Annex 3.　低コスト照明用太陽光エネルギー利用オプション

SHS マイクロユーティリティーが拡大しづらいひとつの理由は，低コストの太陽光発電システムが利用可能となってきたことが挙げられる．本調査対象のビジネスとは外れるが，無電化地域の地方電化という開発の重要な側面もあるため，現在のバングラデシュの状況をみてみよう．

近年，IDCOL の融資制度の対象となるソーラーホームシステムに，10 W_p の小型システムが追加されている．このシステムは 5 W の CFL（または 2–3 個の LED ランプ）を 1 日に 4 時間使用（連続無日照日 3 日に対応できる蓄電池容量を有する）でき，価格は 9,800 Tk である．

これに比較して，ソーラーランタンは 3–5 W_p の太陽光発電パネルと LED 電球，蓄電池を一体化したポータブルな照明機器で，携帯電話用の充電プラグもついている．日本製の高品質のソーラーランタンの価格は 5,000–6,000 円（5,000–6,000 Tk）程度と，10 W_p の小型ソーラーホームシステムの半分程度の価格である．

また，Grameen Distribution Limited が，近々訪問販売で発売を開始した 10 W_p の太陽光発電キット（ミニソーラーシステムと称し，設置工事はユーザーが自分で行う DIY タイプ）は，10 W_p の太陽光発電パネル，3 つの LED 照明（5W 相当），携帯電話充電器，UPS を転用した蓄電池（6 時間相当）で構成され，販売価格は 4,000 Tk である．作りがやや耐久性に乏しく，バッテリーの保証期間が半年であることが課題である．

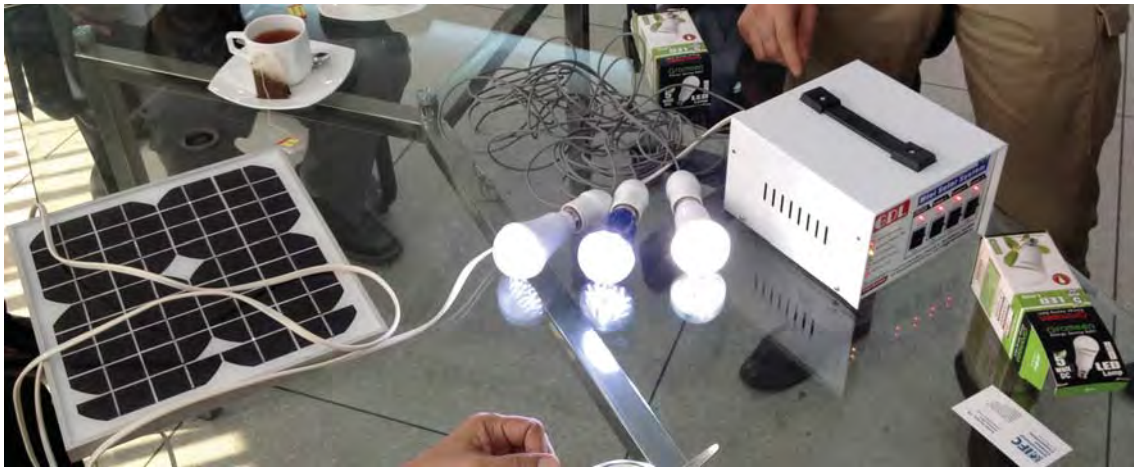


図 A:　Grameen Distribution Limited のミニソーラーシステム(10 W_p)

このようにオフグリッドエリアの低所得者層向けの太陽光発電の利用機器は，小型分野で多様化

が進んでおり，ユーザーの選択肢は拡大している．

ただ，ソーラーランタンの課題は，市場に低価格な粗悪品が多数出回っていることであり（とくにバッテリーの寿命を延ばす回路設計に課題がある），現在，GIZ がソーラーランタンの品質調査，市場調査等を実施している．ソーラーランタンの品質確保対策については，世界銀行の Lighting Africa プロジェクトが最低限及び望ましい品質基準を設定し，品質試験を行い，この試験に合格したソーラーランタンについてメーカー名と型番を，Lighting Africa のウェブで確認できる仕組みを導入している．今後，バングラデシュでソーラーホームシステムの購買力がないユーザーを対象にソーラーランタンの普及を図っていくためには，このような品質検査制度の創設等品質保証の仕組みを導入する必要がある．

ちなみに，IDCOL のプログラムでは，SHS を構成する各機器に，かなり上質の品質を要求している．とくにGS は，京セラの太陽光パネルや今後は日本製のLED 導入を考えている．また，据え付けやメインテナンス等のシステム的対応が完備されており，サービスの質がかなり異なっている．

下表に小型の太陽光発電利用機器の太陽光発電パネルのサイズと利用分野の比較を示す．

表 A:　小型太陽光発電システム比較表

	Micro utility	**Micro SHS**	**Mini SHS system**	**Solar lantern**
Provider	Grameen Shakti	Grameen Shakti & other POs	Grameen distributicn	Home appliance shops
Specification	50W SHS (typical size)	10 – 20W SHS	10W SHS kit	1 LED lamp with 2 -5 W PV panel
Capacity of battery (Ah)	80Ah (50W SHS)	18/30Ah	7Ah	A few Ah (2 – 3)
Application	1 CFL lamp per shop and mobile phone charger (option)	2/3 LED or CFL Lamps and mobile phone charger (option)	3 LED lamps and a mobile phone charger (without house wiring)	I LED lamp and a mobile phone charger
Price (TK)	6,700/user (4 users)	8,800/11.700	4,000	Up to 5,000 (Japanese)

Annex 4.　潜在的マイクロユーティリティーオウナーへのリーフレット

New Opportunity
Biogas Micro-Utility Business

WHAT IS BIOGAS MICROUTILITY?

Outline of the multi-benefits biogas micro-utility business is depicted.

An example story of the poultry farm with 2,000 layers is also provided.

Q & A

You may have several questions, e.g., costs and benefits of the micro-utility business. Can you find the answer?

If not, why not asking Grameen Shakti's local staff? He is an expert.

BASIC INFORMATION

You can easily access to more detailed information of the biogas micro-utility business by contacting...

Contact Address

Grameen Shakti
Grameen Bank Bhaban
Mirpur-2, Dhaka-1216
Bangladesh

Tel: 9004081, 9004314
Fax: 880-2-8035345

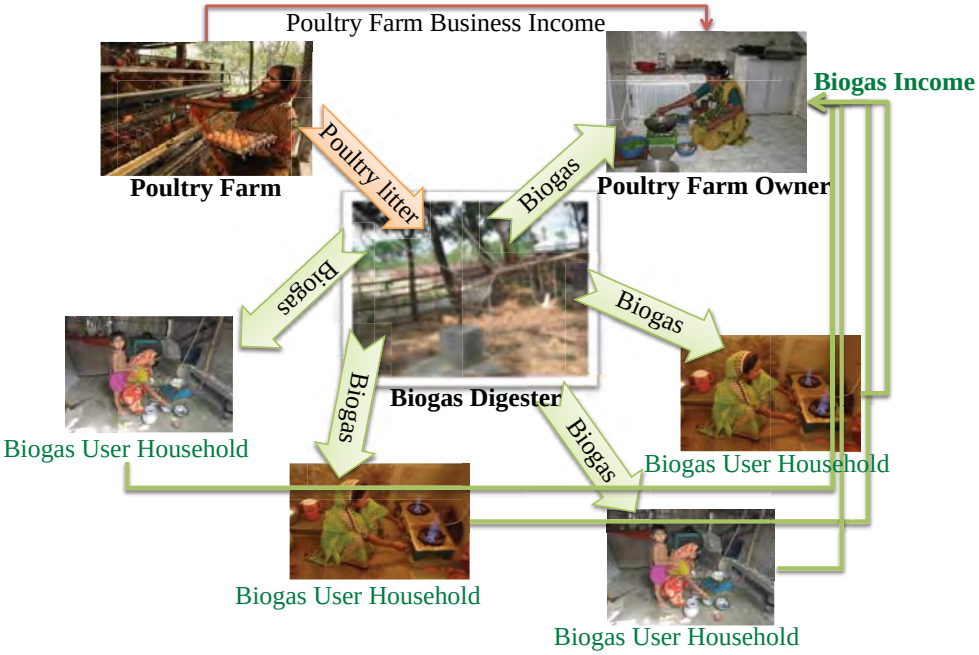
E-mail: g_shakti@grameen.net
g_shakti@grameen.com
Web: www.gshakti.org

New Opportunity for Better Life and Income Generation

Why won't you start Biogas Micro-Utility?

Layer poultry farm owners can enjoy many benefits by starting the biogas micro-utility business.

This leaflet helps to clarify opportunities and benefits of the biogas micro-utility business.



Poultry Farmers' Story

In Tangail, a poultry farm owner who has 2,000 layers installed a biogas digester with his own budget on March 2010.

The size of the biogas digester is 14.2 m^3/day and the owner invested 80,000 Taka for the installation.

The owner has shared his excessive biogas with 17 neighbor households with a fixed price of 300 Taka/month.

Since he has earned 5,100 Taka per month besides saving his own cost for biomass, he gets his investment returned within 16 months.

Moreover, the owner has mostly satisfied the clean kitchen and outdoors environment realized by installation of the biogas digester.

Q&A

Let's learn about biogas micro-utility business !

1. What is the biogas micro-utility business?

The biogas micro-utility business is a kind of biogas sharing business in which the owner of a cattle or a layer poultry farm installs a biogas digester and sells excessive biogas from the digester to nearby households through distribution tubes.

2. Who can run the business?

Households who have more than around 500 birds (layers) are able to run the business through installing a biogas digester with the sizes of bigger than 4.8 m^3/day (in some cases, 3.2 m^3/day) and share their excess biogas with households in the vicinity, if the households have demands for the biogas gas for cooking purpose.

3. What are the costs for the business?

The main costs for the business are the costs for installation of a biogas plant including material cost and construction cost. The costs depend on the size of biogas digester which is determined by the amount of feedstock (poultry litter).

Moreover, carbon benefits from operation of a biogas digester may cover the some cost of the biogas digester.

Table: Typical Scale of Biogas Micro-Utility Business

Digester Size (m^3/day)	Total Cost (Taka/Plant)	Poultry Litter (kg/day)	Number of Birds	Number of User HHs
3.2	40,700	45	450	1
4.8	47,700	68	680	2
7	90,000	100	1,000	4
14	115,000	200	2,000	9
21	150,000	300	3,000	14

[Note] Cost may vary dependent on the local situation. Cost includes maintenance fee. User households (HHs) do not include owners'.

4. What are the benefits from the business?

Economical benefits:

1. Direct income from selling the biogas to neighbor households.

   The price of the biogas is settled through negotiating with user households. Typical price in existing activities is 500 Taka/month.

2. No more need to buy fuelwood.

3. Income from selling the bio-slurry or/and saving an expense for chemical fertilizer.

   The bio-slurry from the biogas digester can be used as supplemental and organic fertilizer to chemical fertilizer. The bio-slurry can be used for biogas digesters owner's own field directly and promises replacement of some portion of the chemical fertilizer for the field. Or the bio-slurry can be sold to nearby farmers or other sources of demand after drying. Grameen Shakti will take care of this practice.

Social benefits for better life:

1. Reduce health risks especially for women and children through improving indoor air quality.
2. Free women and children for spending long time for collecting firewood and other biomass fuels.
3. Provide easy and comfortable cooking technology as well as to reduce time for cooking drastically. Avoided time can be used for other activities.
4. Contribute to enhancement of bio security for bird diseases.
5. Reduce nuisance complaints from nearby communities through reducing offensive odors.
6. Protect forests in Bangladesh.

5. How to determine the size of digester?

The size of a biogas digester is determined by the amount of available raw material (cow dung and/or poultry litters). If you keep more than 9 cows, you can start micro-utility as well (3.2 m^3).

On the other hand, the amount of feedstock depends on the number of birds in a poultry farm. The table on the front page provides examples of typical sizes of digester per number of birds.

6. How to determine the number of user households?

The number of micro utility households is determined by the stable amount of biogas generated by the biogas digester.

On the other hand, the stable amount of biogas generation is ensured by a sufficient amount of raw materials and an appropriate operation of the biogas digester.

Roughly speaking, a household consumes around 1.4 m^3 of biogas per day (although dependent on family size, number of stoves, *etc*) for cooking three meals a day. Therefore, the appropriate number of user households for the digester with the capacity of 7 m^3/day (suitable for around 1,000 birds poultry) is 4, because

7 / 1.4 – 1 (owner's portion) = 4 (user HHs)

It is noted that the amount of *raw material* is the determinant of the biogas generation rather than the digester size.

7. How far can we deliver the biogas?

Generally, the biogas can be distributed up to 200 meters (or more) by delivery tube.

Grameen Shakti will provide information and advices for your decision of the service area.

8. What about the break-even period of the business?

The costs for and benefits from the business will depend on the size of the biogas digester, the number of subcontracted households and the price of biogas and bio-slurry.

Cash flows for layer poultry farms with the sizes of 1,000 and 2,000 birds (typical case) is provided.

It is noted that the economical benefits are energy (saving + sales) and dried bio-slurry (sales); typically both are comparable.

Poultry farm with 1,000 birds	
Basic information	
Size of the biogas digester (m^3/day)	7
Number of user households (excl. owner)	4
Price of biogas for sale (Taka/month/household)	500
Dried bio-slurry (kg/month)	555
Price of dried bio-slurry (Taka/kg)	5
Expense of fuelwood (Taka/month)	1,000
Costs of biogas plant	
Construction cost of biogas digester (Taka; initial)	**90,000**
Maintenance cost	included
Benefits of biogas plant	
Sales of biogas (Taka/month)	2,000
Saved expense of fuelwood (Taka/month)	1,000
Sales of dried bio-slurry (Taka/month)	2,775
Total benefits (Taka/month)	**5,775**
Payback period (months)	**15.6**

Poultry farm with 2,000 birds	
Basic information	
Size of the biogas digester (m^3/day)	14
Number of user households (excl. owner)	9
Price of biogas for sale (Taka/month/household)	500
Dried bio-slurry (kg/month)	1,100
Price of dried bio-slurry (Taka/kg)	5
Expense of fuelwood (Taka/month)	1,000
Costs of biogas plant	
Construction cost of biogas digester (Taka; initial)	**115,000**
Maintenance cost	included
Benefits of biogas plant	
Sales of biogas (Taka/month)	4,500
Saved expense of fuelwood (Taka/month)	1,000
Sales of dried bio-slurry (Taka/month)	5,550
Total benefits (Taka/month)	**11,050**
Payback period (months)	**10.4**

9. How to treat the bio-slurry?

Biogas digester owners should prepare appropriate pits for storing (and sun drying for sales of) the slurry and sludge to get nitrogen-rich high quality organic fertilizer.

Use of the slurry and sludge to owner's own field is recommendable. On the other hand, it can be sold once it is dried if there is a demand.

Grameen Shakti will give some advices and instructions.

10. Any subsidy for the business?

Unfortunately, there has been no any subsidy program for installation of the larger size biogas digesters than 4.8 m^3/day suitable for the business. However, a micro credit scheme may be available. The scheme will provide a loan of 50% of the total cost for a biogas digester in 12 monthly installments with a 10% flat rate in order to reduce the burden of initial cost payment.

Under the scheme, cash flows for layer poultry farms with the sizes of 1,000 and 2,000 birds are explained in the tables on the right.

As a result, every month, benefit exceeds the cost payment.

Poultry farm with 1,000 birds	
Costs of biogas plant	
Downpayment of biogas digester (Taka; initial)	**45,000**
Monthly (micro-credit) payment (Taka/month)	**4,125**
Maintenance cost	included
Benefits of biogas plant	
Sales of biogas (Taka/month)	2,000
Saved expense of fuelwood (Taka/month)	1,000
Sales of dried bio-slurry (Taka/month)	2,775
Total benefits (Taka/month)	**5,775**
Benefits minus Costs (Taka/month)	**+1,650**

Poultry farm with 2,000 birds	
Costs of biogas plant	
Downpayment of biogas digester (Taka; initial)	**57,500**
Monthly (micro-credit) payment (Taka/month)	**5,270**
Maintenance cost	included
Benefits of biogas plant	
Sales of biogas (Taka/month)	4,500
Saved expense of fuelwood (Taka/month)	1,000
Sales of dried bio-slurry (Taka/month)	5,550
Total benefits (Taka/month)	**11,050**
Benefits minus Costs (Taka/month)	**+5,780**

11. What kind of risks do exist?

As poultry litter is the sources for biogas generation, the most significant risk comes from interruption or shortage of poultry litter.

The bird influenza is the main threat for operation of poultry farms. If the operation of poultry farms is halted, the source of poultry litter will be interrupted that will impact the business.

12. How can we minimize the risks from bird influenza?

In order to prevent and reduce risks from bird influenza, poultry farms owners should increase their awareness of the bio-security through training programs of the Government and enhance bio-security at their poultry farms as much as possible based on regulations the Government issued.

Moreover, a compliance of the Government requirement on the bio-security will ensure owners to get compensations for losses in case of bird influenza.

If other alternative raw materials such as cow dung, organic waste and agricultural residues are available in the vicinity area or in the market, it is recommended to use (through purchasing) these materials to maintain the micro-utility business as long as possible.

13. How can we avoid malfunctions of the biogas plant?

Risks related to malfunction of a biogas digester are mostly attribute to inappropriate operation of the biogas digester.

These kinds of risks can be avoided easily by strictly following the instructions given by Grameen Shakti technicians.

Also owner's rapid response for the malfunctions of the biogas digester through contacting Grameen Shakti local staffs is the best option for minimizing the related risks. Grameen Shakti has its warranty/maintenance system.

Annex 5.　CDM PoA-DD と一般的な CPA-DD

CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

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

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

>>

Programme for Promotion of Access to Domestic Biogas in Rural Bangladesh

Ver.: 3.0 (track record from v. 2.1)
Date: 20/06/2012

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

>>

0. Background and outline of the PoA

The natural gas supply network in Bangladesh covers only 4% of the population.[1] Households in rural areas continue to use mainly biomass for cooking. This practice forces the people (especially housewives) to spend money for purchasing fuelwood and/or to require substantial time to collect biomass as well as for cooking. Indoor air pollution is also a big problem for health of household members, especially women and children.

Therefore, several new practices started for better use of thermal energy in rural area. One is to introduce improved cookstove (ICS) technology, which reduces the amount of fuel biomass to around a half from conventional traditional three-stone type practice without chimney. The other and better (but much more expensive) solution is to utilize biogas by installing a micro-scale domestic digester.

Many literature[2] shows that the forest is seriously decreasing in Bangladesh with the rate far exceeding that of replanting, due to pressures from timber extraction, collection of fuelwood for domestic and industrial use, *etc*. Therefore, the fuelwood saved by ICS and biogas digester is recognized as a non-renewable biomass in Bangladesh, *i.e*, ICS and biogas utilization contributes to reduce CO_2 emissions.

For general consumption pattern of thermal energy in household, biomass is used almost exclusively for cooking purpose. Among the biomass, fuelwood constitutes around 42% of total biomass cooking energy in average.[3] It is noted that commercialization of fuelwood is increasing, implying the scarcity in the local environment.

Under these circumstances, the PoA promotes introduction of biogas for rural households coordinated by IDCOL[4] and implemented by the offices of Grameen Shakti (GS)[5] and other partner

[1] "Assessment of Existing Improved Cook Stove in Bangladesh", MA Quaiyum Sarkar *et al*, Environment, BRAC Research Report 2006.

