formerly usage in composting. The latter won't be taking into account, due to the lack of reliable databases concerning the emissions of the composting

process.

The polluting effect of the manure will be reduced by the fermentation process not only in the aspect of greenhouse gas emission reductions but also by reducing the odor from fertilizing with untreated manure. Need for externally bought artificial fertilizer decreases because the utilization of biomass from agricultural area and related business closes the nutrient cycle when the digestate is brought back to the field. The emission reductions from the lower application of artificial fertilizer won't be taking into account neither, because of the relatively small additional GHG-reduction compared with the expected costs for project plans and monitoring.

Agricultural enterprises will also benefit from biogas by diversification of their production. In general, if a diversification is run, the farming system by trend switches to a lower intensity of soil-use with its positive consequences on fertility and shape.
The Baseline for fossil fuel heating differs between the projects. In some projects heating systems were replaced that were run with fossil fuels. In other projects there has been no heating systems run by fossil fuel in the time before the construction of the biogas plant.
In essence project activity will avoid open storage, reduce the demand for long distance transports and will partially also replace fossil fuel heating systems, thereby reducing the total emissions.

In all cases, for application of a renewable crediting period, the baseline shall be reassessed as per the latest version of the methodology and Gold Standard rules on renewal of crediting period

D.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the technology(ies) or practice(s) being included as registered PoA (assessment and demonstration of additionality of VPA):

The project is an anaerobic wet fermentation setup with a grid connected Combined Heat and Power plant (CHP) attached. The source of biogas is a share of manure and a variety of co-ferments like vegetable wastes or wastes from the food industry.
The plants use very different types of substrates, mainly a mixture of a high share of manure and a variety of organic wastes.

D.5.1. Assessment and demonstration of additionality for a typical technology or practice:

>> According to micro scale scheme rules paragraph 7, Regular cycle activities that meet any one of the criteria defined in this paragraph (and meet the eligibility requirements under section 1 of the micro scale scheme rules) shall be deemed additional.

VPAs under this micro scale PoA meet the eligibility requirements in section 1 of the micro-scale scheme rules and paragraph 7 (vi) - the project activity is an emission reduction project in which each of the independent subsytems/measures achieve annual emission reductions equal to or less than 600 tCO2 or annual energy savings equal to or less than 600 MWh or installed capacity is less than 1500 kW for households/ SMEs / communities. Also, according to the rule update in 2014, this has been extended to retroactive projects.

This will be assessed at each VPA level.

D.5.2. Key criteria and data for assessing additionality of a technology or practice:

>> In accordance to micro scale scheme rules paragraph 7 (vi), each activity is deemed additional as long as each of independent subsystems or measures achieve annual emission reductions equal or less than 600 tCO_2 or annual energy savings equal to or less than 600 MWh or installed capacity is less than 1500 kW.

D.6. Estimation of Emission reductions of technology(ies) or practice(s):

>>

Total emission reductions achieved – 8694 TCO_2 per year.

D.6.1. Explanation of methodological choices, provided in the baseline and monitoring methodology applied, selected for a technology or practice:

>>

D.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a technology or practice:

>>

Baseline Emissions:

Baseline emissions have been calculated based on 16 (b) of methodology – using the amount of manure that would decay anaerobically in the absence of the project activity based on direct

measurement of quantity of manure treated together with its specific volatile solids.

$$BE_y = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{BL,j}$$

Where:

Qmanure, j, LT, y = Quantity of manure treated from livestock type LT and animal manure management system j (tonnes/year, dry basis) j LT y

SVS , , = Specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y (tonnes/tonnes, dry basis)

MCFj = Annual methane conversion factor (MCF) for the baseline animal manure management system j,

B0,LT = Maximum methane producing potential of the volatile solid generated for animal type LT (m3 CH4/kg dm)

Project emissions:

Project emissions are calculated as per the formulae below:

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y}$$

Where:

PEy = Project emissions in year y (t CO2e)

PEPL, y = Emissions due to physical leakage of biogas in year y (t CO2e) PE flare, y = Emissions from flaring or combustion of the biogas stream in the year y (t CO2e)

PEpower, y = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (t CO2e) = 0 as the electricity consumed is self-generated.

PEtransp, y = Emissions from incremental transportation in the year y (t CO2e), as per relevant paragraph in AMS-III.AO

PEstorage,y = Emissions from the storage of manure (t CO2e)

1) For simplicity sake in this micro scale PoA overall project emissions will be calculated with a default value of 10% of the baseline emissions. This value can be considered as conservative because this PoA doesn't take into account some additionally achieved GHG reductions which won't be claimed for this

PoA (such as reductions achieved by green electrical energy fed into the grid, digesting of co-substrates instead of composting, shorter transportation ways, less N20-emissions, lower use of artificial fertilizer – all compared with the baseline scenario).

