



**Programme of activities design document form
(Version 09.0)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title of the PoA	Small-Scale Renewable Energy PoA in Thailand
Version number of the PoA-DD	3
Completion date of the PoA-DD	16/06/2020
Coordinating/managing entity	Carbon Coordinating Managing Entity Limited
Host Parties	Thailand
Applied methodologies and standardized baselines	AMS-I.D: Grid connected renewable electricity generation, version 18
Sectoral scopes	Sectoral scope 1 : Energy industries (renewable - / non-renewable sources)

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

(a) Purpose and general description of PoA

This Small-Scale Renewable Energy PoA in Thailand (hereafter referred to as “the PoA”) aims to encourage the widescale adoption of small-scale¹, grid-connected renewable energy projects. The PoA is limited to the technologies/measures that are eligible under AMS-I.D.

The higher-level and long-term additional purpose of this PoA is to strengthen Thailand's renewable energy promotion policies by providing a platform that facilitates the transition to a low-carbon economy through generation of additional financial support for renewable energy via international carbon markets.

Under the feed-in-tariff/adder policy, the Royal Thai Government commits to incremental payments to the operators of eligible project facilities. These costs accumulate as new capacity enters operation under the feed-in-tariff/adder scheme. These costs are re-financed by passing them on to electricity consumers via higher electricity rates. Hence, as the share of eligible renewable energy generation rises, so do costs to the consumer. The capacity to increase the share of renewable energy (by continuing existing renewable energy promotion policies) is thus limited by the political acceptance for electricity rate increases.

The PoA provides a platform that allows a stronger linkage between incentives provided through a domestic policy for the promotion of renewable energy (namely the feed-in-tariff and adder policies that are currently in operation and that are revised from time to time) and the incentives provided through the international carbon market, thus expanding the share of renewable energy in the Thai national grid beyond the scope of current policies.

(b) Framework for the implementation of the PoA

The PoA is coordinated and managed by Carbon Coordinating Managing Entity Ltd. (CCME), an originated joint venture between South Pole Carbon Asset Management Ltd. (South Pole) and Asia Rising Ltd. The purpose of this cooperation is to create the capacity to operate such a PoA on a scaled-up, sectoral level (PEA meters all electricity generated and fed into the Thai power grid) and share the implementation of MRV-related tasks from all activities as well as to identify and bring new activities into the program in a strategic and systematic manner.

South Pole is a carbon asset development and management company headquartered in Switzerland. The company has a local office in Thailand. Provincial Electricity Authority (PEA) is a national distributor of electricity in Thailand and manages the execution of the feed-in-tariff/adder policy in Thailand, namely the metering of renewable energy generation that is supplied to the grid and payments of feed-in-tariffs and adders to project operators. PEA assesses whether a project activity is eligible based on the feed-in-tariff/adder policy and its commercial and technical viability. PEA also enters into power purchase agreement with Project Entities in accordance with applicable feed-in-tariff/adder policies and its assessments. PEA is not responsible for the setting of actual feed-in-tariff rates. This is the responsibility of the Ministry of Energy.

Under the PoA, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K of the generic CPAs). A combination of different Technology Types under one CPA is not permitted. The Technology Types covered by the PoA are as follows:

Eligible Technology Types:

¹ In theory, the maximum allowed installed capacity under the PoA is 15 MW (in line with SSC CDM requirements), however due to the explicit link of the PoA to the Very Small Power Producer (VSPP) scheme in Thailand, eligible Project Activities under the PoA will typically have an installed capacity below 10 MW.

1. Wind power
2. Solar photovoltaic power generation (PV)
3. Concentrated solar power (CSP)
4. Run-of-the-river hydropower
5. Renewable biomass based power generation
6. Biogas based power generation

Please refer to Section A.3 of the PoA DD, Section H.4 and K of the generic CPAs for more details on applicable Technology Types and their respective eligibility criteria.

Under this PoA, the entities responsible for implementation/operation of the Project Activities are referred to as “Project Implementers”², whereas the legal entities that own the underlying assets and are ultimately responsible for the Project Activity towards local authorities are referred to as “Project Entities”³.

CCME follows the process below to implement the PoA:

1. Collect information about Project Activities from Project Implementers or Project Entities;
2. Conduct analysis to confirm eligibility of Project Activity as CDM Program Activity (CPA) as per Section K of generic CPA for each technology;
3. Sign CPA inclusion agreement with the respective Project Entities including exclusive assignment of emission reductions to CCME;
4. Periodically assign DOE to check the consistency of new CPAs with requirements determined in the PoA and CPA DDs;
5. Complete inclusion of eligible CPA(s) into the PoA in accordance with DOE consistency check,
6. Oversee the installation and operation of monitoring instruments and systems at the Project Activity site as per Section I.7 of generic CPA for each technology;
7. Organize and facilitate periodic verification by DOE.

(c) Policy/measure or stated goal of the PoA

The goal of the PoA is to increase the amount of renewable energy in the Thai electricity grid, thereby reducing CO₂ emissions. Project Activities will use renewable energy sources to displace fossil-fuel based power generation.

The PoA supports the effort of the Royal Thai Government to increase the amount of renewable energy in the Thai electricity grid. The PoA is undertaken on a voluntary basis by CCME and is not implementing a mandatory policy or regulation of the Royal Thai Government.

The PoA supports small-sale renewable energy development by:

- adding an additional revenue stream to support fixed feed-in tariff/adder payments⁴,
- making the carbon credit generation process feasible for small renewable energy projects⁵,
- improving the reliability of Project Activity cash flows via professional PoA management (this will significantly reduce registration and issuance risks in comparison to a stand-alone CDM project),
- substantially increasing the net financial contribution of carbon-credit related income by reducing CDM-related transaction costs, and

² The CDM-SSC-CPA-DD form (Version 01) introduces the term “CPA Implementer(s)”, however, given the possibility to bundle more than one Project Activity under a CPA and the eventuality of having more than one implementing entity under one CPA (e.g. in cases where different entities are responsible for implementation of each Project Activity bundled under the CPA), the term “Project Implementer” is regarded as more appropriate in the case of this PoA.

³ The distinction between “Project Implementers” and “Project Entities” is introduced because the respective functions might be exercised by different entities for the same Project Activity (e.g. an external company might be contracted for operation and maintenance of a Project Activity). The distinction is required because of the role of the Project Entity in legal matters surrounding the project itself and its inclusion into the PoA and the role of the Project Implementer for compliance with the monitoring and reporting requirements under the PoA.

⁴ The applicable feed-in tariff/adder for a Project Activity is fixed and not linked to a profitability/hurdle-rate calculation for the Project Activity. The income from carbon credits provide an additional revenue stream for Project Activities.

⁵ A large share of the transaction costs associated with the issuance of CER are fixed costs and independent of project size, thus placing a high burden on small projects. While these small projects qualify under stand-alone CDM rules, the net benefit to the project developer (i.e. the Project Entity) under a stand-alone CDM approach is small and thus not efficient when compared to the PoA approach.

- sharing the cost for a broad implementation of renewable energy in Thailand between Thai electricity consumers and the international carbon market, thus extending the reach of the feed-in tariff/adder system in Thailand.

The feed-in-tariff policy was implemented as a part of Thailand's energy and climate policy, which seeks to reduce the reliance on fossil-fuels, especially natural gas imports⁶. The policy has led to an increase in the number of renewable energy projects in Thailand. The principal policy has been in effect since 2007. Since then, important aspects of the policy, such as the adder payment made to renewable energy project developers, have gone through a number of revisions.

Currently (as of 2011) the feed-in tariffs/adders are being revised because of the rising financial cost to electricity consumers that are associated with this policy⁷. Obviously, these costs increase as the quantity of renewable energy from feed-in-tariff eligible projects that is supplied to the grid grows. The current revision of the feed-in tariff/adder levels demonstrate the limitations of the current feed-in tariff/adder policy mechanism and highlights the need for additional sources of income in order to further expand the share of renewable energies connected to the Thai electricity grid.

Considering the current transition of the international carbon market after 2012, it is relevant that the PoA is designed to operate and integrate with existing and future domestic policies for the promotion of renewable energy in Thailand (under an international or bilateral agreement). The PoA introduces a central mechanism for the monitoring, reporting and verification of both renewable energy production and emission reductions for the purpose of monetizing their value under such an integrated approach while complying with the existing rules of the CDM. It thus contributes to building a bridge between the current carbon markets, domestic policies and future international cooperation mechanisms.

(d) Sustainable development of the PoA

The environmental, social, economic and technological benefits of the PoA are summarized below:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that PoA Project Activities contribute to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

Social benefits

Project Activities under the PoA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. The biomass-related Project Activities under the PoA will provide a solution to the problem of biomass disposal and add value to various biomass residue streams that involve processing, supply management, collection and transportation. Further, the project will have a positive impact on the manufacturing of local parts, plant construction and maintenance (especially for solar-, wind- and hydropower projects). Last but not least, the PoA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

Economic benefits

Project Activities will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy, make better use of Thailand's natural resources, and support sustainable agricultural activities.

Technological benefits

The PoA will lead to technology transfer from abroad to Thailand and within Thailand from urban centres to rural areas. It will strengthen the development of the renewable energy industry across Thailand.

(e) Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

⁶ This is in line with the 11th National Economic and Social Development Plan (2012 - 2016), with regard to (1) the strategy on creating balance and security on food and fuel, and (2) the strategy on sustainable management of natural resources and environment. The PoA contributes also to the target achievement of the 15-year Renewable Energy Development Plan and the increase of power production from renewable energy under the Power Development Plan 2010.

⁷ Bangkok Post newspaper article from 21 July 2010:

<http://www.bangkokpost.com/business/economics/186112/ministry-adamant-on-new-project-tariffs>

This programme is purely a voluntary initiative undertaken by CCME, which is the Coordinating/Managing Entity (CME) of the programme. There are no mandatory requirements in Thailand that mandate the use of renewable energy to produce electricity⁸.

A.2. Physical/geographical boundary of PoA

The geographical boundary of the PoA is defined as the geographical area within which all of the small scale CDM programme activities (SSC-CPAs) that are included in the PoA will occur. All of the CPAs included in the PoA will be implemented within the geographical boundary of Thailand, under consideration of applicable national and/or sectoral policies and regulations of Thailand.

A.3. Technologies/measures

The following renewable energy generation Technology Types shall be applicable under the PoA:

No.	Technology Type	Description
1	Wind power	Wind power Project Activities will consist of one or more wind turbines that convert wind energy to mechanical energy, which drives a generator that produces electricity. In case of multiple turbines within one Project Activity, these turbines shall be interconnected through a medium voltage power collection system and communications network. At a sub-station, this medium-voltage electric current will be increased in voltage with a transformer for connection to the high voltage electric power transmission system (the national grid in this case). Interconnected turbines sharing the same grid-connection at sub-station level shall be defined as one single Project Activity and shall not exceed an installed capacity of 15 MW. Technology Type 1 Project Activities under the PoA might include off-shore locations that fulfil the conditions described above. Off-shore wind power refers to the construction of wind turbines in bodies of water, utilizing traditional fixed-bottom wind turbine technologies, as well as deep-water areas utilizing floating wind turbines.
2	Solar photovoltaic power generation (PV)	PV power generation Project Activities will generate electricity by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. PV Project Activities will consist of an array of solar panels or PV modules (composed of a number of cells containing a photovoltaic material) as well as mechanical and electrical connections and means of regulating and/or modifying the electrical output, in order to be able to export electricity to the national grid. Sending electricity to the grid requires the transformation of DC into AC by a grid-controlled solar inverter. Interconnected PV panels sharing the same grid-connection at sub-station level shall be defined as one single Project Activity and shall not exceed an installed capacity of 15 MW.
3	Concentrated solar power (CSP)	CSP Project Activities will make use of mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Electrical power is produced when the concentrated light is converted to heat, which drives a heat engine (typically a steam turbine or a Stirling engine) connected to an electrical power generator. The technology applied for concentrating the solar thermal energy may correspond to one of four commercially available categories, namely "Parabolic Trough", "Dish Stirling", "Concentrating Linear Fresnel Reflector" and "Solar Power Tower" systems. Apart from the Dish Stirling system, which uses a Stirling engine to convert thermal energy into electricity, all other systems use steam turbines for the heat-to-electrical-power conversion. In case of several electricity generating units sharing the same grid connection at sub-station level, they shall be defined as one single

⁸ According to the Renewable Energy Development Plan for the period 2008 to 2022, the Royal Thai Government supports the use of renewable energy in the country without legally binding regulations that would enforce the implementation of such projects.

No.	Technology Type	Description
		Project Activity and shall not exceed a total installed capacity of 15 MW. CSP Project Activities might use fossil fuels as alternative fuel for thermal energy generation. In such cases, the limit of 15 MW applies only to the CSP component of the Project Activity.
4	Run-of-the-river hydropower	Run-of-the-river (ROR) hydropower is a type of hydroelectric generation whereby a considerably smaller water storage, called “pondage”, or none is used to supply a power station (in comparison to typical reservoirs from hydro dam projects). Run-of-the-river power plants are classified as with or without pondage. A plant without pondage has no storage and is therefore subjected to seasonal river flows. A plant with pondage has the ability to regulate water flow (to a certain extent). ROR projects divert a river’s water flow through a pipe and/or tunnel leading to electricity-generating turbines. Then the water is returned back to the river downstream. ROR Project Activities may consist of one or multiple turbines sharing the same grid-connection at sub-station level. The total installed capacity of such ROR Project Activities shall not exceed 15 MW. Additional eligibility requirements concerning the energy density of pondages (or reservoirs) for this Technology Type are provided in Section K of generic CPA for each technology.
5	Renewable biomass based power generation	<p>Renewable biomass based power generation Project Activities shall consist of either biomass combustion projects or biomass gasification projects, using biomass residues as fuel.</p> <p>Biomass combustion projects consist of a boiler where biomass residues are combusted, a steam turbine which converts the thermal energy from the boiler into mechanical energy, and a generator responsible for the final conversion to electrical power.</p> <p>Biomass gasification projects entail a process that converts biomass residues into a combustible gas mixture consisting mainly of carbon monoxide, hydrogen, carbon dioxide and methane. This is achieved by a thermal conversion process at high temperatures with a limited amount of oxygen. The resulting gas mixture is called syngas (synthesis gas or synthetic gas) or producer gas. Syngas/producer gas is a fuel, which is then used either in gas engines or in a turbine to drive a generator for electrical power generation.</p> <p>Renewable Biomass Project Activities may consist of one or multiple electricity generating units sharing the same grid-connection at sub-station level, whereas the total installed capacity of such Renewable Biomass Project Activities shall not exceed 15 MW. In case of a Renewable Biomass Project Activity co-firing fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW (see also detailed definition of “co-firing” under Section K of the generic CPAs). Combined heat and power (cogeneration) projects are not eligible under this Technology Type (see details under Section K of the generic CPAs). Additional eligibility requirements for this Technology Type concerning the definition of biomass residues and leakage assessment are provided in Section K of generic CPA for each technology.</p>
6	Biogas based power generation	<p>Biogas based power generation Project Activities make use of bacteria, enzymes and other micro-organisms to break down biomass residues and convert them through anaerobic digestion to biogas. Biogas is a combustible gas mixture consisting mainly of methane and carbon dioxide. It is a fuel that can be used in a boiler or gas engines or in a turbine to drive a generator for electrical power generation. Biogas Project Activities eligible under the proposed PoA shall apply controlled biological treatment of biomass or other organic matters based on anaerobic digestion in closed reactors equipped with biogas recovery and combustion and/or flaring systems. Recovery and combustion of landfill gas from solid waste disposal sites is not applicable under this Technology Type.</p> <p>Project Activities under this Technology Type may consist of one or multiple electricity generating units sharing the same grid-connection at sub-station level, whereas the total installed capacity of such Biogas Project Activities shall not exceed 15 MW. In case of a Biogas Project Activity co-firing fossil</p>

No.	Technology Type	Description
		<p>fuel, the capacity of the entire unit shall not exceed the limit of 15 MW (see also a detailed definition of “co-firing” under Section K of the generic CPAs). Combined heat and power (cogeneration) projects are not eligible under this Technology Type (see details under Section K of the generic CPAs). Technology Type 6 Project Activities, shall have a flare system for combustion of biogas in cases where excess biogas is produced or when the power generation system is not available. Flare systems shall be either open or enclosed flares without continuous monitoring of the methane combustion efficiency⁹.</p> <p>In terms of substrate types following options are eligible under this Technology Type:</p> <ul style="list-style-type: none"> i. Digestion of biomass or other organic matter (excluding animal manure and sludge generated in wastewater treatment facilities) as single source of substrate; ii. Co-digestion¹⁰ of multiple sources of biomass substrates, e.g. municipal solid waste (MSW), organic waste, animal manure, wastewater. <p>Digestion of animal manure or wastewater treatment as single sources of substrate are not eligible options under the proposed PoA.</p> <p>Following mechanical/thermal treatments of residual waste streams generated by the biogas digestion systems (i.e. sludge or outflow), are not eligible under this Technology Type:</p> <ul style="list-style-type: none"> • controlled combustion; • gasification to produce syngas/producer gas; • mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass¹¹ (SB) <p>Additional eligibility requirements for this Technology Type concerning the definition of biomass residues and leakage assessment are provided in Section K of generic CPA for each technology.</p>

More details about the technology applied in each CPA will be provided in the respective CPA-DDs. Further requirements with regards to eligibility aspects of individual technologies are provided in K of generic CPA for each technology.

A.4. Coordinating/managing entity

The information regarding CME and Project Participants is as follows:

- A. The CME for this PoA is Carbon Coordinating Managing Entity Ltd. (CCME) representing the entity that communicates with the CDM Executive Board.
- B. CCME and South Pole Carbon Asset Management Ltd. are the Project Participants of the SSC-PoA.

Further contact information is provided in Appendix 1.

⁹ Which is an optional feature according to the “*Tool to determine project emissions from flaring gases containing methane*” that would be economically not feasible for monitoring of a standby/emergency flare unit.

¹⁰ Co-digestion is the simultaneous digestion of a homogenous mixture of two or more substrates from different sources, e.g. co-digestion of MSW and animal manure and/or domestic/industrial wastewater. The most common situation is when a major amount of a primary basic substrate (e.g. manure) is mixed and digested together with minor amounts of other substrates.

¹¹ Stabilized biomass is typically produced in a thermal treatment process (dehydration) under controlled conditions (up to 300 degrees Celsius) for further usage as fuel or raw material in other industrial processes. Stabilized biomass (SB) is defined as biomass adequately treated to prevent further degradation in the environment. Examples of SB are: pellets, briquettes and torrefied wood chips.

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Thailand (host)	Managing entity: Carbon Coordinating Managing Entity Limited	No
Switzerland	Private entity: South Pole Carbon Asset Management Limited	No
Philippines	Asian Development Bank as Trustee of the Future Carbon Fund	No
Sweden	Swedish Energy Agency	No

A.6. Public funding of PoA

No public funding is used to implement this PoA. Furthermore, CCME will ensure that at the time of inclusion of a CPA there is no public funding from foreign countries that might lead to a diversion of Official Development Assistance (ODA) as part of the project finance for the underlying Project Activities. This will be confirmed in a declaration given by the chartered accountant of the Project Entity. In case public funding is received for any Project Activity under the PoA, an explanation shall be provided about the nature of the funding and how it is assured that it does not lead to a diversion of ODA.

SECTION B. Management system**Operational and management plan**

CCME has been established as a legal entity under the laws of Thailand with the purpose to coordinate and manage the PoA, which includes following responsibilities:

- Identification of Project Activities to be included in the PoA
- Contractual arrangements with Project Entities ensuring compliance with the PoA eligibility criteria described under Section K of the generic CPAs
- Preparation of PoA and CPA DDs through service agreements with qualified CDM consultants
- Facilitation of the DNA approval process at PoA and CPA level
- Collection of documents and supporting evidences required for validation of the PoA, inclusion of CPAs as well as verification of CERs
- Communication with the CDM Executive Board, including communication on matters related to the registration process and issuance process, distribution of CERs and change of project participants
- Implementation of a central electronic database allowing for a transparent and unambiguous management of information related to the PoA and its underlying CPAs

The main operational and management arrangements established by CCME for the implementation of the PoA are described as follows:

(a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies*The CME*

CCME will review the competencies of its personnel to be involved in CPA inclusions prior to their employment/assignment and will ensure that staff is properly trained with regards to specific CPA inclusion requirements. Personnel involved in CPA inclusion process shall have a background in engineering or natural sciences and experience in the renewable energy or environmental sectors.

South Pole

South Pole is responsible of providing CCME, during the PoA lifetime, with guidance and technical assistance, including data control, management of information and Quality Assurance and Quality Control services. South Pole provides also technical support to CCME during the entire CDM PoA cycle including,

but not limited to, guidance during the validation/registration process of the PoA as well as inclusion of CPAs and verification/issuance of CERs.

(b) Records of arrangements for training and capacity development for personnel

CCME is committed to train Project Implementer's designated monitoring staff on how to implement the monitoring plan presented in the CPA-DD. Training-specific content and specific material (if applicable) shall be adapted to each specific CPA, according to the technical specifications of each CPA, and to the characteristics of the equipment installed at each facility. Training includes (but is not limited to) the following aspects:

- CDM general information
- Importance of monitoring in the context of a CPA/PoA
- Data recording
- Meter/instrument calibration
- Record holding
- Recording events
- Preparation of monitoring reports for submission to the CME
- Reporting monitoring deficiencies and communication to the CME

(c) Procedures for technical review of inclusion of CPAs

CCME has the main responsibility for technical review of inclusion of CPAs, whereas South Pole provides technical support and quality control/quality assurance services for the inclusion process. All necessary documents to demonstrate compliance with the eligibility criteria of the PoA are collected and verified by CCME prior to signature of the contract between the Project Entity and CCME. CCME collects also all information and supporting evidences required to draft the CPA-DD. The CPA-DD and all supporting documents are then quality checked and review by CDM experts from South Pole prior to submission to the DOE.

The entire technical review process is incorporated in a sophisticated Project Management Tool software developed by South Pole, which is described in detail in the document "*SSC RE PoA Thailand: Management System Procedures*", which has been provided to the DOE.

(d) A system/procedure to avoid double accounting

In line with the "*CDM project standard for programmes of activities*", Version 02.0, CCME will confirm that double accounting is avoided through following procedure:

- a) As part of the CPA eligibility check, CCME will collect a declaration from the Project Entity confirming that Project Activities included in the CPA are not already registered as CDM project activities or as CPAs of another PoA. The declaration shall also confirm that the proposed project activity has not been registered under any other carbon finance mechanism.
- b) CCME will also double check the declaration provided by the Project Entity based on publicly available information sources such as the UNFCCC website, CDM project databases (e.g. UNEP Risoe and IGES CDM databases) and other relevant carbon finance mechanisms (e.g. the Verified Carbon Standard and the Gold Standard).
- c) Prior to inclusion of a CPA into the PoA, CCME will provide a confirmation to the DOE that Project Activities included in the CPA are not registered neither as CDM project activities or as CPAs of another PoA nor under any other carbon finance mechanism, which will be subject to verification by the DOE.
- d) CCME will also ensure that the CDM monitoring and verification periods of each CPA are accounted for only once, which is also subject to confirmation by the DOE during the verification process.

With the purpose of ensuring that the project has not been registered in any other carbon finance mechanism, the following process is to be followed by the CME before requesting inclusion of the CPA.

1. Identify the technology employed by the project and similar technologies as per the UNFCCC definition stated in the latest version of the Common Practice Guidelines.
2. Identify the CPA size and estimate a range of $\pm 10\%$
3. Identify the geographical coordinates of the CPA

4. Identify the official name of the Project Entity and of the Project Implementer involved in the CPA
5. Review in the relevant carbon databases that no other project or CPA with any of the information identified above has been listed
6. Register the CPA into the CCME record keeping system described above

(e) A record keeping and documentation control system for each CPA under the PoA

The CCME will maintain an electronic database containing following information per CPA subscribing to the PoA:

- Serial number of the CPA under the PoA¹² (unique CPA identification number)
- CDM reference number of the CPA (to added after inclusion)
- Name of the CPA
- Number of Project Activities under the CPA
- Serial number of each Project Activity under the CPA¹³
- Name and contact details of the Project Entity involved in each Project Activity
- Name and contact details of the Project Implementer involved each Project Activity
- Installed capacity of electricity generation unit of each Project Activity
- Technology Type of each Project Activity
- Location of each Project Activity, including address and geographical coordinates
- Inclusion date, Project start date, CPA crediting period start date, project commissioning date
- Duration of CPA crediting period
- Monitoring information according to CPA-specific monitoring plan, including but not limited to the net amount of electricity exported to the national grid
- Ex-ante projections and ex-post calculations of emission reductions at CPA level

The above information shall be used during the inclusion process by DOEs to determine that a CPA is not a debundled component of another CPA or CDM Project Activity, and that Project Activities implemented under the CPA are not already registered as a CDM Project Activities or under a CPA of another PoA to avoid the double counting of emission reductions.

CCME will maintain a documentation control system based on documentation requirements laid out in the eligibility criteria for CPAs under the proposed PoA. All documents will be subject to quality control and quality assurance services by South Pole prior to inclusion of CPAs into the PoA and during the monitoring/verification cycle.

CCME will be responsible for archiving all monitored data in an electronic format. The Project Implementers will also keep copies of monitored data records as well as electricity sales receipts. South Pole will assist CCME in the compilation of the monitoring reports for verification and issuance of CERs from individual CPAs. In this role, South Pole will also serve as entity conducting quality control and assurance of monitoring data in order to ensure compliance with CDM rules.

More details on the record keeping and documentation control system used by CCME and South Pole have been provided to the DOE in the document “SSC RE PoA Thailand: Management System Procedures”.

(f) Measures for continuous improvements of the PoA management system

The management system is subject to a continuous review of its effectiveness, which is aligned with a Continuous Improvement Philosophy. Such reviews cover all elements and procedures of the management system. The aim is to identify any shortcomings and correct them, as well as to seek to continuously improve the PoA's performance on all counts. All those involved in the management of the PoA will be encouraged to raise any issues that they feel need to be corrected and suggest any means of improvement.

(g) Other elements

- A system/procedure to ensure that the SSC CPA included in the PoA is not a de-bundled component of another CDM Programme Activity or another CDM project activity

¹² The CPA serial number consists of one running number starting from 1 for each CPA under the PoA (e.g. CPA No.1, CPA No. 2, etc.) and one unique identification number within the electronic database used by CCME.

¹³ One running number starting from 1 for each Project Activity under the CPA (e.g. Project Activity No. 1, Project Activity No. 2, etc.)

As per “Assessment of debundling for small-scale project activities¹⁴”, only CPAs with Project Activities with an installed capacity greater than 150 kW shall perform the de-bundling check. The electronic database described above will be used to perform the de-bundling check. Every new SSC-CPA will be compared to the existing database and the list of project activities under validation or registered at UNFCCC in order to check whether there is already an activity¹⁵ that satisfies both conditions below:

- a) it has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure; **AND**
- b) its boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

If another activity that meets both conditions above is identified, the proposed SSC CPA shall be deemed to be a de-bundled component of a large scale activity, unless the total size of the proposed CPA combined with a registered small-scale CPA of a PoA or a registered CDM project activity does not exceed the limits for small-scale CDM project activities (i.e. 15 MW installed capacity). Under such circumstances, the proposed CPA can qualify to use simplified modalities and procedures for small-scale CDM project activities.

Moreover as shown below, the Project Entity will be made aware of the de-bundling rules and will certify that the proposed SSC-CPA is not a de-bundled part of a bigger project activity. Should such a case occur then the coordinating/managing entity would not proceed with inclusion of the corresponding SSC-CPA under the PoA.

- Provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA

In order to ensure that Project Entities responsible for Project Activities under the PoA are aware of, and have agreed that their activity is being subscribed to the PoA, the Project Entity shall enter into a contractual arrangement with CCME that includes the following provisions:

- a) The Project Activity has not been and will not be registered as a single CDM Project Activity nor as a CPA under another PoA;
- b) The Project Entity is not (and will not be) undertaking another Project Activity within one kilometre of the proposed CPA, leading to a combined installed capacity of the existing CPA and the other Project Activity above 15 MW;
- c) The Project Entity is aware that the CPA will be subscribed to the PoA;
- d) The Project Entity assigns CCME as its authorized representative with regards communication with the Thai DNA, DOEs and the CDM Executive Board, including communication on matters related to the CDM approval process, issuance and distribution of CERs and change of project participants.

Monitoring plan

With regards to monitoring of CPAs under the PoA, CCME opts for or a verification method that does not use sampling but verifies monitoring data from each CPA.

For each Project Activity under a CPA, all relevant parameters defined under Section I.7 of the generic CPAs will be monitored by the Project Implementer according to the procedures and monitoring framework established in I.7.1 of the generic CPAs. The monitoring data will be submitted to CCME, who will check and finalize the monitoring documentation for verification by the DOE and store the data in an electronic database in such a way that the status of verification can be determined for each CPA at any time.

The procedures as described shall ensure that there is no double counting of emission reductions.

SECTION C. Demonstration of additionality of PoA

¹⁴ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁵ In this context, an activity may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity.

As per paragraph 285 of the CDM Project Standard for PoAs, Version 02.0, the CME is not required to reassess the additionality of the PoA nor update the section of the PoA-DD relating to additionality. Thus, the same description as per the registered PoA-DD is addressed as follows.

The registered PoA-DD

As per paragraph 73 of the 47th EB meeting report “additionality is to be demonstrated either at the PoA level or at the CPA level”. In the case of the PoA, additionality shall be demonstrated at CPA level based on one of the following two approaches described below:

Approach 1:

The first approach is based on “*Guidelines for demonstrating additionality of microscale project activities*” (EB 63, Annex 23) and is **applicable to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW**. Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the “*Guidelines on assessment of debundling for SSC project activities*” (EB 54, annex 13) by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds¹⁶.