[2] For example, "Non-Renewable Biomass (NRB) Assessment Report—A Component of The Bangladesh Stoves Baseline Study 2008–9", ClimateCare, 009;
"Environmental Literacy and NGOs: Experience from the Microcredit Based Social Forestry Program of Proshika in Banglades", J.A. Chowdhury, SANDEE Working Paper No 50-10. August 2010.

[3] "Restoring Balance—Bangladesh's Rural Energy Realities", M. Asaduzzaman, *et al.*, World Bank Working Paper No. 181, 2010. http://www.scribd.com/doc/29647179/Restoring-Balance-Bangladesh-s-Rural-Energy-Realities

[4] Infrastructure Development Company Limited was established on 14 May 1997 by the Government of Bangladesh as a non-bank financial institution (http://www.idcol.org/).

organizations.

1. *General operating and implementing framework of the PoA*

IDCOL—a non-bank financial corporation—has been the implementing agency of the National Domestic Biogas and Manure Program (NDBMP)[6] from 2006 to develop and disseminate domestic biogas in rural areas with the ultimate goal to establish a sustainable and commercial biogas sector in Bangladesh. IDCOL's mission is to promote economic development in Bangladesh by encouraging private sector investment in energy and infrastructure projects. Since its inception, IDCOL is playing a major role in bridging the financing gap for developing medium and large-scale infrastructure and renewable energy projects in Bangladesh. IDCOL is implementing the NDBMP with support from Government of Bangladesh, SNV Netherlands and KfW as a programme of renewable energies.

Grameen Shakti, a non-governmental and non-profit organization under the Grameen Family Group of Bangladesh, is one of the largest and fastest growing rural based renewable energy entities in the world. GS has developed one of the most successful market based programs (micro-credit programme) with a social objective for disseminating improved cookstoves (ICSs) and solar home systems (SHSs) to many rural villagers (SHS promotion is under the IDCOL's programme as in the case of biogas digester). Biogas model is trying to follow these successes.

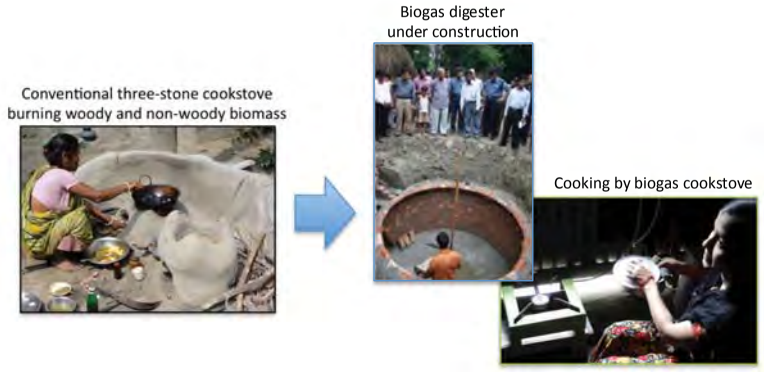


Figure 1: Image of an Element Activity of the PoA

Though there had been a NDBMP that facilitated installation of significant number of biogas digesters in rural area, there is still a huge potential number of rural households need biogas digester installation. As only 4% of the population is covered by the natural gas supply network in Bangladesh,[1] the most of the rural households still use biomass (woody and non-woody biomass) as the fuel for cooking.

[5] http://www.gshakti.org.

[6] National Domestic Biogas and Manure Programme, http://www.idcol.org/biogass_installation.php. NDBMP includes 6 sizes of biogas plants, namely, 1.2, 1.6, 2.0, 2.4, 3.2 and 4.8 m^3 biogas generation capacity per day. http://www.slideshare.net/faisalbpo/national-domestic-biogas-and-manure-programme-bangladesh

In order to expand biogas utilization in rural Bangladesh, IDCOL and GS plans to implement the biogas promotion programme as a Programme of Activities (PoA) that generates additional carbon benefit to enable more rural households to install biogas digester under the micro-credit scheme by utilizing the IDCOL's financing scheme of NDBMP or by GS's own scheme for non-covered digesters by the NDBMP.[7]

The coordinating and/or managing entity (CME) of the PoA is IDCOL. Grameen Shakti (GS), which is an operator of the CPAs, is another project participant in Bangladesh. PEAR Carbon Offset Initiative, Ltd. (PEAR)—a Japanese social venture with expertizes in CDM—is the CER buyer and the PoA developer.

IDCOL is responsible for coordinating the efforts of the different parties involved in the PoA to promote the biogas business in Bangladesh. The PoA includes biogas digesters covered by NDBMP and also those not covered by NDBMP (up to 100 m^3/day capacity).

It is noted that each CPA is defined as the period of the installation dates (= start dates of operation) of digesters.

The inclusions of new CPAs to the PoA will be requested by the CME (IDCOL) to a Designated Operational Entity (DOE) during the lifetime of the PoA.

The PoA has also provided related quality control system (for fixed dome biogas digester) with the compliance of quality standards during construction as well as operation/maintenance phases.

There are basically two types of feedstock for fixed-dome type: (a) cattle dung, and (b) poultry droppings. The sizes of the digester are 1.2, 1.6, 2.0, 2.4, 3.2, 4.8, 6.0, 9.0, 12.0, 15.0, *etc*. with the unit of [m^3 daily biogas generation capacity].[9] The gas generated from the digester with size more than 3.2 m^3/day can be used for multiple households where smaller sizes will be used for single household.[10]

It is noted that both IDCOL nor GS do not invest in the biogas digesters. Each household invests (in many cases by utilizing the micro-financing scheme operated by GS and IDCOL's subsidy for the digesters with biogas generation capacity no larger than 4.8 m^3 per day). CER revenue will be used for the programme (*i.e.*, used for the households). This is completely different from typical CDM projects where project owner invests and obtain the revenue from CERs.

The first CPA is to include biogas digesters installed from the December 13 of 2011 to January 31 of 2012 regardless of geographical location in Bangladesh.[11] The slurry/sludge from the biogas digesters may be used as soil conditioner for the field application by substituting synthetic fertilizer.

[7] It is noted that GS voluntarily implement the activities with the use of IDCOL's financing scheme. CDM does not allow the policy such as subsidy scheme itself as the project activity, but allows the real actions by using the scheme as an eligible activities under CDM.

[9] In Bangladesh, the sizes of biogas digester are classified by gas generation capacity instead of physical volume.

[10] The PoA includes an innovative rural development model called "micro-utility" which enables the larger biogas digester owner to undertake a gas utility business to supply biogas to his neighbors by tube. This model enables the poorest farmers incapable to invest in biogas digester to enjoy the benefits of biogas with around 1/2 cost for purchasing fuelwood.

[11] The number of biogas digesters belonging to a CPA is decided through counting up the number of biogas cookstove burners to the number that cannot exceed the threshold of microscale CDM projects (15 MW_{th}). Since a biogas cookstove under the program have capacity of 1.65 kW_{th} for each burner, the number of biogas cookstove burners under a CPA shall be less than $15MW_{th}/1.65\ kW_{th} = 9{,}096$. Eligibility criteria for inclusion of a CPA set the maximum number of the burners as 8,000. The number of digesters is smaller than this number.

2. Policy/measure or stated goal of the PoA

The PoA contributes to the sustainable development of Bangladesh as explained below:

Most of the population in rural areas in Bangladesh still heavily rely on fuelwood, dung, and crop residues for their cooking needs. The impacts of biomass reliance include deforestation, drudgery from needing to collect and prepare the biomass for use and also health impacts from indoor air pollution to rural women and children.[12]

In order to prevent further environmental deterioration, it is required to promote non-conventional energy technologies in this country. Biogas generated from animal manure and/or other organic wastes is undoubtedly one of the most appropriate sources of energy. Therefore, the goal of the PoA is to accelerate dissemination of biogas application in rural Bangladesh using micro-credit scheme (to reduce the burden for initial investment) with the additional carbon credit-related revenue through the programme

The PoA will contribute to reduce deforestation as the biogas generated will be used to replace mostly non-renewable biomass consumed by households; and also improve the environment of target rural area and households using animal manures which causes indoor air pollution as well. It also set the trajectory of no carbon development pathway by utilizing indigenous renewable energy source in rural Bangladesh.

As a result, the PoA will provide sustainable and self-reliant clean energy for households through replacing the non-renewable biomass and also it reduces GHG emissions. For other/detailed consideration related to the contribution to sustainable development, please see section C.2.

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

There is no any mandatory regulation in Bangladesh for biogas introduction, although the National Strategy for Economic Growth, Poverty Reduction and Social Development prepared by the Ministry of Finance and Planning has also put emphasis on "creating a policy environment that is capable of providing right incentives to adopt new technologies". The NDBMP, supported by Bangladesh Government, is a programme to promote biogas digester introductions by providing incentives and other supports/services. IDCOL is implementing the NDBMP through several partner organizations.

As an implementation entity to construct biogas digesters, GS engaged in the NDBMP as the overwhelming partner organization of IDCOL.[4, 6] Since then, GS has voluntarily continued to implement the biogas digester promotion (programme to develop and disseminate domestic biogas plant/digester in rural area with the ultimate goal to establish a sustainable and commercial biogas sector in Bangladesh) in rural Bangladesh by using its micro-credit programme. GS and other implementers have not obliged or mandated to implement such kind of programmes; nevertheless, the proposed programme is a voluntary action by GS and others. GS, currently facing financial deficits to continue this biogas programme, is willing to promote the programme as a CPA operator supported by the revenue of CERs and related financial arrangements.

[12] Domestic Health Hazard and Indoor Air-Pollution: An Approach to Find Alternative Energy Source for Rural Bangladesh to Minimize the Threat, S. M. Reazul Ahsam, *et al*.

A.3. Coordinating/managing entity and participants of SSC-POA:

Table 1: Project Participants of the PoA

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)
Bangladesh (host Party)	**Infrastructure Development Company Limited** (IDCOL) (Coordinating/Managing Entity)	No
	Grameen Shakti (GS) (a CPA Operator)	
Japan	PEAR Carbon Offset Initiative, Ltd.	No
(*)In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

Infrastructure Development Company Limited (IDCOL) and Grameen Shakti (GS) play the role of the joint focal point for communication with the CDM Executive Board.

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

>>

A.4.1. Location of the programme of activities:

>>

A.4.1.1. Host Party(ies):

>>

Bangladesh

A.4.1.2. Physical/ Geographical boundary:

>>

The PoA covers whole Bangladesh which sits in between 24° 00' North latitude and 90° 00' East longitude (see Figure 2).

Figure 2: Boundary of the PoA
(whole Bangladesh)

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

>>

A typical CPA under the PoA is characterized as follows:

- A CPA consists of activities to install biogas digester systems for a certain period of time and operates the systems throughout the crediting period in many rural places in Bangladesh. The aggregated heat capacity of biogas cookstoves under a CPA shall not exceed 15 MW_{th} (*i.e.*, below the threshold of micro-scale project category), namely, the number of burners of biogas cookstoves is no more than 8,000.
- A CPA is defined as installation of biogas digester systems for a given period of time, not defining any specific area(s) in Bangladesh.
- A CPA targets rural (mainly farmer) households in villages and small towns.
- The fuels used in households for cooking before use of biogas are conventional biomass (non-renewable and renewable biomass).
- Micro-type biogas digesters (fixed dome, fiberglass digesters, *etc.*) and related equipment for rural households are installed. The digesters consume organic waste (typically, cow dung or poultry litter) as a principal feedstock to produce biogas.
- A typical biogas digester system is composed of major parts: inlet, inlet pipe, fermentation chamber, hydraulic chamber, dome, movable cover and gas tube and other relevant equipment (Figure 3 for conventional fixed dome type). Each design typically has different capacities. These sizes will be 1.2, 1.6, 2.0, 2.4, 3.2, 4.8, 6.0, 9.0, 12.0, ... until 100 with the unit of [m^3 daily biogas generation as its production capacity].
- In some cases, a digester may deliver biogas to its neighbour households for cooking through distribution pipelines (tubes) typically with the length of 10–200 m.
- The biogas is completely combusted in biogas cookstoves at the households.
- The sludge and slurry soil application guarantees aerobic condition not to result in methane generation.
- Most of the activities under a CPA are implemented by branch offices of partner organizations of IDCOL.

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

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A typical biogas digester system consists of function parts including inlet, gas tube, movable cover, hydraulic chamber, dome, inlet pipe and fermentation chamber. The structure of conventional fixed dome type biogas digester applied in the PoA is shown in Figure 3 below followed by explanations:

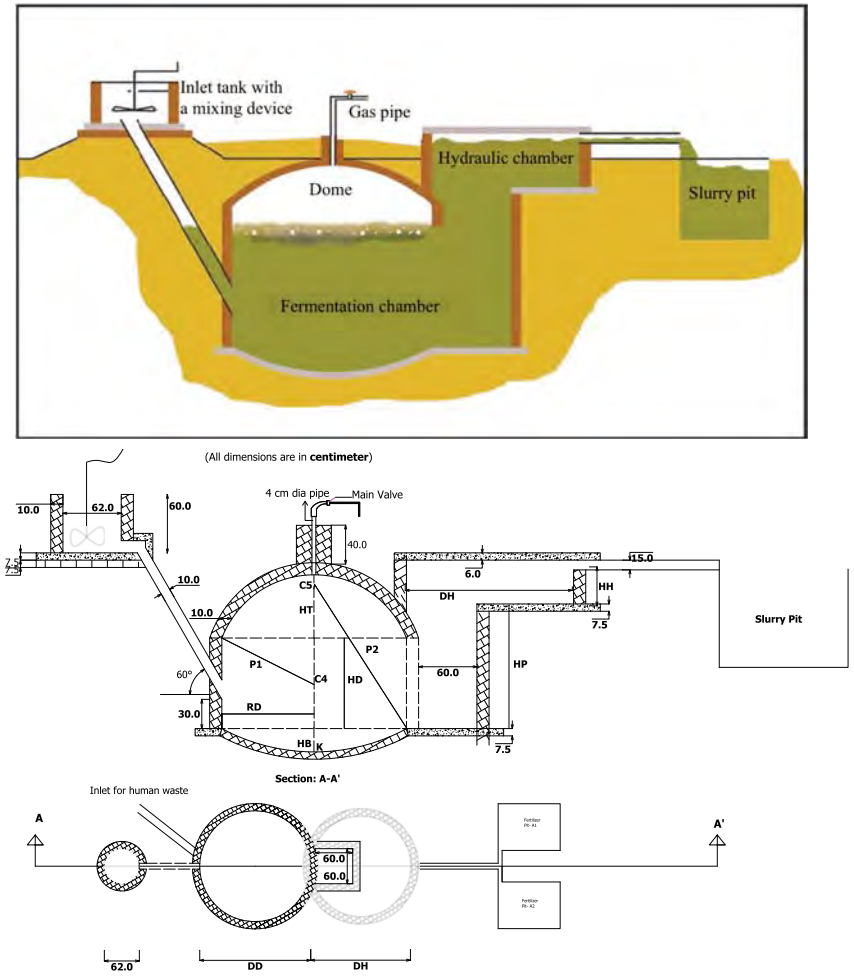

Figure 3: The Structure of a Typical Fixed Dome Type Biogas Digester in Bangladesh

The domestic biogas digester will be installed below or near to the livestock pen so that wastes from the pen are fed into the digester *via* the inlet pipe and undergoes anaerobic digestion in the fermentation chamber, that is a complex biochemical reaction occur under the catalysis of micro

organism in the absence of air. As a result of that anaerobic digestion, the biogas—mainly methane (around 60%) and carbon dioxide (around 40%)—is produced from the organic wastes.

For fixed dome type (others are functionally same), the inlet is a circular tank with a mixing device, which is connected with the inlet pipe through which the digester ordinarily acquires excrements and urine. And inlet pipes lower end is inserted in the middle of the wall of the fermentation chamber. The angle included between the axis of the inlet pipe and vertical line is 30 degrees.

The fermentation chamber is used for the storage of the fermented slurry and the gas produced. And also, the whole fermentation process goes on in this chamber. The upper part of the fermentation chamber is a dome mainly used for the storage of generated biogas, hence called gas storage chamber. In order to protect the center pipe from the dome, a brick turret is provided.

The hydraulic chamber mainly acts as hydraulic pressure besides serving as slurry discharge and seal for preventing outgassing. The generated biogas will occupy a definite space in the digester and a part of fermented liquid will be pressed into the hydraulic chamber so as to make the liquid surface inside the hydraulic chamber rising gradually. This is the action of gas pressing on the water. As the generated biogas is consumed, the space the gas occupied will diminish continuously, and the liquid inside the hydraulic chamber will gradually be pressed back into the fermentation chamber. This is the action of water pressing on gas.

The center tube from the dome is connected with a gas delivery tube(s) so as to convey the gas generated in the digester out.

The generated biogas in digester is then delivered to biogas cookstoves at the household for thermal energy use through the biogas conveyance system that consists of a gas tube, valves and water traps that remove the water from the pipes. The gas pipeline connects the gas tube and the appliances including biogas cookstoves. In some cases—micro-utility model, the biogas is delivered to other households by tube.

Slurry pits are also provided to ensure proper storing of digested slurry.

The performance of the system is assured by related IDCOL standards. Compliance with the standards is inspected during and after construction (for the activities under NDBMP) internally. Households will be instructed on proper operation of biogas digester along with installation with a manual for operation.

Biogas cookstove is also an important device of the activity and a relatively simple appliance for direct combustion of biogas. The Figure 4 below shows the type of biogas cookstoves used in Bangladesh.

Figure 4: Typical Biogas Cookstove Applied in Bangladesh

A typical biogas cookstove consists of gas supply tube, gas tap/valve, gas injector jet, primary air

opening(s) or regulator, throat, gas mixing tube/manifold, burner head, burner ports (orifices), pot supports and body frame. Assembly of a typical biogas burner is shown at Figure 5 below. A biogas cookstove can have single or double burner(s), varying in capacity to consume biogas per hour.

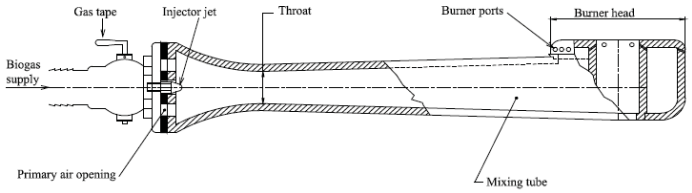

Figure 5: Assembly of Typical Burner for Biogas Cookstove

The biogas flow rate of the biogas cookstove (single burner) is set as 0.3 m^3/h as those approved by IDCOL (used by GS activities) for a (common) single burner type. This is equivalent to 1.65 kW_{th} assuming that methane content is 60% and 300 K (= 27 ^oC, mean temperature of Dhaka).[13]

All technologies utilized in the project activity are technologies in Bangladesh and there will be no need for international technology transfer involved in this project.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

>>

Any CPA under the PoA shall meet the following five criteria in *italic*. The criteria covers the minimum 12 requirements[14] specified in "Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities" (ver. 01.0).[15]

The means of checking by the DOE at the time of inclusion are also explained in roman letters:

(1) The CME (IDCOL) define the period during which the biogas digester systems covered by the CPA are installed (e.g., 1/4/2012–31/9/2012). The CME provides a list of all user information with starting date of the service as well as the associated biogas digester and cookstoves for use. Summary list is attached to the CPA-DD and the electronic file is provided also to the DOE with full relevant information.

