PROGRAMME DESIGN DOCUMENT FORM FOR SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-PoA-DD) Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

>> Small Hydropower Programme of Activities in Albania and Serbia
Version 05
17/12/2012

A.2. Purpose and general description of the PoA

>> The proposed CDM programme of activities "Small Hydro Power Programme of Activities in Albania and Serbia" (hereafter referred to as "the PoA") is a programme for the installation of hydro power projects. It was originally planned to implement the programme in both the Republic of Albania and the Republic of Serbia, but in this first stage the PoA will only cover the Republic of Albania. Serbia (or any other CDM country) may be included into the PoA at a later stage.

The purpose of the proposed PoA is the generation of electricity through the utilization of the hydro power potential in Albania.
The PoA consists of individual component project activities (CPAs) which will construct small hydro power plants (SHPP) within the boundaries of Albania, generate electricity from the hydro energy and supply the electricity to the Albanian electricity grid.

The PoA will comprise the CPAs that install new renewable power plants (small hydro power plants) at a site where no renewable power plants have been operated prior to the implementation of the project activity (greenfield plants).

This PoA will include:
(i) small-scale run-of-river hydropower plants, and
(ii) small-scale hydropower plants with reservoirs.

Each small-scale CPA under this PoA will comprise one or more such hydropower plants and have a combined installed capacity of no more than 15 MW, the threshold for small-scale renewable energy CDM projects.

The PoA, through its successful implementation, will serve as a model for investors, authorities and public, and will result in perception changes that are critical to expanding the use of small hydro power in Albania. Further, the establishment of a market for investing in small hydro power projects will significantly impact building of capacity to manufacture system components domestically and lead to value creation and availability of green job opportunities in the region.

The PoA aims to develop a platform for overcoming institutional, financial and structural hurdles for the construction of small hydropower projects. In this way the PoA will promote the development of renewable energy and facilitate the abatement of greenhouse gas emissions through replacement of fossil fuel based electricity in Albania.

The PoA is expected to contribute to sustainable development in the following manner:
Economical benefits

- The PoA will promote sustainable development in Albania by promoting investment, and thereby improving the local economies;
- The PoA will generate demand for local products when spare parts are needed, leading to promotion of business activities;
- New infrastructure will contribute to economic growth, improve standard of life of the local people and poverty alleviation;
- the PoA will assist to balance the electricity supply and demand gap thus reducing the reliance on fossil fuel-based off-grid power generators and power imports.

Job Creation

- The PoA will increase employment opportunities in Albania and increase the share of green jobs in the region;

Enhanced diffusion of environmentally cleaner technologies

- The PoA will support the transfer of green, sustainable and up-to-date technology and technical know-how to the host country

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

The PoA is a voluntary action taken by the CME. CME is not in any way enforced to accomplish its objectives.

A.3. CMEs and participants of PoA

>> Coordinating/Managing Entity (CME) of this PoA is **enso hydro GmbH**.

CME will have the following responsibilities with respect to the implementation of the proposed PoA:

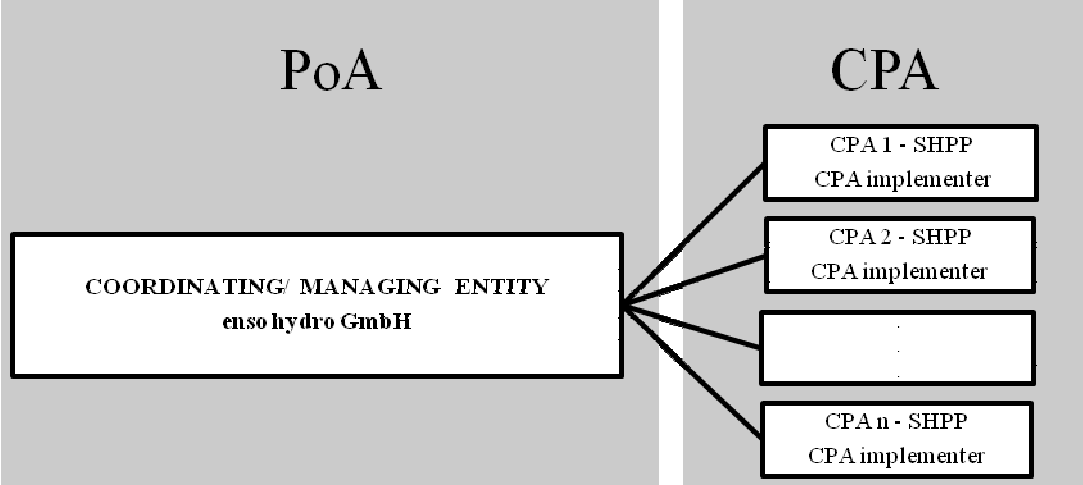
- Identifying the CPAs and evaluating their eligibility
- Creating PoA documentation (the CDM-PoA-DD and CDM-CPA-DD)
- Obtaining a Letter of Authorization from the host country
- Obtaining a Letter of Approval from the host country and the Annex I Party involved
- Communicating with and providing assistance and trainings for the CPAs implementers
- Coordinating the monitoring activities and managing the data
- Drafting monitoring reports for all CPAs in accordance with the methodology outlined in the PoA DD
- Coordinating and communicating with the validator, verifier and the CDM Executive Board
- Requesting the UNFCCC to issue CERs

CME will enter into contractual agreements with the individual owner(s) of the small hydro power plants(s) at the time of inclusion of CPA under the PoA[1].

The overall structure of the proposed scheme is given in Figure 1 below:

[1] As per „Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities, Version 02.1 (EB 70), paragraph 21, the time of CPA inclusion under the PoA is specified as follows: *The CPAs shall may be included in the PoA on the basis that the DOE has confirmed the eligibility of the CPAs where applicable undertaking sample-based checks in accordance with the approved guidelines/standard form approved by the Board.*

Figure 1: Structure of the proposed Programme of Activities



CPA implementers who will operate CPAs under the PoA may be private or public sector entities. Ownership of each CPA will be defined at the CPA level and contractual agreements of CPA implementers with CME will be in place before inclusion of the respective CPA.
CME may construct its own SHPP, too, and act as CPA implementer. If such will be the case, an internal company staff/unit will be assigned as responsible for the CPA and it will act as CPA implementer, fulfilling all the requirements described in the PoA-DD and CPA-DD.

In addition to the CME the following companies are project participants in the PoA:

- Energy Changes Projektentwicklung GmbH
- denkstatt GmbH

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Albania (host)	**enso hydro GmbH**	No
Austria	**enso hydro GmbH** **Energy Changes Projektentwicklung GmbH** **denkstatt GmbH**	No

A.5. Physical/ Geographical boundary of the PoA

>> The geographical boundary of the PoA extends up to the physical boundary of the Republic of Albania.

A.6. Technologies/measures

>> The proposed PoA is a small scale CDM project activity, and falls under:

Type	I. - Renewable energy projects
Scale	Small scale (under 15 MW of installed capacity)
Applicable methodology	AMS-I.D. Grid connected renewable electricity generation
Version	17, (EB 61)
Technology/measure	1. Installing a new renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant), 2. New renewable power plant will be supplying electricity to a national or a regional grid 3. New renewable power plant will be run-of-river small hydro power plant and/or small hydro power plant with reservoir 4. If small hydro power plants with reservoirs then • implemented in an existing reservoir with no change in the volume of the reservoir; or 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 of the applied methodology, is greater than 4 W/m^2; or implementing new reservoir and the power density of the power plant, as per definitions given in the project emissions section of the applied methodology, is greater than 4 W/m^2

A.7. Public funding of PoA

>> There is no public funding from an Annex I country involved in the proposed PoA.

SECTION B. Demonstration of additionality and development of eligibility criteria
B.1. Demonstration of additionality for PoA
>> The following is demonstrated in this section:

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

The implementation of hydro power projects or any renewable power projects is not mandatory in the Republic of Albania. No obligation exists for any entity to develop a PoA in any of these countries, either. The proposed PoA is a voluntary initiative conceived by **enso hydro GmbH** in order to stimulate sustainable development through renewable energy utilization in Albania. The PoA has been conceived in order to enable, simplify and support the small hydro power development in Albania. The proposed PoA can therefore be regarded as a voluntary coordinated action.

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

According to the PoA Standard, Paragraph 7, *the additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur.*

The "Clarifications Regarding the Procedures for Registration of a Programme of Activities as a Single CDM Project Activity And Issuance of Certified Emission Reductions for a Programme Of Activities", (EB 60 Annex 26)[2], clarifies that *a full additionality assessment is not required in the context of component project activities, rather the confirmation of additionality for CPAs should be conducted by means of the eligibility criteria.*

Therefore each small scale CPA included under the proposed PoA shall clearly demonstrate its additionality by means of eligibility criteria which are derived from Guidelines on the demonstration of additionality of small scale project activities Version 09 (EB 68)[3] (formerly known as Attachment A to Appendix B of the simplified modalities and procedures for small scale CDM project activities), *"Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:*

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher."

Furthermore, the following documents are considered for further guidance and guidelines:
(a) "Non-binding best practice examples to demonstrate additionality for SSC project activities" (EB 35, Annex 34),[4]
(b) "Guidelines for demonstrating additionality of microscale project activities", currently Version 04.0 (EB 68, Annex 26)[5]

[2] http://cdm.unfccc.int/Reference/Guidclarif/PoA/poa_guid06.pdf
[3] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf
[4] http://cdm.unfccc.int/EB/035/eb35_repan34.pdf
[5] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid22.pdf

Additionally in the case investment barrier is chosen to determine the eligibility criterion the relevant sections of the following tool and guideline shall be taken into account:

(c) „Tool for the demonstration and assessment of additionality“ Version 07.0.0 (EB 70, Annex 08)[6]
(d) “Guidelines on the assessment of investment analysis” Version 05 (EB 62, Annex 05)[7]

Thus, by demonstrating the additionality of each CPA included in the PoA it is established that in the absence of the CDM PoA, none of the CPAs included in the PoA would occur.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;
The implementation of small hydro power technology is not mandatory in Albania. The proposed PoA is a voluntary action.

(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.
The implementation of small hydro power technology is not mandatory in Albania. The proposed PoA is a voluntary action.

As it is demonstrated above, the GHG emissions reduction through the replacement of grid electricity by generation of electricity from hydro power is not mandatory in Albania and would not be implemented as part of the policy/regulation enforcement and each CPA included in the PoA will demonstrate its additionality. Thus it is demonstrated that the proposed PoA is additional.

B.2. Eligibility criteria for inclusion of a CPA in the PoA
>> The eligibility criteria for inclusion of a CPA in the PoA are based on the requirements of the “Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities”, Version 02.1 (EB 70)[8]; further on referred to as “PoA Standard”. By using this PoA Standard it is demonstrated that all the CPAs that are in compliance with the additionality-related eligibility criteria set below will ensure that all the relevant additionality-related guideline, tools or any requirements embedded in the methodologies are met.

A CPA is eligible for inclusion under the PoA, provided that the CPA fulfils the following criteria, demonstrated through the listed evidences for each eligibility criteria, as follows:

	Eligibility criterion:	**Reference to requirements in the relevant Standard[9]:**
1	Only a CPA installed within the boundaries of Republic of Albania as they may exist at the time of CPA shall be eligible for inclusion under the PoA.	(a) The geographical boundary of the CPA including any time-induced boundary [10] is consistent with the geographical boundary set in the PoA
2	Only a CPA uniquely identified and defined in an unambiguous manner shall be eligible for inclusion under the PoA. There must be no other CDM project activity registered with the same	(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)

[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[7] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[8] http://cdm.unfccc.int/Reference/Standards/meth/meth_stan04.pdf
[9] http://cdm.unfccc.int/Reference/Standards/meth/meth_stan04.pdf
[10] *For example, an emission factor for electricity generation is dependent on the boundaries of regional or state or sub-regional grids.*

	identification data.	
3	Only a CPA that employs a hydro power technology with total installed capacity equal or below 15 MW throughout the whole crediting period shall be eligible for inclusion under the PoA. CPAs included in this PoA shall be a small scale project activity (5 to 15 MW) or a microscale project activity (up to 5 MW). Only a CPA that employs a hydro power technology with total installed capacity equal or below 5 MW shall be eligible for application of micro-scale approach under the UNFCCC.	(c) The specifications of technology/measure including the level and type of service, performance specification including compliance with testing/certifications (k) Where applicable, the conditions that ensure that CPA in aggregate meets the small-scale or micro-scale threshold criteria (please refer to the latest approved version of the Guidelines for demonstrating additionality of microscale project activities and the latest approved version of the General Guidelines to SSC CDM methodologies) and remain within those thresholds throughout the crediting period of the CPA
4	Only a CPA with the starting date on the day or later of the start of validation of the PoA (uploading for global stakeholders comments on the UNFCCC web site) shall be eligible for inclusion under the PoA.	(d) Conditions to check the start date of the CPA through documentary evidence
5	Only a CPA complying with the applicability criteria of the methodology AMS-I.D., Version 17 (EB 61) shall be eligible for inclusion under the PoA. Criteria as per the methodology AMS-I.D., Version 17 (EB 61): 2. Only a CPA connected to the Albanian electricity grid shall be eligible for inclusion under the PoA 3. If the CPA is a small hydro power plant with reservoir: Only the CPA fulfilling one of the following conditions shall be eligible for inclusion under the PoA: 3.1. The project activity is implemented in an existing reservoir with no change in the volume of the reservoir; 3.2. 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 of the applied methodology, is greater than 4 W/m^2; 3.3. The project activity is	(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs

	implementing new reservoir and the power density of the power plant, as per definitions given in the project emissions section of the applied methodology, is greater than 4 W/m^2.	
6	1. Only a CPA that clearly demonstrates its additionality shall be eligible for inclusion under the PoA. 2.1. If the CPA is a micro scale project activity, the "Guidelines for demonstrating additionality of microscale project activities" shall be applied. 2.2. If the CPA is a small scale project activity, the "Guidelines on the demonstration of additionality of small scale project activities" shall be applied.	(f) The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality
7	1. Only a CPA that undertakes the environmental analysis as per requirements of the CDM modalities and procedures shall be eligible for inclusion under the PoA. Only a CPA that performs the environmental impact analysis (EIA) in accordance with the Albanian laws/regulations if it is required shall be eligible for inclusion under the PoA. 2. Only a CPA that has conducted the stakeholder involvement process and that has taken into the due account all the concerns raised during the process shall be eligible for inclusion under the PoA. 3. Only a CPA that installs new power generation equipment in the small hydropower plants shall be eligible under the PoA. No power generation equipment may be transferred from other existing facilities.	(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis[11]
8	Only a CPA that has not/will not receive any public funding from Annex I country or the funding is not a diversion from the Official Development Aid (ODA) shall be eligible for inclusion under the PoA.	(h) Conditions to provide an affirmation that funding from Annex I parties, if any; does not result in a diversion of official development assistance.
9	1. For small scale CPAs: only a CPA which consists of (a) single small project activity(ies) and is not a debundled component of a large scale	(l) Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories

[11] *See also paragraph 6 (m) of "Procedures for registration of a programme of activities as a single CDM project activity and issuance of CERs for a PoA"*

	project activity shall be eligible for inclusion under the proposed PoA. 2. For micro scale CPAs: only a CPA which consists of (a) single micro scale project activity(ies) and is not a debundled component of a small scale project activity shall be eligible for inclusion under the proposed.	

Paragraphs 14 i) and j) are not applicable for the proposed PoA.

Updating the eligibility criteria

According to the Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities, currently Version 02.1 (EB 70)[12], (further on referred to as "PoA Standard"), if the version of methodology AMS-I.D. applied by the proposed PoA is revised or replaced, subsequent to being placed on hold, the CME shall update the eligibility criteria to the requirements of the revised or new methodology/ies with immediate effect and include them in a new version of the PoA-DD (e.g. version 1.1), validate it by a DOE, and shall submit it to the Board for approval.

B.3. Application of methodologies

>> The following approved baseline and monitoring methodology applies to all CPAs that will be included in the PoA:

Title : AMS-I.D. Grid connected renewable electricity generation
Version : 17, (EB 61)
Reference : http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC/CDM.

In case the applied approved methodology is put on hold or withdrawn, no new CPAs will be added to the PoA in accordance with the timelines indicated in latest version of the "Procedures for the revision of an approved baseline and monitoring methodology by the EB", currently Version 09 (EB 35, Annex 13)[13].

If the methodology is subsequently revised, the CDM-PoA-DD must be revised accordingly and validated by a DOE and approved by the EB that will define the new version of the PoA and the PoA specific CDM-CPA-DD. Such revisions are not required in cases where a methodology is revised without being placed on hold or withdrawn.

