



**Programme design document form for
small-scale CDM programmes of activities
(Version 03.0)**

PROGRAMME DESIGN DOCUMENT (PoA-DD)

Title of the PoA	Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh
Version number of the PoA-DD	4
Completion date of the PoA-DD	10/12/2014
Coordinating/ managing entity	Department of Environment (DoE) of Government of Bangladesh
Host Party(ies)	Government of Bangladesh
Sectoral scope(s) and selected methodology(ies), and where applicable, selected standardized baseline(s)	<p>Sectoral scope: 13 - Waste handling and disposal</p> <p>Methodology: AMS-III. F Avoidance of methane emissions through composting, version 11.</p>

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

>> Title: Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh

A.2. Purpose and general description of the PoA

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Bangladesh is a densely populated country in the third world facing myriads of problems with the growth of population. The increased population leads to the growth of urban areas and slums which, in turn, generating a huge volume of waste. A large proportion of the waste is not properly managed and dumped in unplanned sites that are creating severe environmental hazards. According to UNEP governmental regulations on MSW exist, such as the Local Government (Municipal) Act (2009), they are vague, they do not specify obligations, and thus are rarely enforced by municipalities. National policies, such as the 3R strategy, also exist, promoting MSW use as compost, production materials and energy (such as refuse-derived fuel). A detailed plan to implement the 3R strategy, delegating authority and responsibility to individual municipalities while also recognizing the role of the informal sector, would ensure improvement in MSW management. The lack of environmental awareness amongst societal groups tasked with the disposal of MSW, often within the lower strata, is also of notable significance.

In response to this situation the purpose of the proposed PoA is to improve the municipal solid waste disposal system in municipalities in Bangladesh. There is a total of 64 Districts in Bangladesh and hence this proposed PoA will eventually become a nation-wide effort in reducing emission reduction. The PoA also aims to reduce water, soil and air pollution by managing and disposing municipal solid waste in an environmentally sound and sustainable manner. At present only 50% of the generated solid waste in urban areas is collected by the municipalities and is disposed at unmanaged open dump sites in low-lying areas without any cover and/or gas collection system¹.

It is proposed to recover the organic matter from municipal solid waste as compost and avoid methane emission through a "Municipal Waste Compost Programme" with the support of CDM. Each CPA under this PoA involves a composting plant that will be constructed at a location within each municipality and which will be designed to treat the collected solid/organic waste from the municipality. The solid/organic waste will be collected directly through house to house waste collection methods using rickshaw vans or smaller trucks and will then be transported to the composting plant.

By the introduction of the aerobic treatment of organic municipal waste, each CPA under the PoA will contribute to an emission reduction due to the avoided emission from the degradation of organic materials under conditions that otherwise would cause emission of methane from the open waste dump sites. Through this aerobic treatment of the organic waste each CPA will produce compost which will be sold through fertilizer marketing companies.

Surveys indicate that more than 80% of the solid waste consists of organic substances, which have high potential for compost production². The organic waste has high moisture content and high

¹ Department of Environment (2010). "National 3R Strategy for Waste Management", Ministry of Environment and Forests, Government of Bangladesh, December 2010, Dhaka.

² Department of Environment (2013), "Final Report on Baseline Survey on Waste Generation, Physical and Character Analysis" prepared by CEGIS for Programmatic CDM Project of Department of Environment.

density, making it heavy and unsuitable for incineration. The material is considered more suitable for aerobic composting.

Contribution to sustainable development

The PoA is expected to contribute to a sustainable development through the following immediate benefits:

1. Environmental benefits – assist in preventing uncontrolled GHG generation and emission from waste that would have been disposed at the landfill; production of soil improver (compost) to battle soil degradation;
2. Economical benefits – composting on this scale is a new industrial activity for Bangladesh and the projects will contribute to partial replacement of imported chemical fertilizer by locally produced compost;

Social benefits – jobs for locals and staff training to improve skills of locals

A.3. CMEs and participants of PoA

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The Coordinating and Managing Entity of this PoA is the Department of Environment (DoE) under the Ministry of Environment and Forests who has obtained support from the Government of Bangladesh to implement this PoA. The ownership however of the composting plants and solid waste collection equipments is claimed neither by the DoE nor by the National Government. The DoE will act as the Coordinating Managing Entity. The DoE will disburse funds to the municipalities for construction of composting plants. Waste Concern Consultants will act as a CDM project developer/consultant for the Department of Environment.

According to the Local Government (Pourashava) Act 2009 the municipal council of the respective municipalities in the project towns are responsible for the management of municipal solid waste. After construction of the compost plant, the municipalities will contract the operation and maintenance of the composting plants to private sector operators.

A.4. Party(ies)

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of Bangladesh	Department of Environment of the Government of Bangladesh	Yes

A.5. Physical/ Geographical boundary of the PoA

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The physical and geographical boundary of the PoA is the national borders of Bangladesh.



Figure 1: Map of Bangladesh

A.6. Technologies/measures

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Aerobic composting technology shall be used for the composting process. The composting process consists of the following main steps:

1. Receiving process (including sorting and mixing)
2. Composting process
3. Maturing process
4. Screening (including storage and bagging)

1. Receiving process

The process starts by un-loading the municipal solid waste (MSW) from the households and transfer stations of the municipality at the reception area of the plant site, where initially the waste will be inspected. After the inspection the waste will be mixed with structure material (wood chips, twigs, or coconut shell), from where the mixture will be transported to the pre-composting cells. Vehicles that collect the wastes from the households and transfer stations of the municipality will dump the wastes at the receiving area of the plant. Inorganic substances will be removed manually. After inspection and sorting the mixing with structural material follows. Inorganic substances are separated and will be sold for recycling.

2. Composting process

The box method of aerobic composting developed by Waste Concern Consultants will be used for composting. The collected solid waste is separated and sorted in the sorting platform located inside the compost plant. Compostable organic waste is heaped into piles (under a covered shed) in the rectangular compost box, which allows the microorganisms to decompose the organic waste. The shed protects the compost worker from rain and heat of the sun. The optimal pile temperature for aerobic composting is 55-65 degree Celsius. The moisture in each pile is controlled by watering for rapid decomposition. By daily monitoring the temperature it is ensured that the natural aeration process reaches an optimum pre-composting process, so that pathogens, viruses and bacteria are neutralized.

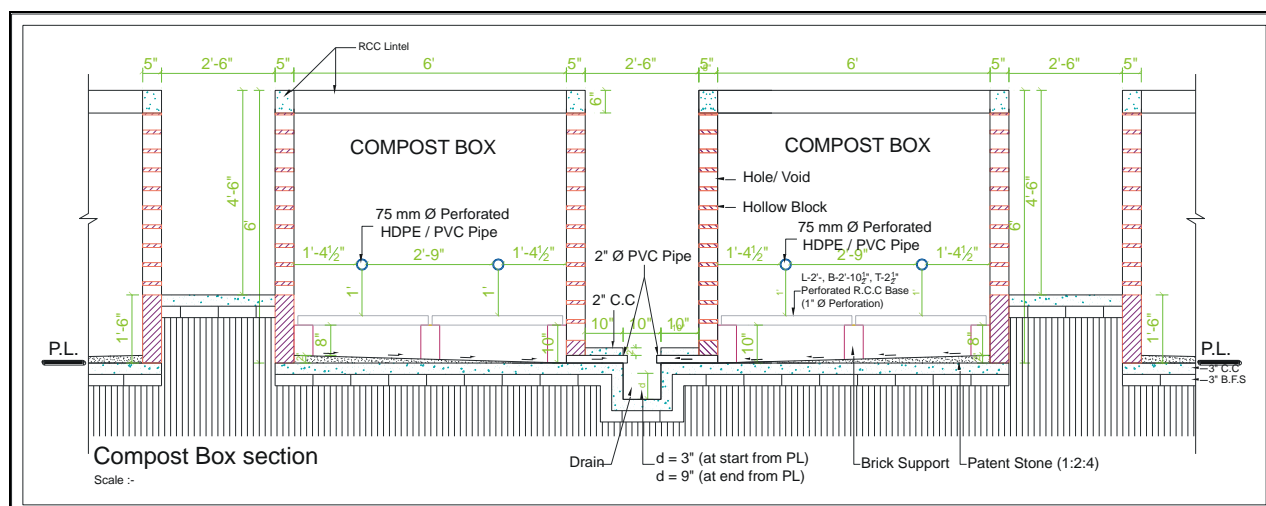


Figure 2: Box method

3. Maturing process

After 40 days, the material in the boxes has a soil-like colour and the temperature has dropped to below 50°C. This indicates that the process has entered the maturing phase. Decomposed organic materials in the compost boxes will then be kept in a large rectangular maturing box with forced aeration system. This forced aeration continues for an additional three weeks. It is necessary to ensure compost maturity and suitability of direct use on plants. During this process the temperature constantly goes down to the ambient temperature.

4. Screening

The final process of screening takes place about 6-7 weeks after the receiving process. The product will be taken out of the maturing boxes and screened. The screening process generates two fractions; the compost and the screening residues. The particle size and amount of the compost is determined by the mesh size. In this case, the screening is done in the fractions of 0-8 mm.

- 0-8 millimetres is the end product, which is the compost and will be stored in cells that are similar to the pre-composting cells only without aeration;
- Materials greater than 8 mm are not ready for marketing or enrichment and will go back to the pre-composting process, where it will be mixed with the materials

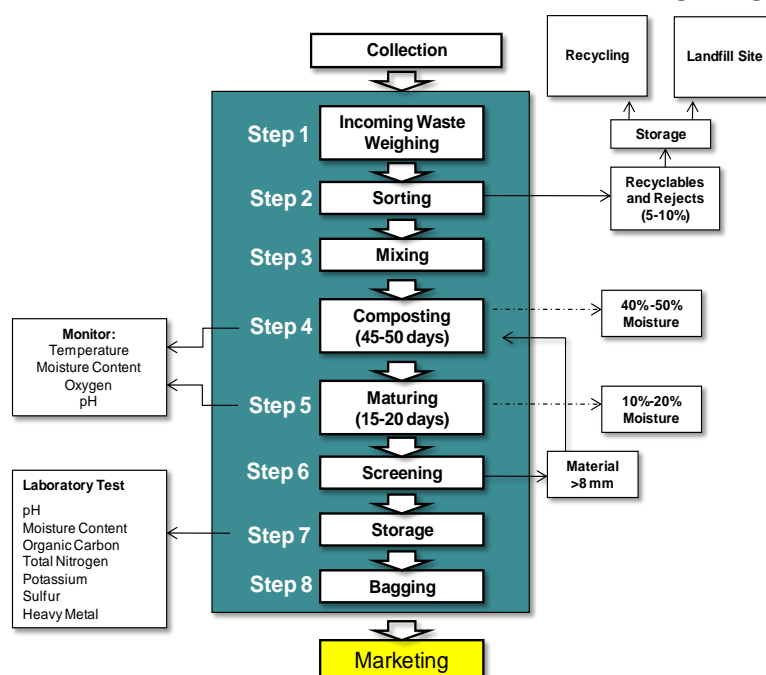


Figure 3: Overall process

A.7 Public funding of PoA

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The implementation of the CPAs of this PoA will receive funding from the government of Bangladesh under the Climate Change Trust Fund.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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The latest Guideline for “Demonstrating additionality of micro scale project activities” (CDM-EB73-A13, version 0.5.0) is used to demonstrate the additionality of a typical CPA.