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils following requirements of the “*Guidelines for demonstrating additionality of microscale project activities*”:

- The total installed electricity generation capacity is equal to or less than 5 MW; **AND**
- The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation; **AND**
- It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the “*Guidelines on assessment of debundling for SSC project activities*” (e.g. by considering microscale thresholds in the place of SSC thresholds)¹⁷;

With regards to the second criteria listed above, additional clarifications have been provided in the EB 62 report, paragraph 48, which specify that most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 5 per cent threshold. Data older than three years from the date of submission of the CPA DD for inclusion shall not be applicable. Technologies/measures recommended by the DNA and approved by the Board to be additional in the host country remain valid for three years from the date of approval. Additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

In the specific context of the PoA, all eligible Project Types contribute less than 3% to national annual grid-connected electricity generation, according to most recent available data from the Electricity Generating Authority of Thailand (EGAT)¹⁸. This has also been confirmed by the Small-Scale Working Group (SSC WG) in its technical assessment of Thailand’s submission on recommended technologies and measures to the Executive Board¹⁹.

For Project Activities applying Approach 1 for additionality demonstration, the contribution of the specific Technology Type applied in a specific CPA towards national annual grid-connected electricity generation

¹⁶ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the *Guidelines on assessment of debundling for SSC project activities* (EB 54, annex 13) excluding paragraph 3 of section A of the latter guidelines.

¹⁷ As per clarification in the EB 62 report, paragraph 48.(e).

¹⁸ According to the “*Thailand Power Development Plan 2010 - 2030*” by EGAT (“Appendix 3: Capacity of Thailand Power System”), hydro power stations below 5 MW represent only about 0.0095% of installed capacity, whereas all other renewable technologies together account for only 1.07% of grid-connected power generation.

Source: http://www.egat.co.th/en/images/stories/pdf/Report%20PDP2010-Apr2010_English.pdf

¹⁹ As per Annex 7, Paragraphs 20 and 21 of the SSC WG meeting 32, the SSC WG concluded that, according to the IEA data provided in Annex 2 (to Annex 7 of SSC WG 32), all renewable energy technology/measures in Thailand contribute less than 5% to annual electricity generation. The threshold of 5% has been subsequently revised to 3% as per EB 63, Annex 23, however as demonstrated in the footnote above, all technologies covered under the current PoA represent less than 3% of grid-connected installed capacity in Thailand and are therefore eligible in theory (subject to DNA recommendation and final approval by the CDM EB).

shall be calculated in the CPA DD based on the most recent data from EGAT (or any other official and publicly available source) at the time of CPA DD submission to the DOE.

Approach 2:

Approach 2 is **applicable to any Project Activity under the PoA**, including Project Activities with a total installed electricity generation capacity that is equal to or below 5 MW (as an alternative to Approach 1).

As per “Attachment A of Appendix B” and in line with the “Non-binding best practice examples to demonstrate additionality for SSC project activities”, Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity’s IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “Guidelines on the assessment of investment analysis, Version 05” (EB 62, Annex 5). In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level²⁰.

The input values used in the investment analysis shall be valid and applicable at the time of the investment decision taken by the Project Entity (in line with Paragraph 6 of the “Guidelines on the assessment of investment analysis, Version 05”). Further information and requirements for calculation of the Project Activity’s IRR and its respective benchmark are provided below.

Justification of the benchmark approach

All Project Activities under the PoA represent investments in new grid-connected electricity generation plants (Greenfield projects) and the baseline scenario, being the national electricity grid, is outside the direct control of the Project Entity. Hence, the most appropriate way to conduct the investment analysis in such cases is the benchmark approach (in line with Paragraph 19 of the “Guidelines on the assessment of investment analysis, Version 05”). The benchmark approach reflects the choice of the Project Entity to invest or not to invest in the underlying Project Activity, whereas the Project Activity is deemed additional if its IRR without consideration of CDM revenues is below the applicable benchmark.

IRR calculation

The financial indicator chosen to assess additionality of Project Activities under the PoA may be either the Equity IRR or the Project IRR. In line with Paragraph 3 of the “Guidelines on the assessment of investment analysis, Version 05”, both Project IRR and Equity IRR calculations shall reflect the period of expected operation of the underlying project activity (technical lifetime), whereas a maximum period of 20 years shall be appropriate. The IRR calculation may include the cost of major maintenance and/or rehabilitation if these are expected to occur during the period of assessment.

Pre-tax vs. post-tax IRR considerations

Both the Equity and the Project IRR may be calculated on a pre- or post-tax basis provided that the applied benchmark is also determined on pre- or post-tax basis respectively. Taxation should only be included as an expense in the IRR calculation in cases where the benchmark is intended for post-tax comparisons (in line with Paragraph 5 of the “Guidelines on the assessment of investment analysis, Version 05”). Furthermore, in cases where a post-tax benchmark is applied, actual interest payable shall be taken into account in the calculation of income tax (in line with Paragraph 11 of the “Guidelines on the assessment of investment analysis, Version 05”).

Further information for Project IRR calculation

When calculating the Project IRR, the cost of financing expenditures (i.e. loan repayments and interest) shall not be included (as per Paragraph 9 of the “Guidelines on the assessment of investment analysis, Version 05”).

Further information for Equity IRR calculation

For calculation of the Equity IRR only the portion of investment costs, which is financed by equity, should be considered as net cash outflow; the portion of the investment costs, which is financed by debt, should not be considered a cash outflow (as per Paragraph 10 of the “Guidelines on the assessment of investment analysis, Version 05”).

Parameters required for IRR calculation

²⁰ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

The IRR calculation for each Project Activity under the PoA will be carried out based on project-specific circumstances and may differ based on methodological assumptions described above (i.e. Project vs. Equity IRR, pre- vs. post-tax IRR, etc.). The input values for the IRR calculation and the respective evidences as well as the calculation itself will be subject to verification by the DOE prior to inclusion of a new CPA to the PoA. This process shall be carried out in a transparent, streamlined and standardized manner, and for this purpose the following list of standard parameters shall be provided for each Project Activity (or CPA – in cases where the investment analysis is conducted at CPA level). The list is not exhaustive; additional parameters might be required on a case-by-case basis.

Parameters for calculation of the Project Activity's IRR

IRR MODEL		Comments
Project vs. Equity IRR	-	The Project Entity shall clearly indicate whether the investment analysis is carried out based on a Project IRR or Equity IRR calculation.
Pre-tax vs. post-tax assessment	-	The Project Entity shall clearly indicate whether the investment analysis is carried out based on a pre-tax or post-tax calculation.
PROJECT DATA	Unit	Comments
Technical lifetime	Year	Based on information provided by technology provider/manufacture, expert opinion or default factors from the “ <i>Tool to determine the remaining lifetime of equipment, Version 01</i> ”.
Investment decision date	DD/MM/YYYY	Can be sourced from e.g. board decision, loan agreement
Construction start	Year	Can be sourced from e.g. feasibility study, project status report, engineering/ equipment purchase or civil work contracts
Project commissioning	Year	Can be sourced from e.g. feasibility study, commissioning certificate, commissioning plan ²¹
FINANCIAL PARAMETERS	Unit	Comments
Debt/Equity ratio	-	Can be sourced from e.g. feasibility study, loan agreement
Cost of servicing debt	%	Interest rate of debt finance component of the Project Activity (if applicable). Can be sourced from e.g. feasibility study, loan agreement.
Total amount of electricity sold to the grid	kWh/year	Can be sourced from feasibility study
Electricity tariff	THB/kWh	Applicable electricity tariff as per current regulations at the time of the investment decision
Inflation rate	% per year	The inflation rate might be used for escalation of costs over time and shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used. ²²
Exchange Rate	Foreign currency/THB	Average exchange rate during the twelve months preceding the date of the investment decision.
CASH FLOWS	Unit	Comments
Total investment	THB	The total investment might include cost components such as (but not limited to): land cost, project development costs (e.g.

²¹ The source for date at which the project starts operating must be consistent with the source for the “construction start date”.

²² In line with Paragraph 7 in the Appendix of the “*Guidelines on the assessment of investment analysis, Version 05*”.

			consultancy fees, license fees, engineering costs), equipment cost, construction costs, etc. If the investment is expected to take place over several years, a yearly breakdown of investments can be provided.
Operation & Maintenance costs	THB/year		The O&M costs might include cost components such as (but not limited to): management and administrative expenses, labor costs, consumables, equipment maintenance costs (including regular as well major maintenance costs that occur on a less-frequent but periodic basis). Can be sourced from e.g. Feasibility Study or information provided by technology provider.
Insurance costs	% of Capex p.a. or THB/year		Can be sourced from e.g. Feasibility Study or insurance quotation/contract.
(Other operating expenditures)	THB/year		Only if applicable.
Revenues from electricity sale to the grid	THB/year		Based on calculation of expected electricity export to the grid times the applicable electricity tariff. In cases where the electricity tariff is subject to variations, the calculation of expected revenues shall be substantiated in a transparent manner.
(Other operating revenues)	THB/year		Only if applicable. Shall apply only to revenue streams directly attributable to the Project Activity.

In Thailand, USD (or EUR) and THB are sometimes applied in financial projections. When conducting the analysis, all foreign currencies may be converted into the local currency, using the average exchange rate during the twelve months preceding the date of the investment decision.

Benchmark determination

Benchmark determination shall be conducted on a case-by-case basis at Project Activity (or CPA) level and shall follow the general guidance provided below. Given the nature of Project Activities under the PoA, the weighted average costs of capital (WACC) may be the most appropriate benchmark approach for comparison with the Project IRR. Therefore, a pre-defined WACC model is explained in more detail as a standard approach.

Appropriate benchmark approaches

As mentioned above, the selected benchmark shall correspond to the choices made for the IRR calculation with respect to Project vs. Equity IRR and pre-tax vs. post-tax considerations. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a **Project IRR**, whereas required/expected returns on equity are appropriate benchmarks for an **Equity IRR**. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented.²³

In line with Paragraph 13 of the “*Guidelines on the assessment of investment analysis, Version 05*”, **internal company-specific benchmarks** and **benchmarks based on parameters that are standard in the market** are both possible alternatives and shall be subject to a validation opinion by the DOE at the time of inclusion of the CPA with regards to the suitability of the selected benchmark in the context of the Project Activity.

Requirements for internal company benchmarks

Internal company benchmarks/expected returns (including those used as the expected return on equity in the calculation of a weighted average cost of capital - WACC), should only be applied in cases where there is only one possible project developer (i.e. Project Entity) and should be demonstrated to have been used for similar projects with similar risks, developed by the same company or, if the company is new, would have been used for similar projects in the same sector in the country/region. This shall require as a minimum clear evidence of the resolution by the company's board and/or shareholders and will require the validating DOE to undertake a thorough assessment of the financial statements of the project developer to assess the past financial behaviour of the entity during at least the last three years in relation to similar projects.²⁴

²³ In line with Paragraph 12 of the “*Guidelines on the assessment of investment analysis, Version 05*”

²⁴ In line with Paragraph 14 of the “*Guidelines on the assessment of investment analysis, Version 05*”

The values in the table in Appendix A of the “*Guidelines on the assessment of investment analysis, Version 05*” may also be used, as a simple default option for determination of the **cost of equity** of internal company benchmarks/expected returns.²⁵

If a company’s internal benchmark is used for the expected return on equity, the **cost of debt** should be based on the weighted average cost of debt financing of the Project Entity. For loans, the weighted average cost of outstanding long-term debt shall be used. For bonds, the weighted average yield of the bonds during the last three months prior to the submission of the CPA DD for validation/inclusion or prior to the investment decision, whichever is earlier, shall be used. The use of bonds to determine the cost of debt is only appropriate for corporate bonds issued in Thailand. In cases where the debt finance structure of the project is not yet available (e.g. a letter of intent for debt funding is not available), the cost of debt can be assumed as the commercial lending rate in the country or the yield of a 10 year bond issued by the Royal Thai Government or, if this is not available, the bond with the maturity which is closest to 10 years. The following should be documented in CPA DD: (a) for bonds: the key parameters of the bond including the time of maturity, yield, registration issuance in the financial system and set-up in the market; (b) for loans from a financial institution: the lending contract between the financial institution and the legal entity owning the assets of the project activity (i.e. the Project Entity), or, in absence of the contract, a letter from the bank stating its intention to award the loan and the key terms for the loan; (c) for debt financing from a parent company: the transfer of capital to the legal entity, documented with the contract of lending between the parent company and the legal entity owning the assets of the project activity and/or the parameters of the corporate bonds as mentioned above. This latter option is only valid for corporate bonds issued in Thailand.²⁶

If a company’s internal benchmark is used for the expected return on equity, then the **percentage of debt financing and equity financing** should reflect the long-term debt/equity finance structure of the Project Entity. The percentage should be determined based on the latest balance sheet provided under local fiscal/accounting standards and rules if: (a) the Project Entity has balance sheets audited by a third party within two years prior to the submission of the CPA DD for validation/inclusion; and (b) the accounting books of the Project Entity reflect at least the total value of all the assets needed for the project activity. If the debt/equity finance structure is not yet available, 50% debt and 50% equity financing may be assumed as a default.²⁷

Requirements for benchmarks that are based on parameters that are standard in the market

If the benchmark is based on parameters that are standard in the market, the **cost of equity** should be determined either by: (a) selecting the values provided in Appendix A of the “*Guidelines on the assessment of investment analysis, Version 05*”; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors.²⁸

If the benchmark is based on parameters that are standard in the market, the **cost of debt** should be calculated as the cost of financing in the capital markets (e.g. commercial lending rates and guarantees required for Thailand and the type of project activity concerned), based on documented evidence from financial institutions with regard to the cost of debt financing of comparable projects. In cases where this data is not available, the commercial lending rate in Thailand shall be used to calculate the cost of debt.²⁹

The typical **debt/equity finance structure** observed in the sector of the country should be used for determination of benchmarks based on parameters that are standard in the market. If such information is not readily available, 50% debt and 50% equity financing may be assumed as a default.³⁰

WACC Approach

Renewable energy projects in Thailand are typically financed using a combination of debt and equity finance. Hence, comparison of the Project IRR with the weighted average costs of capital (WACC) represents a valid approach for many Project Activities under the PoA and is explained in more detail below.

²⁵ In line with Paragraph 15 of the “*Guidelines on the assessment of investment analysis, Version 05*”

²⁶ In line with Paragraph 16 of the “*Guidelines on the assessment of investment analysis, Version 05*”

²⁷ In line with Paragraph 17 of the “*Guidelines on the assessment of investment analysis, Version 05*”

²⁸ In line with Paragraph 15 of the “*Guidelines on the assessment of investment analysis, Version 05*”

²⁹ In line with Paragraph 16 of the “*Guidelines on the assessment of investment analysis, Version 05*”

³⁰ In line with Paragraph 18 of the “*Guidelines on the assessment of investment analysis, Version 05*”

The WACC is defined as the average return expected across the debt and equity components of the Project Activity. For the purpose of this PoA the WACC may be determined for each Project Activity (or alternatively each CPA) based on following general rules:

- All input parameters used for the benchmark determination shall be derived in a transparent manner from verifiable sources.
- The cost of equity shall be determined using the capital asset pricing model (CAPM).

The WACC will be calculated as follows³¹:

$$WACC = CD \times \%Debt + CE \times \%Equity$$

Depending on whether the comparison is carried out on a Post-Tax or Pre –Tax basis, the WACC may be determined as follows:

$$WACC_{post-tax} = CD \times (1 - T) \times \%Debt + CE \times \%Equity$$

The cost of equity shall be determined based on the capital asset pricing model³² (CAPM):

$$CE = RFR + \beta (RP) + SP$$

Where:

$$\beta = \beta_{unlevered} \times (1 + (1 - T) \times D/E)$$

The WACC (pre-tax) can in turn be determined by:

$$WACC_{pre-tax} = WACC_{post-tax} / (1 - T)$$

Where:

Parameters for calculation of benchmark

Parameters	Description	Source and explanation
CD	Cost of Debt	Determination of the cost of debt shall be in line with the relevant requirements described above for company internal benchmarks and benchmarks based on parameters that are standard in the market.
%Debt	Debt ratio as compared to total investment	Determination of the debt ratio shall be in line with the relevant requirements described above for company internal benchmarks and benchmarks based on parameters that are standard in the market.
CE	Cost of Equity, i.e. Average expected return on equity	Calculated as per CAPM, in line with relevant requirements described above for determination of the cost of equity in company internal benchmarks and benchmarks based on parameters that are standard in the market.
%Equity	Equity ratio as compared to total investment	Determination of the equity ratio shall be in line with the relevant requirements described above for company internal benchmarks and benchmarks based on parameters that are standard in the market.
T	Tax rate	Average tax rate over technical lifetime of Project Activity; based on applicable regulations in Thailand.
RFR	Risk Free Rate in a	The U.S. long-term government bond is considered as risk free

³¹ Velez-Pareja, Ignacio and Tham, Joseph, "A Note on the Weighted Average Cost of Capital WACC" (August 7, 2005). Available at SSRN: <http://ssrn.com/abstract=254587>. Tax is excluded from the standard WACC formula to establish a pre-tax benchmark.

³² Black, Fischer., Michael C. Jensen, and Myron Scholes (1972). The Capital Asset Pricing Model: Some Empirical Tests, pp. 79-121 in M. Jensen ed., Studies in the Theory of Capital Markets. New York: Praeger Publishers.

	mature equity market	instrument. Bond rate is taken as the 3 month average prior to the investment decision and for a duration similar to the technical lifetime of the project activity Source: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=longtermrate
$\beta_{unlevered}$	Beta (unlevered)	Total Beta _{unlevered} from Damadoran (Stern University) for the power sector; most recent value before the investment decision. It reflects a firm's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of businesses. http://pages.stern.nyu.edu/~adamodar/ "Total Beta by industry sector"
RP	Total Risk Premium	The Total Risk Premium includes an Equity Risk Premium and a Country Risk Premium applicable to Thailand. The reason behind this premium stems from the risk-return trade off, in which a higher rate of return is required to entice investors to take on riskier investments. http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"
SP	Size Premium	Size premium is an investor's risk incurred when investing in a small project. Betas are generally calculated based on data for large corporations. However companies of different sizes face different levels of risk. The smaller the company the fewer the sources of capital and investors require additional returns to compensate for the lower marketability of shares. According to Ibbotson Associates' statistics for 2009 ³³ for the New York Stock exchange reveals that risk premium increases as the size of a company reduces: The equity risk premium of the largest 10% of companies is -0.36% (i.e. the firms in the largest 10% have an equity risk premium that is 0.36% below average). The smallest 10% of companies (USD 1.6 million USD – 136 million USD) have an equity risk premium of 5.81%. The usual way of accounting for this risk premium is to add this to the Cost of Equity (CE), as given in the equation for CE above.
D/E	Debt to Equity ratio	The debt to equity ratio shall be determined based on guidance provided above for company internal benchmarks OR for benchmarks based on parameters that are standard in the market.
Investment decision date	Date	

If over the course of the lifetime of the PoA, a parameter or the source of its value described in the table above becomes unavailable or is replaced by a more relevant parameter and/or source, then this parameter and/or sources will be revised accordingly and verified by the DOE prior to inclusion of new CPAs to the PoA.

Sensitivity analysis

In line with Paragraph 20 of the *"Guidelines on the assessment of investment analysis, Version 05"*, a sensitivity analysis will be conducted on variables that constitute more than 20% of either total project costs or total project revenues, and shall include the following variables: (1) total investment, (2) O&M, and (3) power tariff. As per Paragraph 21 of the *"Guidelines on the assessment of investment analysis, Version 05"*, as general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless it is deemed inappropriate in the context of the specific Project Activity's circumstances.

³³ Ibbotson SBBI 2009 Valuation Yearbook, Chapter 7, page 96

The full results of each sensitivity analysis will be reported in the respective SSC CPA-DD using the following format:

Framework for reporting results of sensitivity analysis

Factor	Variation		
	-10% (or less if appropriate)	0%	10% (or more if appropriate)
Total investment			
O&M Cost			
Electricity export			
Power tariff			
Benchmark			

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, the Project Entity shall provide evidence that this scenario is unlikely to occur. If no sufficient proof is provided, the Project Activity (or CPA) will be considered as non-additional. Otherwise the Project Activity (or CPA) shall be deemed additional.

Approach 3:

Approach 3 is ***applicable only to Project Activities under Technology Types 2 and 3 (solar technology projects with an installed capacity of up to 15 MW) as well as Technology Type 1 implemented in an off-shore location (off-shore wind projects)***. According to EB 63, Annex 24, Paragraph 2, Project Activities with an installed capacity of up to 15 MW based on solar (including photovoltaic and solar thermal electricity generation) and off-shore wind technologies are automatically defined as additional, without further documentation of barriers.

Hence, a CPA shall be deemed additional under Approach 3, if it can be demonstrated that following requirements are met:

- The total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW; **AND**
- The Project Activity employs one of the following grid-connected renewable energy technologies:
 - (i) Technology Type 1 (wind power) implemented in an off-shore location; **OR**
 - (ii) Technology Type 2 (solar photovoltaic power generation); **OR**
 - (iii) Technology Type 3 (concentrated solar power).

Potential implication of future policies and/or NAMAs in Thailand on the PoA

Given the nature and set-up of the PoA, it might become a relevant tool under the framework of Nationally Appropriate Mitigation Actions (NAMA) to be implemented in Thailand in the future. The framework for additionality assessment of Project Activities under the PoA may need to be adjusted if such a scenario materializes. The same applies in case future feed-in tariff/adder policies in Thailand are explicitly linked to instruments such as the PoA.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

The starting date of the PoA is the date of publication of the PoA-DD at the global stakeholder consultation in accordance with the definition in the Glossary: CDM Terms.

The starting date of the PoA is therefore 14/09/2011³⁴.

³⁴ <https://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/AYYW2EJ3HYUNKG1IW90202KP44Z2NM/view.html>

D.2. Duration of PoA

The length of the PoA is 28 years, in line with paragraph 43 of the CDM Project Standard for PoAs, Version 02.0.

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

- | | |
|--|-------------------------------------|
| 1. Environmental Analysis is done at PoA level | <input type="checkbox"/> |
| 2. Environmental Analysis is done at SSC-CPA level | <input checked="" type="checkbox"/> |

Given the potential diversity of Technology Types and project locations implemented under the PoA, the environmental analysis at CPA level is considered as the most appropriate choice. According to Thai regulations, very few electricity generation activities that qualify under the VSPP scheme are required to conduct an Environmental Impact Assessment (EIA)³⁶ (see Section E.3 below). However, a simplified version called Initial Environmental Evaluation (IEE) is required for approval of CDM Project Activities by the DNA in Thailand. Therefore, in most cases the environmental analysis at CPA level will be conducted as per IEE requirements of the Thai DNA. In cases listed under Section E.3 below, the environmental analysis will be based on an EIA.

E.2. Analysis of environmental impacts

Not applicable. As mentioned under Section E.1, the environmental analysis will be carried out at CPA level and documented in the CPA-DD.

E.3. Environmental impact assessment

According to Thai regulations, the only electricity generation activities required to conduct an Environmental Impact Assessment (EIA)³⁷ are:

1. Project Activities with an installed capacity above 10 MW; or
2. Project Activities located in the "plain area level 1", which refers to protected or conservation forest and headwater source areas and is subdivided into "plain area level 1A", representing protected forest areas which include the headwaters of rivers (usually located at high elevations with steep slopes) and should remain in permanent forest cover, and "plain area level 1B", representing the same type of area but already partially cleared for agricultural use, which might be further cultivated subject to special soil conservation measures and should either be reforested or remain under permanent agro-forestry.

SECTION F. Local stakeholder consultation**F.1. Level at which local stakeholder consultation is undertaken**

- | | |
|--|-------------------------------------|
| 1. Local stakeholder consultation is done at PoA level | <input type="checkbox"/> |
| 2. Local stakeholder consultation is done at SSC-CPA level | <input checked="" type="checkbox"/> |

Given the potential diversity in Project Activities, Project Entities and the socio-economic environment at each project location, the local stakeholder consultation at CPA level is considered as the most appropriate

³⁶ As per "Notice of the Ministry of Natural Resources and Environment on specification of criteria, procedures, code of practice, guidelines, types and sizes of operation which are subject to the Environmental Impact Assessment (EIA)" issued by the Office of Natural Resources and Environmental Policy and Planning (ONEP) on 31 August 2009.

³⁷ As per "Notice of the Ministry of Natural Resources and Environment on specification of criteria, procedures, code of practice, guidelines, types and sizes of operation which are subject to the Environmental Impact Assessment (EIA)" issued by the Office of Natural Resources and Environmental Policy and Planning (ONEP) on 31 August 2009.

choice. Such consultations at CPA level will enable local communities to express their view on the impact of the proposed Project Activities under the CPA.

F.2. Modalities for local stakeholder consultation

Not applicable. As mentioned under Section F.1, a description of how comments by local stakeholders have been invited and compiled will be provided in each individual CPA-DD.

F.3. Summary of comments received

Not applicable. As mentioned under Section F.1, a summary of comments received from local stakeholders will be provided in each individual CPA-DD.

F.4. Consideration of comments received

Not applicable. As mentioned under Section F.1, a report on how due account was taken of any comments received from local stakeholders will be provided in each individual CPA-DD.

SECTION G. Approval and authorization

Letter of Approval of each Party listed in Section A.5 of this document. Carbon Coordinating Managing Entity Limited as CME is authorized by all Parties involved in the PoA in the respective letter of approval.

PART II. Generic component project activity (CPA)

Technology Type 1: Wind power

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Wind Power]

H.2. Reference number of generic CPA

Generic CPA No. 1

Technology Type: Wind power

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Technology Type: Wind power]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA³⁸
- (ii) Technology Type: Wind power
- (iii) Installed capacity
- (iv) Location]

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities³⁹ and Project Implementers⁴⁰ involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 1: Wind Power]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

³⁸ As defined in the PoA-DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA-DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

³⁹ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

⁴⁰ A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools are available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSC TZ8SKT4F7N1CFDXCSA7BDQ7FgU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD⁴¹:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
<p>1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:</p> <p>(a) Supplying electricity to a national or a regional grid; or</p> <p>(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>	<p>In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3 of the PoA-DD:</p> <ol style="list-style-type: none"> 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas <p>This CPA involves technology Type 1: Wind power and exports electricity to the Thai national grid and therefore is applicable under the methodology.</p>
<p>2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation", AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology.</p>	<p>According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.</p>
<p>3. This methodology is applicable to project activities that</p> <p>(a) Install a Greenfield plant;</p> <p>(b) Involve a capacity addition;</p> <p>(c) Involve a retrofit of (an) existing plant(s);</p> <p>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or</p> <p>(e) Involve a replacement of (an) existing plant(s).</p>	<p>In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.</p>
<p>4. Hydro power plants with reservoirs that satisfy at</p>	<p>This CPA uses Technology Type 1: Wind power</p>

⁴¹ The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>and therefore, this condition is not applicable.</p>
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct⁴³ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>This CPA uses Technology Type 1: Wind power and therefore, this condition is not applicable.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.</p>	<p>This CPA uses Technology Type 1: Wind power and therefore, this condition is not applicable.</p>

⁴³ Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]
Figure 1: Project Boundary

The description of the sources and gases included in Technology type 1: Wind power project activities is given below:

GHG sources and gases included in baseline emission calculations:

Source		GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

GHG sources and gases included in project emission calculations:

Option 1:

If the Project Activities under the CPA **co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)**:

"The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of **Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)** is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.

“

Option 2:

“The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 1: Wind power.”

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds to “*the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid*”.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions**I.6.1. Explanation of methodological choices**

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “*Grid connected renewable electricity generation, Version 18*”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system, Version 07.0”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “Tool to calculate emission factor for an electricity system, Version 07.0”.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”. The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.⁴⁴

Project emissions for CPAs that apply Technology Types 1:

Project emissions for all CPAs applying **Technology Types 1 (Wind power)** are considered to be zero. Hence, the only possible project emission source for such CPAs are project emissions from on-site consumption of fossil fuel (if applicable).

Further details regarding calculation of baseline and project emissions are provided in Section I.6.3.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

I.6.2. Data and parameters fixed ex ante

⁴⁴ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”.

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA-DD.
Source of data	<input type="checkbox"/> Legally binding contract ⁴⁵ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 1: Wind power
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA-DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	Installed capacity
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ⁴⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

⁴⁵ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁴⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ⁴⁷ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA-DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 of the PoA DD.

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]
Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7 [add three more years if 10 year crediting period is chosen]	[number]
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

⁴⁷ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Where:

ER_y	Emission reductions in year y (t CO ₂ /y)
BE_y	Baseline emissions in year y (t CO ₂ /y)
PE_y	Project emissions in year y (t CO ₂ /y)
LE_y	Leakage emissions in year y (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE_y	Baseline emissions in year y (t CO ₂)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year y (MWh)
$EF_{grid,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system, Version 07.0*". The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA DD, is provided in Appendix 4 to the PoA DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{grid,y} \\ &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\ &= [number] \text{ tCO}_2\text{e} \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

"CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the "*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*", based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

$PE_{FC,j,y}$	Are the CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr);
$FC_{i,j,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (4)$$

Where:

COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
NCV _{i,y}	Is the weighted average net calorific value of the fuel type <i>i</i> in year <i>y</i> (GJ/mass or volume unit)
EF _{CO₂,i,y}	Is the weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /GJ)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”.

OR

Option 2: If the previous options is not applicable:

There are no relevant project emissions in the particular case of the proposed CPA.

Hence:

$$PE_y = 0$$

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.”

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0$$

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: “All monitoring parameters shall be monitored independently for each Project Activity under the CPA”].

Data/Parameter	EG _{PJ,y}
Data unit	MWh/y

Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meters
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period
Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the “ <i>Demonstration of additionality of microscale project activities⁴⁸</i> ”, it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.
Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:

Applies to Project Activities with ***on-site consumption of fossil fuels***:

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

⁴⁸ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> • Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.
QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.
Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas) ⁴⁹ shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA DD.