DOE is to desk review that the period is consistent with the defined starting date of the CPA as well as to review whether the information is consistent.

[13] Assumptions for calculation: Methane content: 0.6 m^3-CH_4/m^3-biogas; Biogas flow rate: 0.3 m^3-biogas/h; Calorific value of methane: 50.4 MJ/kg-CH_4; Density of methane: 0.67 kg-CH_4/m^3-CH_4 for 20^oC (AMS-III.Y); Atmospheric temperature: 27^oC (Dhaka; mean).

[14] Requirements ID in (alphabet) are shown the explanation.

[15] http://cdm.unfccc.int/UserManagement/FileStorage/E6TY7DMI28WGCUV5J0K3LAOHBQ9RFN.

It is noted that the starting date of CPA can be an earlier date of inclusion if it is after the staring date of the PoA.[16]

Location of each household is also shown in the file. DOE is to confirm all of them are in the geographical area of Bangladesh (*i.e.*, geographical area of the CPA).

This criterion covers (a) and (d) of the requirements specified in the Standard.

(2) The CPA includes installation/construction of biogas digester systems, biogas delivery lines and biogas cookstoves at rural households or small and medium farms in Bangladesh. IDCOL has records and documentation control processes for each CPA as a part of its management system.

CPA-DD with the relevant list of information is submitted for inclusion after installation of all biogas systems in the CPA.

IDCOL will inspect installation of biogas digesters and watch their operation regularly. Inspection procedures have been introduced in NDBMP by IDCOL for proper installation of the system. Each partner organization already has the maintenance system/service for proper operation of the biogas digesters as the eligibility requirements by IDCOL to be a partner organization.

IDCOL keeps information of digesters in a CPA such as locations, ID numbers, names of user households including that of the digester owner and number of biogas cookstove burners and starting date of operation. IDCOL shall demonstrate that it prepares the management system and has operated it properly to the DOE at the time of first verification.

DOE is to check whether IDCOL prepared the management system and operates it properly with the relevant reporting arrangement and can be verifiable at the time of verification. DOE can desk review of this criterion by checking all relevant information provided by IDCOL. If all of them are met for the first CPA and no changes from that time, this criterion is considered to be met. DOE's check does not include whether some specific data is missing for some specific household.

It is noted that proper operation of the management system will be checked at the time of verification again in more detail. In case verification identifies some improper functions in the management system, new CPA inclusion cannot be done until the CME will demonstrate to fix all identified issues.

This criterion covers (c) and (i) of the requirements specified in the Standard.

(3) The CPA is not a part of a registered CDM project or not a CPA under another PoA.

Regarding inclusion of any CPA to the PoA, IDCOL identifies if there is any registered CDM project activity or CPA of a registered PoA that targeting the same households in Bangladesh.

[16] "Glossary of CDM terms" (ver. 05) (http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf) specifies that

Starting date of a CDM programme activity (CPA - All types)

The starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins. The starting date of the CPA cannot be prior to the commencement of validation of the programme of activities, *i.e.* the date on which the CDM-POA-DD is first published for global stakeholder consultation.

DOE is to check whether the information of all current registered CDM project activities and CPAs under PoAs in Bangladesh provided by the CME cover the cooking energy use of targeted households in general.

For this purpose, IDCOL is to prepare the database in order to meet this criterion for the cases mentioned below:

(a) User households of the CPA are not covered by other existing CPAs of this PoA, by checking that the period to define the CPA is different from others. Basically this is true, but if some overlap is set for the period, the households in the overlapping period is checked to avoid double-counting; and

(b) User households of the CPA used ICS before use of biogas will not result in double counting of emission reductions, by introducing checking system in the database.

It is noted that there is a registered PoA for installation of improved cookstoves (ICS).[17] The CPA may include the household covered by this PoA but includes a procedural arrangement to avoid double counting, *i.e.*, a checking system is introduced whether the household has already installed ICS (under registered PoA 4791 as well as by non-CDM programmes or independently). If so, the emission reductions for the households are discounted by subtracting the relevant CO_2 emission reductions by the ICS activities in a conservative manner.

In addition, each biogas digester is equipped with some physical mark specifying that the digester be installed under the CDM PoA.

If this procedure is introduced at the time of the first CPA and no changes from that time, this criterion is met.

This criterion covers (b) of the requirements specified in the Standard.

(4) Installations/operations of biogas digesters shall be in compliance with related national and sectorial standards and regulations.[18]

DOE is to check whether the CME provided all related documents. For proper operation, providing relevant handbook with suitable instruction and establishment of maintenance system are considered to be the evidences. If all of them are provided for the first CPA and no changes from that time, this criterion is met.

It is noted that a monitoring system—*incl.* annual survey—is introduced to include only properly operating biogas digesters in the calculation of emission reductions. The latest survey report is provided to the DOE.

This criterion covers (g) of the requirements specified in the Standard.

(5) The aggregated capacity of biogas cookstoves under a CPA is less than 15 MW_{th}, i.e., the aggregated number of burners of cookstoves is less than 8,000.[19]

Bearing the threshold in mind, IDCOL construct the database of digester systems

[17] PoA 4791: "Improved Cooking Stoves in Bangladesh". See http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/SE7XIMKF8NYVOTL16BW3U45C9ZDGAP/view.

[18] Infrastructure Development Company Ltd. (IDCOL) Model Biogas Plant Construction Manual, IDCOL/SNV, April 2006.

[19] See footnotes 11 and 13 for calculations.

(including cookstoves and related equipment) for each CPA to and provide all specific information of biogas digester system to DOE through the CME.

DOE is to desk review the specification of the system (*esp.*, number of burners of biogas cookstoves) and *ex ante* calculation of GHG emission reductions specified or attached to the CPA-DD. If the data of the number of burners is missing, a conservative default value[20] is applied.

This criterion covers (e), (f) and (k) of the requirements specified in the Standard.

It is noted that most of the essential elements covering the PoA as a whole—such as the assumption that all of the fuelwood portion of biomass is regarded as non-renewable, compliance with national regulations, and each biogas digester' capacity is below 1% of 45 MW_{th}, *etc.*—are demonstrated at the time of validation in this PoA-DD as well as by supportive reports/documents provided to the DOE.

It is also noted that that the eligibility criterion (h) specified in the Standard:

(h) Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance;

cannot be judged by the DOE nor by the CDM EB because this judgment is out of scope for these bodies as shown in the Marrakech Accords "Modalities and procedures for a clean development mechanism, as defined in Article 12 of the Kyoto Protocol". This CMP Decision does not specify any entity to judge this condition. It means that only the host country DNA can judge it in the approval process of the project activity or programme of activities. Therefore, after obtaining the approval letter by Bangladesh DNA, this condition will be no more needed to be checked.

As for sampling-related criterion (j), the PoA designs the sampling in accordance with "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" (Version 02.0; EB 65 Report, Annex 2) and "Best Practices Examples Focusing on Sampling Size and Reliability Calculations" (Version 01.0; EB 67 Report, Annex 6). Please see E.6., E.7., and Annex 5 for details. Once this PoA-DD is validated and registered, this criterion is considered to be met.

Also as for de-bundling criterion (l), this criterion is met for any CPA as shown in A.4.4.1 (4).

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

>>

The information presented here shall constitute the demonstration of additionality of the PoA as a whole. Explanation that the following four conditions *(i)–(iv)* are met is given below:

[20] The default value is set as 2 burners per household conservatively. This can be justified by the fact that the available data for CPA 1 (301 households) consists of: one-burner household (60%), two-burner household (37%), three-burner household (3%) and four-burner household (0.3%).

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

There had been a National Domestic Biogas and Manure Programme (NDBMP) in Bangladesh, which aims to further develop and disseminate domestic biogas plants in rural areas with the ultimate goal to establish a sustainable and commercial biogas sector in Bangladesh. Infrastructure Development Company, Ltd. (IDCOL), a government-owned company, had implemented the programme with the involvement of several capable partners including GS.

GS and other implementers participating the programme have engaged in domestic biogas digesters dissemination in rural area voluntarily by their micro-crediting schemes.

In order to accelerate the dissemination of the biogas digesters through getting help from carbon credit, some of the partner organizations like GS is currently facing financial deficits to continue this programme, proposed to implement the PoA voluntarily.

The timetable for the PoA until now is shown below:

February 2010	Initial discussion with GS on the programme implementation with PEAR
September 2010	Tentative discussion with GS on the programme implementation with PEAR
February 2011	Further discussion with GS on the programme implementation with PEAR
April 2011	Signed an MOU by GS and PEAR on the programme implementation
October 2011	Global stakeholder consultation started
December 2011	Validation (global stakeholder consultation) and first CPA will be started
February 2012	Site visit by DOE was conducted

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

We apply "Guidelines for Demonstrating Additionality of Microscale Project Activities" (version 3) for demonstrating this, as shown in the "Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities" (version 01.0).[21]

As per the "Guidelines for Demonstrating Additionality of Microscale Project Activities" (paragraph 2, (c)), all CPA are additional, because the capacity of each household biogas cookstove (independent sub-system) is around 1.65 kW_{th} (for single burner), *i.e.*, much less than the threshold 1,500 kW_e (4,500 kW_{th}) and all end users of the sub-systems are households.

It is noted that since all CPAs are regarded as additional, the aggregated PoA delivers additional emission reductions.[22] Therefore, without the PoA, the voluntary action of

[21] See http://cdm.unfccc.int/UserManagement/FileStorage/E6TY7DMI28WGCUV5J0K3LAOHBQ9RFN.

[22] The additionality related to the criteria outlined in Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities and the Guidelines for Demonstrating Additionality of Microscale

promoting biogas digesters in rural Bangladesh would not occur as the consistent treatment within CDM scheme.

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

Not applicable.

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

Not applicable.

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

A.4.4.1. Operational and management plan:

>>

(0) Definition of the roles and terminology:

IDCOL is the CME of the PoA responsible for all requirements set forth for the CME.

Each CPA is defined as its "period of the start date of operation of the digesters" rather than some geographical boundary. Each CPA may cover most parts of Bangladesh.

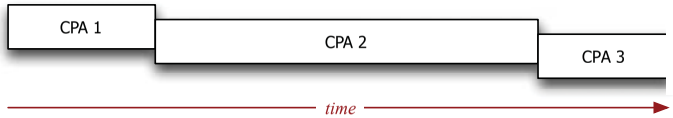

Figure 6: Image of the definition of CPAs concerning the period of the start date of operation of biogas digesters

It is noted that a CPA includes plural implementers, most of them are partner organizations like GS. Implementation includes introduction of biogas digesters, monitoring, *etc*.

In order to avoid confusion, we do not use "CPA operator" which is a unique body responsible for the CPA.

(1) Generic description of the operation and management system:

IDCOL is responsible for collection of all necessary information from implementers directly and compile them as the CME.

Project Activities are for the additionality of the CPA. Because the additionality is the concept to deliver emission reductions, if all CPA delivers additional emission reductions, then the PoA—as an aggregation of the activities of all CPAs—delivers additional emission reductions, by definition. It is noted that additionality check of each CPA is included in the eligibility criteria as clarified by the Board as "The Board clarified that a full additionality assessment is not required in the context of component project activities (CPA), rather the confirmation of additionality for CPAs should be conducted by means of the eligibility criteria." in Annex 26 of the EB 60 Report.

There are a variety of partner organizations.[23] Most of them are much smaller than GS with simple structure. We do not specify them each by each in this document.

The CDM PoA includes both NDBMP (IDCOL's program) covered and non-covered digesters. For NDBMP covered digesters, IDCOL has already established its management system. This is extended to include the requirements by CDM. For non-covered digesters, a similar management system will be established by IDCOL.

It is noted that mainly for NDBMP non-covered digesters (> 4.8 m^3/day), the digester delivers biogas not only to the digester owner but also to its neighbour households.

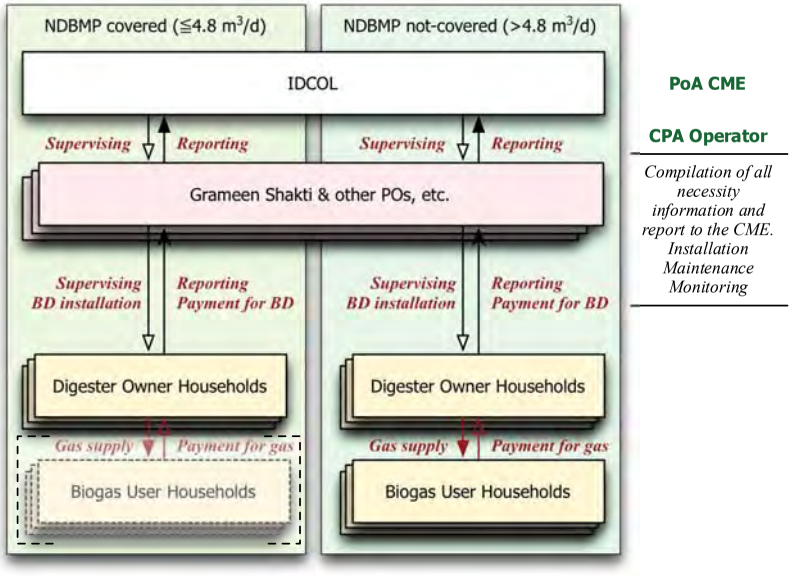

Figure 7: Managing and Reporting Structure of the PoA

Households/farms who voluntarily participate in a CPA have responsibility to provide necessary information for management of the PoA. They also promise to use biogas for the purpose of cooking.

For installation of biogas digesters, the implementers will sign an agreement (using a specific format) with the user giving all the relevant information, including system capacity, price, mode of payment, location/address of customer, maintenance, *etc*. Information of the agreements will be collected and compiled every month by the implementer.

[23] See http://www.idcol.org/contact-LPO,%20CPO,MPO.php, http://www.idcol.org/biogass_installation.php.

The local staff of the implementers will be in close touch with the customers, as they will periodically (once every month, during loan payment period which is typically 2 years, typically) visit the customers' houses both to collect the installments and to attend to any servicing requirements. For example, GS has its 5-year warranty of the biogas digester and will keep maintenance as requested by the digester owner even after the end of the warranty. It is contracted that as soon as the digester is not operational, the owner shall notify the implementer as soon as possible.

Under the (stratified) management structure, information detailing the agreements, installations, loan recovery and maintenance and other PoA-specific information is prepared every month by each implementer. The related database is constructed by the implementer consistent with the formats prepared by IDCOL.

(2) A record keeping system for each CPA under the PoA:

A well-designed record keeping system in full compliance with all relevant standards of the CDM EB[25] and the Bangladesh DNA will be operated for a timely completion of all activities in line with the project schedule and in accordance with the project objectives. The record keeping system consists of the method of data collection, the duty and roles of each player and the database including but not limited to schedule and ID number for each CPA, objective period for installations, size of each CPA, all necessary information/data of every single household in each CPA including:

For biogas digester:

- Name of implementer installing the digester
- ID number of the biogas digester,
- Name of the digester owner and address,
- ID number of the CPA,
- Biogas generation capacity of the biogas digester,
- Starting date of operation (= commencing date of using biogas defined as the date when the first down payment (instalment against loan) was collected),
- Status of operation (*incl*. maintenance record),
- Status of sludge and slurry treatment,
- User households ID number of the biogas (including owner's household),

and other information not necessary for CDM, such as

- Ordered equipment of the system (spec, price, *etc*.)
- Contract type,
- Payment status
- Feedstock type and approximate number of cattle and/or chickens, and
- Whether power generator is introduced (if yes, whether it is in off-grid area).

[25] These include "Clean Development Mechanism Project Standard", "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" and related measures for operation and management of Clean Development Mechanism Projects in Bangladesh.

For user household:

- ID number of the household,
- Name of targeted household representative, address and other household-related information,
- Digester ID from which biogas is delivered,
- Whether the household used ICS,[26] and
- Number of biogas cookstove burners.

It is noted that household ID and biogas digester ID shall be separately treated. One digester may deliver biogas to plural households (including owner's household) based on micro-utility model.

It is also noted that the management system does include other information than the required ones for CDM PoA. IDCOL and other organizations will consider which information/data are to be reported in addition to the ones needed for CDM.

In case some data is missing, a conservative number is applied for the calculation of emission reductions.

Related responsibilities and tasks of participants under the record keeping system are described in the Table 2 below.

Table 2: Responsibilities and tasks of players involved in the PoA

	Player(s)	Processes
Coordination of the PoA	IDCOL	IDCOL, as the CME, supervise implementers and will receive the relevant information provided by the implementer.
Ex ante and *ex post* data collection	Each implementer	Implementers conduct data collection. IDCOL specifies the required data/information to be collected before start and/or during implementation of each CPA.
Data storage and management	IDCOL are responsible for data storage and management in terms of: – Develop database format of CPA – Check the reported data from each implementer – Calculate emission reductions based on the data reported by implementers – Implement data management of covered	All collected data/information by implementers are submitted to IDCOL. IDCOL compiles the data in its database. The database is used by IDCOL for review of inclusion of CPAs including avoidance of double counting. IDCOL also merge CDM-related record and documentation control process to its exiting one.

[26] In this case, the emission reductions associated with ICS use is subtracted from the calculation of emission reductions in a conservative manner (see E.6.).

	CPAs – Store and maintain records	
Communication and reporting	– IDCOL – Implementers – Households	Communication and reporting are conducted as per the managing and operating system formed based on the IDCOL's MRV system. IDCOL is responsible for coordinating between project implementers and communicating with DOE and CDM EB supported by PEAR. Implementers report collected information to IDCOL. Households report all related information to the implementer.
CDM training and capacity building	IDCOL develops and establishes training program for the implementers and households	Implement seminars for implementers and provide guides to households to meet the needs of the monitoring plan. These are integrated to existing training system under NDBMP.
PDCA cycle	– IDCOL	IDCOL review each type of CPAs and the PoA as a whole annually and assess the performance as its integrated part of the Users Survey. If necessary, it revises the current programme. The changes of the programme scheme are to be described in the monitoring plan by IDCOL.

(3) A system/procedure to avoid double accounting *e.g.*, to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA:

As specified in the eligibility criterion (3), it is checked at the time of CPA inclusion that any biogas digester system under the CPA does not belong to another CPA under this PoA or another registered CDM project activity or another CDM PoA.

It is also checked whether there is any other CDM activity (targeting household-level cooking energy) that targeted the same households covered by the CPA proposed. The CPA may include the household covered by the existing CDM PoA 4791 for ICS but includes a procedural arrangement to avoid double counting, *i.e.*, a checking system is introduced whether the household has already installed ICS (under registered PoA 4791 as well as by non-CDM programmes or independently). If so, the emission reductions for the households are discounted by subtracting the relevant CO_2 emission reductions by the ICS activities in a conservative manner.

(4) The SSC-CPA included in the PoA is not a de-bundled component of another CPA or CDM project activity:

"Guidelines on Assessment of De-bundling for SSC Project Activities (ver. 03)" specifies that:

If each of the independent subsystems/measures (e.g., biogas digesters, residential solar energy systems, kerosene or incandescent lighting replacements) included in one or more CDM project activities is no greater than 1% of the small scale thresholds defined by the applied methodology and the subsystems/measures are indicated in the PDDs to be each implemented at or in multiple locations (e.g., installed at or in multiple homes) then these CDM project activities are exempted from performing a de-bundling check, i.e., considered as being not a de-bundled component of a large scale activity.