The above mentioned guideline provides simplified modalities for demonstrating additionality for project activities which meets on of the following criteria:

- (a) Type I: Project activities up to 5 MW that employ renewable energy as their primary technology;
- (b) Type II: Energy efficiency project activities that aim to achieve energy savings at a scale of no more than 20 GWh per year; or
- (c) Type III: Other project activities not included in Type I or Type II that aim to achieve GHG emissions reductions at a scale of no more than 20 kt CO₂e per year.

The proposed PoA does not involve any renewable energy power generation technology, and it does not involve any activities that results in any energy savings. Hence, the PoA does not involved activities under either Type I or Type II.

The PoA aim to promote CPAs that will achieve GHG emission reductions and it is anticipated that none of the CPAs will such activities that result in emission reductions that exceeds 20 kt CO₂e. Hence the CPAs of this PoA is a Type III. Furthermore, according to Section B.2.theeligibility criterion is a requirement for inclusion as a CPA under this PoA, that the project activity in each CPA is limited to project activities involving composting of municipal household waste using an

aerobic process eligible under AMS III F. Any project activity under the PoA is, therefore, a type III project.

According to eligibility criterion Fit is a requirement for inclusion as a CPA under this PoA that the project activities in each CPA is leading to annual emission reductions of no more than 20kt CO₂e.

The project without the income from CER is not viable.

As indicated earlier the boundary of the proposed PoA is the geographical boundary of Bangladesh, and hence all CPA under the PoA must be within this boundary. Bangladesh, being in the group of Least Developed Countries all CPAs will hence comply with the second additionality test.

According to the Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities (EB 74 annex 05), “additionality shall be demonstrated by establishing that in the absence of CDM PoA, none of the implemented CPAs would occur”, which mean that the additionality of the proposed PoA will be demonstrated on the CPA level. For each project under the CPA, detailed information of additionality assessment is included in each specific CPA-DD.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

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The following eligibility criteria have been developed in accordance with the requirements of the EB 65, Annex 3, page 3 B.

Each CPA shall comply with the following eligibility criteria:

#	Eligibility Criteria	Means of checking compliance with criteria
(a)	The geographical boundary of the CPA shall be within the borders of Bangladesh.	Coordinates are within Bangladesh
(b)	Avoiding double counting	Double counting is avoided by the unique identification of each CPA using its coordinates in the Global Positioning System. The CPA Operator shall declare that this project activity will not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned category post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3) Another registered PoA.
(c)	Technology / measures	The technology/measure used in CPAs under the PoA is aerobic composting of municipal solid waste, where the compost is sold on the open market for use as fertiliser.
(d)	Start data of the CPA	Signing date of the Agreement between the Department of Environment and the contractor for construction.
(e)	Compliance with methodology	The applicability of the CPA with the chosen methodology AMS III F shall be demonstrated in the CPA-DD using the applicability criteria of the latest version of AMS III F and will be checked by the CME before inclusion as a CPA under the PoA.
(f)	CPA additionality	The part of the additionality test to be met by each

#	Eligibility Criteria	Means of checking compliance with criteria
		<p>individual CPA is the demonstration that the CPA is an aerobic composting plant according to the applicability criteria listed in the latest version of AMS III F and therefore a type III project together with documentation that the CPA is a micro scale project activity. The demonstration shall include calculation of annual ex ante emission reductions for each year of the crediting period demonstrating that the CPA will remain within the micro scale threshold for being a micro scale project activity in each year of the period, and thus include documentation that the project activity will aim to achieve emission reductions at a scale of no more than 20 k t CO₂e per year in each year of the crediting period.</p> <p>This documentation will be based on:</p> <ul style="list-style-type: none"> • the agreements between project participants and CME, • contracts on supply of MSW between the CPA and the municipality or other administrative entity responsible for MSW handling, as well as on • the physical design of the plant showing the maximum MSW capacity of the plant corresponds to the estimated annual emission reductions anticipated, though allowing for a reserve capacity of up to 50% to be used in periods where the composition of received MSW includes less waste with a high biodegradability such as food and vegetable.
(g)	CME requirements, environmental impact assessment, Stakeholder consultation.	The CPA will have to undertake a stakeholder consultation and environmental impact assessment following the rules for stand alone CDM projects ³ and will have to demonstrate that any comment(s) received in this process has been taken into due account when designing the CPA.
(h)	Funding – diversion of ODA	Declaration by project operator. If any public funding has been granted to the implementation of the CPA, the CPA will have to provide affirmation that funding from Annex 1 parties, if any, does not result in a diversion of official development assistance.
(i)	Target group	Not applicable
(j)	Sampling	Not applicable, each CPA is monitored
(k)	Meets the microscale thresholds	Checking CPA capacity and the calculated CERs
(l)	Debundling	The CPA shall in the CPA-DD demonstrate that the project activity is not a debundled component of large scale CDM project. In doing so, the CPA shall follow the guidance provided in the latest version of the “Guidelines on Assessment of Debundling for SSC Project Activities”.
(m)	CME management	The CPA shall accept that the CME has the

³See relevant paragraphs of “Clean Development Mechanism Project Cycle Procedure”

#	Eligibility Criteria	Means of checking compliance with criteria
		competencies to check the features of potential CPAs in order to ensure that each CPA meets all requirements and eligibility criterion before submission to a DOE of a request for inclusion of the CPA in the PoA.
(n)	Expansions of CPAs	This PoA includes CPAs undertaking construction and/or expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For CPAs that increase capacity utilization at existing facilities, CPAs shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate CDM project activity. The special efforts should be identified and described by the CPA before inclusion in the PoA

All eligibility criterions have been formulated as verifiable criterion.

Updating of eligibility criteria

In case AMS III F has been put on hold and subsequently been revised or replaced the eligibility criteria will be updated to the requirements of the revised or renewed methodology with immediate effect. A new version of the PoA-DD and generic CPA-DD containing updated eligibility criteria validated by a DOE will be submitted to the Board for approval. The revised and validated eligibility criteria will form the basis for all subsequent inclusions of CPAs and for all existing CPAs starting from the following renewal of the crediting period.

The provisions of paragraph 21 through 25 of the latest version of Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities apply.

B.3. Application of technologies/measures and methodologies

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CPAs under this PoA must comply with the approved small scale methodology AMS-III. F Avoidance of methane emissions through composting, version 11.

The eligibility criterions for inclusion of CPAs under this PoA are limited to project activities complying with the applicability criteria of AMS-III. F, version 11.

No sampling plan is applicable since the SSC-CPAs to be included in the PoA are expected to be industrial facilities uniquely designed and operated, thus individually monitored.

The expected annual quantity (tonnes) of the waste received and treated by each CPA during the crediting period is estimated to be a maximum of 100 tonnes MSW per day in each year of the crediting period. Based on a survey from 2012 it was found that the composition of waste received at 24 typical Bangladeshi municipal cities/town together with of the composition of municipal waste in Bangladesh an estimate has been established over the distribution of types of waste and the treatment of the different waste streams in the waste plant. The result of one of the waste analysis is presented in the below table:

Component	Residential High Income (% by wt)	Residential Middle Income (% by wt)	Residential Lower Middle Income (% by wt)	Residential Low Income (% by wt)	Market (% by wt)
Food & Vegetable Waste	83	77	75	68	81.45
Paper Products	4	6	5	6	6.27
Plastic	7	7	5	5	7.27
Rags, Textile, Jute	2	2	1	1	-
Metals	0	0	0	1	-
Wood/Grass/Leaves	1	3	9	5	2.06
Electronic Waste	0	1	1	0	
Others	3	4	4	14	2.95
Total	100	100	100	100	100
Compostable	84	80	83	73	83.51
Non-Compostable	16	20	17	27	16.49

Table 1: Typical example of waste composition in Bangladesh (Mymensingh Pourashava Area) 2012

SECTION C. Management system

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PoA Management System

The CME of the proposed PoA has developed a management system for the present PoA, which shall be mandatory through contractual arrangements with all CPAs to be included under the PoA. The contracts with the CPAs will include provisions for the CME to have the competence to check any feature relevant for checking that each CPA meets all requirements and eligibility criteria before a DoE is hired to validate a CPA-DD for inclusion of a CPA under the PoA.

The management system includes:

a. Definition of roles and responsibilities of personnel involved in the process of inclusion a review of their competencies.

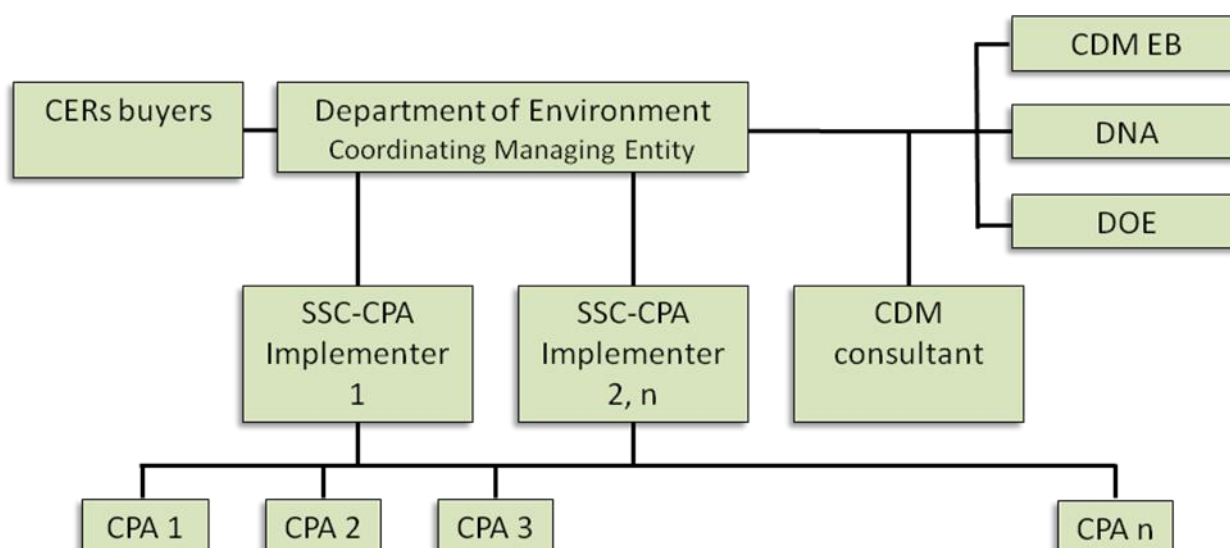
The roles and responsibilities of the CME are

- Set up eligibility criteria
- Set up management system
- Operate and maintain the management system
- Set up monitoring system
- Recruiting CPA implementers,
- Ensuring that the proposed CPA is in compliance with PoA eligibility criteria,
- Write the present PoA-DD and CPA-DD through service agreements with CDM consultants,
- Collecting documents and supporting evidence required for PoA-DD and CPA-DD validation,
- Communicating with the Bangladeshi DNA and the CDM Executive Board,
- Hiring DoE to conduct validation and verification,
- Finding CERs buyers, enter into ERPAs, fulfill ERPA obligations and distributing CERs revenues to CPA implementers,
- Implement a monitoring database,
- Conduct training for monitoring data,
- Periodically collect monitoring data,
- Write the monitoring reports.
- Financing of investment in composting plant

The responsibilities of the CPAs are:

- Construction (based on DoE financing), installation, operation and maintenance of composting plant(s)
- Data checking and monitoring, and storing of monitoring data.
- Facilitate that the CME and Designated Operational Entity receives required documents and access to sites as needed.
- Set up compost marketing system including monitoring of transport, storage and application methods for the compost
- Undertake training of relevant staff in the compost selling chain for correct handling of compost in accordance with the requirements of the CPA-DD.
- Providing land for the composting plant

When the staffing plans are ready for the CME and the CPAs the above tasks will be assigned to individual staff or a group of staff.



b. Records of arrangements for training and capacity development for personnel

The CME will arrange training of dedicated staff of both the CME and the CPA. The training will include a presentation of the overall management system of the PoA with special emphasize on procedures to be followed in order to fulfill the contract between the CME and the CPA, including all requirements and procedures included in the monitoring plan and reporting of monitored data.

c. Procedures for technical review of inclusion of CPAs

The CME will ensure eligibility of the CPAs before they are submitted to a DoE for validation. The CME will review each CPA document and methodically check the fulfillment of each eligibility criterion of the PoA before submission of the CPA-DD to a DoE for validation.

d. A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA).