2) In case of flaring of recovered biogas – project emissions are estimated using the methodological tool "project emissions from flaring" Version 2.0

Emission Reductions:

$$ER_{y,ex\ post} = min\left[\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right), \left(MD_y - PE_{power,y,ex\ post}\right)\right]$$

Where:

$ER_{y,ex\ post}$	=	Emission reductions achieved by the project activity based on monitored values for year y (t CO_2e)
$BE_{y,ex\ post}$	=	Baseline emissions calculated using equation 1 (for projects using option in paragraph 16(a)) using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$. For projects using option in paragraph 16(b), the ex post monitored values for $Q_{manure,i,LT,y}$ and $SVS_{i,LT,y}$ are used
$PE_{y,ex\ post}$	=	Project emissions calculated using equation 5 using ex post monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_l, $Q_{res\ waste,y}$ and if applicable $VS_{LT,y}$
MD_y	=	Methane captured and destroyed or used gainfully by the project activity in year y (t CO_2e)
$PE_{power,y,ex\ post}$	=	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (t CO_2e)

Emission Reductions from AMS I.C

$$BE_{cofire,Co2,y} = \left(\frac{EG_{cofire,PJ,y}}{\eta_{BL,cofire}}\right) \times EF_{cofire,CO2}$$ Equation (5)

Where:

$BE_{cofire,Co2,y}$	=	Baseline emissions from thermal and/or electrical energy displaced by the project activity during the year *y* (t CO_2e)
$EG_{cofire,PJ,y}$	=	Net quantity of energy (electricity/thermal) supplied by the project activity during the year *y* (TJ)
$EF_{cofire,CO2}$	=	CO_2 emission factor of the baseline co-fired plant established using three years average historical data (t CO_2/TJ)
$\eta_{BL,cofire}$	=	Efficiency of the co-fired plant that would have been used in the absence of the project activity determined using paragraph 39 or 40 above

D.6.3. Data and parameters that are to be reported in VPA-DD form for a technology or practice:

(Copy this table for each data and parameter and each technology or practice)

Data / Parameter:	
Data unit:	
Description:	
Source of data used:	
Value applied:	

Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

D.7. Application of the monitoring methodology and description of the monitoring plan:

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Data/Parameter Table 1.	
Data / Parameter:	$Q_{manure, j,LT, y}$
Data unit:	Tonnes DM/year

Description:	Quantity of manure treated from livestock type LT at animal manure management system j
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions	
Description of measurement methods and procedures to be applied:	As the case in paragraph 15(b), manure weight shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision) or together with the density determined from representative country-specific studies. The quantity of animal manure from different farms and different animal types shall be recorded separately for crosscheck. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required
QA/QC procedures to be applied:	
Any comment:	

Data/Parameter Table 2.	
Data / Parameter:	**$SVS_{j,LT,Y}$**
Data unit:	tonnes VS/tonnes DM
Description:	Specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y

Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions	
Description of measurement methods and procedures to be applied:	Specific volatile solids content values will be taken from representative country-specific studies for each livestock and animal manure management system“. This representing study will then be “GRUD16”.
QA/QC procedures to be applied:	
Any comment:	

Data/Parameter Table 3.	
Data / Parameter:	**$B_{0,LT}$**
Data unit:	m^3 CH_4/kg dm

Description:	Maximum methane producing potential of the volatile solid generated for animal type LT
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions	
Description of measurement methods and procedures to be applied:	Only when developed country values are to be used in the project, in such a case relevant parameters specified in the paragraph 16(d) shall be monitored/documented
QA/QC procedures to be applied:	
Any comment:	

Data/Parameter Table 4	
Data / Parameter:	$EG_{thermal,y}$
Data unit:	TJ
Description:	Net quantity of thermal energy supplied by the project activity during the year *y*
Source of data	Plant records

Measurement procedures (if any):	Heat generation is determined as the difference of the enthalpy of the steam or hot fluid and/or gases generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and/or gases blow-down and if applicable any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure. In case of equipment that produces hot water/oil this is expressed as the difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case of equipment that produces hot gases or combustion gases, this is expressed as the difference in the enthalpy between the hot gas produced and all streams supplied to the plant. The enthalpy of all relevant streams shall be determined based on the monitored mass flow, temperature, pressure, density and specific heat of the gas. In case the project activity is exporting heat to other facilities, the metering shall be carried out at the recipient's end
Monitoring frequency:	Continuous monitoring, aggregated annually
QA/QC procedure	Measurement results shall be cross checked with records for sold/purchased thermal energy (e.g. invoices/receipts)
Any comment:	Metering the energy produced by a sample of the systems where the simplified baseline is based on the energy produced multiplied by an emission coefficient

Data/Parameter Table 5	
Data / Parameter:	FF,CO2,i
Data unit:	t CO2e/GJ

Description:	CO2 emission factor of fossil fuel type i
Source of data	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
Measurement procedures (if any):	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
Monitoring frequency:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
QA/QC procedure	-
Any comment:	The parameter need to monitor for project activities which displaces electricity from the fossil fuel based captive power plants

D.7.2.1 Description of the monitoring plan for a technology or practice:

D.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>> 10th April 2017

Tanushree Bagh, South Pole Carbon Asset Management

Lorenz Koehli, Oekostrom Schweiz

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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