⁴⁹ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

1.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

1.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project	The Project Activity falls under [Technology Type 1: Wind	All of the following: <input type="checkbox"/> Confirmation by CME

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	Types: 1. Wind power 2. Solar photovoltaic power generation 3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power	power], which is also confirmed by CME based on the Technology Type descriptions provided in Section A.3 of the PoA-DD.	regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract ⁵⁰ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple Project Activities under one CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	<input type="checkbox"/> Legally binding contract ⁵¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	Criterion 3.a: Additional requirements for Project Activities with both renewable and non-renewable components (e.g. a wind/diesel	[Option 1: If the Project Activity(ies) under the CPA does/do not have non-renewable components: "The Project Activity does not	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of non-renewable components within the Project Boundary; AND

⁵⁰ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁵¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>unit):</p> <p>If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).</p>	<p>have non-renewable components.”</p> <p>OR</p> <p>Option 2:</p> <p>“The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW.”</p> <p>In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p>Any of the following:</p> <p><input type="checkbox"/> Legally binding contract⁵² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity's renewable energy component; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p> <p>[Replace the applicable box with an “X”]</p>
	<p>Criterion 3.b:</p> <p>Additional requirements for Project Activities that co-fires fossil fuel⁵³:</p> <p>If the Project Activity entails co-firing of fossil fuel(s), the capacity of the entire unit shall not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6);</p>	<p>[Option 1:</p> <p>If the Project Activity(ies) does/do not co-fire fossil fuel:</p> <p>“The project does not co-fire fossil fuels.”</p> <p>OR</p> <p>Option 2:</p> <p>“The installed electricity generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.”</p> <p>In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND</p> <p>Any of the following:</p> <p><input type="checkbox"/> Legally binding contract⁵⁴ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p>

⁵² “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

⁵³ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

⁵⁴ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
4	The Project Activity is a grid-connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	The Project Activity will supply electricity to the Thai national grid under the VSPP scheme.	<input type="checkbox"/> Single-line diagram of the Project Activity provided by Project Entity to CME; AND <input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme. [Replace the applicable box with an "X"]
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I-D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a "Greenfield project".	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND Option 1: For Project Activities that have not started construction by the time of the CPA inclusion: <input type="checkbox"/> Confirmation by DOE following a site visit; OR Option 2: For Project Activities that are under construction by the time of the CPA inclusion: <input type="checkbox"/> Legally binding contract ⁵⁵ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND <input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above); OR Option 3: For Project Activities that are already operational by the time of the CPA inclusion: <input type="checkbox"/> Operation license AND <input type="checkbox"/> Legally binding contract ⁵⁶ between the Project Entity and a

⁵⁵ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁵⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			third party related to the implementation or construction of the Project Activity containing a clear project design description; AND <input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/ implementation contract mentioned above and crosschecking this information with the operation license); [Replace the applicable box with an "X"]
6	The Project Activity is not a combined heat and power (co-generation) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<input type="checkbox"/> Legally binding contract ⁵⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Signed PPA ⁵⁸ [Replace the applicable box with an "X"]
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B above, the Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	<input type="checkbox"/> Confirmation by CME on de-bundling check as per the <i>Assessment of debundling for small-scale project activities, Version 04.0</i> ; AND <input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity. [Replace the applicable box with an "X"]
8	The Project Activity's boundary is within the geographical territory of Thailand.	The Project Activity's location is at [province name] in Thailand. [In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of

⁵⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁵⁸ There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>the Project Entity as well as the address of the Project Activity;</p> <p>AND any of the following:</p> <p><input type="checkbox"/> Signed PPA; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)</p> <p>[Replace the applicable box with an "X"]</p>
9	<p>The additionality for each Project Activity is demonstrated by any one of the following approaches:</p> <p>Approach 1: <i>Demonstration of additionality of microscale project activities</i>⁵⁹;</p> <p>OR</p>	<p>[Provide justification of selected approach]</p> <p>[Approach 1:</p> <p><input type="checkbox"/> The total installed electricity generation capacity of the Project Activity⁶³ is equal to or less than 5 MW"</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the "Assessment of debundling for small-scale project activities" based on microscale thresholds in the place of SSC thresholds⁶⁴"</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by the CDM Executive Board to be additional in the host country⁶⁵."</p>	<p>[Approach 1:</p> <p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities";</p> <p>AND</p> <p><input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the respective recommendation by Thailand's DNA)</p> <p>AND any of the following:</p> <p><input type="checkbox"/> Legally binding contract⁶⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing</p>

⁵⁹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

⁶³ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

⁶⁴ As per clarification in the EB 62 report, paragraph 48 (e)

⁶⁵ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per “<i>Demonstration of additionality of small-scale project activities</i>”⁶⁰, Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured⁶¹. OR</p> <p>Approach 3: As per “<i>Demonstration of additionality of small-scale project activities</i>”⁶², Paragraph 11, Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (as defined under Section A.3 of the</p>	<p>[Provide brief justification]</p> <p>Replace all three boxes above with an “X” OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] [“According to the IRR and benchmark calculation conducted in Section C of the PoA DD, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section C of the PoA DD for more details).”]</p> <p>OR Approach 3: <input type="checkbox"/> The Project Activity complies with Eligibility Criteria No. 3;</p> <p>AND any of the following: “<input type="checkbox"/> The Project Activity falls under Technology Type 1 AND is implemented in an off-shore location [Provide brief justification]</p>	<p>information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p> <p>OR “Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection.”]</p> <p>OR “Approach 3: All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity;</p> <p>AND any of the following: <input type="checkbox"/> Legally binding contract⁶⁷ between the Project Entity and a</p>

⁶⁶ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

⁶⁰ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

⁶¹ In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle.

⁶² Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

⁶⁷ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	PoA-DD) with an installed capacity of up to 15 MW (subject to compliance with Eligibility Criteria No. 3) are automatically defined as additional.	<p>“<input type="checkbox"/> The Project Activity falls under Technology Type 2” [Provide brief justification] “<input type="checkbox"/> The Project Activity falls under Technology Type 3” [Provide brief justification]</p> <p>Replace one of the three boxes above with an “X”.]</p>	<p>third party related to the implementation or construction of the Project Activity containing information about the applied technology type and the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p>
10	The proposed Project Activity does not lead to double counting of emission reductions.	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity; OR 2. Part of a bundled CDM Project activity; OR 3. Another registered CDM PoA; OR 4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND <input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND <input type="checkbox"/> Declaration by CME that the Project Activity does not and will not lead to double counting of emission reductions.</p> <p>[Replace the applicable box with an “X”]</p>
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the “Glossary of CDM Terms”, Version 10).	<p>The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA. [In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Legally binding contract⁶⁸ between the Project Entity and a third party with a commitment by the Project Entity to expenditures⁶⁹ related to the implementation or construction of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Any other significant⁷⁰ purchase order, contract or payment evidence related to the construction of the Project Activity; OR</p>

⁶⁸ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

⁶⁹ Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

⁷⁰ Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<input type="checkbox"/> Confirmation by DOE following a site visit that construction has not started before the date of commencement of the PoA validation (in case of early stage Project Activities) [Replace the applicable box with an "X"]

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA
- ☐ **Approach 3** – applicable to Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (i.e. Technology Type 1 implemented in an off-shore location) with an installed capacity of up to 15 MW

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the *"Assessment of debundling for small-scale project activities"*⁷¹ by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds⁷².

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the *"Demonstration of additionality of microscale project activities"*⁷³ listed below:

- ☐ The total installed electricity generation capacity is equal to or less than 5 MW."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the *"Assessment of debundling for small-scale project activities"* (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)⁷⁴."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation."

⁷¹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

⁷² In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the *"Assessment of debundling for small-scale project activities"*, Version 04.0 excluding paragraph 10 of the latter guidelines.

⁷³ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

⁷⁴ As per clarification in the EB 62 report, paragraph 48.(e).

[Replace the box with an “X” if the condition is met. Provide justification for each Project Activity under the CPA.]

OR

For **Approach 2**:

“As per “*Demonstration of additionality of small-scale project activities*”⁷⁵ and in line with the “*Non-binding best practice examples to demonstrate additionality for SSC project activities*”, Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity’s IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*”⁷⁶.”

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level”⁷⁷. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA-DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL	Unit	Input values	Source/Comments
Project vs. Equity IRR	-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax vs. post-tax assessment	-	[“Pre-tax” or “Post-tax”]	[Source/Comments]
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable]	(if [Source/Comments (if applicable)])
Exchange Rate	Foreign currency/THB	[number applicable]	(if [Source/Comments (if applicable)])
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number “%” or “THB/year” applicable]	[Source/Comments (if applicable)]
(Other operating	THB/year	[number (if	[Source/Comments (if applicable)])

⁷⁵ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

⁷⁶ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

⁷⁷ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

expenditures)		applicable)]	
Revenues from electricity sale to the grid	THB/year	[number]	[Source/Comments]
(Other operating revenues)	THB/year	[number (if applicable)]	[Source/Comments (if applicable)]
["Project" or "Equity"] IRR	%	[IRR result]%	

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at ["Project Activity" or "CPA level"] on a ["pre-tax" or "post-tax"] basis. The ["Project" or "Equity"] IRR is compared to the [selected benchmark indicator/approach] based on ["parameters that are standard in the market" or "company internal information"] according to the general principles described in the PoA DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the ["Project" or "Equity"] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA-DD as follows:

Sensitivity analysis at ["Project Activity" or "CPA level"]

Factor	Variation		
	-10% [or less if appropriate]	0%	10% [or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

"The ["Project" or "Equity"] IRR does not cross the benchmark for any of the parameter variations applied above."

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The ["Project" or "Equity"] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range ["and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur"]. Therefore, it can be concluded that the proposed Project ["Activity" or "Activities"] under the CPA (and the CPA as a whole) are additional."

OR

For **Approach 3**:

"According to Demonstration of additionality of small-scale project activities⁷⁸, Paragraph 11, Project Activities with an installed capacity of up to 15 MW based on solar (including photovoltaic and solar thermal electricity generation) and off-shore wind technologies are automatically defined as additional, without further documentation of barriers.

⁷⁸ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

A CPA shall be deemed additional under Approach 3, if it can be demonstrated that following requirements are met:

☐ The total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW."

[Replace the box with an "X" if the condition is met. Provide justification.]

"The Project Activity employs one of the following grid-connected renewable energy technologies:

- ☐ Technology Type 1 (wind power) implemented in an off-shore location; **OR**
- ☐ Technology Type 2 (solar photovoltaic power generation); **OR**
- ☐ Technology Type 3 (concentrated solar power)."

[Replace one of the three boxes above with an "X" if any of these conditions are met. Provide justification.]

PART II. Generic component project activity (CPA)

Technology Type 2: Solar photovoltaic power generation (PV)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Solar PV]

H.2. Reference number of generic CPA

Generic CPA No. 2

Technology Type: Solar photovoltaic power generation (PV)

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Technology Type: Solar photovoltaic power generation (PV)]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA⁷⁹
- (ii) Technology Type: Solar photovoltaic power generation (PV)
- (iii) Installed capacity
- (iv) Location]

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities⁸⁰ and Project Implementers⁸¹ involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 2: Solar photovoltaic power generation (PV)]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

⁷⁹ As defined in the Po- DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA-DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

⁸⁰ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

⁸¹ A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA.]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools are available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD⁸²:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3: <ol style="list-style-type: none"> 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas This CPA involves technology Type 2: Solar photovoltaic power generation (PV) and exports electricity to the Thai national grid and therefore is applicable under the methodology.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation”, AMS-I.F.: Renewable electricity generation for captive use and mini-grid” and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology.	According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or Involve a replacement of (an) existing plant(s).	In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to	This CPA uses Technology Type 2: Solar photovoltaic power generation (PV) and therefore,

⁸² The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>apply this methodology:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>this condition is not applicable.</p>
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct⁸⁴ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>This CPA uses Technology Type 2: Solar photovoltaic power generation (PV) and therefore, this condition is not applicable.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.</p>	<p>This CPA uses Technology Type 2: Solar photovoltaic power generation (PV) and therefore, this condition is not applicable.</p>

⁸⁴ Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]
Figure 1: Project Boundary

The description of the sources and gases included in Technology Type 2: Solar photovoltaic power generation (PV) project activities is given below:

GHG sources and gases included in baseline emission calculations:

Source		GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

GHG sources and gases included in project emission calculations:

Option 1:

If the Project Activities under the CPA *co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)*:

"The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of *Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)* is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.

“

Option 2:

“The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA-DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 2: Solar photovoltaic power generation (PV).”

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds to “*the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid*”.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions**I.6.1. Explanation of methodological choices**

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “*Grid connected renewable electricity generation, Version 18*”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system, Version 07.0”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “Tool to calculate emission factor for an electricity system, Version 07.0”.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”. The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.⁸⁵

Project emissions for CPAs that apply Technology Types 2:

Project emissions for all CPAs applying **Technology Types 2 (Solar photovoltaic power generation)** are considered to be zero. Hence, the only possible project emission source for such CPAs are project emissions from on-site consumption of fossil fuel (if applicable).

Further details regarding calculation of project emissions are provided in Section I.6.3.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

I.6.2. Data and parameters fixed ex ante

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA DD.

⁸⁵ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”.

Source of data	<input type="checkbox"/> Legally binding contract ⁸⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 2: Solar Photovoltaic power generation
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	<i>Installed capacity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ⁸⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

⁸⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁸⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ⁸⁸ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA-DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 to the present PoA-DD.

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA-DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]
Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7 [add three more years if 10 year crediting period is chosen]	[number]
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

⁸⁸ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Where:

ER _y	Emission reductions in year <i>y</i> (t CO ₂ /y)
BE _y	Baseline emissions in year <i>y</i> (t CO ₂ /y)
PE _y	Project emissions in year <i>y</i> (t CO ₂ /y)
LE _y	Leakage emissions in year <i>y</i> (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE _y	Baseline emissions in year <i>y</i> (t CO ₂)
EG _{PJ,y}	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year <i>y</i> (MWh)
EF _{grid,y}	Combined margin CO ₂ emission factor for grid connected power generation in year <i>y</i> calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system, Version 07.0*”. The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA-DD, is provided in Appendix 4 to the PoA-DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{grid,y} \\ &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\ &= [number] \text{ tCO}_2\text{e} \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

“CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”, based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,i,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

PE _{FC,i,y}	Are the CO ₂ emissions from fossil fuel combustion in process <i>j</i> during the year <i>y</i> (tCO ₂ /yr);
FC _{i,j,y}	Is the quantity of fuel type <i>i</i> combusted in process <i>j</i> during the year <i>y</i> (mass or volume unit/yr);
COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type *i*, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (4)$$

Where:

COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
NCV _{i,y}	Is the weighted average net calorific value of the fuel type <i>i</i> in year <i>y</i> (GJ/mass or volume unit)
EF _{CO₂,i,y}	Is the weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /GJ)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”.

OR

Option 2: If the previous options is not applicable:

There are no relevant project emissions in the particular case of the proposed CPA.

Hence:

$$PE_y = 0$$

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.”

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0$$

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: “All monitoring parameters shall be monitored independently for each Project Activity under the CPA”].

Data/Parameter	EG _{PJ,y}
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Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meter(s)
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period
Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the “ <i>Demonstration of additionality of microscale project activities⁸⁹</i> ”, it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.
Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:Applies to Project Activities with ***on-site consumption of fossil fuels***:⁸⁹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> • Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.
QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.
Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas ⁹⁰) shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA-DD.

⁹⁰ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

1.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

1.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project	The Project Activity falls under Technology Type 2: Solar	All of the following: <input type="checkbox"/> Confirmation by CME

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	Types: 1. Wind power 2. Solar photovoltaic power generation 3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power	photovoltaic power generation (PV), which is also confirmed by CME based on the Technology Type descriptions provided in Section A.3 of the PoA-DD.	regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple Project Activities under one CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	<input type="checkbox"/> Legally binding contract ⁹¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	Criterion 3.a: Additional requirements for Project Activities with both renewable and non-renewable components (e.g. a wind/diesel unit):	[Option 1: If the Project Activity(ies) under the CPA does/do not have non-renewable components: "The Project Activity does not have non-renewable	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of non-renewable components within the Project Boundary; AND

⁹¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).	components.” OR Option 2: “The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	Any of the following: <input type="checkbox"/> Legally binding contract ⁹² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity's renewable energy component; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit) [Replace the applicable box with an “X”]
	Criterion 3.b: Additional requirements for Project Activities that co-fires fossil fuel ⁹³ : If the Project Activity entails co-firing of fossil fuel(s), the capacity of the entire unit shall not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6); AND	[Option 1: If the Project Activity(ies) does/do not co-fire fossil fuel: “The project does not co-fire fossil fuels.” OR Option 2: “The installed electricity generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND Any of the following: <input type="checkbox"/> Legally binding contract ⁹⁴ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)
4	The Project Activity is a grid-	The Project Activity will supply	<input type="checkbox"/> Single-line diagram of the

⁹² “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

⁹³ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

⁹⁴ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	electricity to the Thai national grid under the VSPP scheme.	<p>Project Activity provided by Project Entity to CME; AND</p> <p><input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme.</p> <p>[Replace the applicable box with an "X"]</p>
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I-D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a "Greenfield project".	<p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND</p> <p>Option 1: For Project Activities that have not started construction by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit;</p> <p>OR</p> <p>Option 2: For Project Activities that are under construction by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Legally binding contract ⁹⁵ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above);</p> <p>OR</p> <p>Option 3: For Project Activities that are already operational by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Operation license AND</p> <p><input type="checkbox"/> Legally binding contract ⁹⁶ between the Project Entity and a third party related to the</p>

⁹⁵ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁹⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/implementation contract mentioned above and crosschecking this information with the operation license);</p> <p>[Replace the applicable box with an "X"]</p>
6	The Project Activity is not a combined heat and power (co-generation ⁹⁷) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<p><input type="checkbox"/> Legally binding contract⁹⁸ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Signed PPA⁹⁹</p> <p>[Replace the applicable box with an "X"]</p>
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B of the PoA DD, the Project Activity meets the <i>"Assessment of debundling for small-scale project activities, Version 04.0."</i>	<p><input type="checkbox"/> Confirmation by CME on de-bundling check as per <i>Assessment of debundling for small-scale project activities, Version 04.0</i>; AND</p> <p><input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity.</p> <p>[Replace the applicable box with an "X"]</p>
8	The Project Activity's boundary is within the geographical territory of Thailand.	The Project Activity's location is at [province name] in Thailand. [In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of</p>

⁹⁷ Defined as the simultaneous generation of thermal energy and electrical energy in one process.

⁹⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

⁹⁹ There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			the Project Entity as well as the address of the Project Activity; AND and any of the following: <input type="checkbox"/> Signed PPA; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
9	The additionality for each Project Activity is demonstrated by any one of the following approaches: Approach 1: <i>Demonstration of additionality of microscale project activities</i> ¹⁰⁰ ; OR	[Provide justification of selected approach] [Approach 1: " <input type="checkbox"/> The total installed electricity generation capacity of the Project Activity ¹⁰⁴ is equal to or less than 5 MW" [Provide brief justification] " <input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the "Assessment of debundling for small-scale project activities" based on microscale thresholds in the place of SSC thresholds ¹⁰⁵ " [Provide brief justification] " <input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by the CDM Executive Board to be additional in the host country ¹⁰⁶ ."	[Approach 1: <input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities"; AND <input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the respective recommendation by Thailand's DNA) AND any of the following: <input type="checkbox"/> Legally binding contract ¹⁰⁷ between the Project Entity and a third party related to the implementation or construction

¹⁰⁰ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁰⁴ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

¹⁰⁵ As per clarification in the EB 62 report, paragraph 48 (e)

¹⁰⁶ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

¹⁰⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per “<i>Demonstration of additionality of small-scale project activities</i>”¹⁰¹, Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured¹⁰². OR</p> <p>Approach 3: As per “<i>Demonstration of additionality of small-scale project activities</i>”¹⁰³, Paragraph 11, Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (as defined under Section A.3 of the</p>	<p>[Provide brief justification]</p> <p>Replace all three boxes above with an “X” OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] [“According to the IRR and benchmark calculation conducted in Section B.3 of the present document, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section B.3 for more details).”]</p> <p>OR</p> <p>Approach 3: <input type="checkbox"/> The Project Activity complies with Eligibility Criteria No. 3; AND any of the following: “<input type="checkbox"/> The Project Activity falls under Technology Type 1 AND is implemented in an off-shore location [Provide brief justification]</p>	<p>of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p> <p>OR “Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection.”]</p> <p>OR</p> <p>“Approach 3: All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract ¹⁰⁸ between the Project Entity and a</p>

¹⁰¹ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁰² In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle.

¹⁰³ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁰⁸ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	PoA DD) with an installed capacity of up to 15 MW (subject to compliance with Eligibility Criteria No. 3) are automatically defined as additional.	<p><input type="checkbox"/> The Project Activity falls under Technology Type 2” [Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity falls under Technology Type 3” [Provide brief justification]</p> <p>Replace one of the three boxes above with an “X”.]</p>	<p>third party related to the implementation or construction of the Project Activity containing information about the applied technology type and the total installed capacity of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p>
10	The proposed Project Activity does not lead to double counting of emission reductions.	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity; OR</p> <p>2. Part of a bundled CDM Project activity; OR</p> <p>3. Another registered CDM PoA; OR</p> <p>4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND</p> <p><input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND</p> <p><input type="checkbox"/> Declaration by CME that the Project Activity does not and will not lead to double counting of emission reductions.</p> <p>[Replace the applicable box with an “X”]</p>
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the “Glossary of CDM Terms”, Version 10).	<p>The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA.</p> <p>[In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Legally binding contract ¹⁰⁹ between the Project Entity and a third party with a commitment by the Project Entity to expenditures ¹¹⁰ related to the implementation or construction of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR</p> <p><input type="checkbox"/> Any other significant ¹¹¹ purchase order, contract or payment evidence related to the construction of the Project Activity; OR</p>

¹⁰⁹ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

¹¹⁰ Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

¹¹¹ Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<input type="checkbox"/> Confirmation by DOE following a site visit that construction has not started before the date of commencement of the PoA validation (in case of early stage Project Activities) [Replace the applicable box with an "X"]

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA-DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA
- ☐ **Approach 3** – applicable to Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (i.e. Technology Type 1 implemented in an off-shore location) with an installed capacity of up to 15 MW

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the *"Assessment of debundling for small-scale project activities"*¹¹² by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds¹¹³.

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the *"Demonstration of additionality of microscale project activities"*¹¹⁴ listed below:

- ☐ The total installed electricity generation capacity is equal to or less than 5 MW."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the *"Assessment of debundling for small-scale project activities"* (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)¹¹⁵."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation."

¹¹² The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹¹³ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the *Guidelines on assessment of debundling for SSC project activities* (EB 54, annex 13) excluding paragraph 3 of section A of the latter guidelines.

¹¹⁴ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹¹⁵ As per clarification in the EB 62 report, paragraph 48.(e).

[Replace the box with an “X” if the condition is met. Provide justification for each Project Activity under the CPA.]

OR

For **Approach 2**:

“As per “*Demonstration of additionality of small-scale project activities*¹¹⁶” and in line with the “*Non-binding best practice examples to demonstrate additionality for SSC project activities*”, Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity’s IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*¹¹⁷”.

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level¹¹⁸”. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL	Unit	Input values	Source/Comments
Project vs. Equity IRR	-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax vs. post-tax assessment	-	[“Pre-tax” or “Post-tax”]	[Source/Comments]
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable]	(if [Source/Comments (if applicable)])
Exchange Rate	Foreign currency/THB	[number applicable]	(if [Source/Comments (if applicable)])
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number “%” or “THB/year” applicable]	[Source/Comments (if applicable)]
(Other operating expenditures)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])

¹¹⁶ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹¹⁷ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹¹⁸ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

Revenues from electricity sale to the grid	THB/year	[number]	[Source/Comments]
(Other operating revenues)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
[“Project” or “Equity”] IRR % [IRR result]%			

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at [“Project Activity” or “CPA level”] on a [“pre-tax” or “post-tax”] basis. The [“Project” or “Equity”] IRR is compared to the [selected benchmark indicator/approach] based on [“parameters that are standard in the market” or “company internal information”] according to the general principles described in the PoA-DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the [“Project” or “Equity”] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA DD as follows:

Sensitivity analysis at [“Project Activity” or “CPA level”]

Factor	Variation		
	-10% [or less if appropriate]	0%	10%[or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

“The [“Project” or “Equity”] IRR does not cross the benchmark for any of the parameter variations applied above.”

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The [“Project” or “Equity”] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range [“and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur”]. Therefore, it can be concluded that the proposed Project [“Activity” or “Activities”] under the CPA (and the CPA as a whole) are additional.”]

OR

For **Approach 3:**

“According to Demonstration of additionality of small-scale project activities¹¹⁹, Paragraph 11, Project Activities with an installed capacity of up to 15 MW based on solar (including photovoltaic and solar thermal electricity generation) and off-shore wind technologies are automatically defined as additional, without further documentation of barriers.

A CPA shall be deemed additional under Approach 3, if it can be demonstrated that following requirements are met:

¹¹⁹ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

☐ The total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.”

[Replace the box with an “X” if the condition is met. Provide justification.]

“The Project Activity employs one of the following grid-connected renewable energy technologies:

- ☐ Technology Type 1 (wind power) implemented in an off-shore location; **OR**
- ☐ Technology Type 2 (solar photovoltaic power generation); **OR**
- ☐ Technology Type 3 (concentrated solar power).”

[Replace one of the three boxes above with an “X” if any of these conditions are met. Provide justification.]

PART II. Generic component project activity (CPA)

Technology Type 3: Concentrated solar power (CSP)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Concentrated Solar Power (CSP)]

H.2. Reference number of generic CPA

Generic CPA No. 3

Technology Type: Concentrated solar power (CSP)

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Technology Type: Concentrated solar power (CSP)]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA¹²⁰
- (ii) Technology Type: Concentrated solar power (CSP)
- (iii) Installed capacity
- (iv) Location

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities¹²¹ and Project Implementers¹²² involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 3: Concentrated solar power (CSP)]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

¹²⁰ As defined in the PoA-DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA-DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

¹²¹ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

¹²² A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA.]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools area available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD¹²³:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3: 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas This CPA involves technology Type 3: Concentrated solar power (CSP) and exports electricity to the Thai national grid and therefore is applicable under the methodology.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation", AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology.	According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.
4. Hydro power plants with reservoirs that satisfy at	This CPA uses Technology Type 3: Concentrated

¹²³ The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>solar power (CSP) and therefore, this condition is not applicable.</p>
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct¹²⁵ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>This CPA uses Technology Type 3: Concentrated solar power (CSP) and therefore, this condition is not applicable.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.</p>	<p>This CPA uses Technology Type 3: Concentrated solar power (CSP) and therefore, this condition is not applicable.</p>

¹²⁵Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]
Figure 1: Project Boundary

The description of the sources and gases included in Technology type 3: Concentrated solar power (CSP) project activities is given below:

GHG sources and gases included in baseline emission calculations:

Source		GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

GHG sources and gases included in project emission calculations:

Option 1:

If the Project Activities under the CPA **co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)**:

"The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of **Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)** is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.

“

Option 2:

“The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA-DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 3: Concentrated solar power (CSP).

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds to “*the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid*”.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions**I.6.1. Explanation of methodological choices**

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “*Grid connected renewable electricity generation, Version 18*”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system, Version 07.0”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “Tool to calculate emission factor for an electricity system, Version 07.0”.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”. The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.¹²⁶

Project emissions for CPAs that apply Technology Types 3:

Project emissions for all CPAs applying **Technology Types 3 (Concentrated solar power)** are considered to be zero. Hence, the only possible project emission source for such CPAs are project emissions from on-site consumption of fossil fuel (if applicable).

Further details regarding calculation of project emissions are provided in Section I.6.3.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

I.6.2. Data and parameters fixed ex ante

¹²⁶ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”.

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA DD.
Source of data	<input type="checkbox"/> Legally binding contract ¹²⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 3: Concentrated solar power (CSP)
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA-DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	Installed capacity
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ¹²⁸ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

¹²⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹²⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ¹²⁹ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA-DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 of the PoA-DD.

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA-DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]
Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7 [add three more years if 10 year crediting period is chosen]	[number]
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

¹²⁹ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Where:

ER_y	Emission reductions in year y (t CO ₂ /y)
BE_y	Baseline emissions in year y (t CO ₂ /y)
PE_y	Project emissions in year y (t CO ₂ /y)
LE_y	Leakage emissions in year y (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE_y	Baseline emissions in year y (t CO ₂)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year y (MWh)
$EF_{grid,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system, Version 07.0*". The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA DD, is provided in Appendix 4 to the PoA DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{grid,y} \\ &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\ &= [number] \text{ tCO}_2\text{e} \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

"CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the "*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*", based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,i,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

$PE_{FC,i,y}$	Are the CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr);
$FC_{i,j,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
i	Are the fuel types combusted in process j during the year y

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (4)$$

Where:

COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
NCV _{i,y}	Is the weighted average net calorific value of the fuel type <i>i</i> in year <i>y</i> (GJ/mass or volume unit)
EF _{CO₂,i,y}	Is the weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /GJ)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”.

OR

Option 2: If the previous options is not applicable:

There are no relevant project emissions in the particular case of the proposed CPA.

Hence:

$$PE_y = 0$$

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.”

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0$$

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: “All monitoring parameters shall be monitored independently for each Project Activity under the CPA”].

Data/Parameter	EG _{PJ,y}
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Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meter(s)
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period
Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the “ <i>Demonstration of additionality of microscale project activities</i> ” ¹³⁰ , it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.
Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:Applies to Project Activities with ***on-site consumption of fossil fuels***:¹³⁰ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> • Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.
QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.
Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas) ¹³¹ shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA-DD.