The following technology/measures are applied by the CPAs under this PoA:

1. Installing a new renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant),
2. New renewable power plant will be supplying electricity to a national or a regional grid
3. New renewable power plant will be run-of-river small hydro power plant and/or small hydro power plant with reservoir
4. If small hydro power plants with reservoirs then implemented in an existing reservoir with no change in the volume of the reservoir; or 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 of the applied methodology, is greater than 4 W/m^2; or implementing new reservoir and the power density of the power plant, as per definitions given in the project emissions section of the applied methodology, is greater than 4 W/m^2

[12] http://cdm.unfccc.int/Reference/Standards/meth/meth_stan04.pdf
[13] http://cdm.unfccc.int/Reference/Procedures/meth_proc03_ver09.pdf

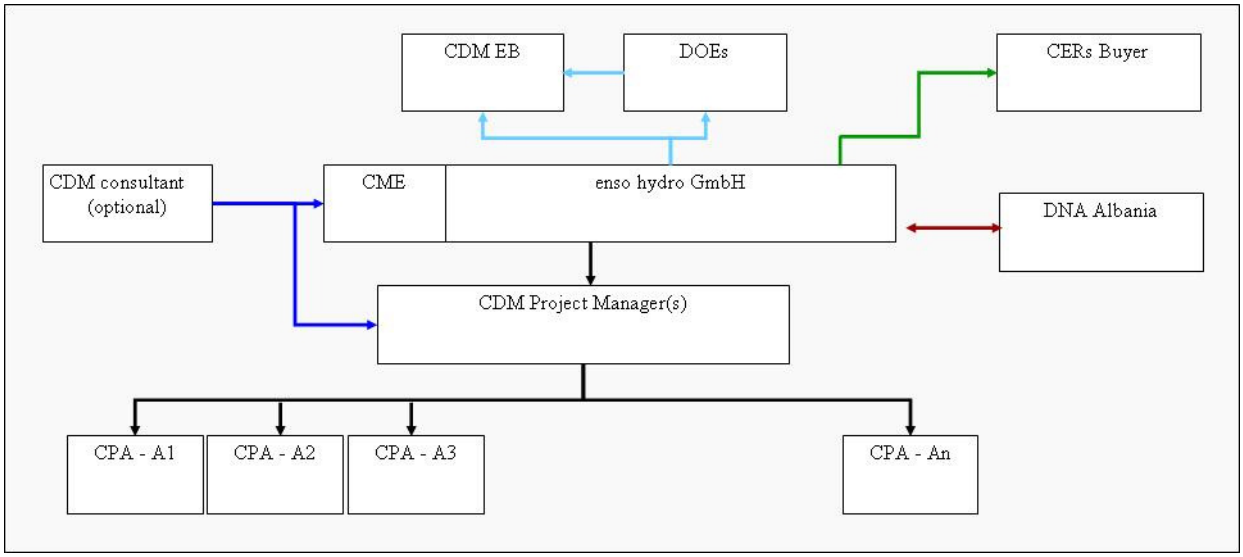
SECTION C. Management system

>> enso hydro GmbH as the coordinating/managing entity of the PoA will be in charge of coordinating the project participants, collecting the monitoring data and communicating with DOEs and CDM Executive Board. The CME will build appropriate in-house CDM capacity for PoA management and CPA inclusions and it will ensure proper capacity building for CPA implementers, too.

The operational and management arrangements to be established at the CME level are described in this section.

Arrangements/structures to be established at the CPA level are described in Part II, Section B.7.2. of this PoA-DD.

Organisational structure of the PoA:



Operational/management arrangements established by CME for implementation of the proposed PoA include:

(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 of this PoA is a single company. Therefore management of **enso hydro GmbH** will be responsible for implementation of the PoA.

The CME will assign the tasks to individual personnel and/or hire new (internal employees or external consultants) if needed after the PoA gets registered at UNFCCC. Some of the positions or tasks may be outsourced by external experts.

CDM team within the company shall be established and tasks assigned as described below. CME will hire additional CDM Project Managers when needed.

Position	Responsibilities & competencies
enso hydro GmbH management	• Secures Training for the CDM team • Secures the legal and economical issues (contracts, invoices, etc.) • Secures external CDM consultant (optional) • Keeps personal files of the staff (on training and education) • Trades the CERs
CDM Project Manager	• Identifies and evaluates new CPAs • Ensures that all requirements and eligibility criteria are met by all assigned CPAs • Keeps a database of CPAs (PoA database)

	• Communicates with CPA implementers • Provides training for CPA implementers • Collects monitoring data from CPAs • Prepares monitoring reports for emission reductions verification • Supports validation, registration and verification of the CPA(s) • Ensures that all requirements, applicability criteria are met by the PoA • Controls the methodology & tools changes, makes amendments to PoA-DD as required • Quality control, reporting to management, suggestions and improvements

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

All training and education records of the employees are stored in personal employee´s file of the company.

(c) Procedures for technical review of inclusion of CPAs

Responsible person (CDM Project Manager) shall verify that the CPA complies with conditions and justifies the compliance by documentation/evidence, as listed in Part II, Section B.5 of this PoA-DD.

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

In order to avoid double counting the CME will confirm, as per EB 55 Annex 38 Paragraph 6(i), that the project activity included in the CPA is not registered in any other CPA of the PoA or any other registered CDM Project activity through the following procedure:

- At the time of CPA eligibility check, CME (CDM Project Manager) will perform thorough control to identify any double counting conflict on internal PoA level and external CDM level, as follows:

  <u>Internal double counting check:</u> The PoA database as described above will not enable duplicate entries of the GPS coordinates which are unique for each CPA. Thus it will be ensured that one turbine is not included in more than one CPA and that one CPA is not included in the PoA more than once.

  <u>External double counting check:</u> CME (CDM Project Manager) will perform a control using the public information sources such as UNFCCC website data, UNEP Risoe CD4CDM data, the VCS website, etc. and confirm that the CPA is not registered as a CPA of other PoA or as any other registered CDM project activity.

- At the time of inclusion, CPA implementer shall sign a contract with CME, amongst other confirming that the CPA implementer will not register the particular SHPP or its turbine/s as a single CDM project activity or as a CPA under another PoA.

Should a case occur that the turbine and/or the CPA is registered in other CPA of the PoA or other registered CDM project activity or that the CPA implementer fails to sign the contract then the CME will not proceed with inclusion of the corresponding CPA into the proposed PoA.

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

In order to ensure transparency and high quality of the information and documentation managed by CME the record keeping system for every CPA and the overall PoA database is specially designed.

Record keeping system for each CPA:

In order to unambiguously identify each small hydro power plant enrolled in the PoA the CME shall develop a serial number system and assign a unique serial number to each CPA. The serial number shall consist of letters and numbers and it will uniquely distinguish each CPA from the others.
This serial coding system shall be used to keep the PoA database. The database will be used to record the baseline and monitoring data continuously and to track the emission reductions of each CPA during the crediting period(s). CME will be responsible for management of records and data related to each CPA. The database will be kept electronically and on paper if appropriate (e.g. documentation and evidence) and it will constitute the basis for the verification by the DOE.
The data recorded and documented by CME in the PoA database:

- Serial number of the CPA
- Name of the CPA implementer, address, contacts
- Exact CPA Location: City/State/Province, GPS coordinate/s of the turbine/s
- Commissioning date of the small hydro power plant and of each turbine and generator
- Start date and end date of each crediting period
- Technical specification of each SHPP (type, make, model, installed capacity, year, etc.)
- End dates of operation permits, if applicable
- Monitored parameters
- Verification status

A record-keeping system will be established by each CPA implementer, too.
CPA implementer shall monitor and record the plant data. The plant data monitoring will primarily include the measurement of electricity supplied to the grid and electricity imported from the grid (consumed) by each CPA. The CPA implementer will report the monitored parameters to the CME Project Manager.

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

Management system of the PoA shall be continuously reviewed by all involved personnel in order to identify any potential weaknesses, threats and their elimination as well as opportunities for improvement. All personnel will be encouraged to raise their comments and suggestions to the CDM Project Manager or to the management board directly. CDM Project Manager or selected representative of the company management shall then execute detailed discussion with all involved in order to find the solution. If necessary, he will assign financial and/or human resources identify the responsible person to perform the actions and report about the results.
"Prevention before remedy" approach will be favoured.

(g) Any other relevant elements

1. Justification that the SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

According to the Guidelines on assessment of debundling for SSC project activities, Version 03, (EB 54, Annex 13)[14], Section II "Guidance for determining the occurrence of debundling under a programme of activities (PoA), *a proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity[15], which satisfies both conditions (a) and (b) below:*

(a) 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) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

[14] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf

[15] *Which 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.*

If a proposed small-scale CPA of a PoA is deemed to be a debundled component in accordance with paragraph 2 above, but the total size of such a 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 and small-scale A/R project activities as set out in Annex II of the decision 4/CMP.1 and 5/CMP.1 respectively, the CPA of a PoA can qualify to use simplified modalities and procedures for small-scale CDM and small-scale A/R CDM project activities.

In order to exclude the de-bundling, at the time of inclusion of each CPA:

- The CME (management) shall check and confirm that it is not managing a large scale PoA of the same technology/measure within 1 km of this CPA´s project boundary, in the same project category and with the same technology, and
- The CME (CDM Project Manager) shall check and confirm that CPA implementer is not already implementing a project activity of the same technology/measure within 1 km of this CPA´s project boundary, in the same project category and with the same technology.

Should a case occur that any of the two requirements is not met then the CME will not proceed with inclusion of the corresponding CPA into the proposed PoA.
Thus it shall be ensured for each CPA included under the PoA that it is not a debundled component of a large scale project activity.

2. *The CPA implementers are aware and have agreed that their activity is being subscribed to the PoA:*

The CPA implementer involved in any of the CPAs under this programme of activities shall confirm this by signing a contract with CME, as mentioned above.
Before inclusion of the CPA in the PoA the CPA implementer shall enter in to this contractual agreement with the CME, confirming that:

- The CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA.
- The CPA implementer is aware that the CPA will be subscribed to the present PoA.

SECTION D. Duration of PoA

D.1. Start date of PoA

>>
Starting date of the PoA is the day of uploading of the CDM-PoA-DD to UNFCCC web site for global stakeholders' comments.
The start date of the proposed PoA is 16/05/2012.

D.2. Length of the PoA

>> 28 years 0 months
As per the "Procedures for registration of a programme of activities as a single CDM project activity and issuance of certified emission reductions for a programme of activities", Version 04.1 (EB 55), Annex 38[16] *the length of the PoA shall not exceed 28 years*.

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

>> Environmental Analysis is done at SSC-CPA level
Projects (CPAs) are unique in their national and technical conditions and therefore the EIA shall be undertaken for each CPA separately.

[16] http://cdm.unfccc.int/Reference/Procedures/PoA_proc01.pdf

E.2. Analysis of the environmental impacts
>> The environmental impact assessment/analysis will be done at the CPA level and it will be described in detail in the CPA-DD.
EIAs of all individual CPAs shall be carried out in accordance with national legislation of Albania.

SECTION F. Local stakeholder comments
F.1. Solicitation of comments from local stakeholders
>> The Local Stakeholder Consultations will be held at the CPA level, taking into consideration the variability of national and technical conditions of CPAs.
CPA implementer with CME assistance shall:

- invite local stakeholders to provide comments on the proposed CPA and shall demonstrate how due steps/actions were taken to appropriately engage stakeholders and solicit comments,
- invite comments from local stakeholders in an open and transparent manner, in a way that facilitates comments to be received from local stakeholders and allows for a reasonable time for comments to be submitted. CPA implementer shall describe the proposed CPA in a manner that allows the local stakeholders to understand it, prepare a summary of the comments received from local stakeholders, demonstrate that all comments received for the proposed CPA have been considered, complete the local stakeholder consultation process before submitting the proposed CPA to a DOE for validation.

F.2. Summary of comments received
>> The Local Stakeholder Consultations will be held at the CPA level, taking into consideration the variability of national and technical conditions of CPAs.

F.3. Report on consideration of comments received
>> The Local Stakeholder Consultations will be held at the CPA level, taking into consideration the variability of national and technical conditions of CPAs.

SECTION G. Approval and authorization
>> As per Section F of the "Clean Development mechanism project standard", at the time of submission of this PoA-DD to the DOE for registration it is the Version 02.1, EB 70, Annex 02, the project participants shall obtain a letter of approval from the DNA of each Party involved in the proposed CDM project activity confirming that[17]:

(a) The Party is a Party to the Kyoto Protocol;

(b) Participation in the proposed CDM project activity is voluntary;

(c) Project participants are authorized to participate in the proposed CDM project activity.

In addition, for project participants from the host Party, the letter of approval shall also confirm that the proposed CDM project activity assists the host Party in achieving sustainable development.

Under the current regulations from the DNA in Albania, no approval of individual CPAs is required.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA
A.1. Purpose and general description of generic CPAs
>> A typical CPA under this PoA:

[17] *At the time of making the PDD public at the stage of validation, a Party involved may or may not have provided its approval of the proposed CDM project activity, but by the time of requesting registration, approval from all Parties involved shall be obtained.*

- Is a new, greenfield hydro power plant,
- Is located within the boundary of Republic of Albania,
- Consists of one or more hydro power plants/units,
- Is run-of-river hydro power plant or a hydropower plant with reservoir,
- Has a total installed capacity of no more than 15 MW,
- Supplies the generated electricity to the Albanian electricity grid
- Will result in an increased share of renewable energy utilization and reduction of carbon intensity of energy production in Albania.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

>> The following approved baseline and monitoring methodology applies to all CPAs that will be included in the PoA:

Title : AMS-I.D. Grid connected renewable electricity generation
Version : 17, (EB 61)
Reference : *http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X*

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC/CDM.

In case the applied approved methodology is put on hold or withdrawn, no new CPAs will be added to the PoA in accordance with the timelines indicated in latest version of the "Procedures for the revision of an approved baseline and monitoring methodology by the EB", currently Version 09 (EB 35, Annex 13)[18].

If the methodology is subsequently revised, the CDM-PoA-DD must be revised accordingly and validated by a DOE and approved by the EB that will define the new version of the PoA and the PoA specific CDM-CPA-DD. Such revisions are not required in cases where a methodology is revised without being placed on hold or withdrawn.

The approved methodology also refers to

- the latest approved versions of the "Tool to calculate the emission factor for an electricity system"; and
- the most recent version of "ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources", at the time of submission of this PoA to the DOE for validation it is Version 13.0.0 (EB 67)[19]
- "General guidelines to SSC CDM methodologies", at the time of submission of this PoA to the DOE for registration it is Version 19 (EB 69)[20]"

The additionality of the CPAs shall be demonstrated and assessed according to the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities", at the time of submission of this PoA to the DOE for validation it is Version 02.1 (EB 70)[21]

[18] *http://cdm.unfccc.int/Reference/Procedures/meth_proc03_ver09.pdf*
[19] *http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT*
[20] *http://cdm.unfccc.int/EB/index.html (Annex 27 of EB 69)*
[21] *http://cdm.unfccc.int/Reference/Standards/meth/meth_stan04.pdf*

The PoA follows:

- "Procedures for registration of a programme of activities as a single CDM project activity and issuance of certified emission reductions for a programme of activities", at the time of submission of this PoA-DD to the DOE for validation it is Version 04.1, EB 55, Annex 38[22],
- "Clean Development mechanism project standard", at the time of submission of this PoA-DD to the DOE for validation it is the Version 02.1, EB 70, Annex 02[23]

B.2. Application of methodology(ies)

>>

The methodology AMS-I.D.- "Grid connected renewable electricity generation" has been applied since it relates to grid-connected electricity generation from renewable sources and since it is foreseen that the total installed capacity of each CPA shall not overcome the small scale threshold of 15 MW. The applicability criteria of the methodology, along with component project activity eligibility criteria (Section B.5., criterion (e)), are provided in the table below:

Applicability condition	Justification
1. & 2. 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."*	The proposed CPAs will install a renewable energy generation units – small hydro power plants. The electricity generated by the CPA SHPP plants will be supplied into the electricity grid of Albania.
3. This methodology is applicable to project activities that: *(a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);* *(b) Involve a capacity addition;* *(c) Involve a retrofit of (an) existing plant(s); or* *(d) Involve a replacement of (an) existing plant(s).*	The CPAs under this PoA will install SHPPs (a) at sites where there was no renewable energy power plant operating before (greenfield plants)
4. Hydro power plants with reservoirs that satisfy at least one of the listed conditions are eligible to apply this methodology: *(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 CPAs under this PoA will install SHPPs either run-of-river type or the type with reservoir. In case of run-of-river hydropower plants, this condition is not applicable. In case of hydropower plants with reservoir, the individual CPAs will comply with the conditions indicated in the methodology in order to be eligible under the proposed programme of activities:

[22] http://cdm.unfccc.int/Reference/Procedures/PoA_proc01.pdf
[23] http://cdm.unfccc.int/Reference/Standards/pp/pp_stan01.pdf

the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; *(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/m^2*	(a) Will be implemented in an existing reservoir with no change in the volume of the reservoir; or (b) Will be implemented in an existing reservoir and the change in the power density is over 4W/m^2; or (c) Will result in a new reservoir with power density over 4W/m^2.
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.	The CPAs of the proposed PoA will have only a renewable component and it is within the 15 MW limit for a small-scale CDM project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	Not relevant: the CPAs included under the proposed PoA project activity are not co-generation systems.
7. In the case of project activities that involve the 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 distinct from the existing units.	Not relevant: all the CPAs will be greenfield power plants.
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not relevant: none of the CPA included under the proposed PoA will be retrofit or a replacement project.