The largest 100 m^3/day biogas digester (independent subsystem) under a CPA of the PoA generates around 22 kW_{th} in average. This figure is much less than 1% of the threshold of small scale CDM project (450 kW_{th}). Therefore, any CPA of the PoA is exempt from performing a de-bundling check.

(5) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA:

Any CPA under the PoA is recommended and planned by IDCOL and PEAR. Moreover, as explained in Table 2 above, under the record keeping system, the implementers are to have a contract to undertake biogas digester penetration activities under the PoA—under supervision by IDCOL—are well aware of and have agreed to their activity under the PoA.

A.4.4.2. Monitoring plan:

>>

(i) Description of the proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA.

The procedures below shall be applied for verification of emission reductions for plural CPAs if every CPA will not be verified each-by-each.[29]

Suppose
- N: number of CPAs to be verified
- i: suffix to specify each CPA
- ER^{MR}_i: emission reduction specified in the monitoring report of CPA_i
- ER^{V}_i: verified emission reduction of CPA_i
- ER: total emission reductions of all CPAs through the procedures

Step 1: Select all CPAs as a group or 16 CPAs in a random manner as a sample group.

Step 2: Undertake desk review of the monitoring reports of the (sample) group based on the applicable requirements of paragraph 62 of the CDM modalities and procedures.

Step 3: In case the desk review process found some inconsistencies with the monitoring plan or incompleteness of one or more CPAs, the DOE shall ask the project participant to re-check and re-submit monitoring reports of all CPAs. Then, start with Step 1 again.

Step 4: Undertake on-site assessment of one or more CPA in the group. The DOE can choose any CPA in the group, preferably a CPA with unclear descriptions in the monitoring report or large CPA in the group. In case the DOE finds some significant problems, it shall ask the project participant to settle the issues and may ask to re-check and re-submit monitoring reports of all

[29] It is noted that the procedures does NOT describe the verification procedures of each CPA.

CPAs as needed.

Step 5: If all is settled in Step 4, undertake a numerical evaluation of the data and calculations specified in the monitoring reports of the CPAs in the sample group. Compile the verified results (shaded cells) in a following tabular format:

CPA ID in the sample group	ER^{MR} (after Step 4)	ER^{V}	$\Delta = (ER^{MR}-ER^{V})/ER^{V}$	$er = ER^{MR}$/(number of households)
1				
2				
3				
...				
16				
Average	–	–	Δ^{AV}	er^{AV}

Step 6: For all N CPAs (monitoring reports), assess distribution of the mean value of emission reductions per household. For CPAs with the value above two times the standard deviation (under the 95% confidence interval), assess the monitoring report whether the reason is clearly shown. If not, the DOE shall ask the project participant to describe it in the monitoring report.

Step 7-1: If Δ^{AV} is negative or zero, the procedures recognize that aggregated $\sum_i ER^{MR}_i$ (after Step 4) over N CPAs is verified as ER.

Step 7-2: If Δ^{AV} is positive, verified ER over N CPAs is recognized as $(1 - 1.5*\Delta^{AV}) * \sum_i ER^{MR}_i$.

Rationale of the above verification procedures:

The procedures aim to provide efficient but reliable verification for many CPAs. The analysis is based on the emission reductions provided in the monitoring report and its verified value. If they are the same or conservative, the results of the monitoring reports are acceptable. If not, statistical adjustment with a conservative factor is applied.

Statistical testing theory shows that the sufficient number of sample group n is

$$n \geqq \left(\frac{Z_{\alpha/2}}{d}\right)^2 \sigma^2$$

where α is the significance level, d is the error level, σ is the standard deviation and $Z_{\alpha/2}$ is the value where upper probability is $\alpha/2$ for normal distribution.

Let $\alpha = 5\%$ ($Z_{\alpha/2} = 1.96$) and $d = 5\%$, $\sigma = 0.1$, then the above formula will be $n \geq 15.3$.

As the assessment is for the normalized amount of emission reductions, and the emission reductions for each CPA is simple summation of that of households in the CPA (and double checked for extreme cases in Step 6), it is conservative enough to set the standard deviation as 0.1 for the gap between ER^{MR}/ER^{V} and 1.

As the distances among the villages are very long and time-consuming for travel, it is unrealistic to visit plural villages. The DOE can choose any CPA based on its expertise.

In case $ER^{MR} > ER^{V}$, the adjustment factor is applied to reduce the value of emission reductions with the conservative factor 1.5.

(ii) In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA (whether in groups or not, with different or identical verification periods) a transparent system is to be defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA;

Not applicable.

Project participants do not opt for the sampling of CPAs necessary for verification.

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

>>

Since a part of the PoA (currently, biogas digesters up to 4.8 m^3/day) is undertaken as the IDCOL program (NDBMP), public funding is used mainly for the source of micro-financing (loan) which provides flexibility for the households for initial investment.[30] It is expected that around 80% of the households requires the loan. Designing the loan scheme is dependent on each partner organization (such as GS) of the IDCOL.

The current subsidy covers about 25% of the total investment requirements by households (biogas digester owners). The subsidy rate will be 9,000 Taka per plant (per household). Currently, the total subsidy amount required for the programme period is Euro 2.5 million of which KfW will provide 85% while the rest 15% will be contributed from the Government of Bangladesh. The total budget required to implement the NDBMP over 3 years (2010–12) will be Euro 10.76 million.[31]

IDCOL specifies the carbon financing opportunities by CDM as an attractive and sustainable source of funding. GS, which contributed around 57% (12,795 out of 22,549 biogas plants) of total construction up to April 2012, got approval by IDCOL to undertake CDM activities. It is noted that the PoA may cover activities of other partner organizations of IDCOL and also it covers larger biogas digesters (> 4.8 m^3/day) not yet covered by IDCOL's program.

It is also noted that any Annex I Party government will not obtain CERs in compensation for the ODA.

[30] It is noted that IDCOL nor GS do not invest in the biogas digesters. Each household invests (in many cases by utilizing the micro-financing scheme operated by GS). CER revenue will be used for the programme (*i.e.*, used for the households). This is completely different from typical CDM project where project owner invests and obtain the revenue from CERs.

[31] National Domestic Biogas and Manure Programme Implementation Plan 2010–12, IDCOL, Dec. 2009. http://www.idcol.org/Download/20100105 Implementation Plan 2010_12 NDBMP IDCOL1.pdf. It says (p.20):

Out of the total amount required for implementing the programme, Government of Netherlands/DGIS/ABP provides Euro 1.35 million for programme operation cost whereas Government of Bangladesh is expected to contribute about Euro 0.37 million on part of subsidy at the rate of 15 percent of subsidy amount while KfW fund of about Euro 2.1 million will be utilized for covering the subsidy for the period of 2010-–2012. In addition KfW will also provide Euro 3.1 million for refinancing.

SECTION B. Duration of the programme of activities (PoA)

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

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The starting date of operation for the first CPA. This date is 13/12/2011.

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

>>

28 years 0 month

SECTION C. Environmental Analysis

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C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☑
2. Environmental Analysis is done at SSC-CPA level ☐

Biogas digester promotion projects are seen to have few negative impacts on environment. Especially domestic biogas digester promotion projects are implemented at household level and their impact on environment is identical in most extension regardless of location; therefore, environmental clearance certificate will be gained at the PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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It is noted that no environmental impact assessment is required by the Government for the activities implemented under the PoA. In reality, we see few negative impacts.

For benefits, biogas is a reliable, affordable, easy and a very useful source of household energy; hence, it is also a stable source of energy. In addition, biogas has several benefits. These benefits are the main motivating factors for households to use biogas.

Based on the findings of the survey by IDCOL/SNV, the assumed benefits from biogas are briefly discussed below[32]:

Gender benefits:

Biogas provides a direct benefit, especially to rural women, as a result of the reduction of the workload when shifting from cooking on conventional biomass to biogas.

Biogas is quicker and easier for cooking than biomass. Moreover, biogas is smokeless and does not require constant attention while cooking; therefore, women can do other activities simultaneously.

On average, biogas enables to save approximately 1 hour and 5 minutes per day per family due to the reduction of time used for collecting biomass, cooking and cleaning of utensils; this saved time can be used for childcare, income generating activities, education, recreation and other social works.

Environmental benefits:

From an individual perspective, the use of biogas significantly improves the indoor air quality by the avoidance of black carbon. In addition, construction of biogas plants results in better living condition due to appropriately treated solid wastes and avoiding bad smells in and around the community near landfills.

[32] Implementation Plan National Domestic Biogas and Manure Programme in Bangladesh, by Infrastructure Development Company Ltd (IDCOL) and Netherlands Development Organization (SNV).

It reduces a considerable amount of greenhouse gases from two perspectives: the carbon released from burning of biomass is minimized; and the saved forest can act as a sink-basin to absorb carbon dioxide.

Health benefits:

A major problem for rural people especially for the housewives is indoor air pollution due to exposures to smoke inside the kitchen while cooking with biomass.

Poor indoor air quality (especially black carbon) is one of the major risks factors for acute respiratory infections especially with housewives and children. Biogas reduces the smoke exposures and significantly improves the air condition inside the kitchen which will ultimately improve the health conditions by reducing the incidences of eye infection, respiratory diseases, coughing, dizziness and headache.

IDCOL expected that better sanitation (toilets) is for around 20% of the total households, while reduction of indoor air pollution is for all households.

For the user's perception on merits, see the survey results shown in Table 3 below:

Table 3: User's perception on merits of biogas plant[33]

Benefits	Rank	Mean
Easy and comfortable cooking	1	19.66
Environment friendly/Protection of forest	2	17.46
Saves time and workload	3	17.30
Nutrient rich fertilizer	4	12.14
Economically beneficial	5	11.78
Health benefits	6	8.58
Fuel saving	7	8.46
Comfort in cleaning cooking vessels	8	8.34
Utilizes waste materials	9	8.02
Readily available cooking fuel	10	7.24
Eliminates the problem due to wet-firewood during rainy season	11	5.26
Encourages livestock development	12	4.72
Easy to handle/operate	13	4.14
Enhances prestige in society	14	4.00
Clean kitchen and cooking environment	14	4.00

[33] Final Report on Technical Study of Biogas Plants Installed in Bangladesh, Report submitted to IDCOL/SNV, P.C. Ghimire, Dec. 2005. (http://www.idcol.org/Download/Final_Survey_Report_Bangladesh.pdf) Survey was conducted as follows (Sect. 4.5.2):

Users were asked to mention three main merits and demerits of biogas plants based upon their experience with the technology. Weights were then allocated according to the number of responses. The highest was given 20 points while subsequent answers were allocated 19,18,17... points each.

Safe to use	16	3.98
Helps to enhance quality of rural life	16	3.98
No need of storage place for firewood	16	3.98
Reduces foul odor from poultry farm	19	3.80

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

>>

In "The Environment Conservation Rules of Bangladesh" the industrial units and projects, in consideration of their site and impact on the environment, are classified into the following four categories:

(a) Green (Environmental Clearance Certificate (ECC) will be issued to all existing industrial units and projects and to all proposed industrial units and projects falling in the Green Category);

(b) Orange – A (For industrial units and projects falling in this category firstly a Location Clearance Certificate and thereafter an ECC shall be issued)

(c) Orange – B (For industrial units and projects falling in this category firstly a Location Clearance Certificate and thereafter an ECC shall be issued. Initial Environmental Examination (IEE) is need);

(d) Red (For industrial units and projects falling in this category firstly a Location Clearance Certificate and thereafter an ECC shall be issued. Environmental Impact Assessment (EIA) is needed).

Biogas digester promotion projects have not been included in the list of either category. To date, the government of Bangladesh has never requested IDCOL, GS or other organization to undertake environmental impact assessments for the microscale biogas digesters.

SECTION D. Stakeholders' comments

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D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☑
2. Local stakeholder consultation is done at SSC-CPA level ☐

Since CPAs under the PoA will be implemented dispersedly in all rural Bangladesh, which is also the geographical boundary for the PoA and the program design, distribution and implementation aspects including the CDM issues are essentially uniform across the country with no CPA specific characteristics, hence it is appropriate to conduct a stakeholder consultation at a PoA level. It is undertaken on 03/10/2011 in Mowna, Gazipur.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

As per CDM and the Gold Standard requirement and procedure, the local stakeholder consultation meeting was held on 3 October 2011, at the Conference room of Proshiku Training Center in Mowna, Gazipur, Bangladesh. Stakeholders were invited by invitation letters, e-mails and posters. Participants included representatives from both Project Participants, local NGOs, biogas digester experts, households and poultry farm owners. Invitations and attendance lists are available upon request. As the programme is also applied for the Gold Standard, therefore the local stakeholder consultation was conducted as per requirements of the Gold Standard process. A brief programme introduction was given by the representatives of the project participants followed by giving clarifications to questions and comments. The floor was then open for the stakeholders for their sustainable development assessment on the programme and then for evaluation the consultation process.

Figure 8: Local stakeholders' meeting

D.3. Summary of the comments received:

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Total 39 participants attended the local stakeholders consultation process and during the open/discussion session the most of the potential poultry farm owners unfolded their interests to have access to microcredit facility for installation of biogas digesters with the size (capacity) of above 4.8 m^3/day. Till now, GS, under IDCOL program, has been offered microcredit facility to the biogas digesters below 4.8 m^3 in capacity. Stakeholders also requested clarifications of benefits for them from the programme. All participants showed their positive attitudes to the programme and there were no comments regarding objections to the proposed PoA.

D.4. Report on how due account was taken of any comments received:

Comments of stakeholders and due accounts of the comments received are given in the table below. All comments are clarified to the local stakeholders.

Table 4. Assessment of Comments

Stakeholders' comments	Was comment taken into account (Yes/ No)?	Explanation (Why? How?)
Is there possibility to provide subsidies for the biogas digesters bigger than 4.8 m^3 in capacity?	Clarification	Under the current IDCOL program there has been no subsidy for the biogas digesters bigger than 4.8 m^3 in size; we would like to propose expansion of subsidies for bigger size biogas digesters to IDCOL. Moreover, the PoA will encourage installation of bigger digesters through the micro utility scheme.
What are the benefits from the program?	Clarification	For households, additional carbon benefit will ease their loan burden. For poultry farmers, the additional carbon benefit will also is used to ease their risks in some extent. Furthermore, some portion of the carbon benefits could be used for sustainable maintenance and management of biogas digesters that will also minimize technical risks on the lifetime of biogas digester operation.
How to deal with the sludge and slurry?	Clarification	The sludge and slurry can be used as organic fertilizer/soil conditioner to one's own field or can be sold to others if one has no own field. Regarding organic fertilizer sales, Grameen Shakti who has a license for selling organic fertilizer, will provide support to biogas digester owners in the terms of information and other issues.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

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AMS-I.E. (ver. 05) "Switch from non-renewable biomass for thermal applications by the user"

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

>>

In the proposed CPAs, GHG emission reduction is gained mainly through replacing non-renewable biomass with renewable biogas. Therefore, the methodology of AMS-I.E will be applied for CPAs under the PoA.

Justification of applicability of the methodology is given in the table below.

Table 5: Justification of applicability of the methodology

Applicable conditions	Justifications
AMS-I.E.	Typical CPA
1. This category comprises activities to displace the use of non-renewable biomass by introducing renewable energy technologies.	1. The CPA is to employ domestic biogas digesters to produce biogas and provide to households for thermal use through replacing non-renewable biomasses with renewable biogas.
2. Project participants are able to show that non-renewable biomass has been used since the 31st of December 1989, using survey methods.	2. Since the 1980s, Bangladesh has been facing steady population growth, placing pressure on the forest resources. A study conducted in Bangladesh between 1986 and 1998 published by the Federal Research Division of the Library of Congress, found that deforestation conditions, and thus the use of non-renewable biomass, existed in the 1980s.[34]
3. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW_{th}.	3. This is a designing point of each CPA. This condition will be confirmed by the DOE based on an eligibility criterion (5) of the CPA.

[34] http://www.countrystudies.us/bangladesh/72.htm

E.3. Description of the sources and gases included in the SSC-CPA boundary

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The boundary of a CPA is the geographical areas where the domestic biogas digester systems are installed and targeted households are located. The GHGs and sources being considered within the boundary are concluded in the table below.

Table 6: Emission sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from non-renewable biomass use	CO_2	Yes	Major emission source
		CH_4	No	Not significant. Excluded for simplification
		N_2O	No	Not significant. Excluded for simplification
Project Activity	CO_2 emissions from non-renewable biomass use	CO_2	Yes	In case household still uses non-renewable woody biomass after use of biogas
		CH_4	No	Zero emission source
		N_2O	No	Zero emission source

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>>

The methodology utilizes the following baseline scenario for calculation of emission reductions:

– It is *assumed* that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs (Paragraph 4 of AMS- I.E, ver.05)

Baseline determination for AMS-I.E.

The baseline scenario for AMS-I.E can be determined as follows.

All possible options (for thermal energy demand mainly for cooking) comply with all applicable and enforced legislation, technically feasible and accessible for households as the main energy source include:

(a) Continuation of current practice (use of fuel wood as the main fuel);

(b) Fossil fuels currently not used mainly (LPG, coal, fuel oil, kerosene, *etc.*);

(c) Grid electricity;

(d) Renewable biomass (tree leaves, crop residue, dung, sawdust) use;

(e) Use of renewable energy from biogas digester.

(f) Use of other renewable energies.

Options (b)–(g) implies *fuel switch* from the current practice. Based on many literatures, *e.g.*, reports shown in the footnotes 1, 2 and 3, households in rural Bangladesh currently use mainly biomass (non-renewable and renewable), because these fuels are the only accessible fuels in the region. Figure 9 below shows around 99.9% of the cooking (including parboiling) energy comes

from biomass.[3]

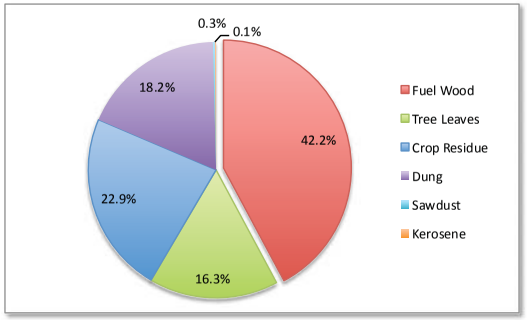

Figure 9: Household energy consumptions for cooking and parboiling in rural Bangladesh[3]

The survey shows that most households have not used fuel oil or kerosene for cooking, because the fuels are expensive to access and moreover the fuels are not suitable for cooking. Therefore, in option (b) switching to coal, fuel oil or kerosene cannot be an applicable scenario as a baseline.

Electricity has not been used for cooking at households in rural Bangladesh due to the costs of electronic cooking appliances and the use of electricity itself. It is also noted that only 30% of rural households can access to grid electricity.[35] Therefore, option (c) cannot be a credible scenario for a baseline.

Renewable biomass, which is outside of the fuel market, is used as supplemental fuel. However, switching from fuel wood to other biomass is difficult because of the lack of supply (with high burden for collection) and difficult accessibility. Therefore, option (d) also cannot be a baseline scenario.

It is difficult for households to install biogas digesters by themselves outside of the IDCOL program. Moreover, 84 million people live in rural area of Bangladesh. Only 0.7% of people have enjoyed the benefits of the biogas so far.[36] "Guidelines for objective demonstration and assessment of barriers" (ver. 01) specifies that the barrier can be demonstrated by showing the penetration rate of the technology in similar circumstances (Guidance 3). Therefore, option (e) cannot be a baseline scenario.