¹³¹ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type i in year y
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

1.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

1.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project Types:	The Project Activity falls under Type 3: Concentrated solar power (CSP) which is also	All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	1. Wind power 2. Solar photovoltaic power generation 3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power generation	confirmed by CME based on the Technology Type descriptions provided in Section A.3 of the PoA-DD.	technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract ¹³² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple Project Activities under one CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	<input type="checkbox"/> Legally binding contract ¹³³ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	Criterion 3.a: Additional requirements for Project Activities with both renewable and non-renewable components (e.g. a wind/diesel unit):	[Option 1: If the Project Activity(ies) under the CPA does/do not have non-renewable components: "The Project Activity does not have non-renewable	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of non-renewable components within the Project Boundary; AND

¹³² "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹³³ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).</p>	<p>components.” OR Option 2: “The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p>Any of the following: <input type="checkbox"/> Legally binding contract¹³⁴ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity's renewable energy component; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p> <p>[Replace the applicable box with an “X”]</p>
	<p>Criterion 3.b: Additional requirements for Project Activities that co-fires fossil fuel¹³⁵:</p> <p>If the Project Activity entails co-firing of fossil fuel(s), the capacity of the entire unit shall not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6); AND</p>	<p>[Option 1: If the Project Activity(ies) does/do not co-fire fossil fuel: “The project does not co-fire fossil fuels.” OR Option 2: “The installed electricity generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND</p> <p>Any of the following: <input type="checkbox"/> Legally binding contract¹³⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p>
4	The Project Activity is a grid-	The Project Activity will supply	<input type="checkbox"/> Single-line diagram of the

¹³⁴ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

¹³⁵ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

¹³⁶ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	electricity to the Thai national grid under the VSPP scheme.	Project Activity provided by Project Entity to CME; AND <input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme. [Replace the applicable box with an "X"]
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I-D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a "Greenfield project".	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND Option 1: For Project Activities that have not started construction by the time of the CPA inclusion: <input type="checkbox"/> Confirmation by DOE following a site visit; OR Option 2: For Project Activities that are under construction by the time of the CPA inclusion: <input type="checkbox"/> Legally binding contract ¹³⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND <input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above); OR Option 3: For Project Activities that are already operational by the time of the CPA inclusion: <input type="checkbox"/> Operation license AND <input type="checkbox"/> Legally binding contract ¹³⁸ between the Project Entity and a third party related to the

¹³⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹³⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/ implementation contract mentioned above and crosschecking this information with the operation license);</p> <p>[Replace the applicable box with an "X"]</p>
6	The Project Activity is not a combined heat and power (co-generation ¹³⁹) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<p><input type="checkbox"/> Legally binding contract¹⁴⁰ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Signed PPA¹⁴¹</p> <p>[Replace the applicable box with an "X"]</p>
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B above, the Project Activity meets the <i>"Assessment of debundling for small-scale project activities, Version 04.0.."</i>	<p><input type="checkbox"/> Confirmation by CME on de-bundling check as per <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>; AND</p> <p><input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity.</p> <p>[Replace the applicable box with an "X"]</p>
8	The Project Activity's boundary is within the geographical territory of Thailand.	The Project Activity's location is at [province name] in Thailand. [In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of</p>

¹³⁹ Defined as the simultaneous generation of thermal energy and electrical energy in one process.

¹⁴⁰ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁴¹ There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>the Project Entity as well as the address of the Project Activity;</p> <p>AND and any of the following:</p> <p><input type="checkbox"/> Signed PPA; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)</p> <p>[Replace the applicable box with an "X"]</p>
9	<p>The additionality for each Project Activity is demonstrated by any one of the following approaches:</p> <p>Approach 1: <i>Demonstration of additionality of microscale project activities</i>¹⁴²;</p> <p>OR</p>	<p>[Provide justification of selected approach]</p> <p>[Approach 1:</p> <p><input type="checkbox"/> The total installed electricity generation capacity of the Project Activity¹⁴⁶ is equal to or less than 5 MW "</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the "Assessment of debundling for small-scale project activities" based on microscale thresholds in the place of SSC thresholds¹⁴⁷</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by the CDM Executive Board to be additional in the host country¹⁴⁸.</p> <p>[Provide brief justification]</p>	<p>[Approach 1:</p> <p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities";</p> <p>AND</p> <p><input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the respective recommendation by Thailand's DNA)</p> <p>AND any of the following:</p> <p><input type="checkbox"/> Legally binding contract¹⁴⁹ between the Project Entity and a third party related to the implementation or construction</p>

¹⁴² The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁴⁶ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

¹⁴⁷ As per clarification in the EB 62 report, paragraph 48 (e)

¹⁴⁸ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

¹⁴⁹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per <i>Demonstration of additionality of small-scale project activities</i>¹⁴³, Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured¹⁴⁴. OR</p> <p>Approach 3: As per <i>Demonstration of additionality of small-scale project activities</i>¹⁴⁵, Paragraph 11, Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (as defined under Section A.3 of the</p>	<p>Replace all three boxes above with an "X" OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] ["According to the IRR and benchmark calculation conducted in Section B.3 of the present document, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section B.3 for more details)."]</p> <p>OR Approach 3: <input type="checkbox"/> The Project Activity complies with Eligibility Criteria No. 3; AND any of the following: "<input type="checkbox"/> The Project Activity falls under Technology Type 1 AND is implemented in an off-shore location [Provide brief justification]</p>	<p>of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)"</p> <p>[Replace the applicable box with an "X"]</p> <p>OR "Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection."]</p> <p>OR "Approach 3: All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract¹⁵⁰ between the Project Entity and a third party related to the</p>

¹⁴³ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁴⁴ In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle..

¹⁴⁵ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁵⁰ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	PoA-DD) with an installed capacity of up to 15 MW (subject to compliance with Eligibility Criteria No. 3) are automatically defined as additional.	<p><input type="checkbox"/> The Project Activity falls under Technology Type 2” [Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity falls under Technology Type 3” [Provide brief justification]</p> <p>Replace one of the three boxes above with an “X”.]</p>	<p>implementation or construction of the Project Activity containing information about the applied technology type and the total installed capacity of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p>
10	The proposed Project Activity does not lead to double counting of emission reductions.	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity; OR</p> <p>2. Part of a bundled CDM Project activity; OR</p> <p>3. Another registered CDM PoA; OR</p> <p>4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND</p> <p><input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND</p> <p><input type="checkbox"/> Declaration by CME that the Project Activity does not and will not lead to double counting of emission reductions.</p> <p>[Replace the applicable box with an “X”]</p>
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the “Glossary of CDM Terms”, Version 10).	<p>The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA.</p> <p>[In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Legally binding contract ¹⁵¹ between the Project Entity and a third party with a commitment by the Project Entity to expenditures ¹⁵² related to the implementation or construction of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR</p> <p><input type="checkbox"/> Any other significant ¹⁵³ purchase order, contract or payment evidence related to the construction of the Project Activity; OR</p> <p><input type="checkbox"/> Confirmation by DOE</p>

¹⁵¹ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

¹⁵² Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

¹⁵³ Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>following a site visit that construction has not started before the date of commencement of the PoA validation (in case of early stage Project Activities)</p> <p>[Replace the applicable box with an "X"]</p>

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA
- ☐ **Approach 3** – applicable to Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (i.e. Technology Type 1 implemented in an off-shore location) with an installed capacity of up to 15 MW

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the *"Assessment of debundling for small-scale project activities"*¹⁵⁴ by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds¹⁵⁵.

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the *"Demonstration of additionality of microscale project activities"*¹⁵⁶ listed below:

- ☐ The total installed electricity generation capacity is equal to or less than 5 MW."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the *"Assessment of debundling for small-scale project activities"* (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)¹⁵⁷."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

¹⁵⁴ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁵⁵ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the *"Assessment of debundling for small-scale project activities"*, Version 04.0 excluding paragraph 10 of the latter guidelines.

¹⁵⁶ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁵⁷ As per clarification in the EB 62 report, paragraph 48.(e).

OR

For **Approach 2**:

“As per “*Demonstration of additionality of small-scale project activities*¹⁵⁸” and in line with the “*Non-binding best practice examples to demonstrate additionality for SSC project activities*”, Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity’s IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*¹⁵⁹”

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level¹⁶⁰”. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL	Unit	Input values	Source/Comments
Project vs. Equity IRR	-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax vs. post-tax assessment	-	[“Pre-tax” or “Post-tax”]	[Source/Comments]
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable] (if applicable)]	[Source/Comments (if applicable)]
Exchange Rate	Foreign currency/THB	[number applicable] (if applicable)]	[Source/Comments (if applicable)]
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number “%” or “THB/year” applicable] (if applicable)]	[Source/Comments (if applicable)]
(Other operating expenditures)	THB/year	[number applicable] (if applicable)]	[Source/Comments (if applicable)]
Revenues from electricity sale	THB/year	[number]	[Source/Comments]

¹⁵⁸ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁵⁹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁶⁰ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

to the grid			
(Other operating revenues)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
["Project" or "Equity"] IRR	%	[IRR result]%	

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at ["Project Activity" or "CPA level"] on a ["pre-tax" or "post-tax"] basis. The ["Project" or "Equity"] IRR is compared to the [selected benchmark indicator/approach] based on ["parameters that are standard in the market" or "company internal information"] according to the general principles described in the PoA-DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the ["Project" or "Equity"] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA-DD as follows:

Sensitivity analysis at ["Project Activity" or "CPA level"]

Factor	Variation		
	-10% [or less if appropriate]	0%	10%[or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

"The ["Project" or "Equity"] IRR does not cross the benchmark for any of the parameter variations applied above."

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The ["Project" or "Equity"] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range ["and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur"]. Therefore, it can be concluded that the proposed Project ["Activity" or "Activities"] under the CPA (and the CPA as a whole) are additional."]

OR

For **Approach 3**:

"According to Demonstration of additionality of small-scale project activities¹⁶¹, Paragraph 11, Project Activities with an installed capacity of up to 15 MW based on solar (including photovoltaic and solar thermal electricity generation) and off-shore wind technologies are automatically defined as additional, without further documentation of barriers.

A CPA shall be deemed additional under Approach 3, if it can be demonstrated that following requirements are met:

¹⁶¹ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

☐ The total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.”

[Replace the box with an “X” if the condition is met. Provide justification.]

“The Project Activity employs one of the following grid-connected renewable energy technologies:

- ☐ Technology Type 1 (wind power) implemented in an off-shore location; **OR**
- ☐ Technology Type 2 (solar photovoltaic power generation); **OR**
- ☐ Technology Type 3 (concentrated solar power).”

[Replace one of the three boxes above with an “X” if any of these conditions are met. Provide justification.]

PART II. Generic component project activity (CPA)

Technology Type 4: Run-of-the-river hydropower

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Run-of-the-river hydropower]

H.2. Reference number of generic CPA

Generic CPA No. 4

Technology Type: Run-of-the-river hydropower

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Run-of-the-river hydropower]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA¹⁶²
- (ii) Technology Type: Run-of-the-river hydropower
- (iii) Installed capacity
- (iv) Location

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities¹⁶³ and Project Implementers¹⁶⁴ involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 4: Run-of-the-river hydropower]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

¹⁶² As defined in the PoA-DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA-DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

¹⁶³ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

¹⁶⁴ A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA.]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools area available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD¹⁶⁵:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3: 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas This CPA involves technology Type 4: Run-of-the-river hydropower and exports electricity to the Thai national grid and therefore is applicable under the methodology.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation", AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology	According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.
4. Hydro power plants with reservoirs that satisfy at	In line with Eligibility Criterion 2.a defined in Section

¹⁶⁵ The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>K, Project Activities based on Technology Type 4 (Run-of-the-river hydropower) are only eligible under the PoA as long as they satisfy one of the conditions below:</p> <ul style="list-style-type: none"> • The Project Activity is implemented in an existing reservoir with no change in the volume of the reservoir; OR • The Project Activity is implemented in an existing reservoir, where the volume of the reservoir is increased and the power density¹⁶⁷ of the Project Activity, is greater than 10 W/m²; OR • The Project Activity results in new reservoirs and the power density of the power plant is greater than 10 W/m².
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component.</p> <p>If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW.</p> <p>In line with Eligibility Criterion 3.b defined in Section K, for Project Activities that co-fire fossil fuel, the installed electricity generation capacity of the entire Project Activity (including co-firing capacity) shall be equal to or less than 15 MW.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct¹⁶⁸ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>This CPA uses Technology Type 4: Run-of-the-river hydropower and therefore, this condition is not applicable.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool</p>	<p>This CPA uses Technology Type 4: Run-of-the-river hydropower and therefore, this condition is not</p>

¹⁶⁷ The power density shall be calculated as per definition provided in Annex 5 to this PoA DD.

¹⁶⁸ Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Applicability Criteria	Project Activity Eligibility
"Project emissions from cultivation of biomass" shall apply.	applicable.

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]

Figure 1: Project Boundary

The description of the sources and gases included in Technology Type 4: Run-of-the-river hydropower Project Activities is given below:

GHG sources and gases included in baseline emission calculations:

	Source	GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

GHG sources and gases included in project emission calculations:

Option 1:

If the Project Activities under the CPA *co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)*:

"The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of *Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)* is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.

“

Option 2:

“The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA-DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 4: Run-of-the-river-hydropower.

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds to “*the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid*”.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions**I.6.1. Explanation of methodological choices**

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “*Grid connected renewable electricity generation, Version 18*”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system, Version 07.0”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “Tool to calculate emission factor for an electricity system, Version 07.0”.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”. The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.¹⁶⁹

Project emissions for CPAs that apply Technology Types 4:

Project emissions for all CPAs applying **Technology Types 4 (Run-of-the-river hydropower)**¹⁷⁰ are considered to be zero. Hence, the only possible project emission source for such CPAs are project emissions from on-site consumption of fossil fuel (if applicable).

Further details regarding calculation of project emissions are provided in Section I.6.3.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

I.6.2. Data and parameters fixed ex ante

¹⁶⁹ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03”.

¹⁷⁰ In case of Project Activities under Technology Type 4 with water reservoirs, project emissions apply only if the power density of the reservoir is between 4 W/m² and 10 W/m² (as per ACM0002, following guidance from Paragraph 39 in AMS-I.D, Version 18). However, only Project Activities with reservoirs (if any) that have a power density greater than 10 W/m² are eligible under the PoA. Therefore, project emissions from water reservoirs can be neglected under the PoA.

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA-DD.
Source of data	<input type="checkbox"/> Legally binding contract ¹⁷¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 4: Run-of-the-river hydropower
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA-DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	Installed capacity
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ¹⁷² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

¹⁷¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁷² "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ¹⁷³ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA-DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 of the PoA-DD.

Data / Parameter	A_{BL}
Unit	m ²
Description	Area of the reservoir measured in the surface of the water, before the implementation of the Project Activity, when the reservoir is full (m ²). For new reservoirs, this value is zero.
Source of data	Confirmation by independent third party (qualified company or government authority) to Project Entity or CME; OR
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Purpose of data	For power density calculation
Additional comment	Value needed for power density calculation as per Appendix 4 to the PoA DD. Power density calculation is only required in case the Project Activity increases or creates a new reservoir. <i>Technology Type 4 (Run-of-the-river Hydropower)</i> Project Activities with reservoirs are only eligible under the PoA if the underlying reservoir has a power density greater than 10 W/m ² .

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]

¹⁷³ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7 [add three more years if 10 year crediting period is chosen]	[number]
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

Where:

ER_y	Emission reductions in year y (t CO ₂ /y)
BE_y	Baseline emissions in year y (t CO ₂ /y)
PE_y	Project emissions in year y (t CO ₂ /y)
LE_y	Leakage emissions in year y (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE_y	Baseline emissions in year y (t CO ₂)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year y (MWh)
$EF_{grid,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system, Version 07.0*". The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA-DD, is provided in Appendix 4 to the PoA-DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned}
 BE_y &= EG_{PJ,y} \times EF_{grid,y} \\
 &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\
 &= [number] \text{ tCO}_2\text{e} [number] \text{ tCO}_2\text{e}
 \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

"CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the "*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*", based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

$PE_{FC,j,y}$ Are the CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr);
 $FC_{i,j,y}$ Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
 $COEF_{i,y}$ Is the CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
 i Are the fuel types combusted in process j during the year y

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y} \quad (4)$$

Where:

$COEF_{i,y}$ Is the CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
 $NCV_{i,y}$ Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
 $EF_{CO_2,i,y}$ Is the weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ)
 i Are the fuel types combusted in process j during the year y

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".

OR

Option 2: If the previous options is not applicable:

There are no relevant project emissions in the particular case of the proposed CPA.

Hence:

$$PE_y = 0$$

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

"Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA."

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

"Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0"$$

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: "All monitoring parameters shall be monitored independently for each Project Activity under the CPA"].

Data/Parameter	<i>EG_{PJ,y}</i>
Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meter(s)
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period
Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the "Demonstration of additionality of microscale project activities" ¹⁷⁴ , it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.

¹⁷⁴ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:

Applies to Project Activities with ***on-site consumption of fossil fuels***:

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> • Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.
QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.

Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas) ¹⁷⁵ shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA-DD.
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Data / Parameter	NCV_{i,y}
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type <i>i</i> in year <i>y</i>
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	EF_{CO₂,i,y}
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i>
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

¹⁷⁵ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Additional monitoring parameters required for Project Activities that apply Technology Type 4 (Run-of-the-river hydropower)

Data / Parameter	A_{PJ}
Unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	<p>Project site.</p> <ul style="list-style-type: none"> Declaration by Project Entity to CME regarding compliance with reservoir requirements; AND Confirmation by independent third party (qualified company or government authority) to Project Entity or CME <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Value(s) applied	[number]
Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	Once at the beginning of each crediting period
QA/QC procedures	-
Purpose of data	For the calculation of power density
Additional comments	Value needed for power density calculation as per Appendix 4 to the PoA-DD. Power density calculation is only required in case the Project Activity increases or creates a new reservoir. <i>Technology Type 4 (Run-of-the-river Hydropower)</i> Project Activities with reservoirs are only eligible under the PoA if the underlying reservoir has a power density greater than 10 W/m ² .

I.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

I.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project Types: 1. Wind power 2. Solar photovoltaic power generation 3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power generation	The Project Activity falls under [Technology Type 4: Run-of-the-river hydropower, which is also confirmed by CME based on the Technology Type descriptions provided in Section A.3 of the PoA-DD.	All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract ¹⁷⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-

¹⁷⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	Criterion 2.a: Additional requirement for Run-of-River hydropower plants (Project Type 4): Hydropower plants with reservoirs ¹⁷⁷ (only if applicable) satisfy conditions as per AMS-I.D, Version 18, Paragraph 5.	[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Type 4: "Not applicable" OR Option 2: <ul style="list-style-type: none"> "The Project Activity is implemented in an existing reservoir with no change in the volume of the reservoir"; "The Project Activity is implemented in an existing reservoir¹⁷⁸, where the volume of the reservoir is increased and the power density¹⁷⁹ of the Project Activity, is greater than 10 W/m²"; "The Project Activity results in new reservoirs and the power density of the power plant is greater than 10 W/m²". Additional explanations/justifications shall be provided under Option 2. In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Type 4: "Not applicable" OR Option 2: <input type="checkbox"/> Declaration by Project Entity to CME regarding compliance with reservoir requirements; AND <input type="checkbox"/> Confirmation by independent third party (qualified company or government authority) to Project Entity or CME" Replace the applicable box with an "X"]
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple Project Activities under one	<input type="checkbox"/> Legally binding contract ¹⁸⁰ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project

¹⁷⁷ A reservoir is a water body created in valleys to store water generally made by the construction of a dam. In the case of run-of-the-river power plants, pondages shall be considered as reservoirs for the sake of conservativeness.

¹⁷⁸ A reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the Project Activity.

¹⁷⁹ The power density shall be calculated as per definition provided in Appendix 4 of the PoA-DD.

¹⁸⁰ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	under the CPA is less than or equal to 15 MW.	CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	<p>Criterion 3.a: Additional requirements for Project Activities with both renewable and non-renewable components (e.g. a wind/diesel unit):</p> <p>If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).</p>	<p>[Option 1: If the Project Activity(ies) under the CPA does/do not have non-renewable components: "The Project Activity does not have non-renewable components." OR Option 2: "The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW." In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of non-renewable components within the Project Boundary; AND Any of the following: <input type="checkbox"/> Legally binding contract ¹⁸¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity's renewable energy component; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit) [Replace the applicable box with an "X"]
	<p>Criterion 3.b: Additional requirements for Project Activities that co-fires fossil fuel¹⁸²:</p> <p>If the Project Activity entails co-firing of fossil fuel(s), the capacity of the entire unit shall</p>	<p>[Option 1: If the Project Activity(ies) does/do not co-fire fossil fuel: "The project does not co-fire fossil fuels." OR Option 2: "The installed electricity</p>	<input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND Any of the following: <input type="checkbox"/> Legally binding contract ¹⁸³ between the Project Entity and a

¹⁸¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁸² A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6); AND	generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)
4	The Project Activity is a grid-connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	The Project Activity will supply electricity to the Thai national grid under the VSPP scheme.	<input type="checkbox"/> Single-line diagram of the Project Activity provided by Project Entity to CME; AND <input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme. [Replace the applicable box with an "X"]
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I-D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a "Greenfield project".	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND Option 1: For Project Activities that have not started construction by the time of the CPA inclusion: <input type="checkbox"/> Confirmation by DOE following a site visit; OR Option 2: For Project Activities that are under construction by the time of the CPA inclusion: <input type="checkbox"/> Legally binding contract ¹⁸⁴ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design

¹⁸³ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁸⁴ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above);</p> <p>OR</p> <p>Option 3: For Project Activities that are already operational by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Operation license AND</p> <p><input type="checkbox"/> Legally binding contract ¹⁸⁵ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/implementation contract mentioned above and crosschecking this information with the operation license);</p> <p>[Replace the applicable box with an "X"]</p>
6	The Project Activity is not a combined heat and power (co-generation ¹⁸⁶) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<p><input type="checkbox"/> Legally binding contract ¹⁸⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Signed PPA¹⁸⁸</p> <p>[Replace the applicable box with an "X"]</p>

¹⁸⁵ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁸⁶ Defined as the simultaneous generation of thermal energy and electrical energy in one process.

¹⁸⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁸⁸ There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B above, the Project Activity meets the “ <i>Assessment of debundling for small-scale project activities, Version 04.0.</i> ”	<input type="checkbox"/> Confirmation by CME on de-bundling check as per <i>Assessment of debundling for small-scale project activities, Version 04.0.</i> ; AND <input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity. [Replace the applicable box with an “X”]
8	The Project Activity's boundary is within the geographical territory of Thailand.	The Project Activity's location is at [province name] in Thailand. [In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of the Project Entity as well as the address of the Project Activity; AND and any of the following: <input type="checkbox"/> Signed PPA; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an “X”]
9	The additionality for each Project Activity is demonstrated by any one of the following approaches: Approach 1: <i>Demonstration of additionality of microscale project activities</i> ¹⁸⁹ ; OR	[Provide justification of selected approach] [Approach 1: “ <input type="checkbox"/> The total installed electricity generation capacity of the Project Activity ¹⁹³ is equal to or less than 5 MW” [Provide brief justification] “ <input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the “ <i>Assessment of debundling for small-scale project activities</i> ” based on	[“ Approach 1: <input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the “ <i>Assessment of debundling for small-scale project activities</i> ”; AND <input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the

¹⁸⁹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

¹⁹³ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the “*Assessment of debundling for small-scale project activities*”, Version 04.0 excluding paragraph 10 of the latter guidelines.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per “<i>Demonstration of additionality of small-scale project activities</i>”¹⁹⁰, Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured¹⁹¹. OR</p> <p>Approach 3: As per “<i>Demonstration of</i></p>	<p>microscale thresholds in the place of SSC thresholds¹⁹⁴” [Provide brief justification] “<input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by the CDM Executive Board to be additional in the host country¹⁹⁵.” [Provide brief justification]</p> <p>Replace all three boxes above with an “X” OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] [“According to the IRR and benchmark calculation conducted in Section B.3 of the present document, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section B.3 for more details).”]</p> <p>OR Approach 3: <input type="checkbox"/> The Project Activity complies</p>	<p>respective recommendation by Thailand’s DNA) AND any of the following: <input type="checkbox"/> Legally binding contract¹⁹⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p> <p>OR “Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection.”]</p> <p>OR “Approach 3: All of the following:</p>

¹⁹⁰ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁹¹ In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p><i>additionality of small-scale project activities</i>¹⁹², Paragraph 10, Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (as defined under Section A.3 of the PoA DD) with an installed capacity of up to 15 MW (subject to compliance with Eligibility Criteria No. 3) are automatically defined as additional.</p>	<p>with Eligibility Criteria No. 3;</p> <p>AND any of the following:</p> <p><input type="checkbox"/> The Project Activity falls under Technology Type 1 AND is implemented in an off-shore location [Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity falls under Technology Type 2 [Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity falls under Technology Type 3 [Provide brief justification]</p> <p>Replace one of the three boxes above with an "X".]</p>	<p><input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity;</p> <p>AND any of the following:</p> <p><input type="checkbox"/> Legally binding contract¹⁹⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the applied technology type and the total installed capacity of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)"</p> <p>[Replace the applicable box with an "X"]</p>
10	<p>The proposed Project Activity does not lead to double counting of emission reductions.</p>	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity; OR</p> <p>2. Part of a bundled CDM Project activity; OR</p> <p>3. Another registered CDM PoA; OR</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND</p> <p><input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND</p> <p><input type="checkbox"/> Declaration by CME that the Project Activity does not and will</p>

¹⁹⁴ As per clarification in the EB 62 report, paragraph 48 (e)

¹⁹⁵ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

¹⁹⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁹² Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

¹⁹⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
		4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period	not lead to double counting of emission reductions. [Replace the applicable box with an "X"]
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the "Glossary of CDM Terms", Version 10).	The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA. [In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]	<input type="checkbox"/> Legally binding contract ¹⁹⁸ between the Project Entity and a third party with a commitment by the Project Entity to expenditures ¹⁹⁹ related to the implementation or construction of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Any other significant ²⁰⁰ purchase order, contract or payment evidence related to the construction of the Project Activity; OR <input type="checkbox"/> Confirmation by DOE following a site visit that construction has not started before the date of commencement of the PoA validation (in case of early stage Project Activities) [Replace the applicable box with an "X"]

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA
- ☐ **Approach 3** – applicable to Project Activities based on solar technologies (i.e. Technology Types 2 and 3) and off-shore wind technology (i.e. Technology Type 1 implemented in an off-shore location) with an installed capacity of up to 15 MW

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the "Assessment of debundling for small-

¹⁹⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

¹⁹⁹ Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

²⁰⁰ Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

*scale project activities*²⁰¹” by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds²⁰².

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the “*Demonstration of additionality of microscale project activities*²⁰³” listed below:

☐ The total installed electricity generation capacity is equal to or less than 5 MW.”

[Replace the box with an “X” if the condition is met. Provide justification for each Project Activity under the CPA.]

“☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the “*Assessment of debundling for small-scale project activities*” (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)²⁰⁴.”

[Replace the box with an “X” if the condition is met. Provide justification for each Project Activity under the CPA.]

“☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation.”

[Replace the box with an “X” if the condition is met. Provide justification for each Project Activity under the CPA.]

OR

For **Approach 2:**

“As per “*Demonstration of additionality of small-scale project activities*²⁰⁵” and in line with the “*Non-binding best practice examples to demonstrate additionality for SSC project activities*”, Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity’s IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*²⁰⁶”.

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level²⁰⁷”. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL			Unit	Input values	Source/Comments
Project vs. Equity IRR			-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax	vs.	post-tax	-	[“Pre-tax” or	[Source/Comments]

²⁰¹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁰² In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the *Assessment of debundling for small-scale project activities* excluding paragraph 3 of section A of the latter guidelines.

²⁰³ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁰⁴ As per clarification in the EB 62 report, paragraph 48.(e).

²⁰⁵ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁰⁶ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁰⁷ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

assessment	"Post-tax"]		
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable]]	(if [Source/Comments (if applicable)])
Exchange Rate	Foreign currency/THB	[number applicable]]	(if [Source/Comments (if applicable)])
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number "% or "THB/year" applicable]]	[Source/Comments (if applicable)]
(Other operating expenditures)	THB/year	[number applicable]]	(if [Source/Comments (if applicable)])
Revenues from electricity sale to the grid	THB/year	[number]	[Source/Comments]
(Other operating revenues)	THB/year	[number applicable]]	(if [Source/Comments (if applicable)])
["Project" or "Equity"] IRR	%	[IRR result]%	

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at ["Project Activity" or "CPA level"] on a ["pre-tax" or "post-tax"] basis. The ["Project" or "Equity"] IRR is compared to the [selected benchmark indicator/approach] based on ["parameters that are standard in the market" or "company internal information"] according to the general principles described in the PoA-DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the ["Project" or "Equity"] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA-DD as follows:

Sensitivity analysis at ["Project Activity" or "CPA level"]

Factor	Variation		
	-10% [or less if appropriate]	0%	10%[or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

“The [“Project” or “Equity”] IRR does not cross the benchmark for any of the parameter variations applied above.”

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The [“Project” or “Equity”] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range [“and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur”]. Therefore, it can be concluded that the proposed Project [“Activity” or “Activities”] under the CPA (and the CPA as a whole) are additional.”]

PART II. Generic component project activity (CPA)

Technology Type 5: Renewable biomass based power generation

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Renewable biomass based power generation]

H.2. Reference number of generic CPA

Generic CPA No. 5

Technology Type: Renewable biomass based power generation

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Technology Type: Renewable biomass based power generation]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA²⁰⁸
- (ii) Technology Type: Renewable biomass based power generation
- (iii) Installed capacity
- (iv) Location]

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities²⁰⁹ and Project Implementers²¹⁰ involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 5: Renewable biomass based power generation]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

²⁰⁸ As defined in the PoA DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA-DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

²⁰⁹ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

²¹⁰ A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA.]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools are available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD²¹¹:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3: 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas This CPA involves technology Type 5: Renewable biomass based power generation and exports electricity to the Thai national grid and therefore is applicable under the methodology.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation", AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology.	According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to	This CPA uses Technology Type 5: Renewable biomass based power generation and therefore, this

²¹¹ The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>apply this methodology:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>condition is not applicable.</p>
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component.</p> <p>If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW.</p> <p>In line with Eligibility Criterion 3.b defined in Section K, for Project Activities that co-fire fossil fuel, the installed electricity generation capacity of the entire Project Activity (including co-firing capacity) shall be equal to or less than 15 MW.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct²¹³ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, the mentioned recovered methane projects are not eligible under the PoA.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.</p>	<p>Biomass sourced from dedicated plantations will not be included in CPAs under Technology Types 5, therefore, the mentioned project emissions from cultivation of biomass are not eligible under the</p>

²¹³Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Applicability Criteria	Project Activity Eligibility
	PoA.