NOTE: In the case of CPAs which individually do not exceed the SSC threshold, SSC methodologies may be used once they have first been reviewed and, as needed, revised to account for leakage in the context of a SSC-CPA.

B.3. Sources and GHGs

>> As per methodology AMS-I.D., Version 17 (EB 61), *the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to*.
The baseline includes the emissions related to the electricity produced by the facilities and power plants to be displaced by the CPA. This involves emissions from displaced fossil fuel use at power plants connected to the electricity grid of Albania (including the off-grid power plants).

For technologies/measures see also section A.6 of Part I of the underlying document.

Table below illustrates the emission sources and gases included in the project boundary for the purpose of calculating project emissions and baseline emissions:

	Source	Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	Emissions from water reservoirs from hydro power plants	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source if CPA is hydro power plant with reservoir
		N_2O	No	Minor emission source
	Emissions related to the operation of geothermal power plants	CO_2	No	Not applicable, no geothermal power plant
		CH_4	No	Not applicable, no geothermal power plant
		N_2O	No	Not applicable, no geothermal power plant
	CO_2 emissions from on-site consumption of fossil fuels due to the project activity	CO_2	No	Not applicable, no fossil fuel consumption
		CH_4	No	No
		N_2O	No	No

B.4. Description of baseline scenario

>> As per AMS.I.D, Version 17 (EB 61), paragraph 10, the baseline scenario is prescribed as follows: "*If the project activity is the installation of a new grid connected renewable power plant/unit, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources*".

Baseline emissions of a CPA are calculated using the grid emission factor that reflects the existing power plants' consumption of fossil fuels and expected electricity generation of the power plants implemented by the CPA.

B.5. Demonstration of eligibility for a generic CPA

>> A CPA is eligible for inclusion under the PoA, provided that the CPA fulfils the following criteria, demonstrated through the listed evidences for each eligibility criteria, as follows:

1	**Eligibility criterion:** Only a CPA installed within the boundaries of Republic of Albania as they may exist at the time of CPA shall be eligible for inclusion under the PoA.
	Evidence for demonstration of CPA compliance with criterion: 1. GPS coordinates of the CPA 2. Map of the respective country with marked location of the project activity

2	**Eligibility criterion:** Only a CPA uniquely identified and defined in an unambiguous manner shall be eligible for inclusion under the PoA. There must be no other CDM project activity registered with the same identification data.
	Evidence for demonstration of CPA compliance with criterion: 1. UNFCCC web site check at the time of CPA inclusion under the PoA by the CME and confirmation that the CPA is not registered as a part of any other PoA or as an individual CDM

	project 2. Unique identification of the CPA, unique CPA code which shall be assigned to the CPA (when the CPA is included under the PoA) entered into the PoA database, containing data: • Name of the CPA implementer (SHPP owner), • Exact CPA location: State/Province/City/GPS coordinates, • Commissioning date of the SHPP (expected date if the SHPP is not commissioned yet), • Expected start date/end date of crediting period(s), • Installed capacity of each power unit 3. Alternatively, a protocol/ report of the CME´s own site visit to the location

3	**Eligibility criterion:** Only a CPA that employs a hydro power technology with total installed capacity equal or below 15 MW throughout the whole crediting period shall be eligible for inclusion under the PoA. CPAs included in this PoA shall be a small scale project activity (5 to 15 MW) or a microscale project activity (up to 5 MW). Only a CPA that employs a hydro power technology with total installed capacity equal or below 5 MW shall be eligible for application of micro-scale approach under the UNFCCC.
	Evidence for demonstration of CPA compliance with criterion: Provided evidence as appropriate and available, e.g. technical project report, technical project design, technology description from the manufacturer

4	**Eligibility criterion:** Only a CPA with the starting date on the day or later of the start of validation of the PoA (uploading for global stakeholders comments on the UNFCCC web site) shall be eligible for inclusion under the PoA.
	Evidence for demonstration of CPA compliance with criterion: Check by CME, comparison of the dates and confirmation that the start date of the CPA (date when the technology has been/will be ordered/purchased) is/will be after the start date of the PoA

5	**Eligibility criterion:** 1. Only a CPA using the methodology AMS-I.D., Version 17 (EB 61)and complying with its applicability criteria at the time of CPA application for inclusion under the PoA shall be eligible for inclusion under the PoA. Criteria as per the methodology AMS-I.D., currently Version 17 (EB 61): 2. Only a CPA connected to the Albanian electricity grid shall be eligible for inclusion under the PoA 3. If the CPA is a small hydro power plant with reservoir: Only the CPA fulfilling one of the following conditions shall be eligible for inclusion under the PoA: 3.1. The project activity is implemented in an existing reservoir with no change in the volume of the reservoir; 3.2. 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 of the applied methodology, is greater than 4 W/m^2; 3.3. The project activity is implementing new reservoir and the power density of the power plant, as per definitions given in the project emissions section of the applied methodology, is greater than 4 W/m^2
	Evidence for demonstration of CPA compliance with criterion: 1. UNFCCC web site check at the time of CPA inclusion under the PoA by the CME and confirmation that a valid version of the methodology is used 2. Provided evidence as appropriate and available, e.g. preliminary grid feed-in approval, Power Purchase Agreement, or other respective agreement or contract of CPA with operator of the electricity grid, or Technical Project Report specifying the grid connection point, etc. 3. Provided evidence as appropriate and available, e.g. Technical Project Report and/or hydro

	power technology order, technology purchase, etc. 3.1. Technical Project Report or a respective document if the project activity is implemented in an existing reservoir with no change in the volume of the reservoir 3.2. & 3.3. Power density calculation by CME. The information and evidences for the demonstration of the power density will be made available for inspection by the DOE and information will be included in the CPA-DD.

6	**Eligibility criterion:** 1. Only a CPA that clearly demonstrates its additionality shall be eligible for inclusion under the PoA. 2.1. If the CPA is a micro scale project activity, the "Guidelines for demonstrating additionality of microscale project activities" shall be applied. 2.2. If the CPA is a small scale project activity, the "Guidelines on the demonstration of additionality of small scale project activities" shall be applied.
	Evidence for demonstration of CPA compliance with criterion: The procedures of the PoA Standard are correctly applied and the statements and assumptions are supported by reliable data sources and evidence, where appropriate. As per Decision 17/cp.7, paragraph 43, *a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity*. Additionality is being assessed and demonstrated at CPA level, individually for each CPA. Every CPA will provide an explanation showing that the project activity would not have occurred otherwise due to at least one of the following barriers below and that it is voluntarily coordinated and would not be implemented in the absence of CDM. The assessment and demonstration of additionality of the CPA will be described in the CPA-DD. A typical CPA included in this PoA is a small scale project activity or a microscale project activity. • For small scale CPAs (from 5 and up to 15 MW): The additionality shall be demonstrated in accordance with the Guidelines on the demonstration of additionality of small scale project activities, Version 09 (EB 68)[24] • For microscale CPAs (up to 5 MW): The additionality shall be demonstrated in accordance with the Guidelines for demonstrating additionality of microscale project activities", currently Version 04.0 (EB 68, Annex 26)[25] Details on demonstration of additionality to be applied by the CPAs are described in the Appendix 6 of this PoA-DD.

7	**Eligibility criterion:** 1. Only a CPA that undertakes the environmental analysis as per requirements of the CDM modalities and procedures shall be eligible for inclusion under the PoA. Only the CPA that performs the environmental impact analysis (EIA) in accordance with the Albanian laws/regulations if it is required shall be eligible for inclusion under the PoA. 2. Only a CPA that has conducted the stakeholder involvement process and that has taken into the due account all the concerns raised during the process shall be eligible for inclusion under the PoA. 3. Only a CPA that installs new power generation equipment in the small hydropower plants shall be eligible under the PoA. No power generation equipment may be transferred from other existing facilities.
	Evidence for demonstration of CPA compliance with criterion:

[24] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf
[25] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid22.pdf

	1. EIA report or description/explanation why the EIA is not performed. 2. Description of the stakeholder involvement process, summary of concerns raised and clarifications provided thereof, if applicable. 3. As appropriate and applicable: Technology orders, technology purchase.

8	**Eligibility criterion:** Only a CPA that has not/will not receive any public funding from Annex I country or the funding is not a diversion from the Official Development Aid (ODA) shall be eligible for inclusion under the PoA.
	Evidence for demonstration of CPA compliance with criterion: CPA implementer confirms to CME that no public funding from Annex I country is involved in the CPA. or Respective evidence on the received funding from Annex I country, check and confirmation of no ODA conflict by CME on individual, case-specific basis.

9	**Eligibility criterion:** 1. For small scale CPAs: only a CPA which consists of (a) single small project activity(ies) and is not a debundled component of a large scale project activity shall be eligible for inclusion under the proposed PoA. 2. For micro scale CPAs: only a CPA which consists of (a) single micro scale project activity(ies) and is not a debundled component of a small scale project activity shall be eligible for inclusion under the proposed.
	Evidence for demonstration of CPA compliance with criterion: Check of the UNFCCC web site by CME confirming that there is no existing activity which has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale (for micro scale CPAs: small scale) PoA of the same sectoral scope; or If there is activity described in point 1., its boundary is more than 1 km further from the proposed small/micro scale CPA, at the closest point; or If there is activity described in points 1. and 2., the total size of such an activity combined with the proposed small/micro scale CPA does not exceed the limits for small/micro scale CDM project activity

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

B.6.1. Explanation of methodological choices

>> **Calculation of Baseline Emissions**

According to the selected methodology AMS-I.D Version 17, paragraph 11: *The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.*

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$

(Equation 1, AMS-I.D., Version 17)

Where:

BE_y	Baseline emissions in year *y* (tCO_2)
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year *y* (tCO_2/MWh)

The quantity of net electricity supplied to the grid ($EG_{BL,y}$) will be calculated annually according to the on-site measurements in the small hydro power plant as the difference between the total (gross)

electricity generation of the project activity SHPP in the year *y* ($EG_{gross,y}$) and the electricity consumption of the project activity in the year *y* (electricity consumption by the auxiliary equipment at the plant: EC_y).

$$EG_{BL,y} = EG_{gross,y} - EC_y$$

(supportive equation)

Where:

$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EG_{gross,y}$	Quantity of the total (gross) electricity generation of the project activity SHPP in the year *y* (on-site measurements) (MWh)
EC_y	Quantity of the electricity consumption of the project activity in the year *y* (electricity consumption by the auxiliary equipment at the plant, on-site measurements) (MWh)

The grid emission factor:

According to the methodology AMS-I.D, Version 17, paragraph 12, *the grid emission factor (measured in tCO_2e/MWh) can be calculated in a transparent and conservative manner, as follows:*

(a) A 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",

OR

(b) The weighted average emissions (in tCO_2e/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The grid emission factor of the Albanian electricity grid is calculated according to the procedures prescribed in the UNFCCC methodological "Tool to calculate the emission factor for an electricity system", at the time of submission of this PoA-DD to DOE for validation the valid Version 2.1.0 (EB 60) (further on referred to as "GEF Tool")[26].

Both grid connected and the off-grid power plants are considered and the average OM method is applied for the calculation. The ex ante vintage option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

Calculation of the grid emission factor:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

(Equation 14, GEF Tool, Version 2.1.0)

Where:

$EF_{grid,CM,y}$	Combined margin emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build emissions factor (%)

Default values of $w_{OM} = 0.5$ *and* $w_{BM} = 0.5$ are applied. Details of methodological steps applied to GEFs calculations and the data used are provided in Appendix 4.

[26] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.1.0.pdf

According to paragraph 28 of the "Procedures for registration of a Programme of Activities as a single CDM Project Activity and Issuance of Certified Emission Reductions for a Programme of Activities", currently Version 04.1, (EB 55, Annex 38)[27], *the latest version of the "Procedures for Renewal of the Crediting Period of a Registered CDM project activity (currently Version 06.0, EB 63, Annex 29[28])" shall be applied, mutatis mutandis, to a PoA every seven years from the start date of the crediting period.*

In Annex 1 of these Procedures, "Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period" it is stated in step 1.4 that updates should be undertaken in the following cases:

- Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC;
- Where emission factors are used and determined only once for the crediting period, they should be updated, except if the emission factors are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity

The grid emission factor of the Albanian electricity grid is calculated ex-ante, once at the validation of the PoA and fixed for the first crediting period. During the first 7 years of the PoA the GEF fixed at validation shall be used by all CPAs included under the PoA and thus will be fixed for the first crediting period of the respective CPAs.
Then, the grid emission factor will be revised and updated at the point of the renewal of the crediting period of the PoA (every seven years) according to the applicable procedures.

Calculation of Project Emissions

According to AMS-I.D, Version 17, paragraph 20: *For most renewable energy the project activities, $PE_y = 0$.*
However, for the categories of project activities geothermal power plants and water reservoirs of the hydro power plants, project emissions have to be considered following the procedure described in the most recent version of ACM0002.
At the time of submission of this PoA-DD to DOE for validation the latest is Version 13.0.0.[29]

The project emissions accounted for according to methodology ACM 0002 are:

- Project emissions from fossil fuel consumption in year *y* (tCO_2)
- Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e)
- Emissions from water reservoirs of hydro power plants in year *y* (tCO_2e)

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

(Equation 1, ACM 0002, Version 13.0.0)

Where:

PE_y	Project emissions in year *y* (tCO_2e)
$PE_{FF,y}$	Project emissions from fossil fuel consumption in year *y* (tCO_2)
$PE_{GP,y}$	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e)
$PE_{HP,y}$	Emissions from water reservoirs of hydro power plants in year *y* (tCO_2e)

Only the emissions from water reservoirs are relevant for the proposed PoA, as follows: *For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that*

[27] http://cdm.unfccc.int/Reference/Procedures/PoA_proc01.pdf
[28] http://cdm.unfccc.int/Reference/Procedures/reg_proc04.pdf
[29] http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated per two alternatives:

a. <u>If the power density of the single or multiple reservoirs (*PD*) is greater than 4 W/m^2 and less than or equal to 10 W/m^2</u>

$$PE_{HP,y} = \frac{EF_{Res} * TEG_y}{1000}$$

(Equation 3, ACM 0002, Version 13.0.0)

Where:

$PE_{HP,y}$	Project emissions from reservoirs of hydro power plants in year *y* (tCO_2e)
EF_{Res}	Default emission factor for emissions from reservoirs of hydro power plants ($kgCO_2e/MWh$) As per decision by EB 23 $EF_{Res} = 90\ kgCO_2e/MWh$
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh)

b. <u>If the power density of the project activity (*PD*) is greater than 10 W/m^2</u>

$$PE_{HP,y} = 0$$

(Equation 4, ACM 0002, Version 13.0.0)

<u>Calculation of the power density of the project activity (*PD*):</u>

The power density of the project activity is calculated as comparison of the installed capacity before and after the implementation of the project and the area of the reservoir/s before and after the implementation of the project.

$$PD = \frac{cap_{PJ} - cap_{BL}}{A_{PJ} - A_{BL}}$$

(Equation 5, ACM 0002, Version 13.0.0)

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
A_{PJ}	Area of the single or multiple reservoirs 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 single or multiple reservoirs 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

<u>Calculation of Leakage Emissions</u>

According to AMS-I.D Version 17, paragraph 22: *if the energy generating equipment is transferred from another activity, leakage is to be considered.*

No power generating equipment will be transferred from another activity to any of the CPAs included in the proposed PoA and therefore no leakage is to be considered: $LE_y = 0$.

<u>Calculation of Emission Reductions</u>

Emission Reductions are calculated according to AMS-I.D Version 17, paragraph 23, as difference between baseline emissions and project emissions.

$$ER_y = BE_y - PE_y - LE_y$$

(Equation 10, AMS-I.D, Version 17)

Where:

ER_y	Emission reductions in year *y* (tCO_2/y)
BE_y	Baseline emissions in year *y* (tCO_2/y)
PE_y	Project emissions in year *y* (tCO_2/y)
LE_y	Leakage emissions in year $_y$ (tCO_2/y)

B.6.2. Data and parameters that are to be reported ex-ante

(Copy this table for each data and parameter.)

Data / Parameter	$EF_{CO2,grid,y}$ ($EF_{grid,CM}$)
Unit	tCO_2/MWh
Description	CO_2 emission factor of the grid in year *y*
Source of data	Calculated as Combined margin CO_2 emission factor for grid connected power generation in year *y* (tCO_2/MWh)
Value(s) applied	0.2836
Choice of data or Measurement methods and procedures	Calculated *ex ante* according to the GEF Tool, Version 02.1.0 (EB 60) for the years 2009 to 2011. Background data provided by the official source, see details in Appendix 4
Purpose of data	(i) Calculation of baseline emissions
Additional comment	The Albanian grid emission factor is determined once at the PoA validation stage, and fixed for the first 7 years of the PoA crediting period. Thus no monitoring and recalculation of the emissions factor for future CPAs is required during the first 7 years of the PoA. It will be used by all CPAs included into the PoA during the first 7 years of the PoA crediting period; and fixed for the first 7 years of the respective crediting period of these CPAs. The Albanian grid emission factor will be revised after 7 years of the PoA crediting period, and fixed and used accordingly.