As a part of fulfilling the eligibility criteria each CPA will sign an agreement with the CME indicating that the CPA is agreeing to participate in the PoA and that it is not a part of any other PoA or CDM project. To further ensure against double counting the CME will undertake the following procedure:

- The CME will review all CDM projects and programs of activities in Bangladesh at both registration and validation stage to ensure that the CPA is not included in either such projects. This information can be obtained from the Project Registry of the UNFCCC website.
- If there are any other CDM projects or PoAs in Bangladesh using AMS-III.F, the CME will go through each and ensure that the GPS coordinates of the CPA is not within 1 km from the nearest other CDM project or PoA using AMS-III.F.

e. Records and documentation control process for each CPA under the PoA

The CME will maintain a database system that will consist of the following details for each CPA, so each can be uniquely identified:

1. Name of the CPA implementer as well as contractual relationships (owner, operator, investor and counterparty to any compost selling agreement). The CME will also record any changes in this structure throughout the crediting period. The control process will include obtaining copies of the official registration documents for the legal entity of the CPA,
2. GPS coordinates and precise location (town, district, thana, etc.). Staff of the CME will visit the site of the CPA and check the GPS coordinates.
3. Technical specifications, such as compost plant capacity in MSW ton per day, plant design, plant organization, amounts of waste received, distribution of waste on waste types, description of sampling procedures, description of monitoring equipment including supplier calibration requirements, description of monitoring procedures and data recording for measurements of oxygen content in compost during the composting process and records of employed staff and their assigned tasks with documentation that they have the necessary training for undertaking the assigned task.
4. Key dates for each facility, including financial closure, groundbreaking, construction and commissioning.
5. Copies of licenses, permits, environmental impact assessments and any other regulatory documentation.
6. Records of start dates for the crediting period as well as monitoring/verification reports and records of issuance of CERs.
7. All records of compost production, storage and sales from each plant.

f. Measures for continuous improvements of the PoA Management system

The efficient operation of the PoA Management system is necessary in order for the successful continuous operation of the PoA in terms of technical and financial performance. Furthermore, the documentation of an efficient operation of the PoA Management system provides a transparent background for the Designate Operational Entity when verifying emission reductions as well as in the validation of further CPAs to be included under the PoA.

The measures for improvements in the management system will have three levels:

1. A continuously check of compliance with reporting requirements by the CPA in order to secure the reception of data necessary for verification of emission reductions.
2. CME will undertake an annual review of the overall PoA management system in connection with the drafting of the yearly monitoring reports, including:
 - Evaluation of the flow of undertaking monitoring and submission of monitoring data, and overall performance of the project.
 - Check of continuous compliance with eligibility criteria.
 - CME staff, CPAs and compost buyers, will be invited on an annual basis to provide comments on the PoA Management System. Based on the comments received and other experience in the first year of the first CPAs a questionnaire will be developed in order to improve collected information.
 - Evaluation of the verification process and any obstacles met for a timely issuance of CERs.
3. Based on the experience obtained during the annual verification the CME will annually prepare a written report for its internal team, CPA implementers and the DoE outlining problems that occurred during the previous year and list specific actions that will take place to remedy identified problems.

g. Any other relevant elements.

The distribution, storage and application procedures for compost will constitute an area of special financial importance to the PoA both in terms of complying with the requirements of the PoA-DD and continued beneficial utilisation of the compost as a fertiliser. The marketing efforts will have to be kept at a continued high level in terms of training of both transporters and end users of the compost in order to secure that no methane formation can take place and that the compost is of good use as a fertiliser

SECTION D. Duration of PoA**D.1. Start date of PoA**

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20/03/2014

D.2. Duration of the PoA

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28 years

SECTION E. Environmental impacts**E.1. Level at which environmental analysis is undertaken**

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Environmental analysis is undertaken at the CPA level. The PoA involves the establishment of a number of composting facilities along with waste collection systems in community areas. The existing waste collection system may vary between CPAs as may the design of the composting system to be implemented. The environmental analyses will therefore be undertaken at the CPA level.

E.2. Analysis of the environmental impacts

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There is no solid waste management handling rules in Bangladesh. However, Ministry of Environment and Forests of the Government of Bangladesh has prepared a National 3R (Reduce, Reuse and Recycle) Strategy for Waste Management. In general waste collection and landfilling in Bangladesh is at a low level with overall collection rates in the magnitude of 50% of generated waste amounts. Landfilling is limited to unmanaged unsanitary landfills. Environmental analysis to be undertaken at the CPA level will include issues such as odour, transport, collection system, noise and water pollution issues. There are no legal requirement for collection and flaring of methane from landfills. Any effort in Bangladesh to collect and manage municipal solid waste will contribute to increased environmental standards in the country in terms of avoidance of odour, spreading of diseases, reduce surface and groundwater pollution. The production of compost will be environmentally beneficial for the country as a soil improver and reduce the use of chemical fertiliser, thus improving the environment.

SECTION F. Local stakeholder comments**F.1. Solicitation of comments from local stakeholders**

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The local stakeholder consultation is undertaken at the CPA level to ensure full participation and consultation of local stakeholders for each CPA. Generally, a public announcement and invitation in local media will be issued, inviting the local stakeholders to attend the consultation for the CPA. Individual invitations via electronic correspondence may also be issued to local authorities, governmental and non-governmental organisations and other relevant stakeholders. During the consultation process participants will be required to register their attendance and presentations will be made to outline the proposed project activity in a non-technical manner that includes environmental, social and technological considerations, climate change and the objective of CDM in general and the climate change contribution expected from the project activity.

F.2. Summary of comments received

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A summary will be provided in the individual CPA-DDs

F.3. Report on consideration of comments received

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A report on consideration of received comments will be provided in the CPA-DDs.

SECTION G. Approval and authorization

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The Letter of Approval dated 16 March 2014 is available in Appendix 6.

PART II. Generic component project activity (CPA)**SECTION A. General description of a generic CPA****A.1. Purpose and general description of generic CPAs**

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The purpose of the CPA in [city/town] is to strengthen local waste collection, treatment and waste management in general as well as to produce fertiliser for local farmers. The lack of satisfactory waste management in Bangladesh in general contributes to an unsustainable environment as well as a reduction of society productivity in general. The agriculture in Bangladesh is in general suffering from a lack of fertiliser. This project will address these two obstacles for overall progress in Bangladesh through establishing a collection system for locally produced municipal waste and through composting of the biodegradable fraction of the waste and transforming it into saleable compost, being sold to local farmers.

The compost will be produced under a quality assurance system in accordance with Bangladeshi regulations, and farmers will receive a comprehensive instruction in the correct storage and application of the compost in order to make the best use of the fertilizer and in order to secure that anaerobic and methane forming conditions do not occur.

The CPA will have a state-of-the-art monitoring system and monitoring equipment for each parameter to be monitored as well as a management system capable of securing implementation and operation of the project in accordance with the requirement of the PoA.

SECTION B. Application of a baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology(ies) and standardized baseline(s)

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The approved baseline and monitoring methodology selected for the proposed Programme of Activities is: AMS-III.F, Avoidance of methane emissions through composting, Version 11.

This version of AMS-III.F refers to the following tools:

- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion
- Emissions from solid waste disposals
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption
- Project and leakage emissions from composting

B.2. Applicability of methodology(ies) and standardized baseline(s)

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AMS-III.F, version 11 addresses – among others - project activities where fresh municipal solid waste originally intended for landfilling is composted in an aerobic process, thus avoiding methane formation and leading to a saleable product, compost, to be used as a fertiliser in local farms. The Green House Gasses involved in the baseline and project activity are CO₂, CH₄ and N₂O.

Requirement for applicability of the methodology	Compliance of eligible CPA with the given requirement	Reference
This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the project activity, controlled aerobic treatment by composting of biomass is introduced.	The CPAs to be implemented under this PoA will involve controlled aerobic treatment of the biomass fraction of MSW that would otherwise have been left to decay anaerobically in a SWDS by composting of MSW. Emission reductions derive from the avoidance of methane formation from decay of MSW in landfills.	AMS-III.F, Version 11, paragraph 1
The project activity does not recover or combust landfill gas from the disposal site (unlike AMS-III.G “Landfill methane recovery”), and does not undertake controlled combustion of the waste that is not treated biologically in a first step (unlike AMS-III.E “Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment”). Project activities that recover biogas from wastewater treatment shall use methodology AMS-III.H “Methane recovery in wastewater treatment”. Project activities involving co-digestion of organic matters shall apply methodology AMS-III.AO “Methane recovery through controlled anaerobic digestion”.	The eligibility criteria for CPAs under this PoA require that CPAs comply with the applicability criteria of the latest version of AMS III F and thus excludes CPAs including recovering or combustion of landfill gas from the disposal site or controlled combustion of the waste that is not treated biologically. The waste that is not treated biologically is limited to non-degradable waste such as dirt, stones, plastic etc., which will be landfilled.	AMS-III.F, Version 11, paragraph 2

Requirement for applicability of the methodology	Compliance of eligible CPA with the given requirement	Reference
Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO ₂ equivalent annually.	The eligibility criterion for the PoA requires CPAs to aim at annual emission reduction of no more than 20,000 tons CO ₂ -e in each year of the crediting period.	AMS-III.F, Version 11, paragraph 3
This methodology is applicable to the composting of the organic fraction of municipal solid waste and biomass waste from agricultural or agro-industrial activities including manure.	The eligibility criterion for the PoA requires that the CPA shall be aiming at aerobic composting of the organic fraction of MSW that would otherwise be left to decay in a SWDS.	AMS-III.F, Version 11, paragraph 4
This methodology includes construction and expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For project activities that increase capacity utilization at existing facilities, project participant(s) shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate CDM project activity. The special efforts should be identified and described.	This PoA includes CPAs undertaking construction and/or expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For CPAs that increase capacity utilization at existing facilities, CPAs shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate CDM project activity. The special efforts should be identified and described by the CPA before inclusion in the PoA	AMS-III.F, Version 11, paragraph 5
This methodology is also applicable for co-composting wastewater and solid biomass waste, where wastewater would otherwise have been treated in an anaerobic wastewater treatment system without biogas recovery. The wastewater in the project scenario is used as a source of moisture and/or nutrients to the biological treatment process e.g. composting of empty fruit bunches (EFB), a residue from palm oil production, with the addition of palm oil mill effluent (POME) which is the wastewater co-produced from palm oil production.	CPAs under this PoA are limited to project activities undertaking aerobic composting of MSW and no co-composting is involved.	AMS-III.F, Version 11, paragraph 6
In case of co-composting, if it cannot be demonstrated that the organic matter would otherwise been left to decay anaerobically, baseline emissions related to such organic matter shall be accounted for as zero, whereas project	CPAs under this PoA are limited to project activities undertaking aerobic composting of MSW and no co-composting is involved.	AMS-III.F, Version 11, paragraph 7