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]

Figure 1: Project Boundary

The description of the sources and gases included in Technology type 5: Renewable biomass based power generation Project Activities is given below:

GHG sources and gases included in baseline emission calculations:

	Source	GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

For Project Activities that apply **Technology Types 5 (Renewable biomass)**

For the sake of simplification and conservativeness, baseline emissions due to uncontrolled burning or anaerobic decay of biomass residues (leading to methane emissions) are excluded from CPAs that apply **Technology Types 5 (Renewable Biomass)**:

Source		GHG	Included?	Justification/Explanation
Baseline	Uncontrolled burning or anaerobic decay of biomass residues	CO ₂	Excluded	It is assumed that CO ₂ emissions related to uncontrolled burning or decay of biomass residues are part of a natural cycle, which releases as much CO ₂ as it absorbs during the formation of the biomass. Therefore CO ₂ emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded.
		CH ₄	Excluded	CH ₄ emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded for the sake of simplification and conservativeness.
		N ₂ O	Excluded	N ₂ O emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded for the sake of simplification and conservativeness.

GHG sources and gases included in project emission calculations:

[Option 1:

If the Project Activities under the CPA *co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)*:

“The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of *Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)* is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ”.

“

Option 2:

“The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA-DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 5: Renewable biomass based power generation.

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds “to the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “Grid connected renewable electricity generation, Version 18”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system, Version 07.0”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “Tool to calculate emission factor for an electricity system, Version 07.0”.

Additional requirement for CPAs that apply Technology Types 5:

The quantities and types of biomass and the biomass to fossil fuel ratio to be used during the crediting period should be explained and documented transparently in the CPA-DDs with Project Activities applying **Technology Types 5 (Renewable biomass)**. For the selection of the baseline scenario, an *ex ante* estimation of these quantities should be provided (in line with AMS-I.D, Version 18, Paragraph 44).

Further details regarding calculation of baseline emissions are provided in Section I.6.3.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “*2006 IPCC Guidelines on National GHG Inventories*”. The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.²¹⁴

Project emissions for CPAs that apply Technology Types 5:

Project emissions for all CPAs applying **Technology Types 5 (Renewable biomass based power generation)** are considered to be zero. Hence, the only possible project emission source for such CPAs are project emissions from on-site consumption of fossil fuel (if applicable).

Further details regarding calculation of project emissions are provided in Section I.6.3.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

Leakage emissions for CPAs that apply Technology Types 5 or 6:

According to Paragraph 42 of AMS-I.D, Version 18, in the specific case of CPAs that apply **Technology Types 5 (Renewable Biomass) or 6 (Biogas)**, the determination of leakage shall be done following the tool “Leakage in biomass small-scale project activities”. Since only biomass and biogas based electricity generation projects that use domestic biomass residues from renewable biomass sources are eligible under the PoA (see also Eligibility Criteria 2.b in Section K), emission sources due to competing use of biomass is the only potential leakage emission source.

For determination of potential leakage emissions due to competing use of biomass, it shall be evaluated ex ante in the CPA-DD if there is a surplus of the biomass, which is not utilised, in the region of the Project Activity(ies) implemented under the CPA. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

I.6.2. Data and parameters fixed ex ante

²¹⁴ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”.

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA-DD.
Source of data	<input type="checkbox"/> Legally binding contract ²¹⁶ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 5: Renewable biomass based power generation
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA-DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	Installed capacity
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ²¹⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

²¹⁶ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²¹⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ²¹⁸ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 to the PoA-DD.

Additional parameters required for Project Activities applying Technology Types 5 (Renewable biomass)

Data / Parameter	<i>Quantities and types of biomass</i>
Unit	t/yr
Description	Ex-ante estimation of quantities and types of biomass to be used during the crediting period in a CPA applying Technology Types 5 (Renewable biomass)
Source of data	Feasibility Study or statement provided by Project Entity.
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	The quantities and types of biomass to be used during the crediting period should be explained and documented transparently in the CPA-DD.
Purpose of data	Calculation of leakage emissions
Additional comment	Only biomass residues sourced within Thailand (not imported from another country) from renewable sources in line with the definition provided in EB 23, Annex 18 and in the “ <i>Glossary of CDM Terms, Version 10</i> ” are eligible under the PoA. This parameter is also used also for leakage emission determination.

Data / Parameter	<i>Biomass to fossil fuel ratio</i>
Unit	%
Description	Ex-ante estimation of biomass to fossil fuel ratio (in case of co-fired system) to be used during the crediting period in a Project Activity applying Technology Types 5 (Renewable biomass)
Source of data	Feasibility Study or statement provided by Project Entity.
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	The biomass to fossil fuel ratio (in case of co-fired system) to be used during the crediting period should be explained and documented transparently in the CPA-DD.
Purpose of data	For co-firing determination
Additional comment	Applies to CPAs that include co-firing of fossil fuels only.

²¹⁸ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Data / Parameter	Quantity of biomass available in the region
Unit	%
Description	Ex-ante assessment of biomass availability in the CPA's region (e.g. 50 km radius)
Source of data	<ul style="list-style-type: none"> Regional biomass survey carried out by third party; OR Published literature; OR Official reports
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	For determination of potential leakage emissions due to competing use of biomass, it shall be evaluated ex ante in the CPA-DD if there is a surplus of the biomass, which is not utilised, in the region of the Project Activity(ies) implemented under the CPA in line with the Leakage in biomass small-scale project activities.
Purpose of data	Leakage determination
Additional comment	If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

Data / Parameter	Moisture content of the biomass
Unit	%
Description	Moisture content of the biomass (wet basis)
Source of data	Ex-ante on-site measurements
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	<p>In line with AMS-I.D, Version 18 requirements</p> <p>The moisture content of biomass of homogeneous quality shall be determined <i>ex ante</i>.</p> <p>The weighted average should be calculated and used in the calculations throughout the crediting period of the CPA.</p>
Purpose of data	For the calculation of dry weight of biomass.
Additional comment	In case of dry biomass, ex-ante measurements of this parameter are not necessary.

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA-DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]
Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7	[number]

[add three more years if 10 year crediting period is chosen]	
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

Where:

ER_y	Emission reductions in year y (t CO ₂ /y)
BE_y	Baseline emissions in year y (t CO ₂ /y)
PE_y	Project emissions in year y (t CO ₂ /y)
LE_y	Leakage emissions in year y (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE_y	Baseline emissions in year y (t CO ₂)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year y (MWh)
$EF_{grid,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system, Version 07.0*". The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA DD, is provided in Appendix 4 to the PoA DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned}
 BE_y &= EG_{PJ,y} \times EF_{grid,y} \\
 &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\
 &= [number] \text{ tCO}_2\text{e}
 \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

"CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the "*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*", based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

$PE_{FC,j,y}$	Are the CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr);
$FC_{i,j,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
i	Are the fuel types combusted in process j during the year y

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i , as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y} \quad (4)$$

Where:

$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO_2,i,y}$	Is the weighted average CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ)
i	Are the fuel types combusted in process j during the year y

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".

OR

Option 2: If the previous options is not applicable:

There are no relevant project emissions in the particular case of the proposed CPA.

Hence:

$$PE_y = 0$$

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

"Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA."

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

"Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0"$$

AND

Option 3:

Applies in cases of Project Activities that apply **Technology Types 5**

Emission sources due to competing use of biomass represent a potential leakage emission source in the specific case of CPAs that apply **Technology Types 5 (Renewable Biomass)**

For determination of potential leakage emissions due to competing use of biomass, it shall be evaluated ex ante in the CPA DD if there is a surplus of biomass, which is not utilised, in the region of the Project Activity(ies) implemented under the CPA. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass within the region (e.g., within a 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected, otherwise this leakage shall be estimated and deducted from the emission reductions.

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: "All monitoring parameters shall be monitored independently for each Project Activity under the CPA"].

Data/Parameter	<i>EG_{PJ,y}</i>
Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meter(s)
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period

Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the “ <i>Demonstration of additionality of microscale project activities</i> ” ²²⁰ , it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.
Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:

Applies to Project Activities with **on-site consumption of fossil fuels**:

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.

²²⁰ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.
Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas) ²²¹ shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA-DD.

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type <i>i</i> in year <i>y</i>
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i>

²²¹ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”.
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Additional monitoring parameters required for Project Activities that apply Technology Type 5 (Renewable biomass)

Description	Quantity of biomass consumed
Unit	t/y
Description	Quantity of biomass residues of type <i>k</i> consumed by the Project Activity in year <i>y</i>
Source of data	On-site measurements and calculations based on energy/mass balance
Value(s) applied	[number]
Measurement methods and procedures	<p>Mass or volume based measurements. In case measurements are conducted on a wet basis, an adjustment based on the moisture content is required in order to determine the quantity of dry biomass.</p> <p>The quantity of biomass shall be measured continuously or in batches.</p> <p>If more than one type of biomass fuel is consumed, each shall be monitored separately.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The quantity of biomass shall be measured continuously or in batches.
QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>Cross-check: The on-site measurements shall be cross-checked with an annual energy balance that is based on purchased quantities (e.g. with sales/receipts) and stock changes. The consistency of measurements shall be checked ex post with annual data on energy generation, fossil fuels (if applicable) and biomass used and the efficiency of energy generation as determined ex ante.</p>
Purpose of data	Calculation of leakage emissions
Additional comment	-

Description	Net calorific value of biomass
Unit	GJ/mass or volume unit
Description	Net calorific value of biomass-type <i>k</i>
Source of data	Laboratory measurements
Value(s) applied	[number]

Measurement methods and procedures	<p>The net calorific value of biomass type <i>k</i> used in the Project Activity shall be determined once during the first year of the crediting period of the underlying CPA.</p> <p>NCV measurements shall be conducted according to following conditions: (i) based on dry biomass; (ii) in laboratories according to relevant national/international standards; (iii) on a quarterly basis (during the first year of the crediting period); (iv) taking at least three samples for each measurement. The average value shall be used for the rest of the crediting period.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The measuring should be conducted on a quarterly basis (during the first year of the crediting period). The average value shall be used for the rest of the crediting period.
QA/QC procedures	The consistency check shall be conducted by comparing the NCV measurement results with, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements shall be conducted.
Purpose of data	Not used in calculations
Additional comment	-

I.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

I.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project Types: 1. Wind power 2. Solar photovoltaic power generation 3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power generation	The Project Activity falls under Technology Type 5: Renewable biomass based power generation, which is also confirmed by CME based on the Technology Type descriptions provided in Section A.3 of the PoA-DD.	All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity; AND any of the following: <input type="checkbox"/> Legally binding contract ²²³ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is

²²³ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	<p>Criterion 2.b: Additional requirements for renewable biomass energy and biogas projects (Technology Types 5 and 6):</p> <ul style="list-style-type: none"> Biomass and biogas based electricity generation projects use only domestic biomass residues from renewable biomass sources (in line with AMS-I.D, Version 18, Paragraphs 2 and 47); AND Information on biomass availability in the region of the CPA is available (for determination of leakage at CPA level; in line with AMS-I.D, Version 18, Paragraph 42) 	<p>[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Types 5 and 6: "Not applicable"] OR Option 2: Confirmation/justification of both points below:</p> <ul style="list-style-type: none"> The Project Activity(ies) under the CPA use(s) only biomass residues from renewable sources in line with the definition provided in EB 23, Annex 18 and in the "Glossary of CDM Terms, Version 10"; AND Summary of surplus biomass ex-ante assessment based on regional biomass survey or published literature or official reports (the tool "Leakage in biomass small-scale project activities", Version 04)] 	<p>[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Types 5 and 6: "Not applicable"] OR Option 2: " <input type="checkbox"/> Declaration by Project Entity to CME regarding compliance with definition of biomass to be used in the Project Activity; AND any of the following documents for determination of leakage: <input type="checkbox"/> Regional biomass survey carried out by third party; OR <input type="checkbox"/> Published literature; OR <input type="checkbox"/> Official reports" Replace the applicable box with an "X"]</p>
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed capacity of all Project Activities under the CPA is less than or equal to 15 MW.	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple Project Activities under one CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	<p><input type="checkbox"/> Legally binding contract²²⁴ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)</p> <p>[Replace the applicable box with an "X"]</p>
	Criterion 3.a: Additional requirements for	[Option 1: If the Project Activity(ies) under	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of

²²⁴ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Project Activities with both renewable and non-renewable components (e.g. a wind/diesel unit):</p> <p>If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).</p>	<p>the CPA does/do not have non-renewable components: “The Project Activity does not have non-renewable components.” OR Option 2: “The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p>non-renewable components within the Project Boundary; AND</p> <p>Any of the following: <input type="checkbox"/> Legally binding contract²²⁵ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity’s renewable energy component; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p> <p>[Replace the applicable box with an “X”]</p>
	<p>Criterion 3.b: Additional requirements for Project Activities that co-fires fossil fuel²²⁶:</p> <p>If the Project Activity entails co-firing of fossil fuel(s), the capacity of the entire unit shall not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6); AND</p>	<p>[Option 1: If the Project Activity(ies) does/do not co-fire fossil fuel: “The project does not co-fire fossil fuels.” OR Option 2: “The installed electricity generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.” In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND</p> <p>Any of the following: <input type="checkbox"/> Legally binding contract²²⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under</p>

²²⁵ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

²²⁶ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

²²⁷ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			construction or commissioned at the time of the site visit) [Replace the applicable box with an "X"]
4	The Project Activity is a grid-connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	The Project Activity will supply electricity to the Thai national grid under the VSPP scheme.	<input type="checkbox"/> Single-line diagram of the Project Activity provided by Project Entity to CME; AND <input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme. [Replace the applicable box with an "X"]
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I-D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a "Greenfield project".	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND Option 1: For Project Activities that have not started construction by the time of the CPA inclusion: <input type="checkbox"/> Confirmation by DOE following a site visit; OR Option 2: For Project Activities that are under construction by the time of the CPA inclusion: <input type="checkbox"/> Legally binding contract ²²⁸ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND <input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above); OR Option 3: For Project Activities that are already operational by the time of the CPA inclusion:

²²⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<input type="checkbox"/> Operation license AND <input type="checkbox"/> Legally binding contract ²²⁹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND <input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/ implementation contract mentioned above and crosschecking this information with the operation license); [Replace the applicable box with an "X"]
6	The Project Activity is not a combined heat and power (co-generation ²³⁰) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<input type="checkbox"/> Legally binding contract ²³¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Signed PPA ²³² [Replace the applicable box with an "X"]
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B above, the Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	<input type="checkbox"/> Confirmation by CME on de-bundling check as per <i>Assessment of debundling for small-scale project activities, Version 04.0</i> ; AND <input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity. [Replace the applicable box with an "X"]
8	The Project Activity's boundary is within the geographical	The Project Activity's location is at [province name] in Thailand.	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the

²²⁹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²³⁰ Defined as the simultaneous generation of thermal energy and electrical energy in one process.

²³¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²³² There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	territory of Thailand.	[In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<p>boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of the Project Entity as well as the address of the Project Activity;</p> <p>AND and any of the following:</p> <p><input type="checkbox"/> Signed PPA; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)</p> <p>[Replace the applicable box with an "X"]</p>
9	<p>The additionality for each Project Activity is demonstrated by any one of the following approaches:</p> <p>Approach 1:</p> <p><i>Demonstration of additionality of microscale project activities</i>²³³;</p> <p>OR</p>	<p>[Provide justification of selected approach]</p> <p>[Approach 1:</p> <p><input type="checkbox"/> The total installed electricity generation capacity of the Project Activity²³⁶ is equal to or less than 5 MW "</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the "Assessment of debundling for small-scale project activities" based on microscale thresholds in the place of SSC thresholds²³⁷"</p> <p>[Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by</p>	<p>[“Approach 1:</p> <p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities";</p> <p>AND</p> <p><input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the respective recommendation by Thailand's DNA)</p> <p>AND any of the following:</p> <p><input type="checkbox"/> Legally binding contract²³⁹</p>

²³³ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²³⁶ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

²³⁷ As per clarification in the EB 62 report, paragraph 48 (e)

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per <i>Demonstration of additionality of small-scale project activities</i>²³⁴, Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured²³⁵.</p>	<p>the CDM Executive Board to be additional in the host country²³⁸.” [Provide brief justification]</p> <p>Replace all three boxes above with an “X” OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] [“According to the IRR and benchmark calculation conducted in Section B.3 of the present document, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section B.3 for more details).”]</p>	<p>between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p> <p>OR “Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection.”]</p>

²³⁹ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

²³⁴ Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

²³⁵ In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
10	The proposed Project Activity does not lead to double counting of emission reductions.	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity; OR 2. Part of a bundled CDM Project activity; OR 3. Another registered CDM PoA; OR 4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND <input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND <input type="checkbox"/> Declaration by CME that the Project Activity does not and will not lead to double counting of emission reductions. [Replace the applicable box with an "X"]</p>
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the "Glossary of CDM Terms", Version 10).	<p>The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA. [In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Legally binding contract ²⁴⁰ between the Project Entity and a third party with a commitment by the Project Entity to expenditures ²⁴¹ related to the implementation or construction of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Any other significant ²⁴² purchase order, contract or payment evidence related to the construction of the Project Activity; OR <input type="checkbox"/> Confirmation by DOE following a site visit that construction has not started before the date of commencement of the PoA validation (in case of early stage Project Activities)</p>

²³⁸ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

²⁴⁰ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁴¹ Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

²⁴² Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			[Replace the applicable box with an "X"]

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the "Assessment of debundling for small-scale project activities"²⁴³" by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds²⁴⁴.

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the "Demonstration of additionality of microscale project activities"²⁴⁵ listed below:

- ☐ The total installed electricity generation capacity is equal to or less than 5 MW."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities" (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)²⁴⁶."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

"☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

OR

For Approach 2:

"As per "Demonstration of additionality of small-scale project activities"²⁴⁷ and in line with the "Non-binding best practice examples to demonstrate additionality for SSC project activities", Approach 2 for demonstration of additionality shall be based on the investment barrier analysis by comparison of the Project Activity's IRR

²⁴³ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁴⁴ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

²⁴⁵ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁴⁶ As per clarification in the EB 62 report, paragraph 48.(e).

²⁴⁷ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*²⁴⁸”.

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level²⁴⁹”. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL	Unit	Input values	Source/Comments
Project vs. Equity IRR	-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax vs. post-tax assessment	-	[“Pre-tax” or “Post-tax”]	[Source/Comments]
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable]	(if [Source/Comments (if applicable)])
Exchange Rate	Foreign currency/THB	[number applicable]	(if [Source/Comments (if applicable)])
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number “%” or “THB/year” applicable]	[Source/Comments (if applicable)]
(Other operating expenditures)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
Revenues from electricity sale to the grid	THB/year	[number]	[Source/Comments]
(Other operating revenues)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
[“Project” or “Equity”] IRR	%	[IRR result]%	

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at [“Project Activity” or “CPA level”] on a [“pre-tax” or “post-tax”] basis. The [“Project” or “Equity”] IRR is compared to the [selected

²⁴⁸ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁴⁹ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

benchmark indicator/approach] based on [“parameters that are standard in the market” or “company internal information”] according to the general principles described in the PoA-DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the [“Project” or “Equity”] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA-DD as follows:

Sensitivity analysis at [“Project Activity” or “CPA level”]

Factor	Variation		
	-10% [or less if appropriate]	0%	10%[or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

“The [“Project” or “Equity”] IRR does not cross the benchmark for any of the parameter variations applied above.”

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The [“Project” or “Equity”] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range [“and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur”]. Therefore, it can be concluded that the proposed Project [“Activity” or “Activities”] under the CPA (and the CPA as a whole) are additional.”]

PART II. Generic component project activity (CPA)

Technology Type 6: Biogas based power generation

SECTION H. Description of generic CPA

H.1. Title of generic CPA

CPA No. [running CPA number]: [CPA name, Biogas based power generation]

H.2. Reference number of generic CPA

Generic CPA No. 6

Technology Type: Biogas based power generation

H.3. Purpose and general description of generic CPA

The proposed small scale CDM Programme Activity “CPA No. [running CPA number]: [CPA name, Biogas based power generation]” (hereafter referred to as CPA) entails [CPA description including:

- (i) Number of Project Activities under the CPA²⁵⁰
- (ii) Technology Type 6: Biogas based power generation
- (iii) Installed capacity
- (iv) Location

The total expected electricity export to the grid at CPA level is about [number] MWh/year. The CPA is expected to reduce [number] tCO₂e per annum, which would have been otherwise emitted to the atmosphere by fossil fuel based power plants connected to the Thai national grid.

[Short description of Project Entities²⁵¹ and Project Implementers²⁵² involved in the Project Activity(ies)]

Project Activity [running Project Activity number (e.g. No. 1, 2,...) in case of multiple Project Activities under the CPA]

Project Entity: [Project Entity name]

Project Implementer: [Project Implementer name]

Technology Type: [Technology Type 6: Biogas based power generation]

Installed capacity: [installed capacity] MW

Project location: [Street, City/Town/Village, District, Province], Thailand

Carbon Coordinating Managing Entity Limited (hereafter referred to as CCME) is the coordinating/managing entity (CME) of the PoA.

²⁵⁰ As defined in the PoA DD, the generation and supply of renewable energy to the grid is classified into different “Technology Types” and is referred to as “Project Activity”. More than one Project Activity of the same Technology Type can be bundled under one SSC CPA (as long as the CPA remains under the SSC threshold and complies with eligibility criteria described under Section K). For the sake of clarity, a Project Activity in the context of this PoA DD shall be defined as a power generation facility with a distinctive connection to the grid. For example, a power generation facility that consists of multiple power generation units that share the same grid connection and are covered under the same Power Purchase Agreement (PPA) shall be regarded as one Project Activity.

²⁵¹ A Project Entity is the entity that owns the underlying assets and is ultimately responsible for the Project Activity towards local authorities.

²⁵² A Project Implementer is the entity responsible for implementation/operation of the Project Activity.

There is no mandatory requirement in Thailand to implement the Project ["Activity" or "Activities"] under the CPA. The Project ["Activity" or "Activities"] under the CPA [is/are] implemented on a voluntary basis, in line with the Eligibility Criteria for inclusion of a SSC-CPA in the PoA (see Section K).

The CPA will contribute to the sustainable development in Thailand as follows:

Environmental benefits

The use of renewable energy resources for electricity production based on modern technologies, in combination with a mandatory initial environmental evaluation that is confirmed by the DNA, ensures that the CPA contributes to the reduction of fossil fuels and associated pollution, including the reduction of GHG emissions without causing environmental harm elsewhere.

[Description of additional CPA-specific environmental benefits, if applicable.]

Social benefits

The CPA will generate additional employment and income generation opportunities, directly and indirectly, for various groups in Thailand. Further, the CPA will have a positive impact on the manufacturing of local parts, plant construction and maintenance. Last but not least, the CPA will facilitate plant constructions and plant maintenance, creating additional jobs and income generation.

[Description of additional CPA-specific social benefits, if applicable.]

Economic benefits

The CPA will reduce fossil-fuel imports (improving Thailand's trade balance), support Thailand's transformation to a low carbon economy, expand the reach of Thailand's renewable energy development policy and make better use of Thailand's natural resources.

[Description of additional CPA-specific economic benefits, if applicable.]

Technological benefits

The CPA will strengthen the development of the renewable energy industry across Thailand.

[Description of additional CPA-specific technological benefits, if applicable.]

H.4. Technologies/measures

[Brief technical description of Project Activity(ies) implemented under the CPA.]

The main equipment installed under the CPA is summarized in the Table below.

Main equipment	Manufacturer/Type/Model	Number of installed equipment	Total capacity

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

The following approved baseline methodology will be applied to SSC-CPAs included in the PoA:

Title: AMS-I.D Grid connected renewable electricity generation

Version: 18, valid from 28 November 2014 onwards

The methodology refers to following tools:

- Tool to calculate the emission factor for an electricity system, Version 07.0
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03.0

The methodology and tools area available on the UNFCCC website under following link:

<http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X>

Following additional procedures and methodological tools are also referenced throughout the PoA-DD²⁵³:

- *CDM project standard for programme of activities, Version 02.0*
- *Glossary of CDM Terms, Version 10.0*
- *Leakage in biomass small-scale project activities, Version 04.0*
- *Assessment of debundling for small-scale project activities, Version 04.0*
- *Demonstration of additionality of small-scale project activities, Version 13.0*
- *Positive list of technologies, Version 02.0*
- *Non-binding best practice examples to demonstrate additionality for SSC project activities (EB35, Annex 34)*
- *Investment analysis, Version 10.0*
- *Demonstration of additionality of microscale project activities, Version 09.0*
- *Project emission from flaring, Version 03.0*
- *Emissions from solid waste disposal site, Version 08.0*

I.2. Applicability of methodologies and standardized baselines

The table below is used to justify the choice of the methodology AMS-I.D, Version 18 by listing all requirements described in the methodology and confirming their applicability to Project Activities/CPAs under the PoA.

Applicability Criteria	Project Activity Eligibility
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	In line with Eligibility Criterion 2 defined in Section K, CPAs implemented under the PoA comprise following applicable technologies as per Technology Type definition provided in Section A.3: 1. Wind Power 2. Solar Photovoltaic (PV) 3. Concentrated Solar Power (CSP) 4. Run-of-the-river Hydropower 5. Renewable Biomass (biomass combustion and gasification of biomass residues) 6. Biogas This CPA involves Technology Type 6: Biogas based power generation and exports electricity to the Thai national grid and therefore is applicable under the methodology.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D.: Grid connected renewable electricity generation", AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and AMS-I.A.: Electricity generation by the user) applies is included in appendix of the applied methodology.	According to Table 1 in AMS-I.D, Version 18, AMS-I.D is applicable since all CPAs implemented under the PoA supply electricity to the Thai national grid.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	In line with Eligibility Criterion 5 defined in Section K, CPAs implemented under the PoA comprise only Greenfield plants.
4. Hydro power plants with reservoirs that satisfy at	This CPA uses Technology Type 6: biogas based

²⁵³ The version provided is valid at the time of submission of the updated PoA-DD to DOE for validation for renewal of crediting period.

Applicability Criteria	Project Activity Eligibility
<p>least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> (d) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (e) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; (f) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	<p>power generation and therefore, this condition is not applicable.</p>
<p>5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 3.a defined in Section K, for Project Activities with both renewable and non-renewable components, the installed electricity generation capacity of the renewable component shall be equal to or less than 15 MW</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>In line with Eligibility Criterion 6 defined in Section K, combined heat and power Project Activities are not eligible under the PoA.</p>
<p>7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct²⁵⁵ from the existing units.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, capacity addition Project Activities are not eligible under the PoA.</p>
<p>8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, retrofit or replacement Project Activities are not eligible under the PoA.</p>
<p>9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.</p>	<p>In line with Eligibility Criterion 5 defined in Section K, the mentioned recovered methane under Type III category projects are not eligible under the PoA.</p>
<p>10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.</p>	<p>In line with the determination of project emissions provided in Section I.6, the project emissions from cultivation of biomass is not relevant.</p>

²⁵⁵Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

I.3. Application of multiple methodologies

This section is not applicable.

I.4. Project boundary, sources and greenhouse gases (GHGs)

The project boundary of the Project ["Activity" or "Activities"] to be implemented under the CPA is described in the figure below. The project boundary includes the renewable energy generating unit and the power plants connected to the Thai national grid.

[Insert project boundary figure.]
Figure 1: Project Boundary

The description of the sources and gases included in Technology type 6: Biogas based power generation Project Activities is given below:

GHG sources and gases included in baseline emission calculations:

Source		GHG	Included?	Justification/Explanation
Baseline	Electricity grid	CO ₂	Included	CO ₂ emissions from fossil fuel based electricity generation plants connected to the electricity grid represent the only baseline component as per AMS-I.D and the "Tool to calculate the emission factor for an electricity system".
		CH ₄	Excluded	CH ₄ emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".
		N ₂ O	Excluded	N ₂ O emissions from fossil fuel based electricity generation plants connected to the electricity grid are excluded for simplification, in line with AMS-I.D. and the "Tool to calculate the emission factor for an electricity system".

For the sake of simplification and conservativeness, baseline emissions due to uncontrolled burning or anaerobic decay of biomass residues (leading to methane emissions) are excluded from CPAs that apply **Technology Types 6 (Biogas)**:

Source		GHG	Included?	Justification/Explanation
Baseline	Uncontrolled burning or anaerobic decay of biomass residues	CO ₂	Excluded	It is assumed that CO ₂ emissions related to uncontrolled burning or decay of biomass residues are part of a natural cycle, which releases as much CO ₂ as it absorbs during the formation of the biomass. Therefore CO ₂ emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded.
		CH ₄	Excluded	CH ₄ emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded for the sake of simplification and conservativeness.
		N ₂ O	Excluded	N ₂ O emissions from uncontrolled burning or anaerobic decay of biomass residues are excluded for the sake of simplification and conservativeness.

GHG sources and gases included in project emission calculations:

[Option 1:

If the Project Activities under the CPA **co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)**:

“The description of GHG sources and gases included in the SSC-CPA boundary for determination of project emissions of **Project Activities that either co-fire fossil fuels or have a non-renewable project component (independent of Technology Type)** is provided below.