Data / Parameter	cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data	As prescribed by methodology ACM 0002, currently Version 13.0.0 (EB67), for new power plants, this value is zero.
Value(s) applied	0
Choice of data or Measurement methods and procedures	The proposed CPA is newly built hydropower station. Therefore, based on the methodology, for new hydro power plants, this value is zero.
Purpose of data	(ii) Calculation of project emissions
Additional comment	Only applicable if the project activity is a SHPP with reservoir.

Data / Parameter	A_{BL}
Unit	m²
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	Technical documentation of the project, e.g. Technical Project Report. or measurement/calculation based on geographical data from credible sources; e.g.:topographical surveys, maps, satellite pictures, etc.
Value(s) applied	- Will be provided in each CPA-DD.
Choice of data or Measurement methods and procedures	If the value will not be available in the technical documentation of the project, it will be measured/calculated and it will be described in accordance with Guidelines for completing CPA-DD form for small-scale CPAs, Section D.6.2, letter (c).
Purpose of data	(ii) Calculation of project emissions
Additional comment	Only applicable if the project activity is a SHPP with reservoir

Data / Parameter	cap_{PJ}
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Technical documentation of the project
Value(s) applied	-
Measurement methods and procedures	Determined once for the whole lifetime of the CPA
Monitoring frequency	N/A
QA/QC procedures	N/A
Purpose of data	(ii) Calculation of the project emissions
Additional comment	Only applicable if the project activity is a SHPP with reservoir

B.6.3. Ex-ante calculations of emission reductions

>> To demonstrate the calculation of emission reductions generated by a CPA included under the proposed PoA, a hypothetical CPA with a new reservoir with parameters as follows:

Installed capacity: 10 MW
Operating hours per year: 4,000 hrs
Gross electricity generation per year: 40,000 MWh/y
Auxiliary consumption of electricity: 130 MWh/y
Net electricity generation: 39,870 MWh/y
Area of the reservoir: 100 m^2
Power density: greater than 4 W/m^2 and less than or equal to 10 W/m^2

The emission reductions calculation is then performed as follows:

Calculation of Baseline Emissions

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$ *(Equation 1, AMS-I.D., Version 17)*

$EF_{CO2,grid,y}$ = 0.2836 tCO_2/MWh
BE_y = 39,870 MWh/y * 0.2836 tCO2/MWh = 11,307 t CO_2/y

Calculation of Project Emissions

$$PE_{HP,y} = \frac{EF_{Res} * TEG_y}{1000}$$ *(Equation 3, ACM 0002, Version 13.0.0)*

As per decision by EB23: EF_{Res} = 90 $kgCO_2e/MWh$
$TEG_y = EG_{gross,y}$ = 40,000 MWh/y
$PE_{HP,y}$ = 90 $kgCO_2e/MWh$ * 40,000 MWh/y / 1000 = 3,600 tCO_2e/y

Calculation of Leakage Emissions

No power generating equipment will be transferred from another activity therefore $LE_y = 0$.

Calculation of Emission Reductions

$$ER_y = BE_y - PE_y - LE_y$$ *(Equation 10, AMS-I.D, Version 17)*

ER_y = 11,307 t CO_2/y - 3,600 tCO_2e/y - 0 t CO_2/y = 7,707 t CO_2/y

B.7. Application of the monitoring methodology and description of the monitoring plan
B.7.1. Data and parameters to be monitored by each generic CPA
(Copy this table for each data and parameter)

Data / Parameter	$EG_{BL,y}$
Unit	MWh/y
Description	Quantity of net electricity supplied to the grid as result of the implementation of the CDM project activity in the year *y*
Source of data	Calculated from the on-site measurements Calculated as the difference between the total (gross) electricity generation of the project activity in the year *y* ($EG_{gross,y}$) and the electricity consumption of the project activity in the year *y* (auxiliary electricity consumption at the SHPP: (EC_y)
Value(s) applied	(estimated value for the purpose of *ex-ante* emission reductions calculation)
Measurement methods and procedures	Calculated from the on-site measurements by electricity meter(s) at the point of feeding to the grid
Monitoring frequency	The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived electronically for 2 years following the end of the last crediting period.
QA/QC procedures	Measured data used to calculate the net electricity supplied to the grid will be cross-checked with electricity purchase and the invoices for consumed electricity from the grid operator. Measuring equipment will be properly calibrated and with proper accuracy, as described per each parameter individually
Purpose of data	(i) Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EG_{gross,y}$ $(=TEG_y)$
Unit	MWh/y
Description	Quantity of the total gross electricity generated and supplied by the project activity SHPP to the grid in the year *y*
Source of data	On-site measurements by electricity meter(s) installed at the point of feeding in to the grid
Value(s) applied	(value for ex ante estimation)
Measurement methods and procedures	Electricity meter(s) at the point of feeding into the grid
Monitoring frequency	The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived electronically for 2 years following the end of the last crediting period.
QA/QC procedures	The metering equipment will be properly calibrated in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to the relevant national/international calibration standard, as available. Calibration should be undertaken as prescribed in the relevant paragraph of "General Guidelines to SSC CDM Methodologies". The accuracy of the meter is not lower than national standards. Measured data used to calculate the net electricity supplied to the grid will be cross-checked with electricity purchase and the invoices for consumed electricity from the grid operator.
Purpose of data	(i) Calculation of baseline emissions
Additional comment	$EG_{gross,y} = TEG_y$ has to be monitored in case of small hydro power projects with reservoir.

Data / Parameter	EC_y
Unit	MWh/y
Description	Quantity of the electricity consumption by the project activity SHPP in the year *y*
Source of data	On-site measurements by electricity meter(s)
Value(s) applied	-
Measurement methods and procedures	Electricity meter(s) at the point of feeding into the grid
Monitoring frequency	The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived electronically for 2 years following the end of the last crediting period.
QA/QC procedures	The metering equipment will be properly calibrated in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to the relevant national calibration standard. The accuracy of the meter(s) will be in accordance with the national/international industry standards or grid operator´s requirements. Electricity consumed by the project activity will be imported from the grid and therefore it will be cross-checked with the electricity invoices from the grid operator.
Purpose of data	(i) Calculation of baseline emissions
Additional comment	-

Data / Parameter	A_{PJ}
Unit	m²
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	Technical documentation of the project, e.g. Technical Project Report and/or Land documents, etc. or measurement/calculation based on geographical data from credible sources; e.g.:topographical surveys, maps, satellite pictures, etc.
Value(s) applied	-
Measurement methods and procedures	Annual measured or calculated from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	(ii) Calculation of project emissions
Additional comment	Only applicable if the project activity is a SHPP with reservoirs

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

>> In the proposed PoA the Option (ii) is chosen, i.e. the CME opts for a verification method that does not use sampling but verifies each small scale CPA.

For each small scale CPA a monitoring plan and QA&QC measures will be prepared and described in the CPA-DD. The monitoring plan will outline the procedures for monitoring and recording of parameters as described in the Section B.7.1. above.

CPA implementer will be responsible for:

- operating the small hydro power plant,
- monitoring, recording and storing the data,
- reporting the data to the CME,
- arranging the maintenance and calibration of the monitoring equipment, as will be described in the monitoring plan of the CPA.

Data sources for the emergency situations when the measurement equipment fails shall be specified in the CPA-DD (e.g. back-up electricity meters, electricity invoices, or other official sources).

- - - - -

Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	enso hydro GmbH
Street/P.O. Box	Franz-Heresch-Strasse
Building	2
City	Wildon
State/Region	-
Postcode	8410
Country	Austria
Telephone	+43 (3182) 41395-810
Fax	+43 (3182) 41395-380
E-mail	office@enso.at
Website	http://www.enso.at
Contact person	Managing Director
Title	
Salutation	Mr.
Last name	Gillich
Middle name	-
First name	Stephan
Department	Management
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	Stephan.gillich@enso.at

Organization	denkstatt GmbH
Street/P.O. Box	Hietzinger Hauptstraße
Building	28
City	Vienna
State/Region	-
Postcode	1130
Country	Austria
Telephone	+43 1 786 89 00
Fax	+43 1 786 89 00 15
E-mail	office@denkstatt.at
Website	http://www.denkstatt.at
Contact person	Managing Partner
Title	
Salutation	Mr.
Last name	Plas
Middle name	-
First name	Christian
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	christian.plas@denkstatt.at

Organization	Energy Changes Projektentwicklung GmbH
Street/P.O. Box	Obere Donaustrasse
Building	12/28
City	Vienna
State/Region	-
Postcode	1020
Country	Austria
Telephone	+43 (1) 9684529
Fax	+43 (1) 9684529
E-mail	kontakt@energy-changes.com
Website	http://www.energy-changes.com
Contact person	Managing Partner
Title	
Salutation	Mr.
Last name	Plöchl
Middle name	-
First name	Clemens
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	clemens.ploechl@energy-changes.com

Appendix 2: Affirmation regarding public funding

No public funding from Annex 1 country is involved for the proposed PoA.

Appendix 3: Application of methodology(ies)

Application of the methodology is described in the Section B.3 of this PoA-DD.

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

1. Calculation of the GEF for the Albanian national grid:

According to the approved UNFCCC *"Tool to calculate the emission factor for an electricity system* (Version 02.1.0)", hereinafter referred to as the "Tool" the **Combined Margin** (CM) consists of the combination of **Operating Margin** (OM) and **Build Margin** (BM).

Sections taken from the *"Tool"* for explanation reasons are *in italic letters.*

The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Annex 2 - Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10% of the total capacity of grid power plants in the electricity system; or the total power generation by off-grid power plants (in MWh) should be at least 10% of the total power generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid is primarily due to constraints in generation and not to other aspects such as transmission capacity.

In the underlying calculation of the GEF for the national grid of Albania off- grid power plants are included. Under Step 4 of the Annex 2 of the "Tool" (see also Step 2 of the "Tool") it is required that the total power generation by off-grid power plants (in MWh) amounts to more than 10% of the total power generation by grid power plants in the electricity system for the year the off- grid study was done. The off- grid study was done for the year 2007.

Note that this tool is also referred to in the Tool to calculate project emissions from electricity consumption for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary.

If during operation of the hydropower project a situation will occur, where electricity is taken from the Albanian grid Scenario A; Option A1 of the *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)"* will be applied. However, this is currently considered unlikely.

Project participants shall apply the following seven steps:

STEP 1. Identify the relevant electric power system.
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional)
STEP 3. Select an operating margin (OM) method.
STEP 4. Calculate the operating margin emission factor according to the selected method.
STEP 5. Identify the cohort of power units to be included in the build margin (BM).
STEP 6. Calculate the build margin emission factor.
STEP 7. Calculate the combined margin (CM) emissions factor.

STEP 1. Identify the relevant electric power system.

*For determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. If the project electricity system is located partially or totally in Annex-I countries, then the tool is not applicable.*

The **project electricity system** is the national grid of Albania. The geographical boundary for the determination of the baseline emissions is therefore defined as the national grid of Albania and direct emissions from all generation sources serving the grid with inclusion of off- grid plants.

*Similarly, a **connected electricity system**, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. If a connected electricity system is located partially or totally in Annex-I countries, then the emission factor of that connected electricity system should be considered zero.*

*Electricity transfers from connected electricity systems to the project electricity system are defined as **electricity imports** and electricity transfers to connected electricity systems are defined as **electricity exports**.*

Electricity is imported to the **project electricity system** (national grid of Albania) from **connected electricity systems** (national grid of Greece, Kosovo/Serbia and Montenegro)[30]. According to the source ENTSOE.EU[31] there are also exports from the national grid to the above mentioned **connected electricity systems.**

*For the purpose of determining the build margin (BM) emission factor, the spatial extent is **limited to the project electricity system**, except where recent or likely future additions to transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.*

For the purpose of determining the operating margin (OM) emission factor, one of the following options should be used to determine the CO_2 emission factor(s) for net electricity imports ($EF_{grid,import,y}$) from a connected electricity system within the same host country(ies):

(a) 0 tCO_2/MWh, or

[30] https://www.entsoe.eu/resources/data-portal/exchange/
[31] https://www.entsoe.eu/resources/data-portal/exchange/

(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in step 3 (d) below; or

(c) The simple operating margin emission rate of the exporting grid, determined as described in step 3 (a), if the conditions for this method, as described in step 2 below, apply to the exporting grid; or

(d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in step 3 (b) below.

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tons CO_2 per MWh.

For both, electricity imports from the Annex I country Greece and non Annex I countries Kosovo/Serbia and Montenegro the emission factors are considered **0** tCO_2/MWh (see Option (a) from above).

*Electricity **exports** should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.*

Exports were not subtracted from the electricity generation for calculation of the Combined Margin (CM) Grid Emission Factor.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: *Only grid power plants are included in the calculation.*
Option II: *Both grid power plants and off-grid power plants are included in the calculation.*

Option I corresponds to the procedure contained in earlier versions of this tool. Option II allows the inclusion of off-grid power generation in the grid emission factor. Option II aims to reflect that in some countries off-grid power generation is significant and can partially be displaced by CDM project activities, e.g. if off-grid power plants are operated due to an unreliable and unstable electricity grid. Option II requires collecting data on off-grid power generation as per Annex 2 and can only be used if the conditions outlined therein are met. Option II may be chosen only for the operating margin emission factor or for both the build margin and the operating margin emission factor but not only for the build margin emission factor.

Option II is chosen and the off- grid electricity generation is taken into account <u>for both</u> the calculation of the build margin (BM) and the operating margin (OM) emission factor.

If Option II is chosen, off-grid power plants should be classified as per the guidance in Annex 2 in different classes of off-grid power plants. Each off-grid power plant class should be considered as one power plant j, k, m or n in the following steps, as applicable.

The classification as per the guidance in Annex 2 is applied accordingly. Each off-grid power plant class is considered as one power plant. In total 23 UNFCCC classes were identified during the off-grid survey (see guidance in Step 1.2 of the Annex 2 of the "Tool"). In the following table the during the off-grid survey determined UNFCCC classes are summarized.

Table 1: Identified UNFCCC off -grid classes

	Nominal capacity of off grid power plants in [kW]						
Diesel	CAP < 10	10 < CAP < 50	50 < CAP < 100	100 < CAP < 200	200 < CAP < 400	400 < CAP < 1000	CAP > 1000
Age (0-5)							
Age (6-10)							
Age (11-20)							
Gasoline							
Age (0-5)							
Age (6-10)							
Age (11-20)							

The only generation technology applied by the surveyed off- grid plants is the reciprocant engine system fuelled either by diesel or by gasoline (see also Annex 1 of the *"Tool"*). The diesel fuelled off- grid plants covered all the seven capacity classes. The gasoline fuelled off-grid plants just covered the first capacity class smaller than 10 kW.

According to Step 4 of Annex 2 of the *"Tool"* the following prerequisites for the inclusion of the off- grid power plants have to be fulfilled:

> ***Step 4 of Annex 2: Assess the extent of off-grid power***
>
> *The effects of feeding additional electricity to the grid or saving electricity demand on off-grid power plants connected to the system are associated with significant uncertainty. For this reason, a significant amount of off-grid power should exist to include these plants in the grid emission factor.*
> *The inclusion of off-grid power plants in the grid emission factor is only allowed if one of the following two conditions are met:*
>
> - *The total capacity of off-grid power plants (in MW) is at least 10% of the total capacity of grid power plants in the electricity system; or*
> - *The total power generation by off-grid power plants (in MWh) is at least 10% of the total power generation by grid power plants in the electricity system.*
>
> *If one of these conditions is not met, then off-grid power plants cannot be included in the calculation of the grid emission factor of the electricity system. Otherwise, proceed to next step.*

There is an inconsistence in the underlined sections above, which has not been solved so far in the revised *"Tool to calculate the emission factor for an electricity system (Version 02.1.0) and (Version 02.2.1.).*

The off- grid study for Albania was done for the year 2007. According to Step 3 of the *"Tool"* a single calendar year within the **5** most recent calendar years prior to the time of submission of the CDM-PDD (PoA) for validation has to be used. By choosing the year 2007 this requirement is fulfilled.

The extrapolated off- grid generation for the year 2007 (lower level of the 95% confidence interval) amounted to **472,708 MWh**. This is equal to 16.3% of the total power generation by grid power plants of the Albanian grid in the year 2007. The total power generation for the year 2007 amounted to 2,892,974 MWh (including hydro power (2,829,512 MWh) and thermal power (63,462 MWh); without imports).

Since the installed capacity of all (sampled) off- grid power plants in operation amounts to 239 MW, which is equal to 14.9 % of the total installed capacity of 1,605 MW both above mentioned requirements are met.

Step 3. Select an operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

Each method is described under Step 4.

The simple OM method (option a) can only be used if low-cost/must-run resources[32] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The dispatch data analysis (Option d) cannot be used if off-grid power plants are included in the project electricity system as per Step 2 above.

Since hourly electricity generation data are not available neither option (b) nor option (c) are applicable.

Since low-cost/must run resources constitute more than 50% of total grid generation in average of the **five most recent years** (see following Table 2 below) the Average Operating Margin (OM) method (option (d)) is used following the requirements of the UNFCCC "*Tool to calculate the emission factor for an electricity system (Version 02.1.0).*

The following table gives an overview about the electricity generation over the last 5 years were data were available.