Requirement for applicability of the methodology	Compliance of eligible CPA with the given requirement	Reference
emissions shall be calculated according to the procedures presented in this methodology for all co-composted substrates.		
<p>The location and characteristics of the disposal site of the biomass, animal manure and co-composting wastewater in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions, using the provisions of AMS-III.G, AMS-III.E (concerning stockpile), AMS-III.D “Methane recovery in animal manure management systems” or AMS-III.H respectively.</p> <p>Project activities for composting of animal manure shall also meet the requirements under paragraphs 1, and 2 (c) of AMS-III.D Further no bedding material is used in the animal barns or intentionally added to the manure stream in the baseline. Blending materials may be added in the project scenario to increase the efficiency of the composting process (e.g. to achieve a desirable C/N ratio or free air space value), however, only monitored quantity of solid waste or manure or wastewater diverted from the baseline treatment system is used for emission reduction calculation. The following requirement shall be checked <i>ex ante</i> at the beginning of each crediting period:</p> <ul style="list-style-type: none"> (a) Establish that identified landfill(s)/stockpile(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or (b) Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill)/stockpile(s). 	<p>The location and characteristics of the disposal site for MSW composted under this PoA will be indicated in each CPA with information of the amount of waste received at the landfill as well as documentation of the depth of the landfill and every other information needed to estimate the MCF and estimate its methane emissions according to the provisions of AMS-III.F</p> <p>This PoA is restricted to CPAs involving composting of MSW and without co-composting.</p> <p>In accordance with the eligibility criteria of the PoA it will be established <i>ex ante</i> at the beginning of the crediting period that</p> <ul style="list-style-type: none"> - it is common practice in the region to dispose of the waste in landfills. 	AMS-III.F, Version 11, paragraph 8
The project participants shall clearly define the geographical boundary of the region referred in paragraph 8 (b), and document it in the CDM-PDD. In defining the geographical boundary of the region, project participants should take into account the source of the waste i.e. if waste is transported up to 50 km, the	The geographical project boundary for each CPA will be clearly defined in the CPA-DD with an estimate of the maximum distance for transportation of waste to the composting site. The distance to which the	AMS-III.F, Version 11, paragraph 9

Requirement for applicability of the methodology	Compliance of eligible CPA with the given requirement	Reference
region may cover a radius of 50 km around the project activity. In addition, it should also consider the distance to which the final product after composting will be transported. In either case, the region should cover a reasonable radius around the project activity that can be justified with reference to the project circumstances but in no case it shall be more than 200 km. Once defined, the region should not be changed during the crediting period(s).	final product will transported will be estimated and the estimate will be justified from the CPA circumstances.	
In case produced compost is handled aerobically and submitted to soil application, the proper conditions and procedures (not resulting in methane emissions) must be ensured.	The eligibility criteria include a provision for each CPA to make provisions for soil application of the compost to ensure that the compost is stored and applied in a manner that does not lead to anaerobic conditions.	AMS-III.F, Version 11, paragraph 10
In case produced compost is treated thermally/mechanically, the provisions in AMS-III.E related to thermal/mechanical treatment shall be applied.	The compost is not expected to be treated thermally/mechanically, but if so the CPA will be obliged to follow the applicable provisions of AMS-III.E	AMS-III.F, Version 11, paragraph 11
In case produced compost is stored under anaerobic conditions and/or delivered to a landfill, emissions from the residual organic content shall to be taken into account and calculated as per the latest version of the methodological tool "Emissions from solid waste disposal sites".	The project activity aims at selling all compost produced to local farmers. The monitoring plan includes monitoring of the produced/sold compost.	AMS-III.F, Version 11, paragraph 12

As the CPAs to be included in the PoA will be small to medium sized industrial facilities individually monitored there will be no sampling plan.

B.3. Sources and GHGs

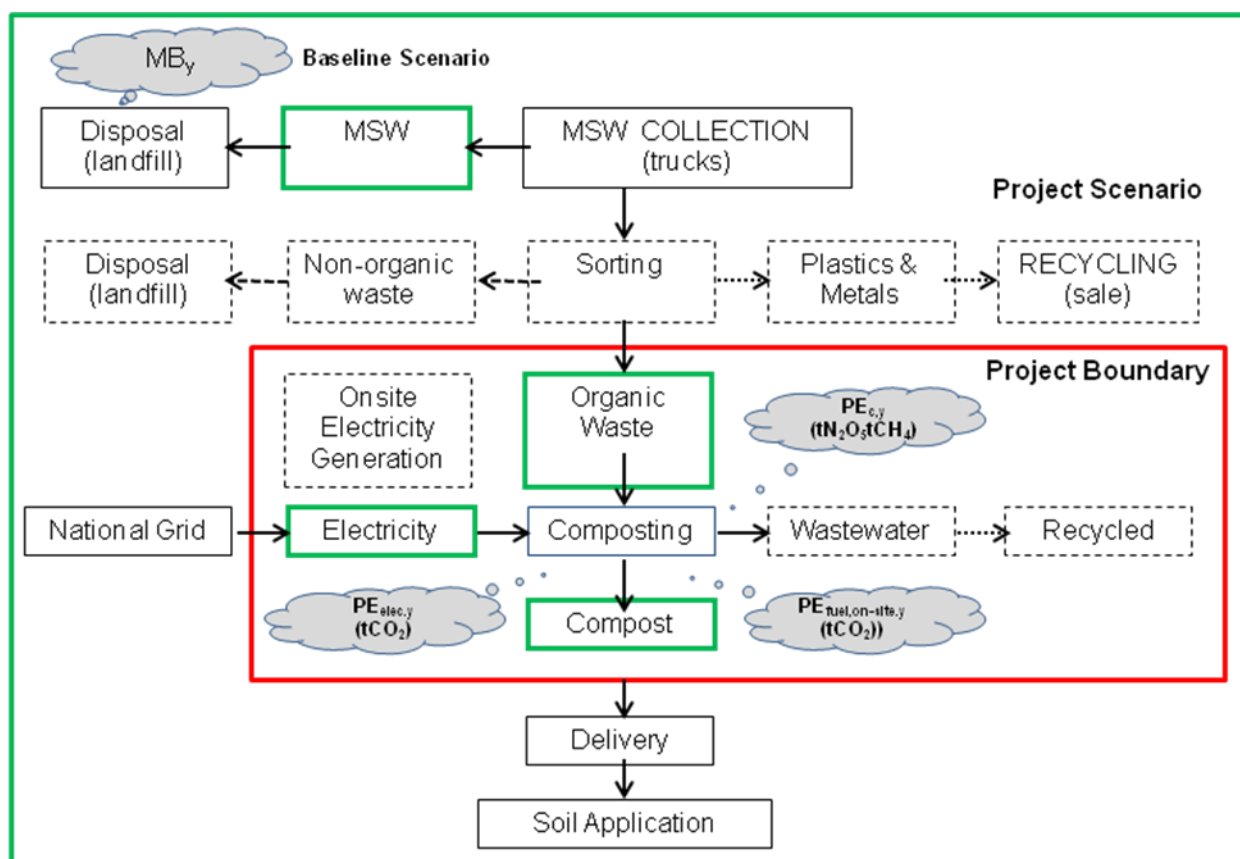
Baseline emissions:

- CH₄ emissions from decay of bio-degradable fraction of MSW.

Project emissions:

- CO₂ emissions from electricity consumption on site
- CO₂ emissions from fuel consumption on site
- N₂O and CH₄ emissions during the composting process.

	Source	GHG	Included Yes/No?	Justification/Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CO ₂	No	CO ₂ emissions from decomposition of organic waste are not accounted. This is conservative.
		CH ₄	Yes	The only source of emissions included in the baseline scenario
		N ₂ O	No	N ₂ O emissions are not included in the calculation of the baseline scenario.
	Emissions from electricity consumption	CO ₂	No	No electricity is consumed in the baseline scenario. This is conservative.
		CH ₄	No	Excluded for simplicity. This is conservative.
		N ₂ O	No	Excluded for simplicity. This is conservative.
	Emissions from thermal energy generation	CO ₂	No	No thermal energy is produced in the baseline scenario.
		CH ₄	No	Excluded for simplification.
		N ₂ O	No	Excluded for simplification.
Project Activity scenario	On-site fossil fuel consumption due to the project activity other than for electricity generation	CO ₂	Yes	Include vehicles and machinery
		CH ₄	No	Excluded for simplification in accordance with the relevant tool.
		N ₂ O	No	Excluded for simplification in accordance with the relevant tool.
	Emissions from on-site electricity use	CO ₂	Yes	Include lighting, equipment and machinery
		CH ₄	No	Excluded for simplification in accordance with the relevant tool.
		N ₂ O	No	Excluded for simplification in accordance with the relevant tool.
	Emissions from thermal energy generation	CO ₂	No	Not applicable since there is no thermal energy generated under the Project Activity.
		CH ₄	No	Not applicable since there is no thermal energy generated under the Project Activity.
		N ₂ O	No	Not applicable since there is no thermal energy generated under the Project Activity.
	Direct emissions from the waste treatment processes	CO ₂	No	The project activity does not include incineration, gasification or combustion of fossil based fuels. In addition, CO ₂ emissions from the decomposition or combustion of organic waste are not accounted for.
		CH ₄	Yes	The composting process may not be complete and result in anaerobic decay.
		N ₂ O	Yes	N ₂ O can be emitted as part of the composting process itself.
	Emissions from waste treatment	CO ₂	No	Not applicable since no CPA will include waste water in the composting process
		CH ₄	No	Not applicable since no CPA will include waste water in the composting process
		N ₂ O	No	Not applicable since no CPA will include waste water in the composting process



B.4. Description of baseline scenario

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In accordance with AMS III F the baseline scenario is the situation where, in the absence of the project activity, biomass is left to decay within the project boundary and methane is emitted to the atmosphere. In accordance with the eligibility criteria CPAs under the present POA are limited to project activities that compost MSW, not including manure or waste water.

In Bangladesh there are no regulations calling for collection and utilization or flaring of methane emissions from landfills. At the present landfills in the country MSW would otherwise have been dumped and left to decay in an uncontrolled manner. In accordance with the lack of requirements calling for capture of methane at landfills in Bangladesh no landfill site has gas collection and flaring system (As reference material please check National 3R Strategy of Bangladesh).

Based on the information on prevailing practice and Bangladeshi regulation for the waste sector the baseline scenario for the handling of MSW in the project activity is landfill of the MSW at unmanaged landfills with no capture of methane.

The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste. The waste composted in the project does not include waste water or manure. The yearly methane generation potential for the solid waste is calculated using the first order decay model as described in the latest version of the methodological tool “Emissions from solid waste disposal sites”.