Source		GHG	Included?	Justification/Explanation
Project activity	On-site combustion of fossil fuels	CO ₂	Included	CO ₂ emissions from on-site combustion of fossil fuels due to the project activity shall be considered (whenever applicable) as per AMS-I.D and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.
		CH ₄	Excluded	CH ₄ emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.
		N ₂ O	Excluded	N ₂ O emissions from on-site combustion of fossil fuels are excluded for simplification, in line with AMS-I.D. and the “ <i>Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</i> ”.

Option 2:

If the Project Activities under the CPA fall under **Technology Type 6 (Biogas)**:

For Project Activities that fall under **Technology Type 6 (Biogas)**, following project emission sources shall be considered as per Appendix 4 of the PoA DD (in line with explanations provided under Section I.6.1):

Source		GHG	Included?	Justification/Explanation
Project activity	Emissions due to incremental transportation distances	CO ₂	Included	CO ₂ emissions due to incremental transportation distances shall be calculated as per Appendix 4 to the PoA DD.
		CH ₄	Excluded	Not applicable
		N ₂ O	Excluded	Not applicable
	Emissions from the anaerobic disposal, storage and/or treatment of residual waste (solid form) and/or outflow (liquid form)	CO ₂	Included	CO ₂ emissions due to mechanical/thermal treatment ²⁵⁶ of residual waste (solid form) and/or outflow (liquid form) shall be calculated as per Appendix 4 to the PoA-DD.
		CH ₄	Included	CH ₄ emissions from the anaerobic disposal, storage and/or treatment of residual waste (solid form) and/or outflow (liquid form) shall be calculated as per Appendix 4 to the PoA-DD.
		N ₂ O	Excluded	Not applicable
	Emissions from the physical leakages of the anaerobic digester	CO ₂	Excluded	Not applicable
		CH ₄	Included	CH ₄ emissions from the physical leakages of the anaerobic digester shall be calculated as per Appendix 4 to the PoA-DD.
		N ₂ O	Excluded	Not applicable
	Emissions due to flare inefficiency	CO ₂	Excluded	Not applicable
		CH ₄	Included	CH ₄ emissions due to incomplete flaring shall be calculated as per Appendix 4 to the PoA-DD.
		N ₂ O	Excluded	Not applicable

Option 3:

If both options above are not applicable:

"The Project Activities implemented under the CPA do neither have fossil fuel based electricity generation components nor do they co-fire fossil fuels. Therefore, as described in the PoA-DD, there are no applicable GHG sources for project emission calculations in this particular CPA based on Technology Type 6: Biogas based power generation.

I.5. Establishment and description of baseline scenario

According to AMS-I.D, Version 18, paragraph 19, the baseline scenario corresponds to *"the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid"*.

The baseline emissions are the product of the **electrical energy** $EG_{PJ,y}$ expressed in MWh and based on the electricity produced by the renewable generating unit multiplied by the **grid emission factor** $EF_{grid,y}$, whereas (as per AMS-I.D, Version 18, paragraph 22):

²⁵⁶ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 to the PoA-DD.

- the **electrical energy** $EG_{PJ,y}$ is based on the monitored amount of net electricity supplied to the grid as a result of the implementation of the Project Activity (in MWh); **AND**
- the **grid emission factor** $EF_{grid,y}$ is calculated in a transparent and conservative manner as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”

For more details about methodological assumptions and baseline emission calculations, please refer to Section I.6.

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

The emission reductions achieved by the proposed PoA are calculated according to the approved methodology AMS-I.D “*Grid connected renewable electricity generation, Version 18*”. Following methodological choices are applicable to CPAs:

Determination of baseline emissions

The baseline scenario is based on the assumption that electricity delivered to the grid by the Project Activities implemented under the PoA would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid. Hence, baseline emissions are the product of the net electricity supplied to the grid by the Project Activity multiplied by the grid emission factor.

In line with Paragraph 23 of AMS-I.D, Version 18, following methodological choices shall be applied to all CPAs for calculation of the grid emission factor:

- The emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system, Version 07.0*”; **AND**
- Calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion: **AND**
- The value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA, in line with the ex-ante option provided under Step 3 of “*Tool to calculate emission factor for an electricity system, Version 07.0*”.

Additional requirement for CPAs that apply Technology Types 6 (Biogas):

The quantities and types of biomass and the biomass to fossil fuel ratio to be used during the crediting period should be explained and documented transparently in the CPA DDs with Project Activities applying **Technology Types 6 (Biogas)**. For the selection of the baseline scenario, an *ex ante* estimation of these quantities should be provided (in line with AMS-I.D, Version 18, Paragraph 44).

Further details regarding calculation of baseline emissions are provided in Section I.6.3.

Determination of project emissions

Project emissions from on-site consumption of fossil fuel

CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”. This provision applies only to CPAs where fossil fuels are consumed due to the underlying Project Activities, independent of the applied Technology Type. The emission factor of the fossil fuels consumed due to the project activity shall be calculated as per Option B of the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”, based on the net calorific value and CO₂ emission factor of the fuels used.

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the “*2006 IPCC Guidelines on National GHG Inventories*”. The appropriateness of regional or national default values (in case of liquid fuels)

shall be reviewed on an annual basis, whereas IPCC default values shall be updated whenever IPCC guidelines are revised.²⁵⁷

Project emissions for CPAs that apply Technology Types 6:

In line with clarifications provided by the SCC WG²⁵⁸ regarding the application of methodology AMS-I.D on a stand-alone basis to biogas projects, i.e. without using a Type III methodology for avoided methane emissions, following project emission sources shall be considered for CPAs applying **Technology Type 6 (Biogas)**²⁵⁹:

- CO₂ emissions due to incremental transportation distances; **AND**
- In case the residual waste from the digestion is stored under anaerobic conditions and/or delivered to a Solid Waste Disposal Site (SWDS), treated in a Wastewater Treatment System (WWTS), and/or treated mechanically/thermally: methane emissions (in case of anaerobic storage or disposal in SWDS or WWTS) and/or CO₂ (in case of mechanical/thermal treatment²⁶⁰ only) emissions from the disposal/storage/treatment of such residual waste; **AND**
- Methane emissions from physical leakages of the anaerobic digester; **AND**
- Methane emissions due to flare inefficiency.

Further details regarding calculation of project emissions are provided in Section I.6.3 and Appendix 4.

Determination of leakage emissions

Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.

Leakage emissions for CPAs that apply Technology Types 6:

According to Paragraph 42 of AMS-I.D, Version 18, in the specific case of CPAs that apply **Technology Types 6 (Biogas)**, the determination of leakage shall be done following the tool "Leakage in biomass small-scale project activities". Since only biomass and biogas based electricity generation projects that use domestic biomass residues from renewable biomass sources are eligible under the PoA (see also Eligibility Criteria 2.b in Section K), emission sources due to competing use of biomass is the only potential leakage emission source.

For determination of potential leakage emissions due to competing use of biomass, it shall be evaluated ex ante in the CPA DD if there is a surplus of the biomass, which is not utilised, in the region of the Project Activity(ies) implemented under the CPA. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

²⁵⁷ In line with definition of monitoring procedures for the net calorific value and CO₂ emission factor as per "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03".

²⁵⁸ Clarifications SSC_173, SSC_485, SSC_516 and SSC_562 stipulate that "AMS I.D and/or AMS I.C can be applied for biogas electricity/heat generation activities on a stand-alone basis, i.e. without using a Type III methodology for avoided methane emissions" (quote from SSC_173). Furthermore, "under situations, where net emissions from the Type III component that can be reasonably attributed to the Type I activity can not be ruled out during the crediting period, the modalities and procedures require that the necessary parameters of the Type III component are also monitored and the emission reductions achieved by the Type I activity are discounted" (quote from SSC_173). SSC_516 further clarified that project proponents may disregard the potential emissions from the Type III component while determining the baseline emissions, "but need to take fully into account any possible emissions due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), either as project emissions or leakage". Last but not least SSC_562 confirmed that SSC_173, SSC_485 and SSC_516 are applicable also in the context of PoAs.

²⁵⁹ Based on AMS-III.AO, Version 01. CO₂ emissions from electricity and/or fossil fuel consumption by the project activity facilities are not considered since these are already included in AMS-I.D, which accounts (i) indirectly for project emissions due to electricity consumption by considering only baseline emissions from the net amount of electricity exported to the grid (after any auxiliary consumption by the Project Activity) and (ii) directly for project emissions due to on-site consumption of fossil fuels.

²⁶⁰ As per Section K of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

I.6.2. Data and parameters fixed ex ante

Data/Parameter	Technology Type applied in the Project Activity
Data unit	-
Description	CPA Technology Type definition as per technology descriptions provided in Section A.3 of the PoA DD.
Source of data	<input type="checkbox"/> Legally binding contract ²⁶² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	Technology Type 6: Biogas
Choice of data or Measurement methods and procedures	The applied technology under the CPA is in line with the Technology Type description provided in Section A.3 of the PoA-DD. The applicable Technology Type is confirmed based on information contained in the [applicable sources identified above].
Purpose of data	To check the type of technology.
Additional comment	-

Data/Parameter	Installed capacity
Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA
Source of data	<input type="checkbox"/> Legally binding contract ²⁶³ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
Value(s) applied	[number] MW
Choice of data or Measurement methods and procedures	Based on [applicable sources identified above]. The total ["(combined)"] installed electricity generation capacity of the Project ["Activity" or "Activities"] under the CPA is below the SSC threshold of 15 MW.
Purpose of data	To check the installed capacity.
Additional comment	-

²⁶² "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁶³ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

Data/Parameter	$EF_{grid,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor of national electricity grid
Source of data	Official data published by the Thai DNA based on data for following years: [YYYY, YYYY and YYYY] ²⁶⁴ .
Value(s) applied	[applicable combined margin emission factor valid at the time of inclusion of the CPA]
Choice of data or Measurement methods and procedures	Calculated according to the “ <i>Tool to calculate the emission factor for an electricity system</i> ” based on the Thai DNA’s grid emission factor calculation, which builds upon official data sources by the Ministry of Energy in Thailand and IPCC factors (see Appendix 4 of the PoA DD for more details).
Purpose of data	To calculate the baseline emissions.
Additional comment	The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. More details regarding the calculation of the combined margin factor for different Technology Types are provided in Appendix 4 of the PoA DD.

Additional parameters required for Project Activities applying Technology Type 6 (Biogas):

Data/Parameter	Flare type
Data unit	-
Description	Flare type used in CPAs that apply Technology Type 6 (Biogas)
Source of data	Purchase order of flare equipment; OR Technical-commercial proposal by technology provider; OR Feasibility study
Value(s) applied	Project-specific value. Enclosed or open flare.
Choice of data or Measurement methods and procedures	The flare type is necessary for calculation of project emissions due to incomplete flaring based on default parameters for open and enclosed flares as per the tool “ <i>Project emissions from flaring</i> ”.
Purpose of data	Determination of flare efficiency
Additional comment	-

²⁶⁴ In case the official DNA publication of the grid emission factor is discontinued after registration of the PoA, CPAs shall calculate the grid emission factor based on the “*Tool to calculate the emission factor for an electricity system*” using official energy statistics by the Ministry of Energy in Thailand (e.g. DEDE and/or EGAT reports) and IPCC factors.

Data/Parameter	<i>Project emission scenario description</i>
Data unit	-
Description	Description of applicable project emission sources for CPAs applying Technology Type 6 (Biogas)
Source of data	Feasibility study or technical-commercial proposal by technology provider
Value(s) applied	Project-specific value.
Choice of data or Measurement methods and procedures	<p>It shall be clarified ex-ante whether any of the project emission sources listed below is considered or excluded based on project design considerations:</p> <ol style="list-style-type: none"> 1. Project emissions due to incremental transportation distances 2. Project emissions from the disposal/storage/treatment of the residual wastes <ol style="list-style-type: none"> a) Aerobic disposal of residual waste (i.e. soil application) b) Mechanical/thermal treatment of residual wastes²⁶⁵ c) Discharge of outflow from the digestion process into a wastewater treatment system or into a water body (i.e. river, sea lake) d) Anaerobic storage and/or disposal of residual waste in a landfill <p>The relevant project emission sources shall be described in more detail in the CPA-DD along with the applicable equations for calculation of project emissions. The respective monitoring parameters shall be included in the monitoring plan of the CPA-DD.</p>
Purpose of data	For calculation of project emissions.
Additional comment	<p>The project emission sources below apply to all Technology Type 6 (Biogas) Project Activities:</p> <ol style="list-style-type: none"> 1. Project emissions from physical leakages of the anaerobic digester 2. Project emissions due to flare inefficiency

Data/Parameter	<i>MCF_{ww,treatment,P,J,k}</i>
Data unit	-
Description	Methane correction factor for project wastewater treatment system k
Source of data	Table III.H.1. of AMS-III.H., Version 19
Value(s) applied	Project-specific value.
Choice of data or Measurement methods and procedures	In line with AMS-III.H., Version 19 based on IPCC Default values from chapter 6 of volume 5 page no 6.21. Waste in "2006 IPCC Guidelines for National Greenhouse Gas Inventories".
Purpose of data	For calculation of project emissions
Additional comment	To be selected based on type of wastewater treatment k, where outflow (if any) from the digestion is discharged to.

Data/Parameter	<i>MCF_{ww,treatment,P,J,k}</i>
Data unit	-
Description	Methane correction factor for project wastewater treatment system k
Source of data	Table III.H.1. of AMS-III.H., Version 19
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	In line with AMS-III.H., Version 19 based on IPCC Default values from chapter 6 of volume 5 page no 6.21. Waste in "2006 IPCC Guidelines for National Greenhouse Gas Inventories".

²⁶⁵ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Purpose of data	Calculation of project emissions
Additional comment	This parameter is only applicable if outflow is generated in the digestion process and discharged into a subsequent wastewater treatment system without biogas recovery.

Data/Parameter	$MCF_{ww,PJ,discharge}$
Data unit	-
Description	Methane correction factor based on the discharge pathway of the outflow/ wastewater in the project scenario (e.g. into sea, river or lake)
Source of data	Table III.H.1. of AMS-III.H., Version 19
Value(s) applied	Project-specific value
Choice of data or Measurement methods and procedures	In line with AMS-III.H., Version 19 based on IPCC Default values from chapter 6 of volume 5 page no 6.21. Waste in "2006 IPCC Guidelines for National Greenhouse Gas Inventories".
Purpose of data	Calculation of project emissions.
Additional comment	This parameter is only applicable if outflow is generated in the digestion process and discharged in e.g. a river, sea or lake in the project scenario (either directly after the digestion or following a subsequent wastewater treatment system without biogas recovery to the biogas digestion facility).

I.6.3. Modalities for ex ante calculation of emission reductions

Emission reductions of the CPA are calculated based on the equations and parameters as following details. The baseline grid emission factor of the Thai national grid is fixed ex-ante as described under Section I.6.2 and the calculation details can be found in Appendix 4 of the PoA-DD.

[Description of assumptions leading up to the amount of annual net electricity exports.]

The annual net electricity exports based on the input parameters described above over the first crediting period of the CPA are as follows:

Year	Annual electricity exports (kWh/year)
Year 1	[number]
Year 2	[number]
Year 3	[number]
Year 4	[number]
Year 5	[number]
Year 6	[number]
Year 7 [add three more years if 10 year crediting period is chosen]	[number]
Average	[average of numbers above]

Calculation of emission reductions

According to Paragraph 43 of AMS-I.D, Version 18, emission reductions at CPA level shall be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

Where:

ER _y	Emission reductions in year <i>y</i> (t CO ₂ /y)
BE _y	Baseline emissions in year <i>y</i> (t CO ₂ /y)
PE _y	Project emissions in year <i>y</i> (t CO ₂ /y)
LE _y	Leakage emissions in year <i>y</i> (t CO ₂ /y)

Calculation of baseline emissions

Baseline emissions at CPA level shall be calculated as per Paragraph 22 of AMS-I.D, Version 18, as product of the electrical energy baseline $EG_{PJ,y}$ (expressed in MWh of electricity produced by the Project Activity(ies) implemented under the CPA) multiplied by the grid emission factor.

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \quad (2)$$

Where:

BE _y	Baseline emissions in year <i>y</i> (t CO ₂)
EG _{PJ,y}	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project Activity(ies) under the CPA in year <i>y</i> (MWh)
EF _{grid,y}	Combined margin CO ₂ emission factor for grid connected power generation in year <i>y</i> calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

The grid emission factor shall be calculated in a transparent and conservative manner based on the combined margin (CM) approach, according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system, Version 07.0*”. The calculation of the grid emission factor shall be based on official data available at the time of the CPA inclusion and the value of the grid emission factor shall be fixed ex-ante for the entire crediting period of the CPA. The detailed grid emission factor calculation based on data available prior to publication of the PoA-DD, is provided in Appendix 4 to the PoA-DD.

Hence, annual baseline emissions are calculated by multiplication of the annual quantity of net electricity supplied to the grid (as calculated above) with the grid emission factor. The average annual baseline emissions are calculated as follows:

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{grid,y} \\ &= [number] \text{ MWh/y} \times [number] \text{ tCO}_2\text{e/MWh} \\ &= [number] \text{ tCO}_2\text{e} \end{aligned}$$

Calculation of project emissions

[Option 1: In cases of **on-site consumption of fossil fuels**:

“CO₂ emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, Version 03*”, based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (3)$$

Where:

PE _{FC,j,y}	Are the CO ₂ emissions from fossil fuel combustion in process <i>j</i> during the year <i>y</i> (tCO ₂ /yr);
FC _{i,j,y}	Is the quantity of fuel type <i>i</i> combusted in process <i>j</i> during the year <i>y</i> (mass or volume unit/yr);
COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type *i*, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (4)$$

Where:

COEF _{i,y}	Is the CO ₂ emission coefficient of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /mass or volume unit)
NCV _{i,y}	Is the weighted average net calorific value of the fuel type <i>i</i> in year <i>y</i> (GJ/mass or volume unit)
EF _{CO₂,i,y}	Is the weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i> (tCO ₂ /GJ)
<i>i</i>	Are the fuel types combusted in process <i>j</i> during the year <i>y</i>

The net calorific value and CO₂ emission factor of the fuels used, shall be based on regional or national default values (in case of liquid fuels) or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Tables 1.2 and 1.4 of Chapter 1 of Vol. 2 (Energy) of the “2006 IPCC Guidelines on National GHG Inventories”.

AND/OR

In line with clarifications provided by the SCC WG (see explanations provided under Section I.6.1) regarding the application of methodology AMS-I.D on a stand-alone basis to biogas projects, i.e. without using a Type III methodology for avoided methane emissions, the following project emission sources shall be considered for CPAs applying **Technology Type 6 (Biogas)**²⁶⁶:

- CO₂ emissions due to incremental transportation distances; **AND**
- In case the residual waste from the digestion is stored under anaerobic conditions and/or delivered to a Solid Waste Disposal Site (SWDS), treated in a Wastewater Treatment System (WWTS), and/or treated mechanically/thermally: methane emissions (in case of anaerobic storage or disposal in SWDS or WWTS) and/or CO₂ (in case of mechanical/thermal treatment²⁶⁷ only) emissions from the disposal/storage/treatment of such residual waste; **AND**
- Methane emissions from physical leakages of the anaerobic digester; **AND**
- Methane emissions due to incomplete flaring.

The equations and further details for calculation of the project emission components listed above are provided in Appendix 4 of the PoA-DD.”

Calculation of leakage emissions

[Option 1:

Applies whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered whenever energy generating equipment is transferred from another activity, independent of the Technology Type applied in the CPA.”

OR

Option 2:

Applies whenever energy generating equipment is NOT transferred from another activity, independent of the Technology Type applied in the CPA:

“Leakage emissions shall be considered when energy generating equipment is transferred from another activity. Since the CPA applies employs a new set of equipment, leakage emissions can be neglected.

Hence:

$$LE_y = 0$$

²⁶⁶ Based on AMS-III.AO, Version 01. CO₂ emissions from electricity and/or fossil fuel consumption by the project activity facilities are not considered since these are already included in AMS-I.D, which accounts (i) indirectly for project emissions due to electricity consumption by considering only baseline emissions from the net amount of electricity exported to the grid (after any auxiliary consumption by the Project Activity) and (ii) directly for project emissions due to on-site consumption of fossil fuels.

²⁶⁷ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

AND/OR

Emission sources due to competing use of biomass represent a potential leakage emission source in the specific case of CPAs that apply **Technology Types 6 (Biogas)**.

For determination of potential leakage emissions due to competing use of biomass, it shall be evaluated ex ante in the CPA-DD if there is a surplus of biomass, which is not utilised, in the region of the Project Activity(ies) implemented under the CPA. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass within the region (e.g., within a 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected, otherwise this leakage shall be estimated and deducted from the emission reductions.

Emission reduction results

Based on the individual components calculated above, the emission reductions at the CPA level are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = [\text{number}] + [\text{number}] + [\text{number}] = [\text{number}] \text{ tCO}_2\text{e}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

The parameter to be monitored at Project Activity level are listed below. [In case of multiple Project Activities under one CPA: "All monitoring parameters shall be monitored independently for each Project Activity under the CPA"].

Data/Parameter	<i>EG_{PJ,y}</i>
Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	On-site measurements using electricity meter(s)
Value(s) applied	[number] MWh/year [In case of multiple Project Activities under one CPA, provide values for each Project Activity under the CPA and one total value at CPA level].
Measurement methods and procedures	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) to/from the grid. Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used for the calculation of baseline emissions.
Additional comment	The net electricity export/supplied to a grid is defined as the difference between the measured quantities of the grid electricity export and the import. If applicable and/or required (in cases where direct determination of the net quantity of electricity supplied to the grid is not possible or ambiguous), a cross-check shall be conducted based on the net electricity supplied to a grid, calculated as gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.

Data/Parameter	<i>Installed capacity after implementation of the Project Activity</i>
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Data unit	MW
Description	Installed electricity generation capacity of the Project Activity implemented under the CPA throughout the crediting period
Source of data	Verification of name plate information by DOE during site visits for verification of CERs from the underlying CPA
Value(s) applied	[number]
Measurement methods and procedures	As per technical specification of the installed equipment (or to be installed), it shall be confirmed that the total installed electricity generation capacity of the Project Activity is equal to or less than 15 MW. In cases of bundled Project Activities under one CPA, the combined installed capacity of the entire bundle shall be also equal to or less than 15 MW. In cases where the Project Activity applies the Additionality Approach 1 based on the “ <i>Demonstration of additionality of microscale project activities</i> ” ²⁶⁸ , it shall be confirmed that the installed capacity of the Project Activity is not expanded beyond 5 MW.
Monitoring frequency	Periodic check of installed capacity at each monitoring and verification cycle of the CPA
QA/QC procedures	N/A
Purpose of data	To check the installed capacity of the project activity.
Additional comment	If the Project Activity has both renewable and non-renewable components, the thresholds above apply to the renewable energy component only. If the Project Activity entails co-firing of fossil fuel(s), the thresholds above apply to the installed capacity of the entire unit.

[Option 1:

Applies to Project Activities with **on-site consumption of fossil fuels**:

“Additional monitoring parameters required for Project Activities with on-site consumption of fossil fuels

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. t/yr or m ³ /yr)
Description	Quantity of fossil fuel type i combusted in process j during the year y
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The consumption should be monitored continuously and recorded at least once on monthly basis.

²⁶⁸ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

QA/QC procedures	<p>Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.</p> <p>The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Where the purchased fuel invoices can be identified specifically for the Project Activity, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.</p>
Purpose of data	For calculation of project emissions.
Additional comments	Any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas) ²⁶⁹ shall be included under this monitoring parameter. For more details regarding project emissions from Technology Type 6 projects, please refer to Appendix 4 of the PoA-DD.

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m ³ , GJ/tonne)
Description	Weighted average net calorific value of fuel type <i>i</i> in year <i>y</i>
Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis.
Monitoring frequency	Annually
QA/QC procedures	In case regional or national default values are applied, it shall be verified if these values are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range, additional information from a testing laboratory shall be justified in order to justify the outcome. If laboratory measurements are used for such justifications, the laboratory should have ISO17025 accreditation or justify that it can comply with similar quality standards.
Purpose of data	Calculation of project emissions
Additional comments	NCV values from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /GJ
Description	Weighted average CO ₂ emission factor of fuel type <i>i</i> in year <i>y</i>

²⁶⁹ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Source of data	<ul style="list-style-type: none"> Regional or national default values based on well documented, reliable sources (such as national energy balances) (in case of liquid fuels only); OR IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the "2006 IPCC Guidelines on National GHG Inventories".
Value(s) applied	[number]
Measurement methods and procedures	<ul style="list-style-type: none"> The appropriateness of regional or national default values (in case of liquid fuels) shall be reviewed on an annual basis IPCC default values shall be updated whenever IPCC guidelines are revised
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	CO ₂ emission factors from fossil fuels shall be applied as default factors (without continuous monitoring), subject to periodic revisions (if applicable) according to the procedures described above.

Additional monitoring parameters required for Project Activities that apply Technology Type 6 (Biogas)

Please refer also to additional information provided in Appendix 4 to the PoA-DD.

Data / Parameter	Q_y
Unit	tonne
Description	Quantity of raw waste/manure treated and/or wastewater co-digested
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	Mass or Volume based measurements All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	The quantity of raw waste/manure treated and/or wastewater co-digested shall be measured continuously or in batches (e.g. using a weigh bridge) and recorded on a monthly basis.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Calculation of project emissions
Additional comments	-

Data / Parameter	$Q_{res\ waste,y}$
Unit	tonne
Description	Quantity of residual waste produced
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	Mass or Volume based measurements All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	The quantity of residual waste produced shall be measured continuously or in batches (e.g. using a weigh bridge) and recorded on a monthly basis.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Calculation of project emissions

Additional comments	This parameter is equivalent to parameter $W_{j,x}$ explained in Appendix 4 of the PoA-DD for calculation of project emissions from anaerobic disposal or storage of residual wastes.
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Data / Parameter	CT_y
Unit	tonne/truck
Description	Average truck capacity for transportation of raw waste/manure treated and/or wastewater
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	The average truck capacity for transportation of raw waste/manure treated and/or wastewater shall be recorded at the project site upon delivery of raw waste/ manure treated and/or wastewater. The average value over the recorded values throughout the monitoring period shall be used. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Once at the beginning of crediting period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions.
Additional comments	N/A

Data / Parameter	$CT_{res\ waste,y}$
Unit	tonne/truck
Description	Average truck capacity for residual waste transportation
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	The average truck capacity for residual waste transportation shall be recorded at the project site whenever residual waste is transported off the project site. The average value over the recorded values throughout the monitoring period shall be used. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Once at the beginning of crediting period
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	N/A

Data / Parameter	DAF_w
Unit	km/truck
Description	Average incremental distance for raw solid waste/manure and/or wastewater transportation
Source of data	On site measurement (assessment)
Value(s) applied	[number]

Measurement methods and procedures	<p>The average incremental distance for raw solid waste/manure and/or wastewater transportation shall be calculated based on the incremental distances between:</p> <ul style="list-style-type: none"> (i) The collection points of biomass and/or manure and the digestion site as compared to the baseline solid waste disposal site or manure treatment site; and/or (ii) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site. <p>The average value shall be determined on an annual basis. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Annually
QA/QC procedures	The calculation of the average value according to procedures described above shall be subject to confirmation of the assumptions by the DOE during the monitoring and verification cycle of the underlying CPA.
Purpose of data	Calculation of project emissions
Additional comments	N/A

Data / Parameter	$DAF_{res\ waste}$
Unit	km/truck
Description	Average distance for residual waste transportation
Source of data	On site measurement (assessment)
Value(s) applied	[number]
Measurement methods and procedures	<p>The average incremental distance for residual waste transportation shall be calculated based on the incremental distances between:</p> <ul style="list-style-type: none"> (i) Treatment sites and the sites for soil application, landfilling and further treatment of the residual waste. <p>The average value shall be determined on an annual basis. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Annually
QA/QC procedures	The calculation of the average value according to procedures described above shall be subject to confirmation of the assumptions by the DOE during the monitoring and verification cycle of the underlying CPA.
Purpose of data	Calculation of project emissions
Additional comments	N/A

Data / Parameter	$EF_{CO_2, transport}$
Unit	kgCO ₂ /km
Description	CO ₂ emission factor from fuel use due to transportation
Source of data	IPCC default values
Value(s) applied	[number]
Measurement methods and procedures	<p>The CO₂ emission factor from fuel use due to transportation shall be determined on an annual basis as the average IPCC factor (in kgCO₂/km) based on the most common fuel and vehicle types used for transportation of raw solid waste/manure and/or wastewater transportation as well as residual waste to and from the project site. Vehicle type and fuel information shall be recorded on-site on the same log sheet, where the average truck capacity is registered.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Annually

QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comments	N/A

Data / Parameter	$BG_{burnt,y}$
Unit	Nm ³
Description	Total amount of biogas generated by the Project Activity
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	<p>If the biogas streams flared and fueled (or utilized) are monitored separately, the two fractions can be added together to determine the total biogas recovered, without the need to monitor the recovered biogas before the separation. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	The amount of biogas recovered, fuelled (for electricity generation) or flared shall be continuously monitored using gas flow meters. At least hourly measurements shall be undertaken; if less, confidence/precision level of 90/10 shall be attained.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Calculation of project emissions
Additional comments	<p>This parameter is required for calculation of project emissions due to physical leakage of the anaerobic digester and emissions due to flare inefficiency.</p> <p>A separate gas flow meter shall be used to measure the amount of biogas sent to the flare, which shall be used to determine the parameter $FV_{RG,h}$ according to procedures described in Appendix 4 to the PoA-DD for calculation of project emissions due to flare inefficiency.</p>

Data / Parameter	T_{flare}
Description	Temperature of the exhaust gas of the flare
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	<p>A temperature above 500 °C indicates that a significant amount of gases are still being burnt and that the flare is operating.</p> <p>Temperature values shall be recorded electronically on a minute-by-minute basis.</p> <p>The recorded temperature shall always be linked to a unique time stamp in order to allow the calculation of the flare efficiency on an hourly basis, which is based on the amount of minutes that the exhaust gas of the flare (T_{flare}) is above or below 500 °C in a given hour h.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Measured continuously in the exhaust gas stream in the flare by a Type N thermocouple.
QA/QC procedures	Thermocouples should be replaced or calibrated every year.
Purpose of data	Calculation of project emissions

Additional comment	<p>This parameter is required for calculation of project emissions due to flare inefficiency. The flare efficiency shall be calculated based on exhaust gas temperatures as follows:</p> <p>For enclosed flares, the flare efficiency in the hour h ($\eta_{flare,h}$) is:</p> <ul style="list-style-type: none"> 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h. 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h. 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h. <p>In case of open flares, the flare efficiency in the hour h ($\eta_{flare,h}$) is:</p> <ul style="list-style-type: none"> 0% if the flame is not detected for more than 20 minutes during the hour h. 50% if the flare is detected for more than 20 minutes during the hour h.
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Data/Parameter	<i>Other flare operation parameters</i>
Data unit	-
Description	-
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	This should include all data and parameters that are required to monitor whether the flare operates within the range of operating conditions according to the manufacturer's specifications including a flame detector in case of open flares.
Monitoring frequency	Continuously
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comment	This parameter is required for calculation of project emissions due to flare inefficiency.