Table 2: Electricity generation of Albania for the most recent 5 years, where data were available

Sum of electricity generation [MWh]	**6,252,993**	**6,921,538**	**7,451,723**	**9,122,184**	**7,065,025**
Electricity Generation [MWh]	**2007**	**2008**	**2009**	**2010**	**2011**
Sum Hydros / low cost-must run	2,836,511	3,832,830	5,201,015	7,678,892	4,097,082
Percentage	0.45	0.55	0.70	0.84	0.58
Sum Import	2,880,000	2,616,000	1,778,000	947,000	2,439,000
Percentage	0.46	0.38	0.24	0.10	0.35
Sum Thermal	536,482	472,708	472,708	496,292	528,943
Percentage	0.09	0.07	0.06	0.05	0.07
Percentage Low cost - must run	**0.91**	**0.93**	**0.94**	**0.95**	**0.93**

*The off- grid electricity generation (low er level of the 95% Confidence intervall) is considerd for the years 2007 to 2011!

For the years 2009 to 2011 the electricity generation from the off- grid plants is taken into consideration. The table shows that the low cost must run resources constitute by far more than 50% for all the 5 most recent years.

In Albania there was just on thermal power plant (TPP FIER) based on the fossil fuel Residual Fuel Oil in operation until 2007. A new CCGT TPP Vlora started operation in the year 2010. All the off-grid power plants are either based on the fossil fuel diesel or gasoline. For the Net Caloric Values (NCV) and the

[32] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

Emission Factors default values from IPCC 2006 V2 were used. In order to stay conservative the lower values within the 95% confidence interval were taken into account.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- ***Ex ante** option: If the **ex ante** option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a **3-year generation**-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For **off-grid power** plants, use a single calendar year within the **5 most recent calendar years prior** to the time of submission of the CDM-PDD for validation.*

- ***Ex post** option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.*

For the calculation of the Average operating margin (OM) the ***ex ante*** option is chosen. The most recent data, which were provided by ERE[33], are from 2009 to 2011.

Step 4: Calculate the Operating Margin emission factor ($EF_{OM,y}$) according to the selected method

In the following section at first the procedure for the calculation of the (a) Simple OM is described, since the applied calculation of the (d) Average OM follows the same procedure. The only difference is the inclusion of low cost/must run power plants under (d) Average OM.

(a) <u>Simple OM</u>

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants/units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;[34] or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

[33] Albanian Energy Regulator (ERE)

[34] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if *all* power units at the site of the power plant belong to the group of low-cost/must-run units or if *all* power units at the site of the power plant do *not* belong to the group of low-cost/must-run units.

Option A - Calculation based on average efficiency and electricity generation of each plant

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (1)$$

Where:

$EF_{grid,OMsimple,y}$ =	*Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)*
$EG_{m,y}$ =	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$EF_{EL,m,y}$ =	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
m =	*All power units serving the grid in year y except low-cost / must-run power units*
y =	*The relevant year as per the data vintage chosen in Step 3*

Determination of $EF_{EL,m,y}$

Since for the power units *m* NO accurate data of fuel consumption and electricity generation was available, the emission factor ($EF_{EL,m,y}$) was determined according to Option A2 of the "Tool".

- ***Option A2.*** *If for a power unit m only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:*

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}} \quad (3)$$

Where:

$EF_{EL,m,y}$ =	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
$EF_{CO2,m,i,y}$ =	*Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)*
$\eta_{m,y}$ =	*Average net energy conversion efficiency of power unit m in year y (ratio)*
m =	*All power units serving the grid in year y except low-cost/must-run power units*
y =	*The relevant year as per the data vintage chosen in Step 3*

Where several fuel types are used in the power unit, use the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$.

Each off-grid power plant is operated just by one fossil fuel source (diesel or gasoline).

Determination of $EG_{m,y}$

For grid power plants, $EG_{m,y}$ should be determined as per the provisions in the monitoring tables.

For off-grid power plants, $EG_{m,y}$ can be determined using one of the following options:[35]

[35] Note that different options can be applied to different classes of off-grid power plants; however, the same option should be applied to all (sampled) off-grid power plants within one class.

- ***Option 1.*** *$EG_{m,y}$ is determined based on (sampled) data on the electricity generation of off-grid power plants, as per the guidance in Annex 2.*
- ***Option 2.*** *$EG_{m,y}$ is determined based on (sampled) data on the quantity of fossil fuels combusted in the class of off-grid power plants m, as per the guidance in Annex 2, and the default efficiencies provided in Annex 1, as follows:*

$$EG_{m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times \eta_{m,y}}{3.6} \quad (4)$$

Where:

$EG_{m,y}$ =	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$FC_{i,m,y}$ =	*Amount of fossil fuel type i consumed by power plants included in off-grid power plant class m in year y (mass or volume unit)*
$NCV_{i,y}$ =	*Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)*
$\eta_{m,y}$ =	*Default net energy conversion efficiency of off-grid power plant class m in year y (ratio), as per the default values provided in Annex 1*
m =	*Off-grid power plant class considered as one power unit (as per the provisions in Annex 2 to this tool)*
y =	*The relevant year as per the data vintage chosen in Step 3*
i =	*Fossil fuel types used*

Since no off- grid power plants could be identified, where electricity generated is measured directly with electricity meters, **Option 1** could not be applied for the off-grid study.

All sampled companies operating off-grid power plants provided the required data for calculation of $EG_{m,y}$ according to the "corrected" **Option 2** above. Thus this option was applied for the calculation of the generated electricity by each off- grid power plant.

(d) Average OM

The average OM emission factor ($EF_{grid,OM-ave,y}$) is calculated as the average emission rate of ***all power plants*** *serving the grid, using the methodological guidance as described under (a) above for the simple OM,* ***but including in all equations also low-cost/must-run power plants****.*

For the project activity the Average OM calculation is applied. The following table below summarizes the results of the calculation of the Average operating margin (OM) for the years 2009 to 2011 including off-grid plants.

Table 3: Calculation of the (OM) Operating Margin emission factor for the years 2009 to 2011

Prepared by denkstatt GmbH

Emission factors for the National Grid of Albania

Baseline (including imports)	$EF_{AverageOM}$ [tCO_2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2009	0.0467	7,451,723	6,979,015	1,778,000
2010	0.0390	9,122,184	8,625,892	947,000
2011	0.0519	7,065,025	6,536,082	2,439,000
	Total (2009-2011) =	23,638,932	22,140,989	5,164,000
	$EF_{AverageOM}$ [tCO_2/MWh]			
	0.0453			

The generation-weighted average OM for the years 2009 to 2011 amounts to **0.0453 tonsCO_2/MWh**.

Step 5. Identify the group of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of either[36]:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[37].

Project participants should use the set of power units that comprises the larger annual generation.

As a general guidance, a power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plant registered as CDM project activities should be excluded from the sample group m. However, If the group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is(are) built more than 10 years ago then:

(i) Exclude power unit(s) that is (are) built more than 10 years ago from the group; and

(ii) Include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.[38]

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The last Power plant which was connected to the grid most recently was the CCGT TPP Vlora at 2010. The net electricity generation for the year 2011 amounted to 56,235 MWh.

The three small Hydro Power Plants (HPPs) Bogove 2.5 MW (2006); Gjanc 3.7 MW (2005) and Smokthine 9.2 MW (2004) were the only power plants built within the last ten years, where individual net electricity generation data was available and thus taken into account for the Build Margin (BM)

[36] If this approach does not reasonably reflect the power plants that would likely be built in the absence of the project activity, project participants are encouraged to submit alternative proposals for consideration by the CDM Executive Board.

[37] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.

[38] This information shall be provided by the host country.

calculation. The net electricity generation of these three SHPPs for the year 2011 amounted to 40,931 MWh.

In "Small HPPs" (95,901 MWh) (see also Table 4 below) a huge amount of very small HPPs are subsumed, where no individual net electricity generation data was available. Some of those small HPPs have been rehabilitated recently and others are older ones. In order to stay conservative in the calculation of the BM emission factor all the small HPPs subsumed under "Small HPPs" are treated as newly built ones and thus taken into account in the calculation of the BM.

Thus, applying Step 5 (a) is not possible since for only a few SHPPs the net electricity generation could be identified. Anyway, if the net electricity generation of the SHPPs subsumed under "Small HPPs", the three HPPs Bogove, Gjanc and Smokthine and the CCGT TPP Vlora is summed the electricity generation amounts to **193,067 MWh** for the set of (five) power plants that have been built most recently at maximum.

Applying Step 5 (b) of above, the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently amount to **2,268,860** MWh which is 49% of the system generation (including CCGT TPP Vlora, Bogove, Gjanc and Smokthine, "Small HPP"; all the off- grid units and HPP KOMAN). This set of power plants also includes power plants that are older than 10 years like some off -grid power units and the HPP KOMAN (start of operation 1986).

According to the *"Tool"* the following procedure applies:

Power plants registered as CDM project activities should be excluded from the sample group m. If the group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is (are) built more than 10 years ago then:

> *(i) Exclude power unit(s) that is (are) built more than 10 years ago from the group; and*
>
> *(ii) Include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.*

Following (ii) of above:

Since Albania so far does not have any existing grid connected power plant registered as CDM project activity, not such a power plant could be included for the calculation of the BM emission factor.

Following (i) of above thermal and hydro power plants built before 1999 were excluded. The excluded power plants are all off grid units (data vintages 2 and 3) (see also clarification below) and the HPP KOMAN.

According to Step 1.2. of Annex 2 of the *"Tool"* the off-grid power plants were sub-divided into three data vintages: plants with 0 to 5 years of operation, plants with 6 to 10 years of operation and plants with 11 to 20 years of operation (the oldest off grid power plant surveyed started operation in 1987).

Thus the second data vintage of the off-grid classes refers to a start of operation between 1998 and 2002, which means that the off- grid power plants of these classes are partly younger and partly older than 10 years since the reference year for the Build Margin (BM) calculation is 2011.

Following the guidelines of the *"Tool"* the off- grid plants only for the first data vintage were taken into account for the calculation of the Build Margin (BM) emission factor.

The following Table 4 summarizes the electricity generation of the finally considered set of power plants for the calculation of the Build Margin (BM) emission factor 2011 according to the procedure from Step 5 of the *"Tool"*.

Table 4: List of power plants taken into consideration for the BM calculation

Electricity generation in [MWh]	2011	Time of Comissioning
Vlora (TPP)	56,235	2010
Small HPP	95,901	2009
Gjanc, Bogove, Smoktine	40,931	2004,2005,2006
off grid class 1	32,527	2003-2007
off grid class 2	13,131	2003-2007
off grid class 3	171,478	2003-2007
off grid class 4	3,419	2003-2007
off grid class 5	25,247	2003-2007
off grid class 6	29,349	2003-2007
off grid class 7	67,940	2003-2007
off grid class 8	26,466	2003-2007
off grid class 9	6,629	1998-2002
off grid class 10	1,066	1998-2002
off grid class 11	32,329	1998-2002
off grid class 12	1,820	1998-2002
off grid class 13	10,126	1998-2002
off grid class 14	8,849	1998-2002
off grid class 15	14,227	1998-2002
off grid class 16	22,944	1998-2002
off grid class 17	0	1988-1997
off grid class 18	493	1988-1997
off grid class 19	700	1988-1997
off grid class 20	242	1988-1997
off grid class 21	247	1988-1997
off grid class 22	1,668	1988-1997
off grid class 23	1,811	1988-1997
Koman (HPP)	1,603,085	1986
Fierza (HPP)	1,234,792	1978
Vau dejes (HPP)	814,694	1975
Shkopet (HPP)	57,643	1963
Ulez (HPP)	69,601	1954
Bistrice 2 (HPP)	28,006	1952
Lanabregas (HPP)	27,569	1951
Bistrice 1 (HPP)	124,860	1948
IMPORTS	2,439,000	
Fier (TPP)	0	
Sum of electricity generation 2011 [MWh]	**4,626,025**	*without Imports
Sum of electricity generation of the sample group for the BM [MWh]	**562,624**	
Percentage of the electricity generation of finally considered power plants under the BM calculation	**12%**	

In terms of vintage of data, project participants can choose between one of the following two options:

***Option 1**. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

***Option 2**. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*

The Build Margin (BM) Emission factor was calculated ***ex-ante*** by choosing **Option 1** from above.

Step 6. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \tag{13}$$

Where:

$EF_{grid,BM,y}$ =	*Build margin CO_2 emission factor in year y (tCO_2/MWh)*
$EG_{m,y}$ =	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$EF_{EL,m,y}$ =	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
m =	*Power units included in the build margin*
y =	*Most recent historical year for which power generation data is available*

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

*For off-grid power plants, $EG_{m,y}$ should be determined as per the guidance in Step 4.*The calculation of the CO_2 -emission factor of the thermal power and the off-grid power plants required for the calculation of the build margin (BM) was conducted by using option A2 of the step 4 (a) of the applied *"Tool"* according to the formula as follows:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}} \tag{3}$$

The following table summarizes in detail the calculation of CO_2 emissions taken into account for the calculation of the Build Margin (BM) emission factor. The only fossil fuelled power plants in operation in the year 2011 are the CCGT TPP Vlora and all the off- grid power plants identified during the off- grid survey.

Table 5: Calculation of CO2- emissions of fossil power plants (including off- grid plants) taken into account for the BM emission factor calculation

Relevant year		CO_2 emissions from (Off- Grid) fossil fuelled - Thermal Power Plants								
2011			A	B	C	D	E	F	G	
	m	i	EG_m	$FC_{i,m}$	NCV_i	**$EF_{CO2,i}$	η_m	$EF_{EL,m}$		
No.	Name of Power Plant	Fuel Type	Net Electricity Generation	Fuel Consumption	Net Calorific Value (Lower Value)	CO_2 Emission Factor (Lower Value)	Average Net Energy Conversion Efficiency	CO_2 Emission Factor	CO_2 Emissions	
			(MWh)	(t)	(GJ/t)	(tCO_2/GJ)	(%)	(tCO_2/MWh)	(t-CO_2)	
							Default values from Annex 1 of the "Electricity Tool"	F=Dx3.6/E	G=AxF	
	Vlora (CCGT)	Natural Gas	56,235		46.5	0.0543	0.6	0.326	18,321	
1	off grid class 1	Diesel	32,527		41.4	0.0726	0.28	0.933	30,362	
2	off grid class 2	Gasoline	13,131		42.5	0.0675	0.28	0.868	11,396	
3	off grid class 3	Diesel	171,478		41.4	0.0726	0.33	0.792	135,811	
4	off grid class 4	Diesel	3,419		41.4	0.0726	0.35	0.747	2,553	
5	off grid class 5	Diesel	25,247		41.4	0.0726	0.37	0.706	17,834	
6	off grid class 6	Diesel	29,349		41.4	0.0726	0.39	0.670	19,668	
7	off grid class 7	Diesel	67,940		41.4	0.0726	0.42	0.622	42,278	
8	off grid class 8	Diesel	26,466		41.4	0.0726	0.45	0.581	15,371	
									293,594	$toCO_2$
									0.5218	**$toCO_2$/MWh**
**2006 IPCC Guidelines for National Greenhous Gas Inventories; Volume 2: Energy; Table 1.4 DEFAULT CO2 EMISSION FACTORS FOR COMBUSTION!										

The column A of the table above shows the extrapolated electricity generation from the off-grid classes (vintage 1). Column C shows the lower value of the Net Caloric Values (NCV) according to IPCC 2006. Column D contains the lower value of the CO_2 Emission Factors of different fossil fuels according to IPCC 2006.

The CO_2 Emission Factor of each power plant ($EF_{EL,m}$) is calculated in column F by application of the formula described under Step 6 of the *"Tool"* above. The CO_2 Emissions (tonsCO_2) are calculated in column G by multiplication of F and A.

The summarized value of **293,594** tonsCO_2 has to be divided by the corresponding electricity generation (MWh) of the group of power plants determined under Step 5 of the "Tool" of above. The electricity generation of these power plants amounts to **562,624 MWh**.

Thus the calculated Build Margin (BM) emission factor amounts to **0.5218 tonsCO_2/MWh**.

Step 7. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (14)$$

Where:

$EF_{grid,BM,y}$ =	*Build margin CO_2 emission factor in year y (tCO_2/MWh)*
$EF_{grid,OM,y}$ =	*Operating margin CO_2 emission factor in year y (tCO_2/MWh)*
w_{OM} =	*Weighting of operating margin emissions factor (%)*
w_{BM} =	*Weighting of build margin emissions factor (%)*

The following default values should 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,[39] unless otherwise specified in the approved methodology which refers to this tool.*

Alternative weights can be proposed, as long as w_{OM} + w_{BM} = 1, for consideration by the Executive Board, taking into account the guidance as described below. The values for w_{OM} + w_{BM} applied by project participants should be fixed for a crediting period and may be revised at the renewal of the crediting period.

$EF_{grid,CM,y}$ is calculated according to formula explained above taking default weights w_{OM} and w_{BM} as 0.50 and 0.50 respectively.

The following table summarizes the calculation of the combined margin (CM) emission factor for the electricity grid of Albania including off-grid power plants..