B.5. Demonstration of eligibility for a generic CPA

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No.	Criteria	Demonstration of Eligibility by CPA
(a)	The geographical boundary of the CPA shall be within the borders of Bangladesh.	GPS coordinates
(b)	Double counting is avoided by the unique identification of each CPA using its coordinates in the Global Positioning System. Also the CPA Operator shall demonstrate that this project activity shall not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned category post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3) Another registered PoA.	GPS coordinates and confirmation note by CPA
(c)	The technology/measure used in CPAs under the PoA is aerobic composting of Municipal Solid Waste, where the compost is sold on the open market for use as fertiliser.	Documentation of drawings for planned compost plant
(d)	The starting date of any CPA will be checked by introducing an opening procedure for the CPA with requirements to be in place. Following these procedures will be conditional for inclusion as a CPA under the PoA. Compliance with the procedures will have to be documented through letters, email or similar between the CME and the CPA confirming that the CME wishes to include the project activity as a CPA under the PoA.	The starting data of the CPA is the date where the project operator is committing to implement the project. This is confirmed eg by the signing of the contract between the CME and the selected contractor for construction of compost plant.
(e)	The applicability of the CPA with the chosen methodology AMS III F shall be demonstrated in the CPA-DD using the applicability criteria of the latest version of AMS-III.F and will be checked by the CME before inclusion as a CPA under the PoA.	Filled out schedule using applicability criteria from latest version of AMS-III. F
(f)	<p>The part of the additionality test to be met by each individual CPA is the demonstration that the CPA is an aerobic composting plant according to the applicability criteria listed in the latest version of AMS III F and therefore a type III project together with documentation that the CPA is a micro scale project activity. The demonstration shall include calculation of annual ex ante emission reductions for each year of the crediting period demonstrating that the CPA will remain within the micro scale threshold for being a micro scale project activity in each year of the period, and thus include documentation that the project activity will aim to achieve emission reductions at a scale of no more than 20 ktCO₂e per year in each year of the crediting period. This documentation will be based on:</p> <ul style="list-style-type: none"> the agreements between project participants and CME, contracts on supply of MSW between the CPA and the municipality or other administrative entity responsible for MSW handling, as well as on the physical design of the plant showing the maximum MSW capacity of the plant corresponds to the estimated annual emission reductions anticipated, though allowing for a reserve capacity of up to 50% to be used in periods where the composition of received 	<p>Agreements between project participants.</p> <p>Contracts on supply of MSW</p> <p>Design drawings for planned compost plant</p> <p>Calculations of potential emission reductions for each year of the first crediting period.</p>

No.	Criteria	Demonstration of Eligibility by CPA
	MSW includes less waste with a high biodegradability such as food and vegetable.	
(g)	The CPA will have to undertake a stakeholder consultation and environmental impact analysis following the rules for standalone CDM projects ⁴ and will have to demonstrate that any comment(s) received in this process has been taken into due account when designing the CPA.	Report on stakeholder consultation as well as environmental impact assessment and demonstration of how comments have been taken into account
(h)	If any public funding has been granted to the implementation of the CPA, the CPA will have to provide affirmation that funding from Annex 1 parties, if any, does not result in a diversion of official development assistance.	Affirmation letter that no diversion of funds has taken place
(k)	where applicable the conditions that ensure that every CPA meets the small-scale or micro-scale threshold and remains within those thresholds throughout the crediting period of the CPA	Checking CPA capacity and the calculated CERs
(l)	The CPA shall in the CPA-DD demonstrate that the project activity is not a debundled component of large scale CDM project. In doing so, the CPA shall follow the guidance provided in the latest version of the "Guidelines on Assessment of Debundling for SSC Project Activities". In accordance with paragraph II of these guidelines	Note from the CPA implementer following the mentioned procedures.
(m)	The CPA shall accept that the CME has the competencies to check the features of potential CPAs in order to ensure that each CPA meets all requirements and eligibility criterion before submission to a DOE of a request for inclusion of the CPA in the PoA.	Paragraph in agreement between CPA and CME on inclusion as a CPA under the present PoA
(n)	Expansions of CPAs	This PoA includes CPAs undertaking construction and/or expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For CPAs that increase capacity utilization at existing facilities, CPAs shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate CDM project activity. The special efforts should be identified and described by the CPA before inclusion in the PoA

⁴See relevant paragraphs of "Clean Development Mechanism Project Cycle Procedure"

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

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According to the simplified approved baseline and monitoring methodology AMS-III.F Avoidance of methane emissions through composting the following equations are used to calculate emission reductions, baseline emissions, project emissions and leakage of each CPA:

$$ER_y = BE_y - (PE_y + LE_y)$$

Where:

ER_y Is the emissions reductions in year y (tCO₂e)
 BE_y Is the emissions in the baseline scenario in year y (tCO₂e)
 PE_y Is the emissions in the project scenario in year y (tCO₂e)
 L_y Is the leakage in year y (tCO₂e)

Baseline Emissions

Baseline emissions shall exclude emissions of methane that would have to be captured, fuelled or flared to comply with national or local safety requirement or legal regulations.

$$BE_y = BE_{CH_4,SWDS,y} + BE_{ww,y} + BE_{CH_4,manure,y} - MD_{y,reg} * GWP_{CH_4} \quad (1)$$

Where:

$BE_{CH_4,SWDS,y}$ Yearly methane generation potential of the solid waste composted by the project activity during the years x from the beginning of the project activity ($x=1$) up to the year y estimated as per the latest version of the methodological tool “Emissions from solid waste disposal sites” (tCO₂e). The tool may be used with the factor “ $f=0.1$ ” taking into account the methane oxidation effect by the upper layer of the landfill. With the definition of year x as ‘the year since the project activity started diverting wastes from landfill disposal, x runs from the first year of crediting period ($x=1$) to the year for which emissions are calculated ($x=y$)’

$MD_{y,reg}$ Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (tonne)

$BE_{CH_4,manure,y}$ Where applicable, baseline emissions from manure composted by the project activities, as per the procedures in AMS-III.D

$BE_{ww,y}$ Where applicable, baseline emissions from the wastewater co-composted, calculated as per the procedures in AMS-III.H

GWP_{CH_4} GWP for CH₄ (value of 25 is used)

CPAs under this PoA will, in accordance with the eligibility criteria, be limited to composting facilities that do not treat either manure or wastewater.

In Bangladesh there are no mandatory rules in force demanding capture and/or combustion of methane from landfills.

Therefore, the equation for calculation of baseline emissions can be reduced to:

$$BE_y = BE_{CH_4,SWDS,y} \quad (2)$$

$BE_{CH_4,SWDS,y}$ shall be calculated according to the methodological tool Emissions from solid waste disposal sites using formula (1) of the methodological tool “Emissions from solid waste disposal sites”. In this PoA the yearly model for calculating baseline emissions is used:

$$BE_{CH_4,SWDS,y} = \varphi \cdot (1 - f_y) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1 - e^{-k_j}) \quad (3)$$

Where:

- $BE_{CH_4,SWDS,y}$ = Baseline, methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO₂e / yr)
- φ = Model correction factor to account for model uncertainties for year y
- f_y = Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in the year y
- GWP_{CH_4} = Global Warming Potential of methane
- OX = Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
- F = Fraction of methane in the SWDS gas (volume fraction)
- x = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$).
- y = Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
- $DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
- MCF_y = Methane correction factor for year y
- $W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
- DOC_j = Fraction of degradable organic carbon in the waste type j (weight fraction)
- k_j = Decay rate for the waste type j (1/yr)
- j = Type of residual waste or type of waste in the MSW

Project Emissions

Project activity emissions from composting process (PE_y) shall be determined as per the latest version of the methodological tool “Project and leakage emissions from composting”. PE_y is equivalent to parameter $PE_{COMP,y}$ in the tool.

The project emissions from composting ($PE_{COMP,y}$) are determined as follows:

$$PE_{COMP,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH_4,y} + PE_{N_2O,y} + PE_{RO,y} \quad (4)$$

Where:

$PE_{COMP,y}$ = Project emissions associated with composting in year y (t CO₂e/yr)

$PE_{EC,y}$ = Project emissions from electricity consumption associated with composting in year y (t CO₂/yr)

$PE_{FC,y}$ = Project emissions from fossil fuel consumption associated with composting in year y (t CO₂e/yr)

$PE_{CH_4,y}$ = Project emissions of methane from the composting process in year y (t CO₂e/yr)

$PE_{N_2O,y}$ = Project emissions of nitrous oxide from the composting process in year y (t CO₂e/yr)

$PE_{RO,y}$ = Project emissions of methane from run-off wastewater associated with co-composting in year y (t CO₂e/yr)

There is no co-composting in the project activity and therefore $PR_{RO,y}$ is set at zero. $PE_{COMP,y}$ will then be:

$$PE_{COMP,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH_4,y} + PE_{N_2O,y} \quad (5)$$

The quantity of waste composted is a parameter required in the determination of emissions associated with each source of project emissions.

The tool provides two options for determining Q_y . CPAs under this PoA will have a weighing bridge at each composting facility and thus use option 1.

For composting plant with an approximate capacity below 20 tpd each arriving truck will unload the waste on a platform from where it will be loaded on a wheel barrel. The wheel barrel will then be weighed. The weighed of the empty wheel barrel will be deducted from the total weight thus arriving at the waste amount.

For composting plants with a capacity of more than 20 tpd each arriving truck will be weighed at the weighing bridge and as well as weighed of the empty truck will be recorded and deducted.

All data will be stored electronically in the monitoring system.

Option 2 concerns the possibility of estimating Q_y based on the number of waste trucks and their carrying capacity and is only for use, when a weighing bridge is not available, thus not applicable in CPAs under this PoA.

Project emissions from electricity consumption

According to the methodological tool "Project and leakage emissions from composting" project emissions from electricity consumption at the composting facility shall be monitored and reported following the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", where the composting activity involves electricity consumption from the grid or from a fossil fuel fired on-site power plant. CPAs under this PoA fall under this definition and thus leakage from use of electricity will be calculated using the mentioned tool.

The project activity emissions from electricity consumption are calculated using formula (1) of the methodological tool "Tool to calculate baseline, project and/or Leakage emissions form electricity consumption", version 01, EB 39.

This tool is applicable for CPAs under the present PoA since the CPAs will fall under Scenario A: "Electricity consumption from the grid". The electricity is purchased from the grid only. Either no captive power plant is installed at the site of electricity consumption or, if any on-site captive power plant exists, it is not operating or it can physically not provide electricity to the source of electricity consumption."

According to the eligibility criteria, all CPAs under this PoA will purchase all power from the grid and no captive power plant is or will be installed at the project site.

Project emissions from electricity consumption are calculated according to formula (1) of the tool as

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y}) \quad (6)$$

Where

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (tCO_2/yr)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

$EF_{EL,j,y}$ = Emission factor for electricity generation for source j in year y (tCO_2/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y

j = Sources of electricity consumption in the project. In this PoA-DD the electricity generation source j is compost.

Determination of quantity of electricity consumed by the project electricity consumption source j

According to equation (3) of the methodological tool “Project and Leakage Emissions from Composting” the quantity of electricity consumed may be calculated using the formula:

$$EC_{PJ,comp,y} = Q_y * SEC_{comp,default} \quad (7)$$

Where:

$EC_{PJ,comp,y}$ = Quantity of electricity consumed for composting in year y (MWh/yr)

Q_y = Quantity of waste composted in year y (t/yr)

$SEC_{comp,default}$ = Default value for the specific quantity of electricity consumed per tonne of waste composted (MWh/t)

The default value for $SEC_{comp,default}$ from the tool (“Project and leakage emissions from composting”) is used; 0.01 (MWh/t).

Determination of the emissions factor for electricity generation using default values

Using option A2 of the methodological tool to calculate baseline, project and/or leakage emissions from electricity consumption under Scenario A: Electricity consumption from a grid, where $EF_{EL,j,y} = 1.3$ (tCO_2/MWh) for the source compost (j)

Determination of technical transmission and distribution losses

Determination of $TDL_{j,y}$ uses the default value of 20% provided by the methodological tool to calculate baseline, project and/or leakage emissions from electricity production (version 01) as applicable for electricity consumption sources from project activities falling under Scenario A.