Data/Parameter	<i>WCH₄, y</i>
Data unit	%
Description	Methane content of the biogas
Source of data	On-site measurement
Value(s) applied	[number]
Measurement methods and procedures	<p>The fraction of methane in the gas should be measured with a continuous analyser or, alternatively, with periodical measurements at a 90/10 confidence/precision level. It shall be measured using equipment that can directly measure methane content in the biogas - the estimation of methane content of biogas based on measurement of other constituents of biogas such as CO₂ is not permitted. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Continuous analyser or, alternatively, with periodical measurements at a 90/10 confidence/precision level.

QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Calculation of project emissions.
Additional comment	This parameter is required for calculation of project emissions due to physical leakage of the anaerobic digester and emissions due to flare inefficiency (it corresponds to parameter $f_{VCH_4, RG, h}$ as described in Appendix 4 to the PoA-DD for calculation of project emissions from flaring).

Data/Parameter	<i>T</i>
Data unit	°C
Description	Temperature of the biogas
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	<p>Shall be measured at the same time when methane content in biogas is measured. The temperature of the gas is required to determine the density of the methane combusted.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Continuous analyser or, alternatively, with periodical measurements at a 90/10 confidence/precision level.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	For density estimation of methane
Additional comment	<p>If the biogas flow meter employed measures flow, pressure and temperature and displays or outputs the normalised flow of biogas, then there is no need for separate monitoring of pressure and temperature of the biogas.</p> <p>This parameter might be required for calculation of project emissions due to physical leakage of the anaerobic digester and emissions due to flare inefficiency.</p>

Data/Parameter	<i>P</i>
Data unit	Pa
Description	Pressure of the biogas
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	<p>Shall be measured at the same time when methane content in biogas is measured. The pressure of the gas is required to determine the density of the methane combusted.</p> <p>All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.</p>
Monitoring frequency	Continuous or, alternatively, with periodical measurements at a 90/10 confidence/precision level.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	For density estimation of methane

Additional comment	If the biogas flow meter employed measures flow, pressure and temperature and displays or outputs the normalised flow of biogas, then there is no need for separate monitoring of pressure and temperature of the biogas. This parameter might be required for calculation of project emissions due to physical leakage of the anaerobic digester and emissions due to flare inefficiency.
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Data/Parameter	<i>Aerobic disposal of residual waste (i.e. soil application)</i>
Data unit	-
Description	-
Source of data	On-site records
Value(s) applied	[number]
Measurement methods and procedures	Records (including but not limited to log sheet entries and pictures) shall be kept at the project site to confirm that the residual waste used for soil application has been used as fertilizer on the premises of the project activity (without storage or transportation) under aerobic conditions (not resulting in methane emissions).
Monitoring frequency	At each disposal
QA/QC procedures	-
Purpose of data	Estimation of project emissions
Additional comment	In case of missing or ambiguous records, which do not allow for the DOE to verify aerobic handling conditions of residual wastes (at the CPA verification stage), it shall be assumed that the residual waste decays in an anaerobic manner leading project emissions as described under sub-section d) <u>Anaerobic storage and/or disposal of residual waste in a landfill in Appendix 4 of the PoA-DD, using the most conservative assumptions possible.</u>

Data/Parameter	<i>Grid electricity consumed for mechanical or thermal treatment</i>
Data unit	MWh/y
Description	Grid electricity consumed for mechanical or thermal treatment of residual wastes
Source of data	[number]
Value(s) applied	All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Measurement methods and procedures	Continuous monitoring, hourly measurement and at least monthly recording.
Monitoring frequency	Measurement results shall be cross checked with records for purchased electricity (e.g. invoices/receipts) from the grid (which can be attributed to mechanical or thermal treatment of residual wastes ²⁷⁰). Electricity meters should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
QA/QC procedures	Calculation of project emissions
Purpose of data	[number]
Additional comment	This parameter applies only in cases where the facilities for mechanical or thermal treatment of residual wastes consumes electricity from the grid and are not supplied with renewable electricity from the project activity. See Appendix 4 for more details.

²⁷⁰ As per Section A.3 of the PoA-DD, following mechanical/thermal treatments of residual waste and/or outflow from Technology Type 6 Project Activities are not eligible under the PoA: controlled combustion; gasification to produce syngas/producer gas and mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass. Therefore, respective project emission sources from such treatment options are not relevant. For more details regarding project emissions from Technology Type 6 Project Activities, please refer to Appendix 4 of the PoA-DD.

Data/Parameter	$Q_{ww,y}$
Data unit	m ³ /month
Description	Volume of wastewater/outflow treated in (subsequent) wastewater treatment system k and/or discharged in e.g. a river, sea or lake in year y (m ³).
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	Volume based measurements using flow meters. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	Monitored continuously (at least hourly measurements are undertaken, if less, confidence/precision level of 90/10 shall be attained), aggregated on a monthly basis.
QA/QC procedures	Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Calculation of project emissions
Additional comment	This parameter is required only if outflow from the biogas reactor is treated in subsequent wastewater treatment facilities without biogas recovery or is discharged to water bodies.

Data/Parameter	$COD_{inflow,k,y}$
Data unit	tCOD/m ³
Description	Chemical oxygen demand of the wastewater/outflow inflow to the treatment system k in year y
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	Average value may be used through sampling with the confidence/precision level 90/10. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	The COD content shall be analyzed using a colorimetric method. The results shall be recorded in log sheets on a daily basis.
QA/QC procedures	The colorimetric method is well documented and well accepted either by national or international standards. A standard solution shall be used for analysis, for which test certificates shall be available. The equipment shall be sent for preventive maintenance and check in line with manufacturer's recommendation at least once in three years.
Purpose of data	Calculation of project emissions
Additional comment	This parameter is required only if outflow from the biogas reactor is treated in subsequent wastewater treatment facilities without biogas recovery or is discharged to water bodies.

Data/Parameter	$COD_{outflow,k,y}$
Data unit	tCOD/m ³
Description	Chemical oxygen demand of the wastewater/outflow leaving the treatment system k in year y
Source of data	On-site measurements
Value(s) applied	[number]

Measurement methods and procedures	Average value may be used through sampling with the confidence/precision level 90/10. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	The COD content shall be analyzed using a colorimetric method. The results shall be recorded in log sheets on a daily basis.
QA/QC procedures	The colorimetric method is well documented and well accepted either by national or international standards. A standard solution shall be used for analysis, for which test certificates shall be available. The equipment shall be sent for preventive maintenance and check in line with manufacturer's recommendation at least once in three years.
Purpose of data	Calculation of project emissions
Additional comment	This parameter is required only if outflow from the biogas reactor is treated in subsequent wastewater treatment facilities without biogas recovery or is discharged to water bodies.

Data/Parameter	$COD_{ww, discharge, PJ, y}$
Data unit	tCOD/m ³
Description	Chemical oxygen demand of the outflow/wastewater discharged into sea, river or lake in the project scenario in the year y (t/m ³)
Source of data	On-site measurements
Value(s) applied	[number]
Measurement methods and procedures	Average value may be used through sampling with the confidence/precision level 90/10. All data collected as part of monitoring shall be archived electronically for a period of two years from the end of the crediting period of the underlying CPA.
Monitoring frequency	The COD content shall be analyzed using a colorimetric method. The results shall be recorded in log sheets on a daily basis.
QA/QC procedures	The colorimetric method is well documented and well accepted either by national or international standards. A standard solution shall be used for analysis, for which test certificates shall be available. The equipment shall be sent for preventive maintenance and check in line with manufacturer's recommendation at least once in three years.
Purpose of data	Calculation of project emissions
Additional comment	This parameter is required only if outflow from the biogas reactor is treated in subsequent wastewater treatment facilities without biogas recovery or is discharged to water bodies.

Data/Parameter	$p_{n,j,x}$
Data unit	-
Description	Weight fraction of the waste type j in the sample n collected during the year x
Source of data	Sample measurements by project participants
Value(s) applied	[number]
Measurement methods and procedures	Sample the waste prevented from disposal, using the waste categories j , as provided in the table for DOC_j and k_j , and weigh each waste fraction. The size and frequency of sampling should be statistically significant with a maximum uncertainty range of 20% at a 95% confidence level. At a minimum, sampling should be undertaken four times per year.
Monitoring frequency	Sampling as described above.
QA/QC procedures	-
Purpose of data	Calculation of project emissions

Additional comment	This parameter applies to only to cases where residual wastes from the biogas Project Activity are disposed/stored in an anaerobic manner and only needs to be monitored if the waste prevented from disposal includes several waste categories j , as categorized in the tables for DOC_j and k_j .
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Data/Parameter	z
Data unit	-
Description	Number of samples collected during the year x
Source of data	Project Entity or CCME
Value(s) applied	[number]
Measurement methods and procedures	Sample the waste prevented from disposal, using the waste categories j , as provided in the table for DOC_j and k_j , and weigh each waste fraction. Continuously monitored and aggregated annually.
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	This parameter applies to only to cases where residual wastes from the biogas Project Activity are disposed/stored in an anaerobic manner and only needs to be monitored if the waste prevented from disposal includes several waste categories j , as categorized in the tables for DOC_j and k_j .

Data/Parameter	GWP_{CH_4}
Data unit	tCO ₂ e / tCH ₄
Description	Global warming potential of methane
Source of data	Decisions under UNFCCC and the Kyoto Protocol
Value(s) applied	[number] A value of 25 is to be applied until further revision (if any)
Measurement methods and procedures	The validity of the value shall be checked on an annual basis and updated in the monitoring report, whenever a revision of this factor is adopted within the UNFCCC framework.
Monitoring frequency	Checked annually against published data from IPCC/UNFCCC
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	This parameter applies to only to cases where residual wastes from the biogas Project Activity are disposed/stored in an anaerobic manner and applies only to calculations under the " <i>Emissions from solid waste disposal site, Version 08.0</i> ".

I.7.2. Sampling plan

There is no sampling plan applied for the monitoring procedure.

I.7.3. Other elements of monitoring plan

1. Monitoring Plan Objective and Organization

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The project owner is mainly responsible for the implementation of the monitoring plan

A chief monitoring officer will be appointed by the project developer, who supervises and certifies metering and recording, collects data (meter's data reading, sale/billing receipts), calculates emission reductions and prepares a monitoring report with a support from CCME.

2. Monitoring Data and archiving

According to the regulation regarding selling of electricity to the national grid, electricity meter with national accuracy standard will be installed which also belong to the government. Moreover, the calibration schedule will be done as per a normal procedure equally applied in the kingdom. The operators will be responsible for the execution of the monitoring plane while the plant manager will take care of approval. At the month end, power distributor will jointly with the plant manager for the meter reading for transparent and accuracy purpose of the monitoring data.

The power distributor is responsible for operation of the measuring equipment, and guarantees that it is in good operation. Any adjustment to the meter is prohibited by law. The data is presented electronically and recorded manually on a daily basis with monthly aggregation.

3. Quality Assurance and Quality Control

The verification of electricity meter is periodically carried out by the power distributor according to the national standard.

The project owner will properly keep the spreadsheets, jointly record as well as the invoice amount of selling electricity on a monthly basis for a period of 2 years following the end of the crediting period.

SECTION J. Crediting period type and duration

Type of crediting period: Renewal crediting period

Duration of crediting period: 7 years

SECTION K. Eligibility criteria for inclusion of CPAs

The eligibility of the proposed CPA for inclusion in the PoA is justified based on the assessment of the eligibility criteria provided in the table below.

[In case of multiple Project Activities under one CPA: "As defined in the PoA-DD, the eligibility criteria are assessed mainly at Project Activity level or, for some particular criteria specified in the table below, at CPA level. Whenever not specified in the table below with explicit reference to individual Project Activity numbers (i.e. Project Activity No. 1 or Project Activity No. 2), the assessment below applies to all Project Activities under the CPA."]

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1	The Project Activity is a voluntary initiative and not implemented due to mandatory policies or regulations.	In Thailand, there is no mandatory requirement to generate electricity from renewable energy sources and the Project Activity is carried out as voluntary initiative, which is also confirmed in the declaration provided by the Project Entity to CME.	Declaration by Project Entity to CME regarding voluntary initiative
2	The Project Activity falls under one of the following Project Types: 1. Wind power 2. Solar photovoltaic power generation	The Project Activity falls under Technology Type 6: Biogas based power generation, which is also confirmed by CME based on the Technology Type descriptions provided in Section	All of the following: <input type="checkbox"/> Confirmation by CME regarding eligibility of the technology type applied in a Project Activity;

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	3. Concentrated solar power 4. Run-of-the-River hydropower 5. Renewable biomass based power generation 6. Biogas based power generation	A.3 of the PoA-DD.	AND any of the following: <input type="checkbox"/> Legally binding contract ²⁷¹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Feasibility study or technical-commercial proposal by technology provider; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	Criterion 2.b: Additional requirements for renewable biomass energy and biogas projects (Technology Types 5 and 6): <ul style="list-style-type: none"> Biomass and biogas based electricity generation projects use only domestic biomass residues from renewable biomass sources (in line with AMS-I.D, Version 18, Paragraphs 2 and 47); AND Information on biomass availability in the region of the CPA is available (for determination of leakage at CPA level; in line with AMS-I.D, Version 18, Paragraph 42) 	[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Types 5 and 6: "Not applicable" OR Option 2: Confirmation/justification of both points below: <ul style="list-style-type: none"> The Project Activity(ies) under the CPA use(s) only biomass residues from renewable sources in line with the definition provided in EB 23, Annex 18 and in the "Glossary of CDM Terms, Version 10"; AND Summary of surplus biomass ex-ante assessment based on regional biomass survey or published literature or official reports (in line with the tool "Leakage in biomass small-scale project activities", Version 04)] 	[Option 1: If the Project Activity(ies) under the CPA does/do fall under Technology Types 5 and 6: "Not applicable" OR Option 2: <input type="checkbox"/> Declaration by Project Entity to CME regarding compliance with definition of biomass to be used in the Project Activity; AND any of the following documents for determination of leakage: <input type="checkbox"/> Regional biomass survey carried out by third party; OR <input type="checkbox"/> Published literature; OR <input type="checkbox"/> Official reports" Replace the applicable box with an "X"]
3	The installed electricity generation capacity of the Project Activity is less than or equal to 15 MW. In case of multiple Project Activities under one CPA, the combined installed	The CPA consists of [number] Project ["Activity" or "Activities"] with an installed capacity of [installed capacity in MW of each Project Activity under the CPA]. [In case of multiple	<input type="checkbox"/> Legally binding contract ²⁷² between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total

²⁷¹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁷² "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	capacity of all Project Activities under the CPA is less than or equal to 15 MW.	Project Activities under one CPA: "The total electricity generation capacity of all Project Activities under the CPA is [number] MW. Both the individual Project Activities as well as the CPA as a whole are below the 15 MW threshold."]	installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
	<p>Criterion 3.a: Additional requirements for Project Activities with both renewable and non-renewable components (e.g. a wind/diesel unit):</p> <p>If the Project Activity has both renewable and non-renewable components, the eligibility limit of 15 MW shall apply only to the renewable component (in line with AMS-I.D, Version 18, Paragraph 6).</p>	<p>[Option 1: If the Project Activity(ies) under the CPA does/do not have non-renewable components: "The Project Activity does not have non-renewable components." OR Option 2: "The installed electricity generation capacity of the renewable component of the Project Activity/Activities is/are equal to or less than 15 MW." In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<input type="checkbox"/> Declaration by Project Entity to CME regarding availability of non-renewable components within the Project Boundary; AND Any of the following: <input type="checkbox"/> Legally binding contract ²⁷³ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity's renewable energy component; OR <input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit) [Replace the applicable box with an "X"]
	<p>Criterion 3.b: Additional requirements for Project Activities that co-fires fossil fuel²⁷⁴:</p> <p>If the Project Activity entails co-firing of fossil fuel(s), the</p>	<p>[Option 1: If the Project Activity(ies) does/do not co-fire fossil fuel: "The project does not co-fire fossil fuels." OR Option 2:</p>	<input type="checkbox"/> Declaration by Project Entity to CME whether Project Activity envisages to co-fire fossil fuels; AND Any of the following: <input type="checkbox"/> Legally binding contract ²⁷⁵

²⁷³ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁷⁴ A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	capacity of the entire unit shall not exceed the limit of 15 MW (in line with AMS-I.D, Version 18, Paragraph 6); AND	<p>“The installed electricity generation capacity of the entire Project Activity (including co-firing capacity) is equal to or less than 15 MW.”</p> <p>In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]</p>	<p>between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity (including co-firing capacity); OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the site visit)</p> <p>[Replace the applicable box with an “X”]</p>
4	The Project Activity is a grid-connected facility supplying electricity to the Thai national grid under Thailand's feed-in tariff/adder policy for Very Small Power Producers (VSPPs).	The Project Activity will supply electricity to the Thai national grid under the VSPP scheme.	<p><input type="checkbox"/> Single-line diagram of the Project Activity provided by Project Entity to CME; AND</p> <p><input type="checkbox"/> Signed PPA between Project Entity and the Distribution Utility confirming that the Project Activity falls under the VSPP scheme.</p> <p>[Replace the applicable box with an “X”]</p>
5	The Project Activity is implemented under a Greenfield scenario (in line with AMS-I.D, Version 18, Paragraph 4).	There is no existing renewable power generation unit at the project site prior to the start of the Project Activity. Hence, the project is considered as a “Greenfield project”.	<p><input type="checkbox"/> Declaration by Project Entity to CME confirming that the Project Activity is a Greenfield plant; AND</p> <p>Option 1: For Project Activities that have not started construction by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit; OR</p> <p>Option 2: For Project Activities that are under construction by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Legally binding contract²⁷⁶ between the Project Entity and a</p>

²⁷⁵ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

²⁷⁶ “Engineering Procurement and Construction” (EPC), “Turnkey” or “Build Own Operate Transfer” (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			<p>third party related to the implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the construction status or equipment on site versus project design as per construction/implementation contract mentioned above);</p> <p>OR</p> <p>Option 3: For Project Activities that are already operational by the time of the CPA inclusion:</p> <p><input type="checkbox"/> Operation license AND</p> <p><input type="checkbox"/> Legally binding contract²⁷⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; AND</p> <p><input type="checkbox"/> Assessment by DOE following a site visit (by comparison of the actual project design versus planned design as per construction/implementation contract mentioned above and crosschecking this information with the operation license);</p> <p>[Replace the applicable box with an "X"]</p>
6	The Project Activity is not a combined heat and power (co-generation ²⁷⁸) project (in line with AMS-I-D, Version 18, Paragraph 7).	The Project Activity is not a combined heat and power (co-generation) project.	<p><input type="checkbox"/> Legally binding contract²⁷⁹ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing a clear project design description; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's</p>

²⁷⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁷⁸ Defined as the simultaneous generation of thermal energy and electrical energy in one process.

²⁷⁹ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			equipment/technology; OR <input type="checkbox"/> Signed PPA ²⁸⁰ [Replace the applicable box with an "X"]
7	The proposed Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	As demonstrated under Section B above, the Project Activity meets the <i>Assessment of debundling for small-scale project activities, Version 04.0.</i>	<input type="checkbox"/> Confirmation by CME on de-bundling check as per <i>Assessment of debundling for small-scale project activities, Version 04.0</i> ; AND <input type="checkbox"/> Declaration by Project Entity that the Project Activity is not a de-bundled component of a large-scale activity. [Replace the applicable box with an "X"]
8	The Project Activity's boundary is within the geographical territory of Thailand.	The Project Activity's location is at [province name] in Thailand. [In case of multiple Project Activities under one CPA: Provide justification for each individual Project Activity.]	<input type="checkbox"/> Declaration by Project Entity to CME confirming that the boundary of the Project Activity is within the geographical boundaries of Thailand, including geographic coordinates (latitude and longitude), name and address of the Project Entity as well as the address of the Project Activity; AND and any of the following: <input type="checkbox"/> Signed PPA; OR <input type="checkbox"/> Confirmation by DOE following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit) [Replace the applicable box with an "X"]
9	The additionality for each Project Activity is demonstrated by any one of the following approaches: Approach 1: <i>Demonstration of additionality of microscale project activities</i> ²⁸¹ ; OR	[Provide justification of selected approach] [Approach 1: <input type="checkbox"/> The total installed electricity generation capacity of the Project Activity ²⁸⁴ is equal to or less than 5 MW " [Provide brief justification]	[" Approach 1: <input type="checkbox"/> Declaration by Project Entity to CME confirming that the total installed electricity generation capacity of the Project Activity is equal to or less than 5 MW and is not a debundled component of a SSC CDM project activity by applying the criteria in the

²⁸⁰ There are different PPA regulations and contracts for VSPP electricity and cogeneration projects in Thailand. Hence, it is evident from the PPA whether the Project Activity is just an electricity generation or a cogeneration project. Along with some basic information about fuel usage in the generic PPA application form, project proponents have also to provide additional documents to PEA/MEA, which allow for a clear distinction of electricity and co-generation projects (based on the PPA application documents).

²⁸¹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁸⁴ In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "*Assessment of debundling for small-scale project activities*", Version 04.0 excluding paragraph 10 of the latter guidelines.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
	<p>Approach 2: As per <i>Demonstration of additionality of small-scale project activities</i>²⁸², Paragraph 10, additionality is demonstrated based on the investment barrier analysis.</p> <p>In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out at CPA level or at Project Activity level depending on how the underlying investment was structured²⁸³.</p>	<p><input type="checkbox"/> The Project Activity is not considered a debundled component of a SSC CDM project activity when applying the criteria in the “<i>Assessment of debundling for small-scale project activities</i>” based on microscale thresholds in the place of SSC thresholds²⁸⁵” [Provide brief justification]</p> <p><input type="checkbox"/> The Project Activity employs specific renewable energy technologies/ measures recommended by the host country DNA and approved by the CDM Executive Board to be additional in the host country²⁸⁶.” [Provide brief justification]</p> <p>Replace all three boxes above with an “X” OR</p> <p>Approach 2: [Provide clarification on whether investment analysis is conducted at Project Activity or CPA level] [“According to the IRR and benchmark calculation conducted in Section C of the present document, the CPA is deemed as additional since the IRR of the CPA is lower than the applicable benchmark (see Section C for more details).”]</p>	<p>“<i>Assessment of debundling for small-scale project activities</i>”; AND <input type="checkbox"/> Approval by the CDM Executive Board of the applied renewable energy technology/measure applied in the Project Activity (following the respective recommendation by Thailand’s DNA)</p> <p>AND any of the following: <input type="checkbox"/> Legally binding contract²⁸⁷ between the Project Entity and a third party related to the implementation or construction of the Project Activity containing information about the total installed capacity of the Project Activity; OR <input type="checkbox"/> Purchase order(s) of the Project Activity’s equipment/technology; OR <input type="checkbox"/> Confirmation by DOE based on the nameplate capacity of installed electricity generation equipment, following a site visit (in cases where the Project Activity is already under construction or commissioned at the time of the visit)”</p> <p>[Replace the applicable box with an “X”]</p> <p>OR “Approach 2: Completed IRR and benchmark calculation (provided after this table) as well as corresponding supporting evidences for justification of the IRR calculation and benchmark selection.”]</p>

²⁸² Version 13.0 is valid at the time of submission of updated PoA-DD to DOE for validation for renewal of crediting period. However, the valid version at the time of submission of the CPA-DD to DOE for validation shall be updated and applied.

²⁸³ In cases where a bundle of small units is considered as a single investment by an investor, the investment analysis shall be conducted at CPA level. In cases where different Project Activities bundled under one CPA were not conceived as a single investment (e.g. subject to different conditions, timing, etc.) the investment analysis shall be conducted individually for each Project Activity under the bundle.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
10	The proposed Project Activity does not lead to double counting of emission reductions.	<p>The Project Activity does not and will not lead to double counting of emission reductions since it does not and will not claim emission reductions as:</p> <p>1. Standalone CDM Project activity: OR</p> <p>2. Part of a bundled CDM Project activity; OR</p> <p>3. Another registered CDM PoA; OR</p> <p>4. Project activity under another emission reduction crediting scheme (e.g. voluntary carbon markets) during the same crediting period</p>	<p><input type="checkbox"/> Declaration by Project Entity to CME that the Project Activity does not and will not lead to double counting of emission reductions; AND</p> <p><input type="checkbox"/> Contract assigning the right to claim and manage emission reduction certificates related to the Project Activity from the Project Entity to the CME; AND</p> <p><input type="checkbox"/> Declaration by CME that the Project Activity does not and will not lead to double counting of emission reductions.</p> <p>[Replace the applicable box with an "X"]</p>
11	The starting date of the Project Activity is not before the date of commencement of validation of the PoA, i.e. the date on which the POA DD is first published for global stakeholder consultation (in line with the "Glossary of CDM Terms", Version 10).	<p>The Project Activity start date is expected to be on [DD/MM/YYYY], which is after the date of commencement of validation of the PoA.</p> <p>[In case of multiple Project Activities with multiple starting dates under one CPA: Provide justification for each individual Project Activity.]</p>	<p><input type="checkbox"/> Legally binding contract ²⁸⁸ between the Project Entity and a third party with a commitment by the Project Entity to expenditures ²⁸⁹ related to the implementation or construction of the Project Activity; OR</p> <p><input type="checkbox"/> Purchase order(s) of the Project Activity's equipment/technology; OR</p> <p><input type="checkbox"/> Any other significant ²⁹⁰ purchase order, contract or payment evidence related to the construction of the Project Activity; OR</p> <p><input type="checkbox"/> Confirmation by DOE following a site visit that construction has not started before the date of commencement of the PoA</p>

²⁸⁵ As per clarification in the EB 62 report, paragraph 48 (e)

²⁸⁶ Following conditions apply: Specific renewable energy technologies/measures refers to grid connected renewable energy technologies (renewable technologies that do not generate electricity, such as heating and cooling technologies, are not eligible) of installed capacity equal to or smaller than 5 MW; the ratio of installed capacity of the specific grid connected renewable energy technology in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3 per cent (for example, if the ratio of total installed capacity of all grid-connected hydropower plants with the capacity equal to or smaller than 5MW and the national grid-connected installed electricity generation capacity is less than 3 per cent in a host country then microscale hydropower is eligible for DNA recommendation in that host country); most recent available data on the percentage of contributions of specific renewable energy technologies shall be provided to demonstrate the compliance with the 3 per cent threshold (in no case shall data older than three years from the date of submission be used). Technologies/ measures recommended by DNAs and approved by the Board to be additional in the host country remain valid for three years from the date of approval. However, additionality of eligible Project Activities applying the guidelines remains valid for the entire crediting period.

²⁸⁷ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁸⁸ "Engineering Procurement and Construction" (EPC), "Turnkey" or "Build Own Operate Transfer" (BOOT) are typical examples of such contracts.

²⁸⁹ Expenditures related to minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, are not applicable in the context of this Eligibility Criterion as they do not necessarily indicate the commencement of implementation of the Project Activity.

²⁹⁰ Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, shall not be considered as significant.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
			validation (in case of early stage Project Activities) [Replace the applicable box with an "X"]

The additionality assessment for the Project Activities implemented under the CPA is demonstrated based on following approach defined in the PoA DD:

- ☐ **Approach 1** – applicable only to Project Activities where the total installed electricity generation capacity is equal to or less than 5 MW
- ☐ **Approach 2** – applicable to any Project Activity under the PoA

[Replace the applicable box with an "X"]

[For **Approach 1**:

"Assessment of additionality using Approach 1 shall be carried out at Project Activity level (which in most cases will be identical to the CPA) and always in combination with the "Assessment of debundling for small-scale project activities"²⁹¹" by suitably considering microscale thresholds of 5 MW in the place of SSC thresholds²⁹².

A CPA shall be deemed additional under Approach 1, if it can be demonstrated that each Project Activity under the CPA fulfils the requirements of the "Demonstration of additionality of microscale project activities"²⁹³ listed below:

- ☐ The total installed electricity generation capacity is equal to or less than 5 MW."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

☐ It shall be demonstrated that the Project Activity is not a debundled component of a SSC CDM project activity by applying the criteria in the "Assessment of debundling for small-scale project activities" (e.g. by suitably considering micro-scale thresholds in the place of SSC thresholds)²⁹⁴."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

☐ The Project Activity employs specific renewable energy technologies/measures recommended by the host country DNA and approved by the Board to be additional in the host country, whereas the total installed capacity of the technology/measure contributes less than or equal to 3% to national annual grid-connected electricity generation."

[Replace the box with an "X" if the condition is met. Provide justification for each Project Activity under the CPA.]

OR

For **Approach 2**:

"As per "Demonstration of additionality of small-scale project activities"²⁹⁵ and in line with the "Non-binding best practice examples to demonstrate additionality for SSC project activities", Approach 2 for demonstration

²⁹¹ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁹² In case of bundled projects, Project Activity refers to individual projects within the bundle and this criterion is applied in conjunction with the "Assessment of debundling for small-scale project activities", Version 04.0 excluding paragraph 10 of the latter guidelines.