Because of the high cost to install solar energy or wind energy, and also unsuitable for cooking purposes, it is difficult for rural households to switch to them. Therefore, option (f) cannot be a

[35] See, *e.g.*, http://www.worldenergyoutlook.org/database_electricity/electricity_access_database.htm.

[36] It is uncertain how many households have introduced biogas digesters in Bangladesh. Considering GS's accumulated installation number to date as 20,000 as well as pre-NDBMP number (around 25,000 as shown in Annex 6 of "Implementation Plan—National Domestic Biogas and Manure Programme in Bangladesh", 2006 http://www.idcol.org/newse/download/Final%20%20NDBMP%20implementation%20Plan_25%20May,2006_.pdf), there may be less than 70,000 digesters. Assuming that there are around 10 million households, the biogas digester has penetrated 0.7% of households nowadays. It is noted that "Guidelines for objective demonstration and assessment of barriers" shows the application of the Guidance 3 by using an example of 10%. Therefore, 0.7% is strong enough to demonstrate the existence of the prohibitive barriers.

baseline scenario.

Therefore, continuation of current practice seems to be the most plausible scenario for baseline.[37].

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

If a CPA that employs renewable energy under the PoA is up to 5 MW_e, then the CPA is demonstrated to be additional by following the Guidelines specified in "Guidelines for demonstrating additionality of microscale project activities" (version 03) approved in the 63th meeting of EB.

The Guidelines states:

Paragraph 2 (c). The project activity is designed for distributed energy generation (not connected to a national or regional grid)[38] with both conditions (i) and (ii) satisfied;

(i) Each of the independent subsystems/measures in the project activity is smaller than or equal to 1500 kW electrical installed capacity;

[37] The most plausible baseline fuel is continuation of current practice, *i.e.*, non-renewable biomass (fuel wood). Therefore, *theoretically* it is correct to use the CO_2 emission factor of the non-renewable biomass in the calculation of emission reductions. However, the methodology does not allow to use such emission factor but requests to use that of (most plausible) fossil fuel by *assuming* that the use of such fossil fuel is the baseline scenario (para. 4 of the methodology). AMS-I.E ver. 04 specifies the default factor as 81.6 tCO_2/TJ.

Historical background of this un-theoretical treatment is the requirement by the Marrakech Accords (Modalities and Procedures for CDM; Decision 17/CP.7): "(CMP) decides: (a) That the eligibility of land use, land-use change and forestry project activities under the clean development mechanism is limited to afforestation and reforestation" (para. 7). Switching from non-renewable biomass to renewable energy is to reduce CO_2 but it may be recognized also as a "land use, land-use change and forestry"-type project activity.

After two years' negotiations, CMP 3 decides that "24. (CMP) *Requests* the Executive Board to approve, at its first meeting in 2008, the simplified methodologies for "Switch from non-renewable biomass for thermal application by the user" and "Energy efficiency measures in thermal applications of non-renewable biomass", as recommended by the Executive Board, for use for clean development mechanism project activities, as contained in annexes 3 and 4 to document FCCC/KP/CMP/2007/3 (Part II), incorporating the necessary changes to ensure that the application of these methodologies introduces new or improves existing end-user technologies and that, in the case of the methodology "Energy efficiency measures in thermal applications of non-renewable biomass", the baseline energy efficiency is measured or is based on referenced literature values" (Decision 2/CMP.3).

Therefore, a *skewed* treatment is incorporated in the methodology such as "It is *assumed* that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs (Paragraph 4 of AMS- I.E, ver.04)" even if the real baseline scenario is continuation of use of non-renewable biomass. The "CDM methodology booklet" prepared by the CDM Secretariat also shows that the real baseline is continuation of non-renewable biomass use.

It is noted that the CO_2 emission factor of the (non-renewable) biomass is around twice of that of LPG (63.0 tCO_2/TJ). Therefore, this treatment is very conservative.

[38] This means that projects applying AMS.I-D are not eligible.

(ii) End users of the subsystems or measures are households/communities/small and medium enterprises (SMEs).

The Guidelines also states that:

Paragraph 6. Project activity' in paragraphs 2–4 means a small scale or large scale CDM project activity or a project activity under a programme of activities (CPA of a PoA).

Because the capacity of each household biogas cookstove (independent sub-system) is around 1.65 kW_{th} (for single burner), *i.e.*, much less than the threshold 1,500 kW_e (4,500 kW_{th}) and all end users of the sub-systems are households that each CPA satisfies the condition stipulated in the "Guidelines for demonstrating additionality of microscale project activities".

Therefore, according to the Guidelines mentioned above, any CPA under the PoA is additional.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

As mentioned in section E.5.1, the additionality of a CPA under the PoA can be cleared if conditions given in "Guidelines for demonstrating additionality of microscale project activities" are satisfied. Bangladesh is a LDC country. So if a CPA belongs to the microscale project activity category or not becomes the key criterion to judge the additionality of the CPA. Key data or information and criteria in assessing additionality are also provided in Table 7 below:

Table 7: Key Criteria for Assessing Additionality of a CPA

Steps	Key data/information	Key criteria
Step 1. Check thermal capacity of biogas cookstoves under the CPA	Aggregated thermal capacity of all biogas cookstoves under the CPA	Less than 15 MW_{th}

E.6. Estimation of emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

>>

Selection of options in the AMS-I.E. (ver. 05)

According to the methodology (AMS-I.E., ver. 04), emission reductions ER_y is calculated as:

$$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel} \quad (1)$$

where

B_y : Quantity of woody biomass that is substituted or displaced (ton). See the calculation method below.

$f_{NRB,y}$: Fraction of woody biomass used in the absence of the project activity that can be established as non-renewable biomass using survey methods or government data or approved default country specific fraction of non-renewable woody biomass values available on the CDM website (no dimension). Fixed (time-independent)

parameter. See the definition below.

$NCV_{biomass}$: Net calorific value of the non-renewable woody biomass that is substituted. IPCC default factor for wood fuel (0.015 TJ/ton) is applied.

$EF_{projected\_fossilfuel}$: Emission factor for the substitution of non-renewable woody biomass by similar consumers. Default value of 81.6 tCO_2/TJ is applied per the methodology.

For calculation of B_y, option (a) is applied:

(a) Calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year); This can be derived from historical data or estimated using survey methods.

It is noted that SSC_538 clarified that

The SSC WG agreed to clarify that the expression "per appliance" does not preclude the survey to be done "per household". As long as it is known how many appliances there are in the surveyed households, the data per household may be used in the calculation. However, the data per household may need to be corrected if the service provided by the project technology is only part of the service provided by the biomass in the baseline, e.g. a biogas cooking stove is introduced whereas biomass in the baseline has been used for both cooking and room heating.

For $f_{NRB,y}$, it is defined as

$$f_{NRB,y} = NRB / (NRB + DRB) \quad (2)$$

where

NRB : Share of non-renewable woody biomass used in the absence of the project activity,

DRB : Share of (demonstrably) renewable woody biomass used in the absence of the project activity.

For leakage, we choose option (c) specified in the methodology:

(c) As an alternative to subparagraphs (a) and (b), B_y can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

Specific elements for this PoA

Evaluation of B_y

B_y is the aggregated mass of woody biomass *substituted* by the CPA, *i.e.*, aggregated baseline woody biomass consumption ($B^{BL}{}_y$) *minus* aggregated project woody biomass consumption ($B^{PJ}{}_y$):

$$B_y = (B^{BL}{}_y - B^{PJ}{}_y) \cdot 0.95 \quad (3)$$

taking account of the leakage factor 0.95 for B_y.

It is *apparent* that summation over appliances (cookstoves) is *identical to* summation over user

households for a CPA.[39]

Let us consider the baseline woody biomass consumption ($B^{BL}{}_y$) first:

$$B^{BL}{}_y = \sum_{cookstove} (\text{baseline woody biomass consumption per cookstove})_y$$
$$= B_{HH}{}^{BL} \cdot N^{OP}{}_{HH,y} \quad (4)$$

where

$B_{HH}{}^{BL}$: Baseline woody biomass consumption per household in a year [ton]. This parameter is fixed by using a reliable survey report.

$N^{OP}{}_{HH,y}$: Number of user households which successfully utilizing the biogas from an operating biogas digester in the CPA in a year y. This factor can be a fraction if some digester is out of order for a certain period and is adjusted to the starting date of operation (as shown below).

It is noted that if some biogas digesters are out of order or not be used, they are not included in the calculation.

The parameter $B_{HH}{}^{BL}$ is set as the default as specified by the SSC WG on standardized approaches for facilitating the baseline emission calculations under AMS-I.E,[40] the regional default value for Asia (excluding high forest areas and mountainous areas) is applied:

$$B_{HH}{}^{BL} = 3.29 \text{ [ton of fuelwood consumption per household per year]} \quad (5)$$

This default value is tentative one and to be replaced by a new one when the CDM Executive Board approve it.

It is noted that even if some biogas is used for power generation, this is not counted for emission reductions (by counting diesel power replacement, *etc.*) This treatment is conservative.

For the project woody biomass consumption ($B^{PJ}{}_y$), we recognize that most biogas users do not use woody biomass anymore after use of biogas except for some climatic events. Therefore, even if it exists, it is a minor portion in the calculation of emission reductions.

IDCOL will undertake a survey for more than 100 current biogas users annually (as a component of its Annual Biogas Users Survey) whether they used woody biomass and if used, how much it was during the latest year.

$$B^{PJ}{}_y = B_{HH}{}^{PJ}{}_y \cdot N^{OP}{}_{HH,y} \quad (6)$$

$$B_{HH}{}^{PJ}{}_y = \text{Average}_j (B_{HH,j}{}^{PJ}{}_y) + 1.96 \cdot (1/(N_{sample,y})^{1/2}) \cdot \sigma^{PJ}{}_{sample,y}] \quad (7)$$

where

$B_{HH}{}^{PJ}{}_y$: Project woody biomass consumption per household in a year y in

[39] This implies that the number of (conventional) cookstoves per household is a *dummy* parameter, *i.e.*, no need in the calculation of emission reductions. However, since it is required by SSC_538, some report will be looked for which will be specified in the first monitoring report.

[40] See http://cdm.unfccc.int/Panels/ssc_wg/meetings/033/ssc_033_an08.pdf.

average [ton]. This parameter is monitored by IDCOL by undertaking a sample survey of more than 100 households which have been using biogas already in order to keep (95/10) confidence/precision level for the sampling method.[41].

$N_{sample,y}$: Number of sample biogas user households covered by the annual sampling survey.

$B_{HH,j}{}^{PJ}{}_{y}$: Project woody biomass consumption for household j covered by the sample survey in a year y [ton/year].

$Average_j\ (X_j)$ $Average_j\ (X_j)$ implies the average value of X_j over j.

$\sigma^{NOP}{}_{sample,y}$: Standard deviation of the sampling survey of $B_{HH,j}{}^{PJ}{}_{y}$ for a year. This factor is for conservativeness. The factor 1.96 is for the confidence level of 95%.

It must be noted that we do not include the case where biogas is not used due to some trouble of the biogas digester, *etc.*, by multiplying the factor $N^{OP}{}_{HH,y}$.

$N^{OP}{}_{HH,y}$ is the most important and time-dependent parameter. It is an aggregation of each household:

$$N^{OP}{}_{HH,y} = (1/365) \cdot r^{OP}{}_{y} \cdot \sum_i n_{i,HH,y} \cdot ADJ_{ICS,i} \quad (8)$$

$$r^{OP}{}_{y} = 1 - (1/365)\ [\ Average_j\ (n^{NOP}{}_{HH,j,y}) + 1.96 \cdot (1/(N_{sample,y})^{1/2}) \cdot \sigma^{NOP}{}_{sample,y}\ ] \quad (9)$$

$$ADJ_{ICS,i} = 1 \quad \text{(if the household } i \text{ is not an ICS ex-user) } or$$
$$= (1 - 1.1 \cdot ER_{ICS}/3.83) \quad \text{(if the household } i \text{ is an ICS ex-user)} \quad (10)$$

where

$r^{OP}{}_{y}$: Ratio of user (including owner) households supplied by properly operating digesters in a year y. This factor reflects malfunction state and discarded state of the digesters. This ratio is determined by annual survey of more than 100 households in order to keep (95/10) confidence/precision level for the sampling method.

i : Index to denote each household belonging to the CPA. This is based on the report prepared by each implementer *ex post* to IDCOL and compiled in the database of IDCOL. All households of the CPA are covered.

$n_{i,HH,y}$: Number of days during which user household (specified as i) utilizing the biogas from a biogas digester in the CPA in a year y. It reflects the starting date of operation if the digester started within one year. If the digester has been operated more than one year, $n_{i,HH,y} = 365$ for the household i.

[41] (95/10) is sampling requirements for PoA for (confidence/precision) by "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities" (ver. 02.0) as well as shown in AMS-I.E (ver. 05). We consider that this requirement should be for "principal" parameter of emission reductions. In other words, it is meaningless to require this level for "minor" correction factor, in theory. However, we apply this level for minor correction factors in this document because no such theoretical consideration is provided in the Standard.

$N_{sample,y}$: Number of sample biogas user households covered by the annual sampling survey. This number should be more than 100.

$n^{NOP}{}_{HH,j,y}$: Number of days during which the supplying digester is not operated for household j covered by the sample survey in a year y.

j : Index to denote each household belonging to the sample group to be undertaken in the Annual Biogas Users Survey. (*cf*: i above denoting household index of all households in the CPA)

$\sigma^{NOP}{}_{sample,y}$: Standard deviation of the sampling survey of $n^{NOP}{}_{HH,j,y}$ for a year. This factor is for conservativeness. The factor 1.96 is for the confidence level of 95%.

$ADJ_{ICS,i}$: Adjustment factor concerning the ex-user of improved cookstove (ICS) for the household i.

ER_{ICS} : Annual Emission reductions by ICS introduction per household. The value will be obtained from the first verification report of the ICS PoA 4791.

1.1 : A conservative factor (10%) for adjustment related to ICS.

3.83 : Annual emission reductions per household without ICS without project emissions as provided by equation (13).

It is noted that the summation is over the *user households* of biogas and not summation over biogas digesters. Some biogas digester may deliver biogas to several households. On the other hand, judgment of 'operation' is related to the status of the associated *biogas digester*, *i.e.*, $n_i{}^{OP}{}_{HH,y}$ belonging to the same biogas digester is the same, in principle.

It must be noted that the above formula is assuming that a monitoring report and verification would be undertaken for a period of one year. Even if some CPA has been implemented less than a year during the monitoring period, the above formula can be applied because the calculation is based on number of days of operation of each digester and associated households.

Evaluation of $f_{NRB,y}$

According to a unanimous agreement from a range of experts, there are no examples of sustainably managed forest areas, despite the existence of formally protected areas in Bangladesh.

From a study, commissioned by JPMorgan Climate Care conducted in Bangladesh on non-renewable biomass (footnote 2), interviews with wood sellers indicated how collection distances have been increasing radically, with many trucks nowadays travelling more than 100 km with wood fuel cargo.[42] The study also found that wood fuel prices have been rising sharply in recent years, and that the mixing in of secondary fuels (dung, leaves, and crop residue) is partly a result of difficulties in procuring wood. With the strong evidence that land across the country is deforesting rapidly and the absence of any evidence for renewable resources sustainably managed, all woody biomass or fuelwood used in households can be seen as non-renewable biomass (NRB).

In addition, we see that woody biomass is traded in the market. This implies that even if some woody biomass is from sustainably managed forest, the consumption of such renewable biomass

[42] This fact implies that the calculation of emission reduction is conservative by ignoring the transportation-related baseline emissions.

drives avoidance of other person's use of renewable biomass, in theory.[43]

In addition, the PoA-DD of the registered PoA 4971: "Improved Cooking Stoves in Bangladesh (footnote 17), shows the value is 1.0 (page 22–23).

Therefore, we can conclude that

$$f_{NRB,y} = 1.0 \quad (11)$$

in Bangladesh.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

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On the basis of E.6.1, emission reductions ER_y is given by:

$$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel}$$

$$= 0.95 \cdot N^{OP}_{HH,y} \cdot (3.29 - B_{HH}^{PJ}) \cdot 1.0 \cdot 0.015 \cdot 81.6$$

$$= 1.163 \cdot N^{OP}_{HH,y} \cdot (3.29 - B_{HH}^{PJ}) \quad (12)$$

For $N^{OP}_{HH,y}$, please see equations (8)–(10) for definition.

In case $B_{HH}^{PJ} = 0$ and for non-ICS ex-user, per household emission reductions for non ex-ICS user household is calculated as

$$\text{(emission reductions per household)} = 3.83 \text{ [tCO}_2\text{/yr/household]} \quad (13)$$

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	B_{HH}^{BL}
Data unit:	ton/household/year
Description:	Woody biomass consumption per household per year
Source of data used:	Standardized approaches for facilitating the baseline emission calculations under AMS-I.E
Value applied:	3.29
Justification of the choice of data or description of measurement methods and procedures actually	The default value is set by the SSC WG report: http://cdm.unfccc.int/Panels/ssc_wg/meetings/033/ssc_033_an08.pdf This default value is tentative one and to be replaced by a new one when the CDM Executive Board approve it.

[43] This is backed by the fact that the woody biomass is traded in market and the renewable biomass *supply* into the market is limited (and not influenced by the project activity).

applied:	
Any comment:	This value is applied for all CPAs.

Data / Parameter:	f_{NRB}
Data unit:	No dimension
Description:	*NRB*: Share of non-renewable woody biomass used in the absence of the project activity *DRB*: Share of (demonstrably) renewable woody biomass used in the absence of the project activity
Source of data used:	Fraction of non-renewable woody biomass used among whole woody biomass in the absence of the project activity, defined as $f_{NRB} = \frac{NRB}{NRB + DRB}$ where NRB is the non-renewable woody biomass and DRB is the demonstrable renewable woody biomass.
Value applied:	1.0 (JPMorgan Climate Care report and World Bank "Restoring Balance—Bangladesh's Rural Energy Realities")
Justification of the choice of data or description of measurement methods and procedures actually applied:	Because Bangladesh is a LDC, available official documents are limited. Therefore, JPMorgan conducted a comprehensive study considering CDM-specific requirements into account. In addition, the World Bank Report (footnote 3) and other materials (see footnote 2) support this result. This is also supported by the registered PoA 4971: "Improved Cooking Stoves in Bangladesh (footnote 11), shows the value is 1.0 (page 22–23).
Any comment:	–

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/ton
Description:	Net calorific value of the woody biomass
Source of data used:	Methodology
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value specified in the AMS-I.E. (ver. 04)
Any comment:	–

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	t CO_2/TJ
Description:	Emission factor for substitution of woody biomass
Source of data used:	Methodology
Value applied:	81.6

Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value specified in the AMS-I.E (ver.04)
Any comment:	–

Data / Parameter:	ER_{ICS}
Data unit:	t CO_2/household/yr
Description:	Annual emission reductions by ICS introduction per household
Source of data used:	First verification report of registered CDM PoA 4791
Value applied:	To be obtained from above mentioned reference
Justification of the choice of data or description of measurement methods and procedures actually applied:	Most appropriate amount of emission reductions by introduction of ICS can be provided for registered CDM project activity. It is noted that in the calculation of emission reductions, this value is multiplied by 110% (as shown in eq. (10)) in order to provide a conservative estimation. It is also noted that this factor is also applied to ICS ex-users not covered by the above-mentioned CDM PoA in order to provide a conservative figure. The value will be fixed once obtained.
Any comment:	–

Data / Parameter:	n_{CCS}
Data unit:	number
Description:	Number of conventional cookstoves per household
Source of data used:	This parameter is provided by some report/document
Value applied:	To be obtained from above mentioned reference
Justification of the choice of data or description of measurement methods and procedures actually applied:	The report/document is shown at the time of first verification to the DOE. The value will be fixed once obtained. If no report/document is found, a survey is conducted and the result will be described in the first monitoring report.
Any comment:	This parameter is a dummy and not used in the calculation of emission reductions.