Following these methodological choices project emissions from electricity consumption can be calculated using the following formula:

$$PE_{EC,y} = Q_y * 0.01 * 1.3 * 1.2 \text{ t } CO_2e \quad (8)$$

Project emissions from fossil fuel consumption

The methodological tool “Project and leakage emissions from composting” offers two options for calculation of project emissions from fossil fuel consumption. The present PoA uses Option 2, where $PE_{FC,y}$ is calculated using:

$$PE_{FC,y} = Q_y * EF_{FC,default} \quad (9)$$

Where:

$PE_{FC,y}$	=	Project emissions from fossil fuel consumption associated with composting in year y (tCO ₂ /yr)
Q_y	=	Quantity of waste composted in year y (t/yr)
$EF_{FC,default}$	=	Default emission factor for fossil fuels consumed by the composting activity per tonne of waste (t CO ₂ /t). The default emission factor is here 0.0207 (tCO ₂ /t) tonne of waste composted (wet basis).

$PE_{FC,y}$ may therefore be calculated as

$$PE_{FC,y} = Q_y * 0.0207 \text{ (t CO}_2\text{/t)waste} \quad (10)$$

Option 1

Project emissions of methane ($PE_{CH_4,y}$)

According to the methodological tool “Project and leakage emissions from composting” project emissions of methane are calculated using:

$$PE_{CH_4,y} = Q_y * EF_{CH_4,y} * GWP_{CH_4} \quad (11)$$

Where:

$PE_{CH_4,y}$	=	Project emissions of methane from the composting process in year y (tCO ₂ e/yr)
Q_y	=	Quantity of waste composted in year y (t/yr)
$EF_{CH_4,y}$	=	Emission factor of methane per tonne of waste composted valid for year y (tCH ₄ /t)
GWP_{CH_4}	=	Global Warming Potential of CH ₄ (tCO ₂ /tCH ₄)

The tool offers two options for calculation of project emissions of methane. The present PoA uses Option 2, with a default value for $EF_{CH_4,y} = EF_{CH_4,default}$ of 0.002 t CH₄/t waste.

The default value of GWP_{CH_4} is 25 for the second commitment period and is mandatory.

$PE_{CH_4,y}$ is therefore calculated using this formula:

$$PE_{CH_4,y} = Q_y * 0.002 * 25 \text{ t CO}_2\text{-e/yr} \quad (12)$$

Project emissions of nitrous oxide ($PE_{N_2O,y}$)

According to the methodological tool “Project and leakage emissions from composting” project emissions of N₂O are calculated using:

$$PE_{N_2O,y} = Q_y * EF_{N_2O,y} * GWP_{N_2O} \quad (13)$$

Where:

$PE_{N_2O,y}$	=	Project emissions of nitrous oxide from composting in year y (t CO ₂ -e/yr)
Q_y	=	Quantity of waste composted in year y (t/yr)
$EF_{N_2O,y}$	=	Emission factor of nitrous oxide per tonne of waste composted valid for year y (tN ₂ O/t)
GWP_{N_2O}	=	Global Warming Potential of N ₂ O (t CO ₂ e/t N ₂ O)

The tool offers two options for calculation of project emissions of N₂O. The present PoA uses Option 2, where a default value for $EF_{N_2O,y} = EF_{N_2O,default}$ of 0.0002 t N₂O/t waste.

The default value of $GWP_{N_2O,default}$ is 298 for the second commitment period and is mandatory

$PE_{N_2O,y}$ is therefore calculated using:

$$PE_{N_2O,y} = Q_y * 0.0002 * 298 \text{ (t CO}_2\text{-e/yr)} \quad (14)$$

Determination of project emissions from run-off waste water

According to the methodological tool “Project and leakage emissions from composting” project emissions from run-off waste water are only calculated for projects with co-composting, which is not the case for CPAs under the present PoA in accordance with the eligibility criteria in Part 1, section B.3.

Leakage emissions ($LE_{comp,y}$)

According to the approved methodology AMS-III. F Avoidance of methane emissions through composting, leakage effects are to be considered (LE_y) if the project technology is the equipment transferred from another activity or if the existing equipment is transferred to another activity.

In case compost is subject to anaerobic storage or disposed of in a SWDS, leakage shall be estimated to account for methane emissions from the anaerobic decay of compost. The relevant procedures in the leakage part of the methodological tool “Project and leakage emissions from composting” shall be followed.

CPA under this PoA are, according to the eligibility criteria, obligated to undergo training in the proper handling of compost in order to avoid methane formation. This training will involve both considerations of the correct application of compost when used as a fertilizer, as well as the correct storage (aerobic) and avoidance of disposal in a SWDS unless used as a top-layer material.

Leakage emissions are therefore estimated to be zero.

Ex ante Emission Reductions

$$ER_{y,ex\,ante} = BE_{y,ex\,ante} - (PE_{y,ex\,ante} + LE_{y,ex\,ante}) \quad (15)$$

Where:

$ER_{y,ex\,ante}$	=	Ex ante emission reduction in year y (tCO ₂ e)
$BE_{y,ex\,ante}$	=	Ex ante baseline emission in year y (tCO ₂ e)
$PE_{y,ex\,ante}$	=	Ex ante project emission in year y (tCO ₂ e)
$LE_{y,ex\,ante}$	=	Ex ante leakage emission in year y (tCO ₂ e)

B.6.2. Data and parameters fixed ex-ante

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Data / Parameter	Φ_{default}											
Data Unit:	-											
Description	Default value for the model correction factor to account for model uncertainties											
Source of data	Tool to calculate Emissions from solid waste disposal sites											
Value(s) applied	<p>For project or leakage emissions: $\phi = 1$ For baseline emissions: $\phi = 0.85$ Refer to table 3 to identify the appropriate factor based on the application of the tool (A or B) and the climate where the SWDS is located.</p> <p>Table 3</p> <table><tr><td></td><td>Humid/wet conditions</td><td>Dry conditions</td></tr><tr><td>Application A</td><td>0.75</td><td>0.75</td></tr><tr><td>Application B</td><td>0.85</td><td>0.8</td></tr></table>				Humid/wet conditions	Dry conditions	Application A	0.75	0.75	Application B	0.85	0.8
	Humid/wet conditions	Dry conditions										
Application A	0.75	0.75										
Application B	0.85	0.8										
Choice of data or Measurement methods and procedures	<p>The project activity is avoiding methane emissions from disposal of MSW through composting and is Application B.</p> <p>The project activity is located in Bangladesh where the climate is humid/wet therefore, the applied value is thus 0.85</p>											
Purpose of data	Calculation of baseline emissions											
Additional comment	Table 3 is applicable to option 1 in the procedure “Determining the model correction factor (ϕ_v)”											

Data / Parameter	OX
Data Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	When methane passes through the top-layer, part of it is oxidized by methanotrophic bacteria to produce CO ₂ . The oxidation factor represents the proportion of methane that is oxidized to CO ₂ . This should be distinguished from the methane correction factor (MCF) which is to account for the situation that ambient air might intrude into the SWDS and prevent methane from being formed in the upper layer of SWDS
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	F
Data Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	Upon biodegradation, organic material is converted to a mixture of methane and carbon dioxide

Data / Parameter	$DOC_{f, default}$
Data Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	<p>This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can only be used for</p> <p>i) Application A; or</p> <p>ii) Application B if the tool is applied to MSW.</p> <p>An alternative to using the default factor is to estimate $DOC_{f,y}$ or $DOC_{f,m}$ using equations (9), (10) and (11) above</p> <p>Project activities under this PoA falls under Application B and is applied to MSW and the default factor is thus applicable.</p>

Data / Parameter	MCF _{default}
Data Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	<p>In case that the SWDS does not have a water table above the bottom of the SWDS and in case of application A, then select the applicable value from the following:</p> <ul style="list-style-type: none"> • 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste; • 0.5 for semi-aerobic managed solid waste disposal sites. These must have controlled placement of waste and will include all of the following structures for introducing air to the waste layers: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system; • 0.8 for unmanaged solid waste disposal sites - deep. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters; • 0.4 for unmanaged-shallow solid waste disposal sites or stockpiles that are considered SWDS. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 meters. This includes stockpiles of solid waste that are considered SWDS (according to the definition given for a SWDS)
Choice of data or Measurement methods and procedures	The value 0.8 is applied. According to the eligibility criteria landfills in CPAs under the present PoA are unmanaged solid waste disposal sites with a depth of greater than or equal to 5 meters.
Purpose of data	Calculation of baseline emissions
Additional comment	MCF accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS. In case of a water table above the bottom of the SWDS, a larger proportion of the SWDS is anaerobic and MCF shall be estimated according to equation (12)

Data / Parameter	DOC _j														
Data Unit	%														
Description	Fraction of degradable organic carbon in the waste type <i>j</i> (weight fraction)														
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)														
Value(s) applied	<p>For MSW, the following values for the different waste types <i>j</i> should be applied:</p> <p>Table 4 Default values for DOC_j</p> <table border="1"> <thead> <tr> <th>Waste type <i>j</i></th><th>DOC_j (% wet waste)</th></tr> </thead> <tbody> <tr> <td>Wood and wood products</td><td>43</td></tr> <tr> <td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr> <tr> <td>Food, food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr> <tr> <td>Textiles</td><td>24</td></tr> <tr> <td>Garden, yard and park waste</td><td>20</td></tr> <tr> <td>Glass, plastic, metal, other inert waste</td><td>0</td></tr> </tbody> </table> <p>For the following residual waste types, project participants may use or derive default values, as follows:</p> <ul style="list-style-type: none"> • For empty fruit branches (EFB), as their characteristics are similar to garden waste, the value for garden, yard and park waste in Table 4 may be used as a default. • For industrial sludge, either a value of 9% (% wet sludge) may be used as a default, assuming an organic dry matter content of 35 percent, or alternatively, if the percentage of organic dry matter content is known, then the DOC value may be calculated as follows: $\text{DOC}_j(\% \text{ wet sludge}) = 9 * (\% \text{ organic dry matter content}/35).$ • For domestic sludge, either a value of 5% (% wet sludge) may be used as a default, assuming an organic dry matter content of 10 percent, or alternatively, if the percentage of organic dry matter content is known, then the DOC value may be calculated as follows: $\text{DOC}_j(\% \text{ wet sludge}) = 5 * (\% \text{ organic dry matter content}/10).$ 	Waste type <i>j</i>	DOC _j (% wet waste)	Wood and wood products	43	Pulp, paper and cardboard (other than sludge)	40	Food, food waste, beverages and tobacco (other than sludge)	15	Textiles	24	Garden, yard and park waste	20	Glass, plastic, metal, other inert waste	0
Waste type <i>j</i>	DOC _j (% wet waste)														
Wood and wood products	43														
Pulp, paper and cardboard (other than sludge)	40														
Food, food waste, beverages and tobacco (other than sludge)	15														
Textiles	24														
Garden, yard and park waste	20														
Glass, plastic, metal, other inert waste	0														
Choice of data or Measurement methods and procedures	Default values for wet waste suggested in IPCC 2006 Guidelines for National Greenhouse Gas Inventories.														
Purpose of data	Calculation of baseline emissions														
Additional comment	<p>The procedure for the ignition loss test is described in <i>BS EN 15169:2007 Characterization of waste. Determination of loss on ignition in waste, sludge and sediments</i>.</p> <p>The percentages listed in Table 4 are based on a wet waste basis which are concentrations in the waste as it is delivered to the SWDS. The IPCC Guidelines also specify DOC values on a dry waste basis, which are the concentrations after complete removal of all moist from the waste, which is not believed practical for this situation</p>														