Table 6 Calculation of the Combined Margin (CM) emission factor for the years 2009 to 2011

Prepared by denkstatt GmbH

Emission factors for the National Grid of Albania

Baseline (including imports)	$EF_{AverageOM}$ [tCO_2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2009	0.0467	7,451,723	6,979,015	1,778,000
2010	0.0390	9,122,184	8,625,892	947,000
2011	0.0519	7,065,025	6,536,082	2,439,000
	Total (2009-2011) =	**23,638,932**	**22,140,989**	**5,164,000**
	$EF_{AverageOM}$ [tCO_2/MWh]	$EF_{BM,2011}$ [tCO_2/MWh]		
	0.0453	0.5218		
	Alternative weights			
	w_{OM} = 0.50			
	w_{BM} = 0.50			
	CM [tCO_2/MWh]			
	0.2836			

The ***ex-ante*** calculated combined margin (CM) emission factor amounts to **0.2836 tonsCO_2/MWh.**

[39] Project participants can submit alternative proposal, for revision of tool or the methodology or deviation from its use, if weightage does not reflect their situation with an explanation for the alternative weights.

"Tool to calculate the emission factor for an electricity system (Version 02.1.0)"

Annex 1: Default efficiency factors for power plants

	Off-grid power plants						
	Nominal capacity of power plants (CAP, in kW)						
Generation Technology	**CAP≤10**	**10<CAP≤50**	**50<CAP≤100**	**100<CAP≤200**	**200<CAP≤400**	**400<CAP≤1000**	**CAP>1000**
Reciprocant engine system (e.g. diesel-, fuel oil-, gas-engines)	28%	33%	35%	37%	39%	42%	45%
Gas turbine systems	28%	32%	34%	35%	37%	40%	42%
Small boiler/steam/turbine system	7%	7%	7%	7%	7%	7%	N/A

Electricity generation data for the years 2006 to 2011

Imports/Exports (2005 to 2010)

Import						
GWh	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
1	98	173	275	278	274	70
2	106	136	312	258	43	37
3	77	94	289	285	197	30
4	47	24	213	175	6	3
5	20	8	174	157	42	63
6	62	50	179	193	134	22
7	88	113	188	140	141	175
8	79	103	233	204	223	237
9	91	88	220	213	224	174
10	145	130	265	202	251	75
11	170	111	258	257	142	28
12	266	210	274	254	101	33
Summe	**1249**	**1240**	**2880**	**2616**	**1778**	**947**
Export						
GWh	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
1	78	58	16	21	40	157
2	112	43	1	12	81	108
3	102	97	0	0	36	227
4	63	104	2	14	162	274
5	89	115	7	19	79	253
6	64	59	0	2	17	100
7	44	10	2	16	6	1
8	25	29	0	9	4	1
9	55	28	0	8	9	0
10	48	32	2	16	23	162
11	31	43	8	33	39	175
12	15	21	12	35	37	219
Summe	**726**	**639**	**50**	**185**	**533**	**1677**
Balance (pos=Import; neg=export)						
GWh	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
1	20	115	259	257	234	-87
2	-6	93	311	246	-38	-71
3	-25	-3	289	285	161	-197
4	-16	-80	211	161	-156	-271
5	-69	-107	167	138	-37	-190
6	-2	-9	179	191	117	-78
7	44	103	186	124	135	174
8	54	74	233	195	219	236
9	36	60	220	205	215	174
10	97	98	263	186	228	-87
11	139	68	250	224	103	-147
12	251	189	262	219	64	-186
Summe	**523**	**601**	**2830**	**2431**	**1245**	**-730**
https://www.entsoe.eu/resources/data-portal/exchange/						

Imports (2011)

DETAILED ELECTRICITY EXCHANGE (IN GWh) (Database: 22.06.2012)

From:	1-2011
To:	12-2011
Values in:	GWh

This data may not be used without mentioning the source: 'Data provided by ENTSO-E'

Country_Exp	month	year	AL		
GR	1	2011	63		
RS	1	2011	0	63	
GR	2	2011	150		
RS	2	2011	9	159	
GR	3	2011	154		
RS	3	2011	14	168	
GR	4	2011	192		
RS	4	2011	38	230	
GR	5	2011	270		
RS	5	2011	38	308	
GR	6	2011	200		
RS	6	2011	34	234	
GR	7	2011	154		
RS	7	2011	39	193	
GR	8	2011	173		
RS	8	2011	27	200	
GR	9	2011	145		
RS	9	2011	28	173	
GR	10	2011	164		
RS	10	2011	12	176	
GR	11	2011	226		
RS	11	2011	42	268	
GR	12	2011	233		
RS	12	2011	34	267	
			sum	**2439**	**GWh**

Source: http://www.entsoe.eu/resources/data-portal/exchange/

Net electricity production 2006

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***5,458,593***	***6,709***	***80,925***	***5,370,958***
Drin River Cascade	***1,350***	***5,011,712***	***5,097***	***75,176***	***4,931,439***
Fierza	500	1,939,718	2,698	29,096	1,907,924
Koman	600	2,119,750	1,087	31,796	2,086,867
Vau Dejës	250	952,244	1,312	14,284	936,648
Mat River Cascade	***49***	***196,134***	***1,210***	***2,942***	***191,982***
Ulëz	25	106,754	501	1,601	104,652
Shkopet	24	89,380	709	1,341	87,331
Bistrica River Cascade	***27.5***	***154,883***	***362***	***2,323***	***152,198***
Bistrica I	22.5	123,606	266	1,854	121,485
Bistrica II	5	31,277	96	469	30,712
Other HPP	***20***	***71,693***	***41***	***485***	***71,168***
Selita	5	32,304	41	485	31,779
Gjanc+Bogovë+Smokthinë	14.5	39,389	0	0	39,389
Small HPP		***24,171***	***0***	***0***	***24,171***
Thermo Production	***159***	***92,630***	***10,960***	***1,389***	***80,281***
TPP Fieri	159	92,630	10,960	1,389	80,281
Total Domestic Production	***1,605***	***5,551,223***	***17,669***	***82,315***	***5,451,239***

Net electricity production 2007

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***2,874,362***	***5,857***	***31,994***	***2,836,511***
Drin River Cascade	***1,350***	***2,519,924***	***4,521***	***28,420***	***2,486,983***
Fierza	500	690,146	1,361	7,105	681,680
Koman	600	1,199,790	1,937	13,976	1,183,877
Vau Dejës	250	629,988	1,223	7,339	621,426
Mat River Cascade	***49***	***138,168***	***893***	***1,610***	***135,665***
Ulëz	25	70,891	503	826	69,562
Shkopet	24	67,277	390	784	66,103
Bistrica River Cascade	***27.5***	***127,533***	***400***	***1,486***	***125,647***
Bistrica I	22.5	121,298	272	1,413	119,613
Bistrica II	5	6,235	129	73	6,033
Other HPP	***20***	***63,576***	***43***	***478***	***63,056***
Selita	5	33,877	43	478	33,357
Gjanc+Bogovë+Smokthinë	14.5	29,699	0	0	29,699
Small HPP		***25,161***	***0***	***0***	***25,161***
Thermo Production	***159***	***72,380***	***7,763***	***843***	***63,774***
TPP Fieri	159	72,380	7,763	843	63,774
Total Domestic Production	***1,605***	***2,946,742***	***13,620***	***32,838***	***2,900,284***

Net electricity production 2008

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***3,849,893***	***4,693***	***12,370***	***3,832,830***
Drin River Cascade	***1,350***	***3,441,046***	***3,184***	***9,937***	***3,427,925***
Fierza	500	1,071,634	1,015	0	1,070,619
Koman	600	1,551,980	1,101	9,937	1,540,941
Vau Dejës	250	817,432	1,068	0	816,364
Mat River Cascade	***49***	***171,703***	***1,061***	***927***	***169,715***
Ulëz	25	92,334	732	476	91,126
Shkopet	24	79,369	329	451	78,589
Bistrica River Cascade	***27.5***	***139,405***	***403***	***972***	***138,030***
Bistrica I	22.5	118,706	262	869	117,575
Bistrica II	5	20,699	141	103	20,455
Other HPP	***20***	***54,996***	***45***	***534***	***54,417***
Selita	5	35,766	45	534	35,187
Gjanc+Bogovë+Smokthinë	14.5	19,230	0	0	19,230
Small HPP		***42,744***	***0***	***0***	***42,744***
Thermo Production	***159***	***0***	***73***	***0***	***-73***
TPP Fieri	159	0	73	0	-73
Total Domestic Production	***1,605***	***3,849,893***	***4,766***	***12,371***	***3,832,756***

Net electricity production 2009

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***5,229,618***	***4,822***	***23,782***	***5,201,014***
Drin River Cascade	***1,350***	***4,704,738***	***3,120***	***20,031***	***4,681,587***
Fierza	500	1,557,357	1,110	0	1,556,248
Koman	600	2,062,050	1,037	20,031	2,040,982
Vau Dejës	250	1,085,330	973	0	1,084,358
Mat River Cascade	***49***	***228,638***	***1,212***	***2,009***	***225,418***
Ulëz	25	126,116	389	1,096	124,631
Shkopet	24	102,522	822	913	100,787
Bistrica River Cascade	***27.5***	***172,128***	***440***	***1,224***	***170,464***
Bistrica I	22.5	136,742	256	1,123	135,364
Bistrica II	5	35,385	184	101	35,100
Other HPP	***20***	***85,052***	***51***	***519***	***84,483***
Selita	5	34,804	51	519	34,235
Gjanc+Bogovë+Smokthinë	14.5	50,248	0	0	50,248
Small HPP		***39,062***	***0***	***0***	***39,062***
Thermo Production	***256***	***870***	***1,024***	***0***	***-154***
TPP Fieri	159	0	0	0	0
TPP Vlora (New)	97	870	1,024	0	-154
Total Domestic Production	***1,702***	***5,230,488***	***5,846***	***23,782***	***5,200,860***

Net electricity production 2010

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***7,714,546***	***5,089***	***30,564***	***7,678,893***
Drin River Cascade	***1,350***	***7,052,603***	***3,292***	***26,663***	***7,022,648***
Fierza	500	2,668,658	1,218	0	2,667,440
Koman	600	2,872,730	1,056	26,663	2,845,012
Vau Dejës	250	1,511,215	1,018	0	1,510,196
Mat River Cascade	***49***	***285,203***	***1,306***	***2,003***	***281,894***
Ulëz	25	157,794	345	981	156,468
Shkopet	24	127,409	961	1,022	125,426
Bistrica River Cascade	***27.5***	***176,403***	***444***	***1,282***	***174,677***
Bistrica I	22.5	140,708	262	1,147	139,300
Bistrica II	5	35,695	182	135	35,377
Other HPP	***20***	***103,168***	***47***	***616***	***102,505***
Selita	5	41,297	47	616	40,634
Gjanc+Bogovë+Smokthinë	14.5	61,870	0	0	61,870
Small HPP		***97,169***	***0***	***0***	***97,169***
Thermo Production	***256***	***28,749***	***5,165***	***0***	***23,584***
TPP Fieri	159	0	0	0	0
TPP Vlora (New)	97	28,749	5,165	0	23,584
Total Domestic Production	***1,702***	***7,743,295***	***10,254***	***30,564***	***7,702,477***

Net electricity production 2011

	Installed Capacity	Gross Generation	Auxuliary Services	Losses	Net Generation
	MW	MWh	MWh	MWh	MWh
Hydro Production	***1,446***	***4,021,963***	***4,305***	***16,475***	***4,097,083***
Drin River Cascade	***1,350***	***3,670,708***	***3,336***	***14,800***	***3,652,572***
Fierza	500	1,235,975	1,183	0	1,234,792
Koman	600	1,619,000	1,114	14,800	1,603,085
Vau Dejës	250	815,733	1,039	0	814,694
Mat River Cascade	***49***	***128,285***	***653***	***388***	***127,244***
Ulëz	25	69,849	145	103	69,601
Shkopet	24	58,436	507	285	57,643
Bistrica River Cascade	***27.5***	***154,021***	***288***	***867***	***152,866***
Bistrica I	22.5	125,799	171	768	124,860
Bistrica II	5	28,222	117	99	28,006
Other HPP	***19.5***	***68,948***	***28***	***420***	***68,500***
Selita	5	28,018	28	420	27,569
Gjanc+Bogovë+Smokthinë	14.5	40,931	0	0	40,931
Small HPP	***64***	***95,901***	***0***	***0***	***95,901***
Thermo Production	***256***	***59,611***	***3,376***	***0***	***56,235***
TPP Fieri	159	0	0	0	0
TPP Vlora (New)	97	59,611	3,376	0	56,235
Total Domestic Production	***1,702***	***4,177,475***	***7,681***	***16,475***	***4,153,319***

Source: Albanian Energy Regulator (ERE): Confirmation letter about the net electricity production data for the years 2006-2011; Filename: 20120619_Confirmation Letter with el_data_2006_2011.pdf

Selection of the method to determine the operating margin (OM):

Electricity generation of the grid of Albania for the years 2007 to 2011 (with inclusion of off- grid generation in the years 2007 to 2011)

Sum of electricity generation [MWh]	**6,252,993**	**6,921,538**	**7,451,723**	**9,122,184**	**7,065,025**
Electricity Generation [MWh]	**2007**	**2008**	**2009**	**2010**	**2011**
Sum Hydros / low cost-must run	2,836,511	3,832,830	5,201,015	7,678,892	4,097,082
Percentage	0.45	0.55	0.70	0.84	0.58
Sum Import	2,880,000	2,616,000	1,778,000	947,000	2,439,000
Percentage	0.46	0.38	0.24	0.10	0.35
Sum Thermal	536,482	472,708	472,708	496,292	528,943
Percentage	0.09	0.07	0.06	0.05	0.07
Percentage Low cost - must run	**0.91**	**0.93**	**0.94**	**0.95**	**0.93**
*The off- grid electricity generation (low er level of the 95% Confidence intervall) is considerd for the years 2007 to 2011!					

Due to the fact that low-cost/must run resources amount to more than 50% for the most recent 5 years (2007 to 2011), where data was available the operating margin (OM) is calculated according to Option (d) of Step 3 of the *"Tool"* the Average OM.

The calculation is provided for the years 2009 to 2011 as follows:

Electricity generation in [MWh]	*2007	2008	2009	2010	2011	Date of comissioning	Sources
Gjanc,Bogovce, Smokthine	29,699	19,230	50,248	61,870	40,931	2004,2005,2006	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
off grid class 1	32,527	32,527	32,527	32,527	32,527	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 2	13,131	13,131	13,131	13,131	13,131	2003-2007	See CDM-SSC-CPA-DD Annex 3 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 3	171,478	171,478	171,478	171,478	171,478	2003-2007	See CDM-SSC-CPA-DD Annex 3 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 4	3,419	3,419	3,419	3,419	3,419	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 5	25,247	25,247	25,247	25,247	25,247	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 6	29,349	29,349	29,349	29,349	29,349	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 7	67,940	67,940	67,940	67,940	67,940	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 8	26,466	26,466	26,466	26,466	26,466	2003-2007	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 9	6,629	6,629	6,629	6,629	6,629	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 10	1,066	1,066	1,066	1,066	1,066	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 11	32,329	32,329	32,329	32,329	32,329	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 12	1,820	1,820	1,820	1,820	1,820	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 13	10,126	10,126	10,126	10,126	10,126	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 14	8,849	8,849	8,849	8,849	8,849	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 15	14,227	14,227	14,227	14,227	14,227	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 16	22,944	22,944	22,944	22,944	22,944	1998-2002	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 17	0	0	0	0	0	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 18	493	493	493	493	493	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 19	700	700	700	700	700	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 20	242	242	242	242	242	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 21	247	247	247	247	247	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 22	1,668	1,668	1,668	1,668	1,668	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
off grid class 23	1,811	1,811	1,811	1,811	1,811	1988-1997	See CDM-SSC-PoA-DD Appendix 4 "Procedures related to off-grid power generation (following Annex 2 of the "Tool")
Koman (HPP)	1,183,877	1,540,941	2,040,982	2,845,012	1,603,085	1986	ERE - Albanian Energy Regulator Confirmation letter about the net electricity production data for the years 2006 to 2011;
Fierza (HPP)	681,680	1,070,619	1,556,248	2,667,440	1,234,792	1978	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Vau dejes (HPP)	621,426	816,364	1,084,358	1,510,196	814,694	1975	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Shkopet (HPP)	66,103	78,589	100,787	125,426	57,643	1963	ERE - Albanian Energy Regulator Confirmation letter about the net electricity production data for the years 2006 to 2011;
Ulez (HPP)	69,562	91,126	124,631	156,468	69,601	1954	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Bistrice 2 (HPP)	6,033	20,455	35,100	35,377	28,006	1952	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Lanabregas (Selita) (HPP)	33,357	35,187	34,235	40,634	27,569	1951	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Bistrice 1 (HPP)	119,613	117,575	135,364	139,300	124,860	1948	Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Other HPPs	25,161	42,744	39,062	97,169	95,901		Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
Fier (TPP)	63,774	0	0	0	0	1966/1983/2009	ERE - Albanian Energy Regulator Confirmation letter about the net electricity production data for the years 2006 to 2011;
Vlora (TPP)	0	0	0	23,584	56,235		Confirmation letter about the net electricity production data for the years 2006 to 2011; 19.06.2012
IMPORTS	2,880,000	2,616,000	1,778,000	947,000	2,439,000		https://www.entsoe.eu/resources/data-portal/exchange/
Sum of electricity generation [MWh]	**6,252,993**	**6,921,538**	**7,451,723**	**9,122,184**	**7,065,025**		

Electricity Generation [MWh]	2007	2008	2009	2010	2011
Sum Hydros / low cost-must run	2,836,511	3,832,830	5,201,015	7,678,892	4,097,082
Percentage	0.45	0.55	0.70	0.84	0.58
Sum Import	2,880,000	2,616,000	1,778,000	947,000	2,439,000
Percentage	0.46	0.38	0.24	0.10	0.35
Sum Thermal	536,482	472,708	472,708	496,292	528,943
Percentage	0.09	0.07	0.06	0.05	0.07
Percentage Low cost - must run	**0.91**	**0.93**	**0.94**	**0.95**	**0.93**

*The off - grid electricity generation (lower level of the 95% Confidence intervall) is considerd for the years 2007 to 2011!