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

E.7.1. Data and parameters to be monitored by each SSC-CPA:

The following data are those specific to the CPA:

Data / Parameter:	$N^{OP}_{HH,y}$
Data unit:	Number of user households
Description:	Number of user households which are successfully utilizing the biogas from

	operating biogas digesters in the CPA in a year *y*.
Source of data to be used:	This value is specified in the database of the management of the PoA. This parameter is calculated *ex post* by using the dataset of $n_i^{OP}{}_{HH,y}$ below mainly and other factors. This value can be a fraction if some digester is out of order for a certain period or a digester starts its operation in the middle of the verification period.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	IDCOL constructs a database for the PoA. The database includes the information of the household which introduced a biogas digester and the user households of the biogas digester. This parameter is calculated as an aggregation of each household: $N^{OP}_{HH,y} = (1/365) \cdot r^{OP}_{y} \cdot \sum_i n_{i,HH,y} \cdot ADJ_{ICS,i}$ as shown in eq. (8). (For notations, see the following monitoring items) It also includes the starting date of operation of the biogas digester for $n_{i,HH,y}$.
QA/QC procedures to be applied:	This parameter is automatically calculated in the database.
Any comment:	It is noted that the summation is over the *user household* of biogas and not summation over biogas digester. Some biogas digester may deliver biogas to several households. On the other hand, judgment of 'operation' is related to the status of the associated *biogas digester*, *i.e.*, $n_{i,HH,y}$ belonging to the same biogas digester is the same.

Data / Parameter:	$n_{i,HH,y}$
Data unit:	Number of days
Description:	Number of days during which user household (specified as *i*) is utilizing the biogas from a biogas digester in the CPA in a year *y*.
Source of data to be used:	This parameter is based on the status reports by implementers.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	365
Description of measurement methods and procedures to be applied:	Implementers shall prepare a database of the installation of biogas digesters as well as the user households. The database includes the start date of operation defined as the commencing date of using biogas defined as the date when the first down payment (instalment against loan) was collected. From this date, $n_{i,HH,y}$ is calculated as the remaining number of days during the monitoring period for each user household. If the digester has been operated more than one year, $n_{i,HH,y}$ = 365 for the household *i*.
QA/QC procedures to	Monitoring, recording and reporting by each implementer is integrated to

be applied:	existing IDCOL's management system. Database managed by IDCOL is to collect all the data for calculation of $N^{OP}_{HH,y}$.
Any comment:	Not-in-use state of the digester is calculated in r^{OP}_{y}, not by this parameter.

Data / Parameter:	$ADJ_{ICS,i}$
Data unit:	No dimension
Description:	Adjustment factor concerning the ex-user of improved cookstove (ICS) for the household *i*
Source of data to be used:	This parameter is based on the status reports by implementers.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1
Description of measurement methods and procedures to be applied:	This parameter is based on the binary questions whether the user household was ex-user of ICS. The entire household data is collected. If this information is missing for some household, this household shall be regarded as ex-ICS user for conservativeness.
QA/QC procedures to be applied:	–
Any comment:	This is applied not only for ICS CDM PoA but also for any other ICS programmes for conservativeness.

Data / Parameter:	n_i^{burner}
Data unit:	Number of burners of biogas cookstove
Description:	Number of biogas cookstove burners per each household *i*
Source of data to be used:	Order sheet of the biogas digester system to be compiled in the status report by the implementers
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	Usually, specs and numbers of the biogas cookstoves are shown in the order sheet of the biogas system. In case the data is missing, "2" (double burner biogas cookstove) is set for conservativeness for the household.
QA/QC procedures to be applied:	Inspected after installation of the biogas digester system. The biogas digester owner shall communicate with GS unit office if additional biogas cookstoves were installed after the installation of the system.
Any comment:	This parameter is used to judge whether the CPA complies with the eligibility criterion (5). The maximum number of the burners per a CPA is 9,096 in order to meet the threshold of Microscale CDM, while the eligibility criterion set the limit as 8,000 (around 88% of the threshold); it has the safety margin.

	In the Annual Biogas Users Survey 2010 states that "Single burner is the dominant form of using biogas in the surveyed households: 216 out of 300 households use single burners." Therefore setting "2" is conservative.

The following data are those for sampling survey:

Data / Parameter:	$n^{NOP}_{HH,j,y}$
Data unit:	Number of days
Description:	Number of days during which the supplying digester is not operated for household *j* covered by the sample survey in a year *y*
Source of data to be used:	IDCOL's Annual Biogas Users Survey
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	IDCOL undertakes a sample survey of this ratio in its Annual Biogas Users Survey. The number of sample user households should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This parameter is used to calculate r^{OP}_{y} per eq. (9). It is noted that if the user household stopped using biogas anymore because of abandoning of the digester or some other reasons, $n^{NOP}_{HH,j,y} = 365$ for the household.
QA/QC procedures to be applied:	In case some irregular data is found, IDCOL will analyse the data and correct them if necessary. This process should be recorded if undertaken.
Any comment:	See Annex for the sampling method. It is noted that the owner household usually tries to fix the malfunction as soon as possible.

Data / Parameter:	$N_{sample,y}$
Data unit:	Number of households
Description:	Number of sample biogas user households covered by the annual sampling survey.
Source of data to be used:	IDCOL's Annual Biogas Users Survey
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	This number should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This sampling survey is common for the surveys of $n^{NOP}_{HH,j,y}$ and $B^{PJ}_{HH,j,y}$.
QA/QC procedures to be applied:	In case some irregular data is found, IDCOL will analyse the data and correct them if necessary or discard the data. Even if some data are discarded, the

	number should be more than 100. This process should be recorded if undertaken.
Any comment:	–

Data / Parameter:	$B_{HH_j}{}^{PJ}{}_y$
Data unit:	ton/household/year
Description:	Project woody biomass consumption for household *j* covered by the sample survey in a year *y*
Source of data to be used:	IDCOL's Annual Biogas Users Survey.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	IDCOL undertakes a sample survey of this ratio in its Annual Biogas Users Survey. The number of sample user households should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This parameter is used to calculate $B_{HH}{}^{PJ}{}_y$ per eq. (7).
QA/QC procedures to be applied:	In case some inconsistency is found, the reason shall be clarified. If the reason is not clarified, the data shall not be included.
Any comment:	The woody biomass is the tree cut by the household or the wooden biomass (incl. charcoal) purchased in the market. It does not include the pick-up twigs because they are recognized as renewable.

E.7.2. Description of the monitoring plan for a SSC-CPA:

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1. Monitoring framework

IDCOL will manage whole activities under the PoA as the CME. The monitoring management system is integrated part of the implementation management system as shown in A.4.4.

The operation and management structure for monitoring is based on IDCOL's existing monitoring system with involvement of implementers (partner organizations). IDCOL will act as the overall supervisor and prepare a monitoring report periodically (typically annually) to the DOE by using the reports by GS and other implementers.

The implementers will undertake the monitoring (especially preparing the monthly and annual status report) based on the operation and monitoring manual prepared by IDCOL. Results will be reported to IDCOL. IDCOL have the responsibility to manage and operate all of the CPA.

Each CPA is basically sequential for the period of its starting dates of digesters (see Figure 6) and covers whole Bangladesh.

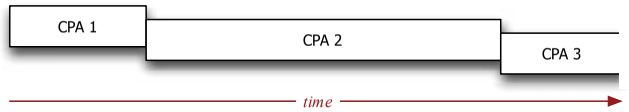

Figure 6 (revisited): Image of the definition of CPAs concerning the period of the start date of operation of biogas digesters

2. The role of CME and implementers

The following table shows the roles of the CME and implementers for monitoring.

Table 8: Functions of IDCOL (CME) and implementers

	IDCOL (supported by PEAR)	Implementers (GS and other organizations)
Monitoring management	- Develop the operation and monitoring manual for activities. - Develop and establish data collection and reporting system for parameters monitored in every CPAs. - Implement and manage monitoring of CPAs.	- Implement and manage monitoring of activities (information related to installation of biogas digesters and biogas use, undertaking maintenance services, *etc.*). - This can be supported by monthly collection of installments.
Data collection	- Establish and maintain data collection systems for parameters monitored. - Check data quality and collection procedures regularly.	- Implement data collection; especially at the time of biogas digester installation and operation start. - Check internal data quality and collection procedures regularly.
Data storage and management	- Develop database format of CPA. - Check the reported data from each CPAs. - Calculate emission reductions based on the data reported by the implementers. - Implement data management of CPAs. - Store and maintain records.	- Enter collected data to a computer database. - Implement data management of the activities. - Store and maintain records.
Reporting	- Analyze data and compare project performances. - Prepare and forward monthly or annual reports.	- Report electronic data to the program coordinator (IDCOL). - Households report related information and any malfunctions happened on biogas digesters to the implementer
CDM training and capacity building	- Develop and establish training program for implementers and prepare a manual for households.	- Implement simple training for households for operation of the digester and biogas use.
Quality	- Undertake Annual Biogas Users	- Undertake regular check of biogas

assurance and verification	Survey to grasp the status of the program which includes monitoring related to CDM. - Establish and maintain quality assurance system with a view to ensuring transparency and allowing for verification. - Prepare for, facilitate and co-ordinate verification process.	digester for 2 years (monthly for households utilizing micro-finance), including assurance for 5 years maintenance as well as to make contract to inform malfunction to the implementer after that period for recovery. - All of these information are recorded and reported to IDCOL.

3. Monitored data

The data to be monitored are described in section E.7.1.

4. Data collection

Data collection regarding households will mainly be carried out by implementers. The role of IDCOL in data collection is checking the quality of the data collected by implementers.

5. Data management

Data management is the most important step in the monitoring process to ensure transparent and credible emission reduction calculations.

Each implementer (GS or other organization) shall collect data described in section E.7.1 and archive these electronically using the common template developed by the program coordinator (IDCOL). The electronic files and the hard copy shall be sent to IDCOL.

IDCOL will develop an appropriate electronic template for archiving all data of every activity. After reporting data from implementers, IDCOL shall check the data. If there are any errors found, they will be checked against original data and carry out interview with farmers if necessary.

IDCOL will calculate emission reductions for each CPA supported by PEAR, and store the outputs in hard disks as well as hard copy printouts.

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

>>

20/06/2012

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[Note] PEAR carbon Offset Initiative, Ltd. is a project participant of the PoA.

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Coordinating and Managing Entity and Joint Focal Point

Organization:	Infrastructure Development Company Limited
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Since a part of the PoA (currently, biogas digesters up to 4.8 m^3/day) is undertaken as the IDCOL program (NDBMP), public funding is used mainly for the source of micro-financing (loan) which provides flexibility for the households for initial investment.[44] It is expected that around 80% of the households requires the loan. Designing the loan scheme is dependent on each partner organization (such as GS) of the IDCOL.

The current subsidy covers about 25% of the total investment requirements by households (biogas digester owners). The subsidy rate will be 9,000 Taka per plant (per household). Currently, the total subsidy amount required for the programme period is Euro 2.5 million of which KfW will

[44] It is noted that IDCOL nor GS do not invest in the biogas digesters. Each household invests (in many cases by utilizing the micro-financing scheme operated by GS). CER revenue will be used for the programme (*i.e.*, used for the households). This is completely different from typical CDM project where project owner invests and obtain the revenue from CERs.

provide 85% while the rest 15% will be contributed from the Government of Bangladesh. The total budget required to implement the NDBMP over 3 years (2010–12) will be Euro 10.76 million.[45]

IDCOL specifies the carbon financing opportunities by CDM as an attractive and sustainable source of funding. GS, which contributed around 57% (12,795 out of 22,549 biogas plants) of total construction up to April 2012, got approval by IDCOL to undertake CDM activities. It is noted that the PoA may cover activities of other partner organizations of IDCOL and also it covers larger biogas digesters (> 4.8 m^3/day) not yet covered by IDCOL's program.

It is also noted that any Annex I Party government will not obtain CERs in compensation for the ODA.

Annex 3

BASELINE INFORMATION

The baseline study consisted of a literature review, which provided the *ex ante* parameter values given in section E.6.3 above.

Annex 4

MONITORING INFORMATION

Please refer to B.6.1.

Annex 5

SAMPLING AND SURVEY PLAN

Sampling survey for the parameters

- $B_{HH,j}{}^{PJ}{}_{y}$ (project woody biomass consumption for household j in a year y), and
- $n^{NOP}{}_{HH,j,y}$ (number of days during which the supplying digester is not operated for household j in a year y)

is undertaken annually as an integrated element of IDCOL's Annual Biogas Users Survey.

[45] National Domestic Biogas and Manure Programme Implementation Plan 2010–12, IDCOL, Dec. 2009. http://www.idcol.org/Download/20100105 Implementation Plan 2010_12 NDBMP IDCOL1.pdf. It says (p.20):

Out of the total amount required for implementing the programme, Government of Netherlands/DGIS/ABP provides Euro 1.35 million for programme operation cost whereas Government of Bangladesh is expected to contribute about Euro 0.37 million on part of subsidy at the rate of 15 percent of subsidy amount while KfW fund of about Euro 2.1 million will be utilized for covering the subsidy for the period of 2010-–2012. In addition KfW will also provide Euro 3.1 million for refinancing.

(a) Sampling Design

(i) Objectives and Reliability Requirements

The sampling and survey plan is to obtain the reliable mean value as well as its statistical uncertainties of $B_{HH,j}{}^{PJ}{}_{y}$ and is $n^{NOP}{}_{HH,j,y}$ in order to calculate project emissions and baseline emissions, respectively.

The survey is undertaken once a year as an integrated (and extended from current annual survey) element of the IDCOL's Annual Biogas Users Survey. The latest results are used for the calculation of emission reductions.

The associated values are determined by annual survey of more than 100 households in order to keep (95/10) confidence/precision level as per the requirements for PoA although the values are minor correction factors for whole emission reductions (see the explanation in footnote 11).

(ii) Target Population

The target population is all biogas user households[46] implemented under this PoA.

(iii) Sampling Method

Sampling of households for survey is undertaken using a stratified random sampling approach. The minimum number of households for this specific CDM purpose is 100 (typically much more than 100).

For sampling purposes, the country has been divided in 4 major regions representing the former Divisions of the country, *i.e.*, Dhaka, Chittagong, Rajshahi and Khulna. The required numbers of households have been selected from each region to reach the total sample size of 100 or more although the Annual Biogas Users Survey for NDBMP covers more households in general (300 for 2010 Survey). The sample size for each region is proportionate to the number of total households using biogas plants in the region.

The sampling is done through the following steps:

Step 1: From each of the 4 regions, 3 districts have been selected randomly to cover the major ecological and socio-cultural variations prevailing in the region. The random sampling has been repeated until the selected districts sufficiently represented the variations.

Step 2: The number of households in each region has been divided by 3 to get the required number of households to be surveyed in each of the 3 districts of each region. The districts having fewer households than the required number have not been considered.

Step 3: In case of large number and spread of households in a district, further stratification in selecting sub-districts or communities has been undertaken to select the households from a randomly selected *upazila*.

Step 4: From the list of households having biogas in the selected district/*upazila*, the required number of households has been sampled randomly for the survey.

[46] To date, the Annual Biogas Users Survey targeted biogas digester owner households who introduced the digester within a year under the NDBMP. On the other hand, this CDM-specific survey targets all biogas user (including digester owner) households covered by the PoA (*i.e.*, including non-covered households by the NDBMP supplied by over 4.8 m^3/day digester).

(iv) Sample Size

As shown in the following theoretical calculations, minimum sampling size is set as 100 in order to keep (95/10) confidence/precision level.

Table 9: Sample size calculation

Population	1,000,000	1,000,000	1,000,000	1,000,000
Margin of error	10%	10%	5%	5%
Confidence level	95%	90%	90%	95%
Critical value for the confidence level	1.96	1.64	1.64	1.96
The number of sample	**97**	68	271	384

It is noted that the number of sample is almost independent for large population size (*e.g.*, 96 for the population size of 100,000 for (95/10)).

(v) Sampling frame

The sampling list is the whole available listing of all biogas user households (including digester owner households) covered by the PoA until the designing date of the Annual Biogas Users Survey in the year.

(b) Data

(i) Field Measurement

The parameters to be monitored are:

– $B_{HH,j}{}^{PJ}{}_{y}$ (project woody biomass consumption for household j in a year y), and

– $n^{NOP}{}_{HH,j,y}$ (number of days during which the supplying digester is not operated for household j in a year y).

The frequency is once a year.

The method is conducting detailed interview with the households (together with subjects specified in the Annual Biogas Users Survey.

(ii) QA/QC

The interviewer is to check the obtained information from various aspects. If some inconsistencies are found in the interview, the interviewer is trying to clarify such inconsistencies. If the interviewer concluded that the obtained data is not reliable, the household should be outside of the sample group.

(iii) Analysis

In addition, the obtained results will be checked against the historical trend. If some specific aspects is found, some analysis would be undertaken and the results will be explained in the monitoring report. Experts' opinion may also be included.

Using the result, IDCOL will calculate the associated parameters and describe them in the monitoring report.

(c) Implementation

(i) Implementation Plan

IDCOL will choose a consultant firm with the expertise every year and ask it with the requirements shown above for CDM and other routine elements to be surveyed. Typically, the survey would be undertaken in April to June.

The results will be compiled as the Annual Biogas Users Survey Report.

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CLEAN DEVELOPMENT MECHANISM
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CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

[**Note**] Throughout this generic CPA-DD, [*explanation*] implies this CPA-specific term of explanation is inserted for specific CPA-DD.

A.1. Title of the small-scale CPA:

>>

Domestic Biogas CPA-[*ID number of CPA*] **in Rural Bangladesh (**[*period of the starting date of operation of the biogas digesters covered by the CPA specified as D1/M1/Y1–D2/M2/Y2*]**)**

Ver.: [*version number of the CPA-DD comes here*]
Date: [*date of completion of this document comes here specified as D/M/Y*]

ID number of CPA is set as "*n.m.y*" where "*n*" is the serial number of the CPA under the PoA, "*m*" is the month when the CPA starts and "*y*" is the year when the CPA starts.

A.2. Description of the small-scale CPA:

>>

Under the PoA entitled "Programme for Promotion of Access to Domestic Biogas in Rural Bangladesh", the CPA introduces micro-type biogas digesters and supply biogas for households in rural Bangladesh as shown in A.4.2 of the PoA-DD.

This CPA is characterized as follows:

Period of the starting date of operation* of the biogas digesters covered by the CPA	[*D1/M1/Y1–D2/M2/Y2*]
Number of biogas digesters	[*number*]
Average of biogas generation capacity of digesters	[*number*] m^3/day
Number of user households	[*number*]
Number of cookstove burners	[*number*]
Household which used ICS before using biogas[3]	[*number*]
Number of micro-utility model[4]	[*number*]
CPA operator	IDCOL
CPA implementers (abbreviation)	[*abbreviations of the implementers*]

*It is noted that starting date of operation is the commencing date of using biogas defined as the date when the first down payment (instalment against loan) was collected.