Data / Parameter	k_j																																	
Data Unit	l/yr																																	
Description	Decay rate for the waste type j																																	
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)																																	
Value(s) applied	<p>Apply the following default values for the different waste types j</p> <p>Table 5 Default values for the decay rate (k_j)</p> <table border="1"> <thead> <tr> <th colspan="2" rowspan="2">Waste type j</th><th colspan="2">Boreal and Temperate (MAT\leq20°C)</th><th colspan="2">Tropical (MAT$>$20°C)</th></tr> <tr> <th>Dry (MAP/PET <1)</th><th>Wet (MAP/PET >1)</th><th>Dry (MAP < 1000mm)</th><th>Wet (MAP > 1000mm)</th></tr> </thead> <tbody> <tr> <td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.04</td><td>0.06</td><td>0.045</td><td>0.07</td></tr> <tr> <td>Wood, wood products and straw</td><td>0.02</td><td>0.03</td><td>0.025</td><td>0.035</td></tr> <tr> <td>Moderately degrading</td><td>Other (nonfood) organic putrescible garden and park waste</td><td>0.05</td><td>0.10</td><td>0.065</td><td>0.17</td></tr> <tr> <td>Rapidly degrading</td><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.06</td><td>0.185</td><td>0.085</td><td>0.40</td></tr> </tbody> </table> <p>NB: MAT - mean annual temperature, MAP - Mean annual precipitation, PET - potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.</p> <p>If a waste type disposed in a SWDS cannot clearly be attributed to one of the waste types in the table above, project participants should choose, among the waste types that have similar characteristics, the waste type where the values of DOC_j and k_j result in a conservative estimate (lowest emissions), or request a revision of/deviation from this methodology.</p> <p>In the case of EFB, as their characteristics are similar to garden waste, the parameter values correspondent of garden waste shall be used. In case of sludge from pulp and paper industry, a conservative value of 0.03 shall be used for all precipitation and temperature combinations</p>	Waste type j		Boreal and Temperate (MAT \leq 20°C)		Tropical (MAT $>$ 20°C)		Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP < 1000mm)	Wet (MAP > 1000mm)	Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07	Wood, wood products and straw	0.02	0.03	0.025	0.035	Moderately degrading	Other (nonfood) organic putrescible garden and park waste	0.05	0.10	0.065	0.17	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40
Waste type j				Boreal and Temperate (MAT \leq 20°C)		Tropical (MAT $>$ 20°C)																												
		Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP < 1000mm)	Wet (MAP > 1000mm)																													
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07																													
	Wood, wood products and straw	0.02	0.03	0.025	0.035																													
Moderately degrading	Other (nonfood) organic putrescible garden and park waste	0.05	0.10	0.065	0.17																													
Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40																													
Choice of data or Measurement methods and procedures	-																																	
Purpose of data	Calculation of baseline emissions																																	
Additional comment	<p>Document in the CDM-PDD the climatic conditions at the SWDS site (temperature, precipitation and, where applicable, evapotranspiration). Use long term averages based on statistical data, where available. Provide References.</p> <p>Bangladesh is a wet, tropical country with mean annual temperature above 20 C and MAP above 1000 mm/yr. The relevant values of the table will be used.</p> <p>http://www.discoverybangladesh.com/meetbangladesh/climate.html</p>																																	

Data / Parameter	GWP _{CH₄}
Data Unit	t CO ₂ -e/t CH ₄
Description	Global Warming Potential of methane
Source of data	IPCC
Value(s) applied	25 for the second commitment period. Shall be updated for future commitment periods according to any future COP/MOP decisions
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data / Parameter	GWP _{N₂O}
Data Unit	t CO ₂ -e/t N ₂ O
Description	Global Warming Potential of N ₂ O
Source of data	IPCC
Value(s) applied	298 for the second commitment period. Shall be updated for future commitment periods according to any future COP/MOP decisions
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	EF _{CH₄,default}
Data Unit	t CH ₄ /t
Description	Default emission factor of methane per tonne of waste composted (wet basis)
Source of data	The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high quality sources was analyzed and a value conservatively selected from the higher end of the range in results.
Value(s) applied	0.002
Choice of data or Measurement methods and procedures	Applicable to Option 2 in the step "Determination of methane and nitrous oxide emissions from the composting process".
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	EF _{N2O, default}
Data Unit	t CH ₄ /t
Description	Default emission factor of nitrous oxide per tonne of waste composted (wet basis)
Source of data	The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high quality sources was analyzed and a value conservatively selected from the higher end of the range in results
Value(s) applied	0.0002
Choice of data or Measurement methods and procedures	Applicable to Option 2 in the step "Determination of methane and nitrous oxide emissions from the composting process."
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	SEC _{comp,default}
Data Unit	MWh/t
Description	Default value for the specific quantity of electricity consumed per tonne of waste composted
Source of data	Based on a review of information from relevant validation reports of CDM projects
Value(s) applied	0.01
Choice of data or Measurement methods and procedures	Applicable to the step "Determination of project emissions from electricity consumption (PE _{EC,y})".
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	EF _{FC,default}
Data Unit	t CO ₂ /t
Description	Default emission factor for fossil fuel consumed by the composting activity per tonne of waste composted (wet basis)
Source of data	Based on a review of fossil fuel consumption per tonne of waste composed in relevant validation reports of CDM projects and using a conservative default emission factor for diesel (from the 2006 IPCC Guidelines)
Value(s) applied	0.0207
Choice of data or Measurement methods and procedures	Applicable to Option 2 in the step "Determination of project emissions from fossil fuel consumption (PE _{FC,y})".
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	Z_x
Data Unit	-
Description	Number of samples collected during the year x
Source of data	Project participants
Value(s) applied	To be provided at CPA level
Choice of data or Measurement methods and procedures	Ex ante values will be based on waste samples received at the SWDS where the composting plant will be established
Purpose of data	Calculation of baseline emissions
Additional comment	The application of the tool is Application B and will be monitored.

Data / Parameter	$EF_{EL,i,y}$
Data Unit	t CO ₂ /MWh
Description	Emission factor for project emissions from source j (compost)
Source of data	Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01, EB 39, Annex 7
Value(s) applied	1.3
Choice of data or Measurement methods and procedures	<p>The CPAs use electricity from the grid. In option 2 the default value is applied to calculate the project emissions from electricity consumption. This choice is applicable since no electricity consumption is included in the calculation of baseline emissions.</p> <p><u>Scenario A: Electricity consumption from the grid</u> In this case, project participants may choose among the following options: Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the Tool to calculate the emission factor for an electricity system. ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$).</p> <p>Option A2: Use the following conservative default values:</p> <ul style="list-style-type: none"> • A value of 1.3 tCO₂/MWh if <ul style="list-style-type: none"> (a) Scenario A applies only to project and/or leakage electricity consumption sources but not to baseline electricity consumption sources; or (b) Scenario A applies to: both baseline and project (and/or leakage) electricity consumption sources; <u>and</u> the electricity consumption of the project and leakage sources is <u>greater</u> than the electricity consumption of the baseline sources. • A value of 0.4 t CO₂/MWh for electricity grids where hydro power plants constitute less than 50% of total grid generation in 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production, and a value of 0.25 t CO₂/MWh for other electricity grids. <p>These values can be used if:</p> <ul style="list-style-type: none"> (a) Scenario A applies only to baseline electricity consumption sources but not to project or leakage electricity consumption sources ; or (b) Scenario A applies to: both baseline and project (and/or leakage) electricity consumption sources; <u>and</u> the electricity consumption of the baseline sources is <u>greater</u> than the electricity consumption of the project and leakage sources.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$TDL_{i,y}$
Data Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source j
Source of data	Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01, EB 39, Annex 7
Value(s) applied	20%
Choice of data or Measurement methods and procedures	<p>As a Scenario A project the default value of 20% is used by the CPA.</p> <p>In case of scenario B and scenario C, case C.II, assume $TDL_{j/k,l,y} = 0$ as a simplification. In case of other scenarios (scenario A and scenario C, cases C.I and C.III), choose one of the following options:</p> <ul style="list-style-type: none"> • Use recent, accurate and reliable data available within the host country; • Use as default values of 20% for <ul style="list-style-type: none"> (a) project or leakage electricity consumption sources; (b) baseline electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is <u>larger</u> than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies. • Use as default values of 3% for <ul style="list-style-type: none"> (a) baseline electricity consumption sources; (a) project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies.
Purpose of data	Calculation of project emissions
Additional comment	-

B.6.3. Ex-ante calculations of emission reductions

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The baseline emissions are calculated as follows using equation (2) and (3) of this PoA-DD:

Baseline Emission from avoidance of methane emissions, cf. AMSIII.F, version 11.0

$$BE_y = BE_{CH_4,SWDS,y}$$

Where:

$$BE_{CH_4,SWDS,y} = \varphi \cdot (1 - f_y) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1 - e^{-k_j})$$

$$BE_{CH_4,SWDS,y} = \varphi \cdot (1 - f) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC \cdot MCF \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1 - e^{-k_j})$$

Emission reduction are calculated using the FOD and an input of [amount provided by CPA]t MSW/year resulting in the following BE_y from avoided methane emissions:

There will be a waste sampling procedure to estimate the waste fractions W_j.

Year	BE _{CH₄,SWDS,y} (tCO ₂ -e/yr)
1	-
2	-
3	-
4	-
5	-
6	-
7	-
8	-
9	-
10	-
Total	-

Project Activity Emissions

The project emissions are calculated as follows under AMS III.F using equation (5) of this PoA-DD:

$$PE_{COMP,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH_4,y} + PE_{N_2O,y}$$

A. $PE_{EC,y}$ (Project emissions from project electricity consumption) is calculated using equation (6) and (7) of this PoA-DD

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

Year	PE _{EC,y} = Q _y * SEC _{comp,default} * EF _{EL,y} * (1 + TDL _{i,y})					
	PE _{EC,y}	EC	Q _y	SEC _{comp,default}	EF _{EL,j,y}	TDL _{default}
	t CO ₂ -e	MWh	t	MWh/t	t CO ₂ -e/MWh	%
1				0.01	1.3	20
2				0.01	1.3	20
3				0.01	1.3	20
4				0.01	1.3	20
5				0.01	1.3	20
6				0.01	1.3	20
7				0.01	1.3	20

B. $PE_{FC,y}$ (Project Emissions due to combustion of fossil fuels) is calculated using equation (9) of this PoA-DD

$$PE_{FC,y} = Q_y * EF_{FC, default}$$

Year	$PE_{FC,y} = Q_y * EF_{FC, default}$		
	$PE_{FC,y}$	Q_y	$EF_{FC, default}$
	t CO ₂ -e	t	t CO ₂ -e/t
1			0.0207
2			0.0207
3			0.0207
4			0.0207
5			0.0207
6			0.0207
7			0.0207

C. $PE_{CH_4,y}$ (Project emissions of methane) is calculated using equation (11) of this PoA-DD

$$PE_{CH_4,y} = Q_y * EF_{CH_4, default} * GWP_{CH_4}$$

Year	$PE_{CH_4,y} = Q_y * EF_{CH_4, default} * GWP_{CH_4}$			
	$PE_{CH_4,y}$	Q_y	$EF_{CH_4, default}$	GWP_{CH_4}
	t CO ₂ -e	t	t CH ₄ /t	t CO ₂ -e/t CH ₄
1			0.002	25
2			0.002	25
3			0.002	25
4			0.002	25
5			0.002	25
6			0.002	25
7			0.002	25