²⁹³ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁹⁴ As per clarification in the EB 62 report, paragraph 48.(e).

²⁹⁵ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

of additionality shall be based on the investment barrier analysis by comparison of the Project Activity's IRR to an appropriate benchmark. Both the IRR calculation and the benchmark determination shall be carried out as per “*Methodological tool for Investment analysis*²⁹⁶”.

[In case of multiple Project Activities under one CPA: “In case of bundled Project Activities within one CPA, additionality assessment using Approach 2 might be carried out separately for each individual Project Activity within the CPA or at CPA level²⁹⁷”. Clarify whether the investment analysis is carried out at CPA level or Project Activity level.]

“The IRR and benchmark calculation at CPA level is carried out as per guidance provided in Section C of the PoA-DD.

IRR Calculation ([“CPA level” or “Project Activity level”])

IRR MODEL	Unit	Input values	Source/Comments
Project vs. Equity IRR	-	[“Project IRR” or “Equity IRR”]	[Source/Comments]
Pre-tax vs. post-tax assessment	-	[“Pre-tax” or “Post-tax”]	[Source/Comments]
PROJECT DATA	Unit	Input values	Comments
Technical lifetime	Year	[number] years	[Source/Comments]
Investment decision date	DD/MM/YYYY	[DD/MM/YYYY]	[Source/Comments]
Construction start date	Year	[YYYY]	[Source/Comments]
Project commissioning date	Year	[YYYY]	[Source/Comments]
FINANCIAL PARAMETERS	Unit	Input values	Comments
Debt/Equity ratio	-	[number/number]	[Source/Comments]
Cost of servicing debt	%	[number]	[Source/Comments]
Total amount of electricity sold to the grid	kWh/year	[number]	[Source/Comments]
Electricity tariff	THB/kWh	[number]	[Source/Comments]
Inflation rate	% per year	[number applicable]	(if [Source/Comments (if applicable)])
Exchange Rate	Foreign currency/THB	[number applicable]	(if [Source/Comments (if applicable)])
CASH FLOWS	Unit	Input values	Comments
Total investment	THB	[number]	[Source/Comments]
Operation & Maintenance costs	THB/year	[number]	[Source/Comments]
Insurance costs	% of Capex p.a. or THB/year	[number “%” or “THB/year” applicable]	[Source/Comments (if applicable)]
(Other operating expenditures)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
Revenues from electricity sale to the grid	THB/year	[number]	[Source/Comments]
(Other operating revenues)	THB/year	[number applicable]	(if [Source/Comments (if applicable)])
[“Project” or “Equity”] IRR	%	[IRR result]%	

Benchmark determination

In line with the IRR calculation above, the benchmark determination is carried out at [“Project Activity” or “CPA level”] on a [“pre-tax” or “post-tax”] basis. The [“Project” or “Equity”] IRR is compared to the [selected

²⁹⁶ The valid version at the time of submission of the CPA-DD to DOE for validation shall be applied.

²⁹⁷ This option might be more relevant or the only applicable option in cases where a bundle of small units is considered as a single investment by the Project Entity.

benchmark indicator/approach] based on [“parameters that are standard in the market” or “company internal information”] according to the general principles described in the PoA-DD.

[Follow guidance provided in the PoA-DD for benchmark determination].

According to assessment conducted above, the applicable benchmark for comparison with the [“Project” or “Equity”] IRR is [benchmark result] %.

Sensitivity analysis

The sensitivity analysis is presented according to the format suggested in the PoA-DD as follows:

Sensitivity analysis at [“Project Activity” or “CPA level”]

Factor	Variation		
	-10% [or less if appropriate]	0%	10%[or more if appropriate]
Total investment	[number] %	[IRR result] %	[number] %
O&M Cost	[number] %		[number] %
Electricity export	[number] %		[number] %
Power tariff	[number] %		[number] %
Benchmark	[Benchmark result] %		

[Option 1:

“The [“Project” or “Equity”] IRR does not cross the benchmark for any of the parameter variations applied above.”

Option 2:

If the IRR in the sensitivity analysis exceeds the benchmark while altering one the four parameters, it shall be further substantiated that such a scenario is unlikely to occur.]

Conclusion

The [“Project” or “Equity”] IRR of [IRR result] % is below the applicable benchmark of [Benchmark result] %. The sensitivity analysis further substantiates that the Project IRR remains below the benchmark whenever key input parameters for the IRR calculation are subject to a +/- 10% variation range [“and/or that scenarios that lead the IRR to cross the benchmark are unlikely to occur”]. Therefore, it can be concluded that the proposed Project [“Activity” or “Activities”] under the CPA (and the CPA as a whole) are additional.”]

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	<input checked="" type="checkbox"/> Coordinating/managing entity <input type="checkbox"/> Project participant
Organization name	Carbon Coordinating Managing Entity Limited
Country	Thailand
Address	2/22, Iyara Building, 6 th Floor, Soi 2 Chan Road, Bangkok
Telephone	+66 2 678 89 79
Fax	
E-mail	registration@southpolecarbon.com
Website	
Contact person	Ingo Puhl

Coordinating/managing entity and/or project participants	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Project participant
Organization name	South Pole Carbon Asset Management Ltd.
Country	Switzerland
Address	Technoparkstrasse 1, Zurich 8005
Telephone	+41 43 501 35 50
Fax	
E-mail	registration@southpolecarbon.com
Website	
Contact person	Renat Heuberger

Coordinating/managing entity and/or project participants	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Project participant
Organization name	Asian Development Bank, as Trustee of Future Carbon Fund
Country	Philippines
Address	6 ADB Avenue, 1550 Mandaluyong City
Telephone	+6326324444
Fax	
E-mail	furthercarbonfund@adb.org
Website	
Contact person	Woochong Um

Coordinating/managing entity and/or project participants	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Project participant
Organization name	Swedish Energy Agency
Country	Sweden
Address	P.O Box -310, SE-631-04 Eskilstuna
Telephone	+46165442438
Fax	
E-mail	Ida.hamilton@energimyndigheten.se
Website	
Contact person	Ida Hamilton

Appendix 2. Affirmation regarding public funding

[Option 1: “No public funding from foreign countries or Official Development Assistance (ODA) is being used to implement the CPA.”]

OR

Option 2: In case public funding is received for any Project Activity under the CPA, an explanation shall be provided about the nature of the funding and how it is assured that it does not lead to a diversion of ODA.]

Appendix 3. Applicability of methodologies and standardized baselines

The complete information is provided in Section I.2 of the generic CPA.

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

Calculation of the grid emission factor of Thailand

The emission factor of the Thai national grid has been taken from the most recent data made available by the Thai DNA²⁹⁸. The most important results for calculation of the combined margin emission factor are displayed in the table below.

Tool	Weight	Emission Factor	Unit
Operating Margin: OM	0.5	0.5719	tCO ₂ /MWh
Build Margin: BM	0.5	0.5609	
Combined Margin: CM – General Project		0.5664	

Tool	Weight	Emission Factor	Unit
Operating Margin: OM	0.75	0.5719	tCO ₂ /MWh
Build Margin: BM	0.25	0.5609	
Combined Margin: CM – Wind and Solar		0.5692	

The above values are calculated as per the methodological tool - Tool to calculate the emission factor for an electricity system, version 05.0. There have been no details updated relevant to the Project Activities from Version 05.0 to Version 07.0. Thus, the values are applicable.

However, according to paragraph 86 of the applied tool, the following default values shall be used for w_{OM} and w_{BM} :

- Wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;
- All other projects: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved

²⁹⁸ <http://ghgreduction.tgo.or.th/tver-method/tver-calculation-data.html>

methodology which refers to this tool.

Therefore, the combined margin emissions factor for second crediting periods shall be calculated as follows:

- For the Project Activities applying Technology Type 1, 2 and 3, the combined margin emissions factor for second crediting periods remains the same; $EF_{CO_2} = EF_{grid,y} = 0.5692 \text{ tCO}_2/\text{MWh}$
- For the Project Activities applying Technology Type 4, 5 and 6, the combined margin emissions factor for second crediting periods is $EF_{CO_2} = EF_{grid,y} = 0.5637 \text{ tCO}_2/\text{MWh}$

Tool	Thai DNA		Second crediting period	
	Weight (w)	Emission Factor (tCO ₂ /MWh)	Weight (w)	Emission Factor (tCO ₂ /MWh)
Operation Margin: OM ($EF_{grid,OM,y}$)	0.5	0.5719	0.25	
Build Margin: BM ($EF_{grid,BM,y}$)	0.5	0.5609	0.75	
Combined Margin: CM - General Project		0.5664		0.5637

Project Emissions Calculation for Biogas Projects

CO₂ emissions due to incremental transportation distances

Project emissions due to incremental transport distances ($PE_{transp,y}$) are calculated based on the incremental distances between:

- The collection points of biomass and/or manure and the digestion site as compared to the baseline solid waste disposal site or manure treatment site;
- When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;
- Treatment sites and the sites for soil application, landfilling and further treatment of the residual waste.

$$PE_{transp,y} = (Q_y / CT_y) * DAF_w * EF_{CO_2,transport} + (Q_{res-waste,y} / CT_{res-waste,y}) * DAF_{res-waste} * EF_{CO_2,transport} \quad (1)$$

Where:

Q_y	Quantity of raw waste/manure treated and/or wastewater co-digested in year y (tonnes)
CT_y	Average truck capacity for transportation (tonnes/truck)
DAF_w	Average incremental distance for raw solid waste/manure and/or wastewater transportation (km/truck)
$EF_{CO_2,transport}$	CO ₂ emission factor from fuel use due to transportation (kgCO ₂ /km, IPCC default values or local values may be used)
$Q_{res-waste,y}$	Quantity of residual waste produced in year y (tonnes)
$CT_{res-waste,y}$	Average truck capacity for residual waste transportation (tonnes/truck)
$DAF_{res-waste}$	Average distance for residual waste transportation (km/truck)

Project emissions from the disposal/storage/treatment of the residual wastes

Based on procedures laid out in AMS-III.AO, following scenarios are considered with regards to emissions from disposal, storage and/or treatment of residual wastes ($PE_{res\ waste, y}$):

a) Aerobic disposal of residual waste (i.e. soil application)

In case residual waste from the digestion is handled aerobically and submitted to soil application, methane emissions from the disposal/storage/treatment of residual wastes can be neglected (or assumed to be zero). In such cases where digestion is handled aerobically and submitted to soil application, the proper conditions

and procedures (not resulting in methane emissions) for storage and transportation and soil application must be ensured.²⁹⁹ Records (including but not limited to log sheet entries and pictures) shall be kept at the project site to confirm that the residual waste used for soil application has been used as fertilizer on the premises of the project activity (without storage or transportation) under aerobic conditions (not resulting in methane emissions). In case of missing or ambiguous records, which do not allow for the DOE to verify aerobic handling conditions of residual wastes (at the CPA verification stage), it shall be assumed that the residual waste decays in an anaerobic manner leading project emissions as described under sub-section d) below, using the most conservative assumptions possible.

b) Mechanical/thermal treatment of residual wastes

As defined in Section A.3 of the PoA DD, following mechanical/thermal treatments of residual waste streams generated by biogas digestion systems (i.e. sludge or outflow), are not eligible under the PoA:

- controlled combustion;
- gasification to produce syngas/producer gas;
- mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass³⁰⁰ (SB)

Given the exclusion of possible emission sources listed above, provisions in AMS-III.E related to project emissions are not applicable (and therefore paragraph 6 of AMS-III.AO is not relevant). Nevertheless, as per paragraph 13.(b) of AMS-III.AO, "CO₂ emissions from electricity and/or fossil fuel consumption by the project activity facilities", which might include other types of on-site mechanical or thermal treatment of residual wastes generated by biogas digestion systems, such as dewatering of sludge (by compression and/or heating) for example, are taken into account.

As mentioned in the footnote under the sub-section titled "Project emissions from on-site consumption of fossil fuel" of Section I.6.3 of the generic CPA, any fossil fuels consumed for the mechanical or thermal treatment of biomass or residual wastes in Project Activities applying Technology Types 5 (Renewable Biomass) or 6 (Biogas), shall be accounted for as part of the "Project emissions from on-site consumption of fossil fuel".

In case of electricity consumption from the grid for mechanical or thermal treatment of residual wastes, the grid emission factor (tCO₂e/MWh) shall be used (as calculated under Appendix 4 of the PoA DD). In this case, the amount of grid electricity consumed for mechanical or thermal treatment of residual waste shall be multiplied by applicable grid emission factor valid for the CPA.

c) Discharge of outflow from the digestion process into a wastewater treatment system or into a water body (i.e. sea, river, lake)

In case the outflow from the digestion is discharged to a subsequent wastewater treatment system or to the natural water receiving body, relevant procedures in AMS-III.H shall be followed to estimate the resultant project emissions³⁰¹: ($PE_{ww,treatment,y}$) and ($PE_{ww,discharge,y}$).

In line with Paragraph 29 of AMS-III.H, Version 16, $PE_{ww,treatment,y}$ shall be calculated as follows:

$$PE_{ww,treatment,y} = \sum_i (Q_{ww,y} * COD_{inf\ low,k,y} * \eta_{PJ,k} * MCF_{ww,treatment,PJ,k}) * B_{o,ww} * UF_{PJ} * GWP_{CH4}$$

Where:

$PE_{ww,treatment,y}$	Methane emissions from (subsequent) wastewater treatment systems affected by the project activity, and not equipped with biogas recovery, in year y (tCO ₂ e). These emissions shall be calculated as per equation above, using an uncertainty factor of 1.12 and data applicable to the project situation ($MCF_{ww,treatment,PJ,k}$ and $\eta_{PJ,k,y}$).
$Q_{ww,y}$	Volume of wastewater/outflow treated in (subsequent) wastewater treatment system k in year y (m ³). For <i>ex ante</i> estimation, forecasted wastewater/

²⁹⁹ AMS-III.AO, Version 1.0, Paragraph 5.

³⁰⁰ Stabilized biomass is typically produced in a thermal treatment process (dehydration) under controlled conditions (up to 300 degrees Celsius) for further usage as fuel or raw material in other industrial processes. Stabilized biomass (SB) is defined as biomass adequately treated to prevent further degradation in the environment. Examples of SB are: pellets, briquettes and torrefied wood chips.

³⁰¹ AMS-III.AO, Version 1.0, Paragraph 8.

outflow generation volume or the designed capacity of the wastewater treatment facility can be used. However, the *ex post* emissions reduction calculation shall be based on the actual monitored volume of treated wastewater/outflow.

$COD_{inflow,k,y}$	Chemical oxygen demand of the wastewater/outflow inflow to the treatment system k in year y (t/m ³). Average value may be used through sampling with the confidence/precision level 90/10
$\eta_{PJ,k,y}$	Chemical oxygen demand removal efficiency of the project wastewater treatment system k in year y (t/m ³), measured based on inflow COD (see monitoring parameter $COD_{inflow,k,y}$) and outflow COD (see monitoring parameter $COD_{outflow,k,y}$) in system k .
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for project wastewater treatment system k (MCF values as per Table III.H.1 below)
k	Index for project wastewater treatment system
$B_{o,ww}$	Methane producing capacity of the wastewater (IPCC default value of 0.25 kg CH ₄ /kg COD) ³⁰²
UF_{PJ}	Model correction factor to account for model uncertainties (default value of 1.12)
GWP_{CH4}	Global Warming Potential for methane (default value of 21)

Methane emissions from degradable organic carbon in the treated outflow/wastewater discharged in e.g. a river, sea or lake in the project scenario are determined as follows:

$$PE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{PJ} * COD_{ww,discharge,PJ,y} * MCF_{ww,PJ,discharge}$$

Where:

$PE_{ww,discharge,y}$	Methane emissions from degradable organic carbon in treated outflow/wastewater in year y (tCO ₂ e). These emissions shall be calculated using an uncertainty factor of (UF_{PJ}) 1.12 and data applicable to the project conditions ($COD_{ww,discharge,PJ,y}$, $MCF_{ww,PJ,discharge}$). The parameters $Q_{ww,y}$, GWP_{CH4} and $B_{o,ww}$ are the same as the ones introduced in the previous equation.
$COD_{ww,discharge,PJ,y}$	Chemical oxygen demand of the outflow/wastewater discharged into sea, river or lake in the project scenario in the year y (t/m ³).
$MCF_{ww,PJ,discharge}$	Methane correction factor based on the discharge pathway of the outflow/wastewater in the project scenario (e.g. into sea, river or lake) (MCF values as per Table III.H.1 below)

The Methane Correction Factor (MCF) applied in the two previous equations shall be determined based on the following table:

Table III.H.1. IPCC default values³⁰³ for Methane Correction Factor (MCF)

Type of wastewater treatment and discharge pathway or system	MCF value
Discharge of wastewater to sea, river or lake	0.1
Aerobic treatment, well managed	0.0
Aerobic treatment, poorly managed or overloaded	0.3
Anaerobic digester for sludge without methane recovery	0.8
Anaerobic reactor without methane recovery	0.8
Anaerobic shallow lagoon (depth less than 2 metres)	0.2
Anaerobic deep lagoon (depth more than 2 metres)	0.8
Septic system	0.5

d) Anaerobic storage and/or disposal of residual waste in a landfill

³⁰² Project activities may use the default value of 0.6 kg CH₄/kg BOD, if the parameter BOD_{5,20} is used to determine the organic content of the wastewater. In this case, baseline and project emissions calculations shall use BOD instead of COD in the equations, and the monitoring of the project activity shall be based in direct measurements of BOD_{5,20}, i.e. the estimation of BOD values based on COD measurements is not allowed.

³⁰³ Default values from chapter 6 of volume 5. Waste in 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

In case residual waste from the digestion is stored under anaerobic conditions and/or delivered to a landfill, project emissions shall be calculated as per “*Emissions from solid waste disposal site, Version 08.0*”³⁰⁴ as follows:

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

Where:

$PE_{CH_4,SWDS,y}$	Methane emissions from disposal/storage of residual waste at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO ₂ e)
ϕ	Model correction factor to account for model uncertainties. A default factor of 1 shall be applied.
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner. For the sake of conservativeness a value of 0 shall be assumed as default factor.
GWP_{CH_4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period (and subject to decisions under UNFCCC and the Kyoto Protocol, which might lead to a different factor in the future). A default factor of 21 shall be applied throughout the crediting period, unless the factor is changed after the first Kyoto Protocol commitment period.
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste). For the sake of conservativeness a value of 0 shall be assumed as default factor.
F	Fraction of methane in the SWDS gas (volume fraction). A default factor of 0.5 shall be applied.
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose. A default factor of 0.5 shall be applied.
MCF	Methane correction factor; to be determined according to the table provided below.
$W_{j,x}$	Amount of organic waste type j sent to disposal in the SWDS (or stored under anaerobic conditions) in the year x (tons). Monitored parameter defined as $Q_{res\ waste,y}$ (Quantity of residual waste produced) under Section I.7.1 of Part II – Generic CPA for Technology Type 6.
DOC_j	Fraction of degradable organic carbon (by weight) in the waste type j, to be determined according to the table provided below.
k_j	Decay rate for the waste type j; to be determined according to the table provided below.
j	Waste type category (index)
x	Year during the crediting period: x runs from the first year of the first crediting period ($x = 1$) to the year y for which project emissions are calculated ($x = y$).
y	Year for which methane emissions are calculated.

Where different waste types j are disposed (or stored) under anaerobic conditions, determine the amount of different waste types ($W_{j,x}$) through sampling and calculate the mean from the samples, as follows:

$$W_{j,x} = W_x \cdot \frac{\sum_{n=1}^z p_{n,j,x}}{z}$$

Where:

³⁰⁴ AMS-III.AO, Version 1.0, Paragraph 7.

$W_{j,x}$	Amount of organic waste type j sent to disposal in the SWDS (or stored under anaerobic conditions) in the year x (tons). Monitored parameter defined as $Q_{res\ waste,y}$ (Quantity of residual waste produced) under Section I.7.1 of Part II – Generic CPA for Technology Type 6.
W_x	Total amount of organic waste sent to disposal in the SWDS (or stored under anaerobic conditions) in year x (tons)
$p_{n,j,x}$	Weight fraction of the waste type j in the sample n collected during the year x . Monitored according to the information provided below.
z	Number of samples collected during the year x . Monitored according to the information provided below.

The *MCF* factor shall be determined (and reported in the CPA DD) as follows:

Data / Parameter:	<i>MCF</i>
Data unit:	-
Description:	Methane correction factor
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value to be applied:	Use the following values for <i>MCF</i> : <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 and/or with high water table. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. The latter situation corresponds to filling inland water, such as pond, river or wetland, by waste. • 0.4 for unmanaged-shallow solid waste disposal sites. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 metres.
Any comment:	The methane correction factor (<i>MCF</i>) 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 uncertainty or ambiguity regarding the determination of the type of the disposal site, the most conservative value of 1.0 for anaerobic managed solid waste disposal sites shall be used for calculation of project emissions.

The *DOC_j* factor shall be determined (and reported in the CPA-DD) as follows:

Data / Parameter:	<i>DOC_j</i>				
Data unit:	-				
Description:	Fraction of degradable organic carbon (by weight) in the waste type j				
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)				
Value to be applied:	Apply the following values for the different waste types j : <table border="1"> <thead> <tr> <th>Waste type j</th><th><i>DOC_j</i> (% wet waste)</th></tr> </thead> <tbody> <tr> <td>Wood and wood products</td><td>43</td></tr> </tbody> </table>	Waste type j	<i>DOC_j</i> (% wet waste)	Wood and wood products	43
Waste type j	<i>DOC_j</i> (% 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
<p>If a waste type 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 (highest emissions), or request a revision of/deviation from this methodology.</p> <p>In the case of empty fruit bunches (EFB), as their characteristics are similar to garden waste, the parameter value correspondent of garden shall be used. In the case of industrial sludge, a value of 9% (% wet sludge) shall be used assuming an organic dry matter content of 35 percent³⁰⁵. In the case of domestic sludge, a value of 5% (wet sludge) shall be used, assuming an organic dry matter content of 10 percent³⁰⁶.</p>		
Any comment:	-	

The k_j factor shall be determined (and reported in the CPA-DD) as follows:

Data / Parameter:	k_j					
Data unit:	-					
Description:	Decay rate for the waste type j					
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 3.3)					
Value to be applied:	Apply the following values for the different waste types j :					
Waste type j		Boreal and Temperate (MAT≤20°C)		Tropical (MAT>20°C)		
		Dry (MAP/PET <1)	Wet (MAP/PET <1)	Dry (MAP < 1000mm)	Wet (MAP > 1000mm)	
Slowly degrading	Pulp, paper and cardboard (other than sludge)	0.04	0.06	0.045	0.07	
	Wood and wood products	0.02	0.03	0.025	0.035	
Moderately degrading	Other (non-food) 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	
Note: MAT - mean annual temperature, MAP - Mean annual precipitation, PET - potential evapotranspiration. MAP/PET is the ratio between the						

³⁰⁵ This value, for industrial sludge, must be adjusted for other percentages of organic dry matter content as follows:
 $DOC (\% \text{ wet sludge}) = 9 * (\% \text{ organic dry matter content} / 35)$.

³⁰⁶ This value, for domestic sludge, must be adjusted for other percentages of organic dry matter content as follows:
 $DOC (\% \text{ wet sludge}) = 5 * (\% \text{ organic dry matter content} / 10)$.

	<p>mean annual precipitation and the potential evapotranspiration.</p> <p>If a waste type 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 empty fruit bunches (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>
Any comment:	Document in the CPA-DD 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.

At the renewal of the crediting period, the following data should be updated according to default values suggested in the most recently published IPCC Guidelines for National Greenhouse Gas Inventories:

- Oxidation factor (OX);
- Fraction of methane in the SWDS gas (F);
- Fraction of degradable organic carbon (DOC) that can decompose (DOC_f);
- Methane correction factor (MCF);
- Fraction of degradable organic carbon (by weight) in each waste type j (DOC_j);
- Decay rate for the waste type j (k_j).

If the most recent IPCC Guidelines suggest different categorization of waste types, solid waste disposal sites or climate conditions, these should be applied.

Additional monitoring parameters

Following additional monitoring parameters are required for application of the “*Emissions from solid waste disposal site, Version 08.0*”.

- The parameter W_x , representing the amount of organic waste sent to disposal in the SWDS (or stored under anaerobic conditions) in the year x shall be monitored according to parameter $Q_{res\ waste,y}$ (Quantity of residual waste produced) defined under Section I.7.1 of the Generic CPA No. 6.
- As mentioned in Appendix 4, the parameter f , representing the fraction of methane captured at the SWDS and flared, combusted or used in another manner, shall (for the sake of simplification of the monitoring plan) be used as default factor based on the most conservative choice possible, i.e. 0.
- The **Global Warming Potential (GWP)** factor of 21 for methane shall be valid for the first commitment period under the Kyoto protocol and shall be updated if any future decisions under UNFCCC and the Kyoto Protocol lead to a revision of this factor in subsequent commitment periods.
- Where different waste types j are disposed (or stored) under anaerobic conditions and the amount of different waste types ($W_{j,x}$) is determined through sampling as explained in Appendix 4, the following additional monitoring parameters apply:

Please refer to Section I.7.1 of the Generic CPA No. 6 for more information on these additional monitoring parameters.

Methane emissions from physical leakages of the anaerobic digester

Methane emissions due to physical leakages from the digester and recovery system ($PE_{phy\ leakage,y}$) shall be estimated using a default factor of 0.05 m³ biogas leaked/m³ biogas produced. For ex ante estimation the expected biogas production of the digester may be used, for ex post calculations the effectively recovered biogas amount shall be used for the calculation.

Methane emissions due to flare inefficiency

Methane emissions due to incomplete flaring shall be calculated as per the tool “*Project emissions from flaring, Version 03*” as follows:

STEP1 - Determination of the mass flow rate of the residual gas that is flared

This step calculates the residual gas mass flow rate in each hour h , based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas. As per the guidance of the tool, a simplified approach will be used and only the volumetric fraction of methane will be measured, the difference is considered to be 100% Nitrogen.

STEP 2 through STEP 4 are not applicable for CPAs under the PoA.

Step 2 is not necessary because of the simplification to measure only the volumetric fraction of methane described under Step 1 above. Steps 3 and 4 are only applicable if the methane combustion efficiency of the flare is continuously monitored, which is not applicable to Project Activities applying Technology Type 6 (Biogas) under the proposed PoA.

STEP 5: Determination of methane mass flow rate in the residual gas on a dry basis

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas ($FV_{RG,h}$), the volumetric fraction of methane in the residual gas ($fV_{CH4, RG,h}$) and the density of methane ($\rho_{CH4,n}$) in the same reference conditions (normal conditions and dry or wet basis).

Considering that the gas is cooler than 60 degrees Celsius, the reported density is expressed on dry basis already.

$$TM_{RG,h} = FV_{RG,h} * fV_{CH4, RG,h} * \rho_{CH4,n}$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in hour h (kg/h)
$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m ³ /h)
$fV_{CH4, RG,h}$	Volumetric fraction of methane in the residual gas on dry basis in hour h
$\rho_{CH4,n}$	Density of methane at normal condition (0.716 kg/m ³)

STEP 6: Determination of the hourly flare efficiency

Default factors shall be used for determination of the flare efficiency. In case of enclosed flares and use of the default value for the flare efficiency, the flare efficiency in hour h ($\eta_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during hour h
- 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during hour h , but the manufacturer's specifications on proper operation of the flare are not met at any point in time during hour h .
- 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during hour h and the manufacturer's specifications on proper operation of the flare are met continuously during hour h .

In case of open flares, the flare efficiency in hour h ($\eta_{flare,h}$) is:

- 0% if the flame is not detected for more than 20 minutes during hour h .
- 50%, if the flare is detected for more than 20 minutes during hour h .

STEP 7: Calculation of annual project emissions from flaring

According to step 7 annual project emissions from flaring are calculated as the sum of emissions from each hour h , based on the methane flow rate in the residual gas ($TM_{RG,h}$) and the flare efficiency during each hour h ($\eta_{flare,h}$), as follows:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare-h}) * GWP_{CH4} / 1000$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in hour h (kg/h)
$\eta_{flare-h}$	Flare efficiency in hour h
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO ₂ e/tCH ₄)

Power Density Calculation

The power density (*PD*) of the Project Activity is calculated as follows³⁰⁷:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD	Power density of the Project Activity (W/m ²)
Cap _{PJ}	Installed capacity of the hydro power plant after the implementation of the Project Activity (W)
Cap _{BL}	Installed capacity of the hydro power plant before the implementation of the Project Activity (W). For new hydro power plants, this value is zero (which applies to any potential CPA under this PoA since only Greenfield plants are eligible).
A _{PJ}	Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full (m ²)
A _{BL}	Area of the reservoir measured in the surface of the water, before the implementation of the Project Activity, when the reservoir is full (m ²). For new reservoirs, this value is zero.

Appendix 5. Further background information on monitoring plan

The complete monitoring information is provided in Section I.7 of the generic CPA.

Appendix 6. Summary report of comments received from local stakeholders

As per the detail in Section F of the PoA-DD, the information on comments received from local stakeholders will be provided in each individual CPA-DD.

Appendix 7. Summary of post-registration changes

There is no post-registration changes in the PoA. This section is not applicable.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Make editorial improvements.

³⁰⁷ As per project emissions section of ACM0002, Version 20.0.

<i>Version</i>	<i>Date</i>	<i>Description</i>
08.1	28 June 2017	Revision to: <ul style="list-style-type: none"> • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Improve consistency with the “CDM project standard for programmes of activities” and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the “Programme design document form for small-scale CDM programmes of activities” (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: <ul style="list-style-type: none"> • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • 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 Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the <i>Guideline: Completing the programme design document form for CDM programmes of activities</i> (EB 70, Annex 6).

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.
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