[3] In case some household used ICS before use of biogas, the household is judged to be ineligible and excluded from the CPA (*i.e.*, not counting in calculation of emission reductions).

[4] Micro-utility model is a business model that a biogas digester owner delivers biogas to his/her neighbor households.

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A typical CPA will provide sustainable clean energy (biogas) for households through replacing the non-renewable biomass so that reduces GHG emissions. At the same time it contributes to the sustainable development of Bangladesh that is explained as below:

Most of the population in rural areas in Bangladesh still heavily rely on fuelwood, dung, and crop residues for their cooking needs. The impacts of biomass reliance include deforestation, drudgery from needing to collect and prepare the biomass for use and also health impacts from indoor air pollution to rural women and children.[5]

In order to prevent further environmental deterioration, it is required to promote non-conventional energy technologies in this country. Biogas generated from animal manure and/or other organic wastes is undoubtedly one of the most appropriate sources of energy.

A typical CPA will contribute to reduce deforestation as the biogas generated will be used to replace mostly non-renewable biomass consumed by households; and also improve the environment of target rural area and households using animal manures which causes indoor air pollution as well.
It also set the trajectory of no carbon development pathway by utilizing indigenous renewable energy source in rural Bangladesh.

More detailed information of the biogas digesters and user households are provided in Annex 5.

A.3. Entity/individual responsible for the small-scale CPA:

>>

Brief information of the CPA operator is as follows.

Name of the CPA operator	IDCOL
Whether is it a project participant?	Yes
Whether is it the CME?	Yes
Name and Position in charge of the CPA	[*name*] [*position*]
Location of the office	UTC Building (Level-16), 8 Panthapath, Kawranbazar, Dhaka-1215, Bangladesh

The PoA has only one CPA operator which is IDCOL. CPA operator is defined as the unique entity responsible for the CPA.

Implementers of the CPA are GS and other organizations (typically, partner organizations of IDCOL) which implement the activities of the CPA under the CME. The information of the

[5] Domestic Health Hazard and Indoor Air-Pollution: An Approach to Find Alternative Energy Source for Rural Bangladesh to Minimize the Threat, S. M. Reazul Ahsam, *et al*.

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

partner organization is shown in http://www.idcol.org/contact-LPO,%20CPO,MPO.php.[6] The list of organizations will increase over time. Implementation includes introduction of biogas digesters, monitoring, *etc.*

Apart from the terminology of CDM, the management role of the PoA as well as each CPA is to be undertaken by IDCOL, supported by PEAR. Implementation of the activities is done by GS and other organizations (*i.e.*, they are called implementers) in general. The implementers are required to send the necessity information to IDCOL. (In order to avoid confusion, we do not use the terminology 'CPA implementer').

Brief information of other implementer(s) of the CPA not specified in the Web-url above are shown below: [*if needed, add tables*]

Organization of the implementer	[*name of organization*]
Whether is it a project participant?	No
Whether is it the CME?	No
Name and Position of contact person	[*name*] [*position*]
Address of the office	[*Postal address*]
Partner organization of IDCOL?	[*Yes or No*]

Organization of the implementer	[*name of organization*]
Whether is it a project participant?	No
Whether is it the CME?	No
Name and Position of contact person	[*name*] [*position*]
Address of the office	[*Postal address*]
Partner organization of IDCOL?	[*Yes or No*]

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

>>

A.4.1.1. Host Party:

>>

Bangladesh

[6] Partner organization-wise biogas plant installation status under the NDBMP is given in http://www.idcol.org/biogass_installation.php. On the other hand, it is noted that the PoA includes non-covered biogas digester with the capacity over 4.8 m^3/day (less than 100 m^3/day) as well.

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

>>

Each location of the biogas digester and user households in Bangladesh covered by this CPA are summarized in Annex 5 and specified in the attachment file.

The entity responsible for the CPA is IDCOL as specified in A.3.

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

>>

[*The first date of the period specified in A.1 and A.2 comes here as D1/M1/Y1*] which is defined as the starting date of operation of the first biogas digester in the CPA.

A.4.2.2. Expected operational lifetime of the small-scale CPA:

>>

20 years 0 month

A.4.3. Choice of the crediting period and related information:

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

>>

[*The first date of the period specified in A.1 and A.2 comes here as D1/M1/Y1*] which is defined as the starting date of operation (*i.e.*, real action) of the first biogas digester in the CPA.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

>>

7 years (as crediting period for the PoA is 28 years, the total crediting period of any CPA through renewing should be limited to the end date of the PoA crediting period)

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>

Year	Estimation of overall emission reductions (tonnes of CO_2 e)
Year A	
Year A+1	
Year A+2	
Year A+3	

Year A+4	
Year A+5	
Year A+6	
Year A+7	
Total (tonnes of CO_2 e)	

[Note] It is noted that 8 calendar years are required for the 7-year crediting period unless the CPA started on Jan.1.

A.4.5. Public funding of the CPA:

>>

Since a part of the PoA is undertaken as the IDCOL program (NDBMP), public funding—whose source comes from several industrialized countries—is used mainly for the source of micro-financing (loan) which provides flexibility for the households for initial investment. On the other hand, it is noted that IDCOL nor implementers do not invest in the biogas digesters. Each household invests (in many cases by utilizing the micro-financing scheme operated by the implementers).

It is also noted that any Annex I Party government will not obtain CERs in compensation for the ODA.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

>>

The largest 100 m^3/day biogas digester (independent subsystem) under a CPA of the PoA generates around 22 kW_{th} in average. This figure is much less than 1% of the threshold of small scale CDM project (45 MW_{th}). Therefore, as per "Guidelines on Assessment of De-bundling for SSC Project Activities" (version 03) (paragraph 10)[7], any CPA of the PoA is exempt from performing a de-bundling check.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

>>

The third eligibility criteria specifies the procedures to confirm this point as follows:

(3) The CPA is not a part of a registered CDM project or not a CPA under another PoA.

Regarding inclusion of any CPA to the PoA, IDCOL identifies if there is any registered CDM project activity or CPA of a registered PoA that targeting the same households in Bangladesh.

[7] If each of the independent subsystems/measures (*e.g.*, biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity.

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DOE is to check whether the information of all current registered CDM project activities and CPAs under PoAs in Bangladesh provided by the CME cover the cooking energy use of targeted households in general.

For this purpose, IDCOL is to prepare the database in order to meet this criterion for the cases mentioned below:

(a) User households of the CPA are not covered by other existing CPAs of this PoA, by checking that the period to define the CPA is different from others. Basically this is true, but if some overlap is set for the period, the households in the overlapping period is checked to avoid double-counting; and

(b) User households of the CPA used ICS before use of biogas will not result in double counting of emission reductions, by introducing checking system in the database.

It is noted that there is a registered PoA for installation of improved cookstoves (ICS).[8] The CPA may include the household covered by this PoA but includes a procedural arrangement to avoid double counting, *i.e.*, a checking system is introduced whether the household has already installed ICS (under registered PoA 4791 as well as by non-CDM programmes or independently). If so, the emission reductions for the households are discounted by subtracting the relevant CO_2 emission reductions by the ICS activities in a conservative manner.

In addition, each biogas digester is equipped with some physical mark specifying that the digester be installed under the CDM PoA.

If this procedure is introduced at the time of the first CPA and no changes from that time, this criterion is met.

The information in Annex 5 as well as attachment file shows the related information for the items (a) and (b) above.

This ICS PoA is the only PoA which targets thermal energy use of household in rural Bangladesh to date. [*This paragraph will be modified if other PoAs, which may target the thermal energy use of the same household, will be implemented in rural Bangladesh. The method how to avoid overlapping will be described as well in this case.*]

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

>>

Title: **Programme for Promotion of Access to Domestic Biogas in Rural Bangladesh**

Ver.: 3.0

Date: 20/06/2012

[8] PoA 4791: "Improved Cooking Stoves in Bangladesh". See http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/SE7XIMKF8NYVOTL16BW3U45C9ZDGAP/view.

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA:

>>

All of the eligibility criteria are met as shown below:

(1) The CME (IDCOL) define the period during which the biogas digester systems covered by the CPA are installed (e.g., 1/4/2012–31/9/2012). The CME provides a list of all user information with starting date of the service as well as the associated biogas digester and cookstoves for use. Summary list is attached to the CPA-DD and the electronic file is provided also to the DOE with full relevant information.

DOE is to desk review that the period is consistent with the defined starting date of the CPA as well as to review whether the information is consistent.

It is noted that the starting date of CPA can be an earlier date of inclusion if it is after the staring date of the PoA.[9]

Location of each household is also shown in the file. DOE is to confirm all of them are in the geographical area of Bangladesh (*i.e.*, geographical area of the CPA).

As shown in sub-section A.2. backed by Annex 5 and attachment file, this condition is met.

(2) The CPA includes installation/construction of biogas digester systems, biogas delivery lines and biogas cookstoves at rural households or small and medium farms in Bangladesh. IDCOL has records and documentation control processes for each CPA as a part of its management system.

CPA-DD with the relevant list of information is submitted for inclusion after installation of all biogas systems in the CPA.

IDCOL will inspect installation of biogas digesters and watch their operation regularly. Inspection procedures have been introduced in NDBMP by IDCOL for proper installation of the system. Each partner organization already has the maintenance system/service for proper operation of the biogas digesters as the eligibility requirements by IDCOL to be a partner organization.

IDCOL keeps information of digesters in a CPA such as locations, ID numbers, names of user households including that of the digester owner and number of biogas cookstove burners and starting date of operation. IDCOL shall demonstrate that it prepares the management system and has operated it properly to the DOE at the time of first verification.

[9] "Glossary of CDM terms" (ver. 05) (http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf) specifies that

Starting date of a CDM programme activity (CPA - All types)

The starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins. The starting date of the CPA cannot be prior to the commencement of validation of the programme of activities, *i.e.* the date on which the CDM-POA-DD is first published for global stakeholder consultation.

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DOE is to check whether IDCOL prepared the management system and operates it properly with the relevant reporting arrangement and can be verifiable at the time of verification. DOE can desk review of this criterion by checking all relevant information provided by IDCOL. If all of them are met for the first CPA and no changes from that time, this criterion is considered to be met. DOE's check does not include whether some specific data is missing for some specific household.

It is noted that proper operation of the management system will be checked at the time of verification again in more detail. In case verification identifies some improper functions in the management system, new CPA inclusion cannot be done until the CME will demonstrate to fix all identified issues.

The management system has not been changed after the validation process. [*If some changes was made, explain how it has been changed. It is also needed to state that all of the requirements for CDM have been maintained as before.*] No significant problems have been observed. [*If some significant problems occurred, please specify what it is. It is also needed to state that all of the necessary data was recovered or emission reductions are not claimed for the data lost.*]

In addition, as shown in sub-section A.2. backed by Annex 5 and attachment file, this condition is met.

(3) The CPA is not a part of a registered CDM project or not a CPA under another PoA.

See sub-section A.4.7 for confirmation.

(4) Installations/operations of biogas digesters shall be in compliance with related national and sectorial standards and regulations.[10]

DOE is to check whether the CME provided all related documents. For proper operation, providing relevant handbook with suitable instruction and establishment of maintenance system are considered to be the evidences. If all of them are provided for the first CPA and no changes from that time, this criterion is met.

It is noted that a monitoring system—*incl.* annual survey—is introduced to include only properly operating biogas digesters in the calculation of emission reductions. The latest survey report is provided to the DOE.

The national and sectoral standards and regulations, which set requirements to the PoA activities, has not been changed after the validation process. [*If some changes was made, explain how it has been changed. It is also needed to state that all requirements by them are met.*] Therefore, this condition is met.

[10] Infrastructure Development Company Ltd. (IDCOL) Model Biogas Plant Construction Manual, IDCOL/SNV, April 2006.

(5) The aggregated capacity of biogas cookstoves under a CPA is less than 15 MW_{th}, i.e., the aggregated number of burners of cookstoves is less than 8,000.[11]

Bearing the threshold in mind, IDCOL construct the database of digester systems (including cookstoves and related equipment) for each CPA to and provide all specific information of biogas digester system to DOE through the CME.

DOE is to desk review the specification of the system (*esp.*, number of burners of biogas cookstoves) and *ex ante* calculation of GHG emission reductions specified or attached to the CPA-DD. If the data of the number of burners is missing, a conservative default value[12] is applied.

As shown in sub-section A.2. backed by Annex 5 and attachment file, this condition is met. See A.2. for the cookstove numbers.

B.3. Assessment and demonstration of additionality of the small-scale CPA, as per eligibility criteria listed in the Registered PoA:

Please see sub-section E.5.1 of the PoA-DD which is referred as below:

If a CPA that employs renewable energy under the PoA is up to 5 MW_e, then the CPA is demonstrated to be additional by following the Guidelines specified in "Guidelines for demonstrating additionality of microscale project activities" (version 03) approved in the 63th meeting of EB.

The Guidelines states:

Paragraph 2 (c). The project activity is designed for distributed energy generation (not connected to a national or regional grid)[13] *with both conditions (i) and (ii) satisfied;*

(i) Each of the independent subsystems/measures in the project activity is smaller than or equal to 1500 kW electrical installed capacity;.

(ii) End users of the subsystems or measures are households/communities/small and medium enterprises (SMEs).

The Guidelines also states that:

Paragraph 6. Project activity' in paragraphs 2–4 means a small scale or large scale CDM project activity or a project activity under a programme of activities (CPA of a PoA).

Because the capacity of each household biogas cookstove (independent sub-system) is around 1.65 kW_{th} (for single burner), *i.e.*, much less than the threshold 1,500 kW_e (4,500 kW_{th}) and all end users

[11] See footnotes 8 and 10 for calculations (of the PoA-DD).

[12] The default value is set as 2 burners per household conservatively. This can be justified by the fact that the available data for CPA 1 (301 households) consists of: one-burner household (60%), two-burner household (37%), three-burner household (3%) and four-burner household (0.3%).

[13] This means that projects applying AMS.I-D are not eligible.

of the sub-systems are households that each CPA satisfies the condition stipulated in the "Guidelines for demonstrating additionality of microscale project activities".

Therefore, according to the Guidelines mentioned above, any CPA under the PoA is additional.

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

>>

As shown in sub-section E.3 of the PoA-DD, the boundary of a CPA is the physical, geographical site of renewable energy (biogas) is used through installation and operation of biogas digesters at households. The GHGs and sources being considered within the boundary are concluded in the table below.

Table: Emission sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from non-renewable biomass use	CO_2	Yes	Major emission source
		CH_4	No	Not significant. Excluded for simplification
		N_2O	No	Not significant. Excluded for simplification
Project Activity	CO_2 emissions from non-renewable biomass use	CO_2	Yes	In case household still uses non-renewable woody biomass after use of biogas
		CH_4	No	Zero emission source
		N_2O	No	Zero emission source

As the CPA targets households in rural Bangladesh, it is obvious that the CPA is located within the geographical boundary of the registered PoA.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

>>

Data / Parameter:	B_{HH}^{BL}
Data unit:	ton/household/year
Description:	Woody biomass consumption per household per year
Source of data used:	Standardized approaches for facilitating the baseline emission calculations under AMS-I.E
Value applied:	3.29
Justification of the choice of data or description of measurement methods and procedures actually	The default value is set by the SSC WG report: [to be replaced] http://cdm.unfccc.int/Panels/ssc_wg/meetings/033/ssc_033_an08.pdf This default value is tentative one and to be replaced by a new one when the CDM Executive Board approve it.

applied:	
Any comment:	This value is applied for all CPAs.

Data / Parameter:	f_{NRB}
Data unit:	No dimension
Description:	*NRB*: Share of non-renewable woody biomass used in the absence of the project activity *DRB*: Share of (demonstrably) renewable woody biomass used in the absence of the project activity
Source of data used:	Fraction of non-renewable woody biomass used among whole woody biomass in the absence of the project activity, defined as $f_{NRB} = \frac{NRB}{NRB + DRB}$ where NRB is the non-renewable woody biomass and DRB is the demonstrable renewable woody biomass.
Value applied:	1.0 (JPMorgan Climate Care report and World Bank "Restoring Balance—Bangladesh's Rural Energy Realities")
Justification of the choice of data or description of measurement methods and procedures actually applied:	Because Bangladesh is a LDC, available official documents are limited. Therefore, JPMorgan conducted a comprehensive study considering CDM-specific requirements into account. In addition, the World Bank Report (footnote 3 of PoA DD) and other materials (see footnote 2 of PoA DD) support this result. This is also supported by the registered PoA 4971: "Improved Cooking Stoves in Bangladesh (footnote 11), shows the value is 1.0 (page 22–23).
Any comment:	–

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/ton
Description:	Net calorific value of the woody biomass
Source of data used:	Methodology
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value as per AMS-I.E. (ver. 04)
Any comment:	–

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	t CO_2/TJ

Description:	Emission factor for substitution of woody biomass
Source of data used:	Methodology
Value applied:	81.6
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value as per AMS-I.E (ver.04)
Any comment:	–

B.5.2. Ex-ante calculation of emission reductions:

>>

The sub-section E.6.2 of the PoA-DD (eq. 12 and 13) shows:

$$ER_y = 1.163 \cdot N^{OP}{}_{HH,y} \cdot (3.29 - B_{HH}{}^{PJ})$$

For $N^{OP}{}_{HH,y}$, please see equations (8)–(10) in the PoA DD for definition.

In case $B_{HH}{}^{PJ} = 0$ and for non-ICS ex-user, per household emission reductions for non ex-ICS user household is calculated as

(emission reductions per household) = 3.83 [tCO_2/yr/household]

The amount of emission reductions *ER* in a typical year (assuming that one year has passed from installation of the last biogas digester and all digesters functions properly) is calculated as

$ER_y = 3.83 \cdot N^{OP}{}_{HH,y}$ [tCO_2/yr]

= [*insert calculated value from below*] [tCO_2/yr]

by inserting that

$N^{OP}{}_{HH,y} = (1/365) \cdot r^{OP}{}_y \cdot \sum_i n_{i,HH,y} \cdot ADJ_{ICS,i}$

(*defined in eq. (8) of the PoA-DD for ex post calculation*)

= ($r^{OP}{}_y$ for latest year[14]) · (number user households covered by the CPA)
· (average of $ADJ_{ICS,i}$ for the user households covered by the CPA)

(*for the purpose of ex ante calculation*)

= [*insert the associated calculations from below*]

where

($r^{OP}{}_y$ for latest year) = [*insert calculated value using the latest Annual Biogas Users Survey*

[14] If the latest Annual Biogas Users Survey does not include this information, $r^{OP}{}_y$ is set as 1 for *ex ante* calculation.

data[15]]

r^{OP}_y is the ratio of user (including owner) households supplied by properly operating digesters in a year *y*. This factor reflects malfunction state and discarded state of the digesters. This ratio is determined by annual survey of more than 100 households in order to keep (95/10) confidence/precision level for the sampling method. Please see eq. (9) of the PoA-DD.

(number user households covered by the CPA) = [*insert this number consistent with A.2. and Annex 5*]

(average of $ADJ_{ICS,j}$ for the user households covered by the CPA) = [*insert this number consistent with A.2. and Annex 5*]

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
Year A			0	
Year A+1			0	
Year A+2			0	
Year A+3			0	
Year A+4			0	
Year A+5			0	
Year A+6			0	
Year A+7			0	
Total (tonnes of CO_2 e)			0	

[Note] It is noted that 8 *calendar years* are required for the 7-year crediting period unless the CPA started on Jan.1.