D. $PE_{N_2O,y}$ (Project emissions of N₂O) is calculated using equation (13) of this PoA-DD

$$PE_{N_2O,y} = Q_y * EF_{N_2O, default} * GWP_{N_2O}$$

Year	$PE_{N_2O,y} = Q_y * EF_{N_2O, default} * GWP_{N_2O}$			
	$PE_{N_2O,y}$	Q_y	$EF_{N_2O, default}$	GWP_{N_2O}
	t CO ₂ -e	t	t N ₂ O/t	t CO ₂ -e/t N ₂ O
1			0.0002	298
2			0.0002	298
3			0.0002	298
4			0.0002	298
5			0.0002	298
6			0.0002	298
7			0.0002	298

Leakage

There is no leakage in this project activity

Ex ante Emission Reductions

$$ER_y = BE_y - (PE_y + leakage)$$

B.7. Application of the monitoring methodology and description of the monitoring plan**B.7.1. Data and parameters to be monitored by each generic CPA**

Data / Parameter	$Q_{y,}$
Data Unit	T
Description	Amount of waste composted per year
Source of data	Weighing bridge Calibrated weighbridge (annual calibration) Type: Eveready Accuracy: 5 kg Model: Orion Ultimate +
Value(s) applied	Obtained from actual monitoring from each CPA activity
Measurement methods and procedures	The data will be measured and recorded daily in a log sheet and aggregated monthly for calculations
Monitoring frequency	The waste to be composted will be monitored by calibrated weighbridge(s)
QA/QC procedures	Calibration and maintenance are subject to procedures established by the instrument manufacturer.
Purpose of data	Calculation of baseline emissions
Additional comment	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.

Data / Parameter	$p_{n,j,x}$
Data Unit	-
Description	Weight fraction of the waste type j in the sample n collected during year x
Source of data	Sample measurements by project participants
Value(s) applied	Obtained from actual monitoring from each CPA activity
Measurement methods and procedures	Sample the waste composition, using the categories j , as provided in the table for DOC_j and k_j , and weigh each fraction (measure on wet basis) Ex ante values will be based on ex ante sampling of waste received at the SWDS where the composting plant will be established
Monitoring frequency	Quarterly.
QA/QC procedures	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.
Purpose of data	Calculation of baseline emissions
Additional comment	The application of the tool is Application B and will be monitored

Data / Parameter	Compost _{produced}
Data Unit	kg
Description	Amount of produced
Source of data	Compost production register maintained by the operator
Value(s) applied	-
Measurement methods and procedures	The produced compost will be stored in bags, which will contain a uniform amount (weight) of compost, which will be measured on a mobile scale. Calibration frequency of the scale will be based on the specification of supplier. Accuracy of the scale will be based on specification of the supplier.
Monitoring frequency	Continuously
QA/QC procedures	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	Compost _{sold}
Data Unit	kg
Description	Amount of sold
Source of data	Compost sales register maintained by the operator
Value(s) applied	-
Measurement methods and procedures	The compost will be stored in bags for sales, which will contain a uniform amount (weight) of compost, which will be measured on a mobile scale. Calibration frequency of the scale will be based on the specification of supplier. Accuracy of the scale will be based on specification of the supplier.
Monitoring frequency	Continuously
QA/QC procedures	Data monitored and required for verification and issuance will be kept for a minimum of two years after the end of the crediting period or the last issuance of CERs for this programme activity, whichever occurs later. An in situ verification of the proper soil application of the compost to ensure aerobic conditions for further decay will be carried out. Such verification shall be done at representative sample of user sites. The conditions for proper soil application ensuring aerobic conditions can be established by a local expert taking into account the soil conditions, crop types grown and weather conditions.
Purpose of data	Calculation of baseline emissions
Additional comment	Records of amount of compost that is transport to dedicated sales centers will also be collected.

B.7.2. Description of the monitoring plan for a generic CPA

The monitoring plan details the actions necessary to record all the data parameters required by the methodology AMS III.F, version 11, as detailed in section E.7.1 above.

The monitoring plan forms an integral part of this PDD and will facilitate accurate and consistent monitoring of the Programme's Certified Emission Reductions (CERs).

The purpose of the Monitoring Plan is to provide a standard by which all CPA will conduct monitoring, data handling and verification of the proposed CDM activity. The monitoring plan will also act as a guide for the coordinating entity to ensure accurate and timely monitoring, reporting and verifications for all CPA activities.

The factor "r" for capacity expansion CPAs will be calculated from the monitored parameter of Qy and "Registered annual amount of waste composted (tonnes) at the facility on a business as usual basis calculated as the highest amount of annual compost production in the last five years prior to the project implementation", as per the methodology.

CPAs will also

- document in a quality control program the operation of the composting plant, monitoring of the conditions and procedures that ensure the aerobic condition of the waste during the composting process (e.g. temperature and moisture during different composting stages).
- Monitor the soil application of the compost in agriculture or related activities by documenting the sales or delivery of the compost final product. CPA will also make provisions for in situ verification of the proper soil application of the compost to ensure aerobic conditions for further decay in line with para 22 of the methodology.

1. Monitoring Plan Objective and Organization

The purpose of the monitoring plan is to measure the emission reductions achieved by each CPA. Details of the CPA monitoring plans will be described in each SSC CPA-DD but shall conform to the following procedures.

- Establishing and maintaining a reliable and accurate monitoring system
- Provide guidance for the implementation of necessary measurement and record management operations
- Provide guidance for meeting CDM requirements for verification and certification

2. Operational and Monitoring Obligations

The monitoring plan will be supported by a Monitoring Manual which will be prepared before the start of the first crediting period and will be tested during start up of the components of the Programme activity. This will provide an opportunity to correct any deficiencies and further refine the monitoring and recording procedures. It will also provide an opportunity to train operating personnel for the strict requirements for accuracy in collecting and recording data for CDM purposes.

3. Monitoring Data and archiving

Data to be monitored is defined in section E.7 and will be recorded as per the specific parameter frequency. The operator of each composting facility (CPA) will be responsible for collecting the monitoring data and will provide the coordinating entity with full data records and if applicable calibration certificates. All the data will be archived electronically, backed up regularly by the composting facility and it will be stored both by the composting facility and by the coordinating entity for 2 years after the end of the crediting period of each CPA or the last issuance of CERs of this project, whichever occurs last.

4. Quality Assurance and Quality Control

The installation of the monitoring equipment is detailed in each SSC CPA-DD. The CPA entity will implement QA&QC measures to calibrate and guarantee the accuracy of metering and safety of the project operation. The metering devices will be calibrated and inspected properly and periodically as per standard industry norms or requirements of each specific parameter. Additionally, in order to ensure a successful operation of the Programme and the credibility and verifiability of the CERs achieved, the Programme will have a well-defined management and operational system, (Procedures to discount conservatively the emission reductions from the projects will be defined, in the event either the project owner or the coordinating entity detects any distortion or mal-function of the monitoring equipment. All data and information related to the monitoring parameters will be readily accessible for the Designated Operational Entity (DOE) carrying out the verification.

In order to maintain and upgrade the capability and skill of the operator, training related to the monitoring and data management system of the composting system will be performed. Prior to the operation of the project, trainings are to be conducted for each of SSC-CPA personnel in order to ensure that the persons in charged are competent in performing their duties related to monitoring.

Appendix 1. Contact information of coordinating/managing entity and responsible person(s)/ entity(ies)

CME and/or responsible person/ entity	<input checked="" type="checkbox"/> CME <input type="checkbox"/> Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
Organization	Department of Environment
Street/P.O. Box	Environment Bhaban
Building	E/16 Agargoan, Sher-E Bangla Nagar
City	Dhaka
State/Region	
Postcode	1205
Country	Bangladesh
Telephone	+88-02-8181782
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E-mail	azaddoe22@yahoo.com
Website	www.doe-bd.org
Contact person	Md. Abul Kalam Azad
Title	Mr.
Salutation	
Last name	Azad
Middle name	Md. Abul Kalam

CME and/or responsible person/ entity	<input type="checkbox"/> CME <input checked="" type="checkbox"/> Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA
Organization	Waste Concern Consultants
Street/P.O. Box	House No 21 (Side B), Road-7, Block-G, Banani
Building	
City	Dhaka
State/Region	
Postcode	1213
Country	Bangladesh
Telephone	+88-02-9873002
Fax	+88-02-9884774
E-mail	lftekhar@wasteconcern.org
Website	www.wasteconcern.org
Contact person	lftekhar Enayetullah
Title	Mr.
Salutation	
Last name	Enayetullah
Middle name	lftekhar

Appendix 2: Affirmation regarding public funding

All relevant information is contained in earlier sections.

Appendix3: Applicability of methodology(ies) and standardized baseline(s)

All relevant information is contained in earlier sections.

Appendix 4: Further background information on ex ante calculation of emission reductions

All relevant information is contained in earlier sections.

Appendix 5: Further background information on the monitoring plan

All relevant information is contained in earlier sections.

Appendix 6: Letter of Approval



Department of Environment
Ministry of Environment and Forests
Government of the People's Republic of Bangladesh

Paribesh Bhaban

E-16 Agargaon,
Sher-e-Bangla Nagar
Dhaka- 1207
Phone: 880-2-8181800
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E-mail: dg@doe-bd.org

Ref. DoE/Int.Con./CDM/2011/06/13

Date: 16 March, 2014

Sub: Host Country Approval of CDM Project titled "Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh."

Dear Sir/Madam,

On behalf of the Designated National Authority (DNA), I have the pleasure to inform you that DNA of Bangladesh has approved the CDM project titled "Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh" in National CDM Board Meeting held in 9th March 2014.

The DNA of Bangladesh confirms that:

- ❖ The Government of Bangladesh has ratified the Kyoto Protocol on 22 October 2001;
- ❖ This is a voluntary participation in the proposed CDM project activity;
- ❖ The project contributes to the sustainable development in Bangladesh.

The DNA assures you to provide all kind of supports in this regard.

Sincerely yours,


(A. M. Monsurul Alam)

Director (Administration) and
Member Secretary, National CDM Committee
Tel: 880-2-8181772
E-mail: monsurulalam86@gmail.com

Distribution:

1. Project Director, Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh, Department of Environment, Agargaon, Dhaka-1000.
2. Iftexhar Enayetullah, Consultant, Programmatic CDM project using Municipal Organic Waste of 64 Districts of Bangladesh, House-21(Side B), Road-7, Block-G, Banani Model Town, Dhaka-1213, Bangladesh.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	25 June 2014	<p>Revisions to:</p> <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the programme design document form for small-scale CDM programme of activities (these instructions supersede the "Guideline: Completing the programme design document form for small-scale CDM programme of activities" (Version 03.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Error! Reference source not found.; • Change the reference number from <i>F-CDM-SSC-PoA-DD</i> to <i>CDM-SSC-PoA-DD-FORM</i>; • Editorial improvement.
02.0	13 March 2012	<p>EB 66, Annex 13</p> <p>Revision required to ensure consistency with the "Guidelines for completing the programme design document form for small-scale CDM programmes of activities".</p>
01.0	27 July 2007	<p>EB33, Annex43</p> <p>Initial adoption.</p>
<p>Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: programme of activities, project design document, SSC project activities</p>		