Relevant year		CO_2 emissions from (Off- Grid) fossil fuelled - Thermal Power Plants								
2009			A	B	C	D	E	F	G	
	m	i	EG_m	$FC_{i,m}$	NCV_i	$**EF_{CO2,i}$	η_m	$EF_{EL,m}$		
No.	Name of Power Plant	Fuel Type	Net Electricity Generation	Fuel Consumption	Net Calorific Value (Lower Value)	CO_2 Emission Factor (Lower Value)	Average Net Energy Conversion Efficiency	CO_2 Emission Factor	CO_2 Emissions	
			(MWh)	(t)	(GJ/t)	(tCO_2/GJ)	(%)	(tCO_2/MWh)	(t-CO_2)	
							Default values from Annex 1 of the "Electricity Tool"	F=Dx3.6/E	G=AxF	
1	off grid class 1	Diesel	32,527		41.4	0.0726	0.28	0.933	30,362	
2	off grid class 2	Gasoline	13,131		42.5	0.0675	0.28	0.868	11,396	
3	off grid class 3	Diesel	171,478		41.4	0.0726	0.33	0.792	135,811	
4	off grid class 4	Diesel	3,419		41.4	0.0726	0.35	0.747	2,553	
5	off grid class 5	Diesel	25,247		41.4	0.0726	0.37	0.706	17,834	
6	off grid class 6	Diesel	29,349		41.4	0.0726	0.39	0.670	19,668	
7	off grid class 7	Diesel	67,940		41.4	0.0726	0.42	0.622	42,278	
8	off grid class 8	Diesel	26,466		41.4	0.0726	0.45	0.581	15,371	
9	off grid class 9	Diesel	6,629		41.4	0.0726	0.28	0.933	6,188	
10	off grid class 10	Gasoline	1,066		42.5	0.0675	0.28	0.868	925	
11	off grid class 11	Diesel	32,329		41.4	0.0726	0.33	0.792	25,605	
12	off grid class 12	Diesel	1,820		41.4	0.0726	0.35	0.747	1,359	
13	off grid class 13	Diesel	10,126		41.4	0.0726	0.37	0.706	7,153	
14	off grid class 14	Diesel	8,849		41.4	0.0726	0.39	0.670	5,930	
15	off grid class 15	Diesel	14,227		41.4	0.0726	0.42	0.622	8,853	
16	off grid class 16	Diesel	22,944		41.4	0.0726	0.45	0.581	13,326	
17	off grid class 17	Diesel	0		41.4	0.0726	0.28	0.933	0	
18	off grid class 18	Gasoline	493		42.5	0.0675	0.28	0.868	428	
19	off grid class 19	Diesel	700		41.4	0.0726	0.33	0.792	554	
20	off grid class 20	Diesel	242		41.4	0.0726	0.35	0.747	181	
21	off grid class 21	Diesel	247		41.4	0.0726	0.37	0.706	174	
22	off grid class 22	Diesel	1,668		41.4	0.0726	0.39	0.670	1,118	
23	off grid class 23	Diesel	1,811		41.4	0.0726	0.42	0.622	1,127	
	Fier	Residual Fuel Oil			39.8	0.0755	0.375	0.725	0	
	Vlora (CCGT)	Natural Gas			46.5	0.0543	0.6	0.326	0	
**2006 IPCC Guidelines for National Greenhous Gas Inventories; Volume 2: Energy; Table 1.4 DEFAULT CO2 EMISSION FACTORS FOR COMBUSTION!										**348,194**
										0.0467

Relevant year		CO_2 emissions from (Off- Grid) fossil fuelled - Thermal Power Plants								
2010			A	B	C	D	E	F	G	
	m	i	EG_m	$FC_{i,m}$	NCV_i	$^{**}EF_{CO2,i}$	η_m	$EF_{EL,m}$		
No.	Name of Power Plant	Fuel Type	Net Electricity Generation	Fuel Consumption	Net Calorific Value (Lower Value)	CO_2 Emission Factor (Lower Value)	Average Net Energy Conversion Efficiency	CO_2 Emission Factor	CO_2 Emissions	
			(MWh)	(t)	(GJ/t)	(tCO_2/GJ)	(%)	(tCO_2/MWh)	(t-CO_2)	
							Default values from Annex 1 of the "Electricity Tool"	F=Dx3.6/E	G=AxF	
1	off grid 1	Diesel	32,527		41.4	0.0726	0.28	0.933	30,362	
2	off grid 2	Gasoline	13,131		42.5	0.0675	0.28	0.868	11,396	
3	off grid 3	Diesel	171,478		41.4	0.0726	0.33	0.792	135,811	
4	off grid 4	Diesel	3,419		41.4	0.0726	0.35	0.747	2,553	
5	off grid 5	Diesel	25,247		41.4	0.0726	0.37	0.706	17,834	
6	off grid 6	Diesel	29,349		41.4	0.0726	0.39	0.670	19,668	
7	off grid 7	Diesel	67,940		41.4	0.0726	0.42	0.622	42,278	
8	off grid 8	Diesel	26,466		41.4	0.0726	0.45	0.581	15,371	
9	off grid 9	Diesel	6,629		41.4	0.0726	0.28	0.933	6,188	
10	off grid 10	Gasoline	1,066		42.5	0.0675	0.28	0.868	925	
11	off grid 11	Diesel	32,329		41.4	0.0726	0.33	0.792	25,605	
12	off grid 12	Diesel	1,820		41.4	0.0726	0.35	0.747	1,359	
13	off grid 13	Diesel	10,126		41.4	0.0726	0.37	0.706	7,153	
14	off grid 14	Diesel	8,849		41.4	0.0726	0.39	0.670	5,930	
15	off grid 15	Diesel	14,227		41.4	0.0726	0.42	0.622	8,853	
16	off grid 16	Diesel	22,944		41.4	0.0726	0.45	0.581	13,326	
17	off grid 17	Diesel	0		41.4	0.0726	0.28	0.933	0	
18	off grid 18	Gasoline	493		42.5	0.0675	0.28	0.868	428	
19	off grid 19	Diesel	700		41.4	0.0726	0.33	0.792	554	
20	off grid 20	Diesel	242		41.4	0.0726	0.35	0.747	181	
21	off grid 21	Diesel	247		41.4	0.0726	0.37	0.706	174	
22	off grid 22	Diesel	1,668		41.4	0.0726	0.39	0.670	1,118	
23	off grid 23	Diesel	1,811		41.4	0.0726	0.42	0.622	1,127	
	Fier	Residual Fuel Oil			39.8	0.0755	0.375	0.725	0	
	Vlora (CCGT)	Natural Gas	23,584		46.5	0.0543	0.6	0.326	7,684	
**2006 IPCC Guidelines for National Greenhous Gas Inventories; Volume 2: Energy; Table 1.4 DEFAULT CO2 EMISSION FACTORS FOR COMBUSTION!										**355,877**
										0.0390

Relevant year		CO_2 emissions from (Off- Grid) fossil fuelled - Thermal Power Plants								
2011			A	B	C	D	E	F	G	
	m	i	EG_m	$FC_{i,m}$	NCV_i	$^{**}EF_{CO2,i}$	η_m	$EF_{EL,m}$		
No.	Name of Power Plant	Fuel Type	Net Electricity Generation	Fuel Consumption	Net Calorific Value (Lower Value)	CO_2 Emission Factor (Lower Value)	Average Net Energy Conversion Efficiency	CO_2 Emission Factor	CO_2 Emissions	
			(MWh)	(t)	(GJ/t)	(tCO_2/GJ)	(%)	(tCO_2/MWh)	(t-CO_2)	
							Default values from Annex 1 of the "Electricity Tool"	F=Dx3.6/E	G=AxF	
1	off grid 1	Diesel	32,527		41.4	0.0726	0.28	0.933	30,362	
2	off grid 2	Gasoline	13,131		42.5	0.0675	0.28	0.868	11,396	
3	off grid 3	Diesel	171,478		41.4	0.0726	0.33	0.792	135,811	
4	off grid 4	Diesel	3,419		41.4	0.0726	0.35	0.747	2,553	
5	off grid 5	Diesel	25,247		41.4	0.0726	0.37	0.706	17,834	
6	off grid 6	Diesel	29,349		41.4	0.0726	0.39	0.670	19,668	
7	off grid 7	Diesel	67,940		41.4	0.0726	0.42	0.622	42,278	
8	off grid 8	Diesel	26,466		41.4	0.0726	0.45	0.581	15,371	
9	off grid 9	Diesel	6,629		41.4	0.0726	0.28	0.933	6,188	
10	off grid 10	Gasoline	1,066		42.5	0.0675	0.28	0.868	925	
11	off grid 11	Diesel	32,329		41.4	0.0726	0.33	0.792	25,605	
12	off grid 12	Diesel	1,820		41.4	0.0726	0.35	0.747	1,359	
13	off grid 13	Diesel	10,126		41.4	0.0726	0.37	0.706	7,153	
14	off grid 14	Diesel	8,849		41.4	0.0726	0.39	0.670	5,930	
15	off grid 15	Diesel	14,227		41.4	0.0726	0.42	0.622	8,853	
16	off grid 16	Diesel	22,944		41.4	0.0726	0.45	0.581	13,326	
17	off grid 17	Diesel	0		41.4	0.0726	0.28	0.933	0	
18	off grid 18	Gasoline	493		42.5	0.0675	0.28	0.868	428	
19	off grid 19	Diesel	700		41.4	0.0726	0.33	0.792	554	
20	off grid 20	Diesel	242		41.4	0.0726	0.35	0.747	181	
21	off grid 21	Diesel	247		41.4	0.0726	0.37	0.706	174	
22	off grid 22	Diesel	1,668		41.4	0.0726	0.39	0.670	1,118	
23	off grid 23	Diesel	1,811		41.4	0.0726	0.42	0.622	1,127	
	Fier	Residual Fuel Oil			39.8	0.0755	0.375	0.725	0	
	Vlora (CCGT)	Natural Gas	56,235		46.5	0.0543	0.6	0.326	18,321	
**2006 IPCC Guidelines for National Greenhous Gas Inventories; Volume 2: Energy; Table 1.4 DEFAULT CO2 EMISSION FACTORS FOR COMBUSTION!										**366,515**
										0.0519

Prepared by denkstatt GmbH

Emission factors for the National Grid of Albania

Baseline (including imports)	$EF_{AverageOM}$ [tCO_2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2009	0.0467	7,451,723	6,979,015	1,778,000
2010	0.0390	9,122,184	8,625,892	947,000
2011	0.0519	7,065,025	6,536,082	2,439,000
	Total (2009-2011) =	**23,638,932**	**22,140,989**	**5,164,000**
	$EF_{AverageOM}$ [tCO_2/MWh]			
	0.0453			

Electricity generation in [MWh]	2011	Time of Comissioning
Vlora (TPP)	56,235	2010
Small HPP	95,901	2009
Gjanc, Bogove, Smoktine	40,931	2004,2005,2006
off grid class 1	32,527	2003-2007
off grid class 2	13,131	2003-2007
off grid class 3	171,478	2003-2007
off grid class 4	3,419	2003-2007
off grid class 5	25,247	2003-2007
off grid class 6	29,349	2003-2007
off grid class 7	67,940	2003-2007
off grid class 8	26,466	2003-2007
off grid class 9	6,629	1998-2002
off grid class 10	1,066	1998-2002
off grid class 11	32,329	1998-2002
off grid class 12	1,820	1998-2002
off grid class 13	10,126	1998-2002
off grid class 14	8,849	1998-2002
off grid class 15	14,227	1998-2002
off grid class 16	22,944	1998-2002
off grid class 17	0	1988-1997
off grid class 18	493	1988-1997
off grid class 19	700	1988-1997
off grid class 20	242	1988-1997
off grid class 21	247	1988-1997
off grid class 22	1,668	1988-1997
off grid class 23	1,811	1988-1997
Koman (HPP)	1,603,085	1986
Fierza (HPP)	1,234,792	1978
Vau dejes (HPP)	814,694	1975
Shkopet (HPP)	57,643	1963
Ulez (HPP)	69,601	1954
Bistrice 2 (HPP)	28,006	1952
Lanabregas (HPP)	27,569	1951
Bistrice 1 (HPP)	124,860	1948
IMPORTS	2,439,000	
Fier (TPP)	0	
Sum of electricity generation 2011 [MWh]	**4,626,025**	*without Imports
Sum of electricity generation of the sample group for the BM [MWh]	**562,624**	
Percentage of the electricity generation of finally considered power plants under the BM calculation	**12%**	

Relevant year		CO_2 emissions from (Off- Grid) fossil fuelled - Thermal Power Plants								
2011			A	B	C	D	E	F	G	
	m	i	EG_m	$FC_{i,m}$	NCV_i	**$EF_{CO2,i}$	η_m	$EF_{EL,m}$		
No.	Name of Power Plant	Fuel Type	Net Electricity Generation	Fuel Consumption	Net Calorific Value (Lower Value)	CO_2 Emission Factor (Lower Value)	Average Net Energy Conversion Efficiency	CO_2 Emission Factor	CO_2 Emissions	
			(MWh)	(t)	(GJ/t)	(tCO_2/GJ)	(%)	(tCO_2/MWh)	(t-CO_2)	
							Default values from Annex 1 of the "Electricity Tool"	F=Dx3.6/E	G=AxF	
	Vlora (CCGT)	Natural Gas	56,235		46.5	0.0543	0.6	0.326	18,321	
1	off grid class 1	Diesel	32,527		41.4	0.0726	0.28	0.933	30,362	
2	off grid class 2	Gasoline	13,131		42.5	0.0675	0.28	0.868	11,396	
3	off grid class 3	Diesel	171,478		41.4	0.0726	0.33	0.792	135,811	
4	off grid class 4	Diesel	3,419		41.4	0.0726	0.35	0.747	2,553	
5	off grid class 5	Diesel	25,247		41.4	0.0726	0.37	0.706	17,834	
6	off grid class 6	Diesel	29,349		41.4	0.0726	0.39	0.670	19,668	
7	off grid class 7	Diesel	67,940		41.4	0.0726	0.42	0.622	42,278	
8	off grid class 8	Diesel	26,466		41.4	0.0726	0.45	0.581	15,371	
									293,594	$toCO_2$
									0.5218	**$toCO_2$/MWh**

**2006 IPCC Guidelines for National Greenhous Gas Inventories; Volume 2: Energy; Table 1.4 DEFAULT CO2 EMISSION FACTORS FOR COMBUSTION!

Prepared by denkstatt GmbH

Emission factors for the National Grid of Albania

Baseline (including imports)	$EF_{AverageOM}$ [tCO_2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2009	0.0467	7,451,723	6,979,015	1,778,000
2010	0.0390	9,122,184	8,625,892	947,000
2011	0.0519	7,065,025	6,536,082	2,439,000
	Total (2009-2011) =	**23,638,932**	**22,140,989**	**5,164,000**
		$EF_{BM,2011}$ [tCO_2/MWh]		
		0.5218		

Prepared by denkstatt GmbH

Emission factors for the National Grid of Albania

Baseline (including imports)	$EF_{AverageOM}$ [tCO_2/MWh]	Load [MWh]	LCMR [MWh]	Imports [MWh]
2009	0.0467	7,451,723	6,979,015	1,778,000
2010	0.0390	9,122,184	8,625,892	947,000
2011	0.0519	7,065,025	6,536,082	2,439,000
	Total (2009-2011) =	**23,638,932**	**22,140,989**	**5,164,000**
	$EF_{AverageOM}$ [tCO_2/MWh]	$EF_{BM,2011}$ [tCO_2/MWh]		
	0.0453	0.5218		
	Alternative weights			
	w_{OM} = 0.50			
	w_{BM} = 0.50			
	CM [tCO_2/MWh]			
	0.2836			

Procedures related to off-grid power generation (following Annex 2 of the "Tool")

Excerpt from the "Tool" is marked in Italic.

The procedures in this annex serve to (a) identify those off-grid power plants that are eligible for inclusion in the grid emission factor and to (b) collect the necessary data to include them in the calculations of the operating and build margin emission factors of this tool.