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

>>

[15] If the latest Annual Biogas Users Survey does not include this information, r^{OP}_y is set as 1 for ex ante calculation.

1. Monitoring framework

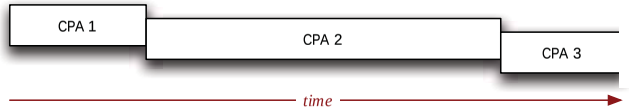
1. Monitoring framework

IDCOL will manage whole activities under the PoA as the CME. The monitoring management system is integrated part of the implementation management system as shown in A.4.4.

The operation and management structure for monitoring is based on IDCOL's existing monitoring system with involvement of implementers (partner organizations). IDCOL will act as the overall supervisor and prepare a monitoring report periodically (typically annually) to the DOE by using the reports by GS and other implementers.

The implementers will undertake the monitoring (especially preparing the monthly and annual status report) based on the operation and monitoring manual prepared by IDCOL. Results will be reported to IDCOL. IDCOL have the responsibility to manage and operate all of the CPA.

Each CPA is basically sequential for the period of its starting dates of digesters and covers whole Bangladesh.



2. The role of implementers

The following table shows the roles of the CME and implementers for monitoring.

Table: Functions IDCOL (CME) and implementers

	IDCOL (supported by PEAR)	Implementers (GS and other organizations)
Monitoring management	- Develop the operation and monitoring manual for activities. - Develop and establish data collection and reporting system for parameters monitored in every CPAs. - Implement and manage monitoring of CPAs.	- Implement and manage monitoring of activities (information related to installation of biogas digesters and biogas use, undertaking maintenance services, *etc.*). - This can be supported by monthly collection of installments.
Data collection	- Establish and maintain data collection systems for parameters monitored. - Check data quality and collection procedures regularly.	- Implement data collection; especially at the time of biogas digester installation and operation start. - Check internal data quality and collection procedures regularly.
Data storage and	- Develop database format of CPA. - Check the reported data from each	- Enter collected data to a computer database.

management	CPAs. - Calculate emission reductions based on the data reported by the implementers. - Implement data management of CPAs. - Store and maintain records.	- Implement data management of the activities. - Store and maintain records.
Reporting	- Analyze data and compare project performances. - Prepare and forward monthly or annual reports.	- Report electronic data to the program coordinator (IDCOL). - Households report related information and any malfunctions happened on biogas digesters to the implementer
CDM training and capacity building	- Develop and establish training program for implementers and prepare a manual for households.	- Implement simple training for households for operation of the digester and biogas use.
Quality assurance and verification	- Undertake Annual Biogas Users Survey to grasp the status of the program which includes monitoring related to CDM. - Establish and maintain quality assurance system with a view to ensuring transparency and allowing for verification. - Prepare for, facilitate and co-ordinate verification process.	- Undertake regular check of biogas digester for 2 years (monthly for households utilizing micro-finance), including assurance for 5 years maintenance as well as to make contract to inform malfunction to the implementer after that period for recovery. - All of these information are recorded and reported to IDCOL.

3. Monitored data

The data to be collected once not specific to the CPA is as follows:

Data / Parameter:	ER_{ICS}
Data unit:	t CO_2/household/yr
Description:	Annual emission reductions by ICS introduction per household
Source of data used:	First verification report of registered CDM PoA 4791
Value applied:	To be shown in the above mentioned reference
Justification of the choice of data or description of measurement methods and procedures actually applied:	Most appropriate amount of emission reductions by introduction of ICS can be provided for registered CDM project activity. It is noted that in the calculation of emission reductions, this value is multiplied by 110% (as shown in eq. (10) of the PoA-DD) in order to provide a conservative estimation. It is also noted that this factor is also applied to ICS ex-users not covered by the above-mentioned CDM PoA in order to provide a conservative figure. The value will be fixed once obtained.

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Any comment:	–

Data / Parameter:	n_{CCS}
Data unit:	number
Description:	Number of conventional cookstoves per household
Source of data used:	This parameter is provided by some report/document
Value applied:	To be shown in the above mentioned reference
Justification of the choice of data or description of measurement methods and procedures actually applied:	The report/document is shown at the time of first verification to the DOE. The value will be fixed once obtained. If no report/document is found, a survey is conducted and the result will be described in the first monitoring report.
Any comment:	This parameter is a dummy and not used in the calculation of emission reductions.

The following data are those specific to the CPA:

Data / Parameter:	$N^{OP}_{HH,y}$
Data unit:	Number of user households
Description:	Number of user households which are successfully utilizing the biogas from operating biogas digesters in the CPA in a year *y*.
Source of data to be used:	This value is specified in the database of the management of the PoA. This parameter is calculated *ex post* by using the dataset of $n_i^{OP}{}_{HH,y}$ below mainly and other factors. This value can be a fraction if some digester is out of order for a certain period or a digester starts its operation in the middle of the verification period.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	IDCOL constructs a database for the PoA. The database includes the information of the household which introduced a biogas digester and the user households of the biogas digester. This parameter is calculated as an aggregation of each household: $N^{OP}_{HH,y} = (1/365) \cdot r^{OP}{}_{y} \cdot \sum_i n_{i,HH,y} \cdot ADJ_{ICS,i}$ as shown in eq. (8) in the PoA-DD. (For notations, see the following monitoring items) It also includes the starting date of operation of the biogas digester for $n_{i,HH,y}$.
QA/QC procedures to be applied:	This parameter is automatically calculated in the database.

Any comment:	It is noted that the summation is over the *user household* of biogas and not summation over biogas digester. Some biogas digester may deliver biogas to several households. On the other hand, judgment of 'operation' is related to the status of the associated *biogas digester*, *i.e.*, $n_{i,HH,y}$ belonging to the same biogas digester is the same.

Data / Parameter:	$n_{i,HH,y}$
Data unit:	Number of days
Description:	Number of days during which user household (specified as *i*) is utilizing the biogas from a biogas digester in the CPA in a year *y*.
Source of data to be used:	This parameter is based on the status reports by implementers.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	365
Description of measurement methods and procedures to be applied:	Implementers shall prepare a database of the installation of biogas digesters as well as the user households. The database includes the start date of operation defined as the commencing date of using biogas defined as the date when the first down payment (instalment against loan) was collected. From this date, $n_{i,HH,y}$ is calculated as the remaining number of days during the monitoring period for each user household. If the digester has been operated more than one year, $n_{i,HH,y}$ = 365 for the household *i*.
QA/QC procedures to be applied:	Monitoring, recording and reporting by each implementer is integrated to existing IDCOL's management system. Database managed by IDCOL is to collect all the data for calculation of $N^{OP}_{HH,y}$.
Any comment:	Not-in-use state of the digester is calculated in r^{OP}_{y}, not by this parameter.

Data / Parameter:	$ADJ_{ICS,i}$
Data unit:	No dimension
Description:	Adjustment factor concerning the ex-user of improved cookstove (ICS) for the household *i*
Source of data to be used:	This parameter is based on the status reports by implementers.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1
Description of measurement methods and procedures to be	This parameter is based on the binary questions whether the user household was ex-user of ICS. The entire household data is collected. If this information is missing for some household, this household shall be

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applied:	regarded as ex-ICS user for conservativeness.
QA/QC procedures to be applied:	–
Any comment:	This is applied not only for ICS CDM PoA but also for any other ICS programmes for conservativeness.

Data / Parameter:	n_i^{burner}
Data unit:	Number of burners of biogas cookstove
Description:	Number of biogas cookstove burners per each household *i*
Source of data to be used:	Order sheet of the biogas digester system to be compiled in the status report by the implementers
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	Usually, specs and numbers of the biogas cookstoves are shown in the order sheet of the biogas system. In case the data is missing, "2" (double burner biogas cookstove) is set for conservativeness for the household.
QA/QC procedures to be applied:	Inspected after installation of the biogas digester system. The biogas digester owner shall communicate with GS unit office if additional biogas cookstoves were installed after the installation of the system.
Any comment:	This parameter is used to judge whether the CPA complies with the eligibility criterion (5). The maximum number of the burners per a CPA is 9,096 in order to meet the threshold of Microscale CDM, while the eligibility criterion set the limit as 8,000 (around 88% of the threshold); it has the safety margin. In the Annual Biogas Users Survey 2010 states that "Single burner is the dominant form of using biogas in the surveyed households: 216 out of 300 households use single burners." Therefore setting "2" is conservative.

The following data are those for sampling survey:

Data / Parameter:	$n^{NOP}_{HH,j,y}$
Data unit:	Number of days
Description:	Number of days during which the supplying digester is not operated for household *j* covered by the sample survey in a year *y*
Source of data to be used:	IDCOL's Annual Biogas Users Survey
Value of data applied for the purpose of calculating expected emission reductions in	0

section B.5	
Description of measurement methods and procedures to be applied:	IDCOL undertakes a sample survey of this ratio in its Annual Biogas Users Survey. The number of sample user households should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This parameter is used to calculate r^{OP}_{y} per eq. (9) of the PoA-DD. It is noted that if the user household stopped using biogas anymore because of abandoning of the digester or some other reasons, $n^{NOP}_{HH,j,y}$ = 365 for the household.
QA/QC procedures to be applied:	In case some irregular data is found, IDCOL will analyse the data and correct them if necessary. This process should be recorded if undertaken.
Any comment:	See Annex for the sampling method. It is noted that the owner household usually tries to fix the malfunction as soon as possible.

Data / Parameter:	$N_{sample,y}$
Data unit:	Number of households
Description:	Number of sample biogas user households covered by the annual sampling survey.
Source of data to be used:	IDCOL's Annual Biogas Users Survey
Value of data applied for the purpose of calculating expected emission reductions in section B.5	–
Description of measurement methods and procedures to be applied:	This number should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This sampling survey is common for the surveys of $n^{NOP}_{HH,j,y}$ and $B_{HH,j}{}^{PJ}{}_{y}$.
QA/QC procedures to be applied:	In case some irregular data is found, IDCOL will analyse the data and correct them if necessary or discard the data. Even if some data are discarded, the number should be more than 100. This process should be recorded if undertaken.
Any comment:	–

Data / Parameter:	$B_{HH,j}{}^{PJ}{}_{y}$
Data unit:	ton/household/year
Description:	Project woody biomass consumption for household j covered by the sample survey in a year y
Source of data to be used:	IDCOL's Annual Biogas Users Survey.
Value of data applied for the purpose of calculating expected	0

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emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	IDCOL undertakes a sample survey of this ratio in its Annual Biogas Users Survey. The number of sample user households should be more than 100 in order to keep (95/10) confidence/precision level for the sampling method. This parameter is used to calculate $B_{HH}{}^{PJ}{}_{y}$ per eq. (7) in the PoA-DD.
QA/QC procedures to be applied:	In case some inconsistency is found, the reason shall be clarified. If the reason is not clarified, the data shall not be included.
Any comment:	The woody biomass is the tree cut by the household or the wooden biomass (incl. charcoal) purchased in the market. It does not include the pick-up twigs because they are recognized as renewable.

4. Data collection

Data collection regarding households will mainly be carried out by implementers. The role of IDCOL in data collection is checking the quality of the data collected by implementers.

5. Data management

Data management is the most important step in the monitoring process to ensure transparent and credible emission reduction calculations.

Each implementer (GS or other organization) shall collect data described above and archive these electronically using the common template developed by the program coordinator (IDCOL). The electronic files and the hard copy shall be sent to IDCOL.

IDCOL will develop an appropriate electronic template for archiving all data of every activity. After reporting data from implementers, IDCOL shall check the data. If there are any errors found, they will be checked against original data and carry out interview with farmers if necessary.

IDCOL will calculate emission reductions for each CPA supported by PEAR, and store the outputs in hard disks as well as hard copy printouts.

SECTION C. Environmental Analysis

>>

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☑ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

Biogas digester promotion projects are seen to have few negative impacts on the environment. Especially domestic biogas digester promotion projects are implemented at household level and their impact on the environment is identical in most extension regardless of location; therefore, environmental clearance certificate will be gained at the PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Please refer sub-section C.2 of the PoA-DD. There is no specific elements to this CPA.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

>>

No EIA is required for activities under the PoA.

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SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☑ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

Since CPAs under the PoA will be implemented dispersedly in all rural Bangladesh, which is also the geographical boundary for the PoA and the program design, distribution and implementation aspects including the CDM issues are essentially uniform across the country with no CPA specific characteristics, hence it is appropriate to conduct a stakeholder consultation at a PoA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

>>

D.3. Summary of the comments received:

>>

D.4. Report on how due account was taken of any comments received:

>>

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Coordinating and Managing Entity and Joint Focal Point

Organization:	Infrastructure Development Company Limited
Street/P.O.Box:	8 Panthapath, Kawran Bazar
Building:	UTC Building, 16th Floor,
City:	Dhaka
State/Region:	Dhaka
Postfix/ZIP:	1215
Country:	Bangladesh
Telephone:	9102171-8
FAX:	+880-2-8116663
E-Mail:	contact@idcol.org
URL:	http://www.idcol.org/
Represented by:	Islam Sharif
Title:	Executive Director and CEO
Salutation:	Mr.
Last Name:	Sharif
Middle Name:	
First Name:	Islam
Department:	
Mobile:	
Direct FAX:	+880-2-8116663
Direct tel:	
Personal E-Mail:	islamsharif@idcol.org

Project Participant and Joint Focal Point

Organization:	Grameen Shakti
Street/P.O.Box:	Mirpur-2
Building:	Grameen Bank Bhaban (19th Floor)
City:	Dhaka
State/Region:	Dhaka
Postfix/ZIP:	1216
Country:	Bangladesh
Telephone:	88029004314
FAX:	88028035345
E-Mail:	g_shakti@grameen.net
URL:	http://www.gshakti.org/
Represented by:	Abser Kamal
Title:	Managing Director
Salutation:	Mr.
Last Name:	Kamal

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Middle Name:	
First Name:	Abser
Department:	
Mobile:	+8801711567042
Direct FAX:	
Direct tel:	
Personal E-Mail:	g_shakti@grameen.com

For other implementers, please see http://www.idcol.org/biogass_installation.php for IDCOL partner organizations as implementers. [*In case other organizations than IDCOL's POs participate in this CPA, specify the details here.*]

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Please refer Annex 2 of the PoA-DD.

Annex 3

BASELINE INFORMATION

Please see B.5 and Annex 5 for details of information.

Annex 4

MONITORING INFORMATION

Please refer to B.6.1 of the PoA-DD.

Annex 5

INFORMATION OF THE BIOGAS DIGESTERS AND USER HOUSEHOLDS

The necessity information for CDM specified in A.4.4.1 (2) for this PoA are summarized.

In addition, a database spread sheet file is provided for more detailed biogas digester-wise and household-wise information.

[*The following templates are used for the spread sheet*]

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

Sumary Table of the CPA

CPA title: Domestic Biogas CPA-[ID number of CPA] in Rural Bangladesh
([period of the starting date of operation of the biogas digesters covered by the CPA specified as D1/M1/Y1–D2/M2/Y2])

CPA-ID: [sequential number given by IDCOL]

Period of starting date* of operation of covered digesters: [D1/M1/Y1] – [D2/M2/Y2]
*Commencing date of using biogas defined as the date when the first down payment (instalment against loan) was collected

Digester numbers (by capacity)

Total	
1.2, 1.6 m^3/day	
2.0 m^3/day	
2.4 m^3/day	
3.2 m^3/day	
4.8 m^3/day	
> 4.8 m^3/day	

Use household* numbers (by capacity) * User household of biogas includes owner household

Total	
1.2, 1.6 m^3/day	
2.0 m^3/day	
2.4 m^3/day	
3.2 m^3/day	
4.8 m^3/day	
> 4.8 m^3/day	

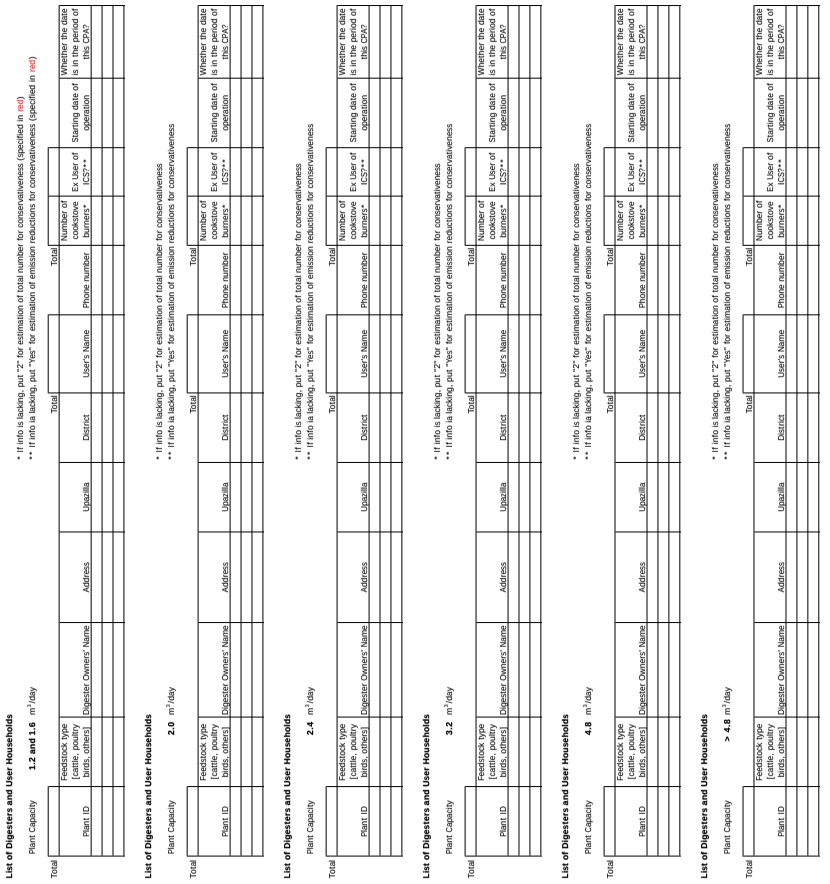
ICS ex-user household* numbers (by capacity) * In case info is lacking, put "Yes" for conservativeness

Total	
1.2, 1.6 m^3/day	
2.0 m^3/day	
2.4 m^3/day	
3.2 m^3/day	
4.8 m^3/day	
> 4.8 m^3/day	

Biogas cookstive burner* numbers (by capacity) * In case info is lacking, put "2" for conservativeness

Total	
1.2, 1.6 m^3/day	
2.0 m^3/day	
2.4 m^3/day	
3.2 m^3/day	
4.8 m^3/day	
> 4.8 m^3/day	

[note] In case some other capacity options are added, the table is modified.



List of Digesters and User Households — Plant Capacity 1.2 and 1.6 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

List of Digesters and User Households — Plant Capacity 2.0 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

List of Digesters and User Households — Plant Capacity 2.4 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

List of Digesters and User Households — Plant Capacity 3.2 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

List of Digesters and User Households — Plant Capacity 4.8 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

List of Digesters and User Households — Plant Capacity > 4.8 m^3/day

Plant ID	Feedstock type [cattle, poultry birds, others]	Digester Owners' Name	Address	Upazilla	District	User's Name	Phone number	Number of cookstove burners*	Ex User of ICS?**	Starting date of operation	Whether the date is in the period of this CPA?
Total											

* If info is lacking, put "2" for estimation of total number for conservativeness (specified in red)
** If info is lacking, put "Yes" for estimation of emission reductions for conservativeness (specified in red)

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