Step 1: Obtain data on off-grid power generation

Data on off-grid power generation is usually not readily available and has to be collected to include off-grid power generation in the grid emission factor. The collection of data on off-grid power generation has two purposes: data is required to determine whether an identified power plant qualifies as .off-grid power plant., as defined in the definitions section; and data is required to calculate the emissions and electricity generation from off-grid power plants.

For this purpose, project proponents can conduct an own survey, or use existing data (if such data provides the necessary information as outlined further below and if the existing data has the vintage as required per this tool).

The project developer Energji ASHTA assigned VeVe Group, which is the Energji Ashta's local partner in Albania, to conduct an off-grid survey. Additionally Energji ASHTA assigned DATA TECHNOLOGY Betriebsberatungs GmbH & Co KG (CEO: Univ.Prof. Dr. Marcus Hudec) with the Quality Assurance (QA) and Quality Control (QC).

The CME of the underlying PoA "Small Hydropower Programme of Activities in Albania and Serbia" enso hydro GmbH agreed with Energji ASHTA about the rights to use the "off-grid study". The Letter of this Agreement is provided to the DoE on request.[40].

The collected data can be used in the following two ways:

(a) ***Direct use of data on a plant-by-plant basis:*** *Include in the emission factor only those off-grid power plants for which the necessary data is available or is collected. Ensure that the plants selected for inclusion in the grid emission factor are reasonably representative for the overall off-grid power generation in the electricity system[41];*
(b) ***Statistical evaluation of the data based on sampling:*** *Collect the necessary data for a representative and appropriately stratified sample of off-grid power plants and infer the data to the entire electricity system.*

Document in the CDM-PDD which approach is followed.

In the above mentioned off-grid survey approach (b) was chosen. The whole off-grid survey consists of a stratified sampling of off-grid power plants and a statistical extrapolation to the overall population.

As already mentioned above the whole statistical survey was accompanied for Quality Assurance (QA) reasons by the Austrian statistic expert Univ. Prof. Dr. Marcus Hudec (DATA TECHNOLOGY

[40] See file: Off_Grid_Study_Energji_Ashta_enso_hydro_120320_P1.pdf
[41] For example, information on off-grid power generation could only be available for some sectors of the economy. In this case, only the plants from these sectors may be included in the grid emission factor. However, in including selected plants, no systematic bias should be introduced (e.g. by including only coal fired plants).

Betriebsberatungs GmbH & Co KG) in order to comply with international statistical standards and the UNFCCC requirements determined in Annex 2 of the *"Tool"*. Marcus Hudec is member of the Council of Statistics of Austria and head of the group responsible for statistical quality standards.

Step 1.1: Choose the data to be collected

Document which data is collected for each (sampled) off-grid power plant. Table 1 provides the minimum data that must be collected for each (sampled) off-grid power plant p.

Table 1: Minimum data/information to be collected on each off-grid power plant p

Data	Description
CAP_p:	Nominal electric capacity of the off-grid power plant p (MW)
$TECH_p$:	The type of technology of the off-grid power plant p. This should include, *inter alia*, the following types of technologies: (a) Reciprocating engines (b) Steam turbine (c) Gas turbine (d) Combined cycle power generation (e) Hydro, solar wind or geothermal power generation
$FUEL_p$:	The fuel type(s) used in the off-grid power plant p. This should include at least the following fuel types: (a) Diesel (b) Gasoline (c) Kerosene (d) Natural gas (e) Coal (f) Biomass/biofuels (g) Any relevant blends or other fuels
$GRID_p$:	Are the consumers supplied by the off-grid power plant also connected to an electricity grid which is capable of supplying their power demand entirely during time intervals where grid electricity is available, reliable and stable? (True/false)
$SWITCH_p$:	Can the consumers supplied by the off-grid power plant easily switch between electricity supply from the grid and off-grid power plants? This applies, for example, if the consumers have a manual or automatic change-over-switch system in place. (True/false)

In addition, other data may be collected, depending on how the requirements of this annex for inclusion of an off-grid power plant p in the grid emission factor are assessed and on which options are used in Step 3 of the tool to calculate the emission factor for a class of off-grid power plants m (Option A1, A2 or A3) and the electricity generation by a class of off-grid power plants m (Option 1, 2 or 3). This may include the following data:

All the input parameters summarized in Table 1 above are collected for each sampled off-grid power plant during the field survey (Questionnaire in English and Albanian language as Annexes to the documentation of the off- grid study by VeVe, which is provided to the DOE on request).

The design of the questionnaire has been developed in iterations of drafts and included extensive pretesting to assure a highest standard of data quality according to the data collection process. The questionnaire was utilized in personal interviews by a specially trained group of interviewers.

Table 2: Additional data that may be collected on off-grid power generation

Data	Description	Explanation
$DATE_{start,p}$:	Year of first commissioning of the off-grid power plant p (year)	This data is required for inclusion of off-grid power in the BM emission factor
$EG_{p,y}$:	Electricity generation of off-grid power plant *p* in year *y* (MWh)	This data is required if Option 1 is used to determine $EG_{m,y}$ in Step 4 of the tool
$FC_{p,i,y}$:	Amount of fuel type *i* consumed by off-grid power plant *p* in year *y* (mass or energy unit)	This data is required if Option A1 in Step 4 of this tool is applied of if Option 2 is used to determine $EG_{m,y}$ in Step 4 of the tool
$NCV_{p,i,y}$:	Net calorific value of fuel type i consumed by off-grid power plant p in year y (GJ/mass or energy unit)	This data is required if Option A1 or Option 2 in Step 4 of this tool is applied and if the IPCC default values are not used
Data	**Description**	**Explanation**
$OMC_{p,y}$:	Variable operation and maintenance costs of off-grid power plant *p* in year *y* (currency/MWh)	This is data is required if in Step 2 the third condition is demonstrated by using Option (a)
$T_{EL,p,y}$:	Tariff of purchasing grid electricity for consumers supplied by off-grid power plant p in year *y*	This is data is required if in Step 2 the third condition is demonstrated by using Option (a)

Note that the same data collection approach should be applied to all off-grid plants in one sector (e.g. industrial, commercial and residential sector).

The following input parameters summarized in Table 2 above are collected for each sampled off- grid power plant during the field survey see Questionnaire in English and Albanian language as Annexes to the documentation of the whole off- grid study of VeVe, which is provided to the DOE on request)

$DATE_{start,p}$ since the off-grid power plants are also included in the build margin (see Step 1.2 of the Annex 2 of the *"Tool"* below)

The conducted field survey showed that it was impossible for the respondents to provide the following data of the Table 2 of above. These data were asked for in the Questions 21d and 21b of the Questionnaire:

- Question Q21d "Net calorific value of used fuel" (**$NCV_{p,i,y}$**). None of the respondents did know the exact value of the **NCV.** Thus, conservative default values (Source: IPCC 2006) were taken into account.

- Question Q21b "Energy produced from the off grid power plant (**$EG_{p,y}$**)".
  None of the respondents could provide this data since no electricity meter are installed in the off- grid power plans.
  Thus, the value for this data question has been calculated as product of Net calorific value (**$NCV_{p,i,y}$**) with the corresponding default efficiency factors for power plants $\eta_{m,y}$ (see Annex 1 of above)) and with the value of question Q21c ''Fuel quantity used (**$FC_{p,i,y}$**)'' divided by 3.6 in order to convert GJ into MWh (**Option 2** of Step 4 of the *"Tool"*)

$$EG_{m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times \eta_{m,y}}{3.6} \text{ [MWh]}$$

Where:

$EG_{m,y}$ =	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$FC_{i,m,y}$=	*Amount of fossil fuel type i consumed by power plants included in off-grid power plant class m in year y (mass or volume unit (tons))*
$NCV_{i,y}$ =	*Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit (GJ/ton))*
$\eta_{m,y}$	*Default net energy conversion efficiency of off-grid power plant class m in year y (ratio), as per the default values provided in Annex 1*
m =	*Off-grid power plant class considered as one power unit (as per the provisions in Annex 2 to this tool)*
y =	*The relevant year as per the data vintage chosen in Step 3*
i =	*Fossil fuel types used*

This approach was used as already mentioned above since no questionnaire provided the directly measured net quantity of generated electricity (**$EG_{m,y}$**) requested for application of Option 1 of Step 4 of the *"Tool"*. All questionnaires provided the amounts of fossil fuel consumed (**$FC_{i,m,y}$**) by each off-grid power plant during the year 2007. Thus $EG_{m,y}$ was calculated for all the UNFCCC off- grid classes according to the corrected Option 2 of Step 4 of the *"Tool"*.

$OMC_{p,y}$: This data set was not provided in the Questionnaire since for the 3rd point of Step 2 of Annex 2 point (c) was applied.

T_{EL}: This data set was not provided in the Questionnaire since for the 3rd point of Step 2 of Annex 2 point (c) was applied. During the survey every company provided the tariff class for the electricity purchased from the national grid of Albania (see also approach described under Step 2 of Annex 2 of the "Tool").

Step 1.2: Define the classification of off-grid power plants

To facilitate data collection and calculations, off-grid power plants should be classified in different classes of off-grid power plants. All off-grid power plants included in one class are considered as one single power unit for the calculations in this tool.

Off-grid power plants should be classified according to their capacity (CAP_p), fuel type ($FUEL_p$), and type of technology ($TECH_p$).

This classification was applied in the conducted off-grid survey (see documentation of the whole off-grid study conducted by VeVe is available to the DOE on request).

Referring to the collected data from the questionnaires a theoretical maximum of 42 (7 x 1 x 2 x 3 = 42) UNFCCC classes could be identified:

- CAP_p (question Q13 in the questionnaire), 7 different categories
- $TECH_p$ (question Q8 in the questionnaire), 1 category
- $FUEL_p$ (question Q10 in the questionnaire), 2 categories
- Age (question Q15 in the questionnaire), 3 categories

During the off grid survey just one technology was identified, namely the "Reciprocating engines". The off- grid power plants were either fuelled by diesel or by gasoline ($FUEL_p$). Gasoline was just used in very small off- grid power plants (CAP < 10 kW).

Since the off- grid power plants are included also for the calculation of the build margin (BM) emission factor the following age classes were defined based on the start date of operation ($DATE_{start,p}$) according to Step 1.2 of Annex 2 of the "Tool".

0 – 5 years of operation (reference year 2007)
6 – 10 years of operation (reference year 2007)
11 – 20 years of operation (reference year 2007)

The oldest off-grid power plant surveyed started operation in 1987.

If off-grid power plants are also included in the build margin, their vintage needs to be determined based on the start date of operation ($DATE_{start,p}$). In this case, the classes have to be differentiated into three data vintages: plants with up to five years of operation, plants with up to 10 years of operation and plants with more than 10 years of operation.

Finally the following 23 UNFCCC classes separated into the data vintages required in the "Tool" were identified:

	Nominal capacity of off grid power plants in [kW]						
Diesel	CAP < 10	10 < CAP < 50	50 < CAP < 100	100 < CAP < 200	200 < CAP < 400	400 < CAP < 1000	CAP > 1000
Age (0-5)							
Age (6-10)							
Age (11-20)							
Gasoline							
Age (0-5)							
Age (6-10)							
Age (11-20)							

If default efficiencies, as provided in Annex 1 of this tool, are used to determine the emission factor for a power plant (see Option A2 in Step 4 of this tool), the power plant classification provided in Annex 1 should be used. If the Options A1 and/or A3 in Step 4 of this tool are applied to determine the emission factors for off-grid power plant classes, project participants may also use their own classification.

Since default efficiencies, as provided in Annex 1 of the *"Tool"*, are used to determine the emission factor for each power plant (The sum of all off- grid power plants included in one UNFCCC class are considered as one single power unit.) (see Option A2 in Step 4 of the *"Tool"*), the same power plant classification provided in Annex 1 is used.

Step 1.3: Define the sectors for which data is collected

Define for which sectors (e.g. households, commercial sector) or industries data on off-grid electricity generation is collected or whether data is collected for the whole economy. The project participants may deliberately choose the sectors for which data is collected; however, the sectors should be clearly and unambiguously defined (e.g. which size of companies or households, the geographical area covered, etc) and the selection should include any systematic bias (e.g. by including only a sub-sector which uses only coal as fuel while less carbon intensive fuels are used in other sub-sectors).

The survey was conducted as a probability survey, where the Business register of INSTAT was used as a sampling frame. To achieve a maximum quality of the results a stratified sampling approach has been chosen. The stratification is based on the economic activity and the size of the company which was considered to be most appropriate for the off- grid survey.

As potential users of off-grid power plants private and state owned economic enterprises, public institutions and households were identified. So the target population in the conducted survey was determined to include all off-grid power plants used by enterprises, households and public institutions.

According to NACE Rev 1.1, there are 12 sections of economic activities to be considered. The size of companies is divided in 4 groups: over 50 employees, 10 - 49 employees, 5 - 9 employees and 1 - 4 employees. In this way in total 48 strata are formed. The table below *Active enterprises by Economic Activities and Size, 2007 (Section A, B and P not-included)* summarizes for each stratum, the number of enterprises according to the economic activity and the size of companies.

The specific conditions of Albania (high cost of producing electricity because of high fuel prices) lead to marginal use of off-grid power plants in households for non business purposes. Thus the household sector (NACE section P) was neglected and off-grid power plants used by families are not considered in the off-grid survey.

Off-grid power plants used by the enterprises, operating in economic activities such as agriculture, hunting and forestry (NACE section A) and fishing (NACE Section B) are excluded as well in the survey since the type of activity refers to marginal off- grid power use as well. The excluded enterprises represent less than 1% of the total number of enterprises.

The enterprises cover all sizes of economy and all geographical sector of Albania in order to avoid any bias described in Step 1.3 of Annex 2 of the *"Tool"* above.

The following table summarizes the number of companies within different sectors. The companies are located in all geographical areas of Albania. All the company data were provided by the official Statistic Authority of Albania INSTAT to VeVe.

Active enterprises by Economic Activities and Size, 2007 (Section A, B and P not-included)

Economic Activity (NACE Section)	Size of enterprises				
	50+ employees	10-49 employees	4-9 employees	1-4 employees	Total
C-Mining and quarrying	9	55	74	217	355
D-Manufacturing	233	557	629	6,631	8,050
E-Electricity, gas and water supply	32	31	19	30	112
F-Construction	107	829	735	2,749	4,420
G-Wholesale and retail trade	48	422	999	41,060	42,529
H-Hotels and restaurants	16	69	299	11,657	12,041
I-Transport, storage and communication	41	107	241	7,780	8,169
J-Financial intermediation	28	16	48	228	320
K-Real estate, renting and business activities	55	186	241	3,815	4,297
M-Education	72	64	101	486	723
N-Health and social work	100	318	144	1,212	1,774
O-Other community, social and personal service	52	139	184	3,586	3,961
Total	**793**	**2,793**	**3,714**	**79,451**	**86,751**

Source INSTAT

The selected enterprises in the table above were considered to represent best the overall population of off-grid power plants in Albania, by application of the working assumption that each active enterprise at least possesses on off-grid power plant.

Step 1.4: Establish the survey design and management scheme (applicable if a survey is used)

Document transparently the design and methodology of the survey, following best practices in survey design and statistics. In doing so, the following guidance shall be applied:

- *The institution conducting the survey should have relevant experience with undertaking surveys;*

  The whole off-grid study was conducted by the local consultant VeVe Group and local statistic experts from the University of Tirana. For Quality Assurance (QA) reasons the whole statistical survey was accompanied by the Austrian statistic expert Univ. Prof. Dr. Marcus Hudec (DATA

TECHNOLOGY Betriebsberatungs GmbH & Co KG) in order to comply with international statistical standards and UNFCCC requirements.

- *Ensure a proper stratification within the geographical area of the electricity system and within the different users of off-grid power generation (e.g. considering relevant differences between sectors, household income, etc). To this end, it may be necessary to conduct a pre-survey to collect information which sectors, companies or households typically use off-grid power plants;*

  See described stratification in Step 1.3 of above.

  Sampling frame and Sampling units
  Since the survey is a probability survey, for construction of the sample the existence of a sampling frame was required. The sampling frame is the list/population (sampling units) from which the samples will be drawn, it's (almost) never exactly equal to the target population.

  In order to get a representative sampling the Business Register is used as sampling frame, which is created and maintained by INSTAT (Institute of official statistics in Albania). The New Business Register constitutes all non-agricultural active enterprises (public and private enterprises and also public institutions) operating within the territory of Albania.

  For the underlying survey conducted, the Business Register was considered the best registry for economic enterprises in Albania.

  The Business Register contains required information regarding:

  - **Identification of enterprises as:** identification code (NIPT), legal form, ownership, name, address, contact details (phone, fax etc.)
  - **Stratification variable as:** main economic activity, size according number of employees, geographic location
  - **Demographic variable as:** the date of foundation and the date of activity closure.

  These variables are updated periodically by different INSTAT activities like: The activity status (active or non-active), main economic activity, size according to employees, addresses, contact details; phone, fax, mobile, e-mail). The economic activity of companies is based on the Economic Activity Nomenclature, NACE Rev 1.1.

  The sources for updating these variables are administrative registers or/and statistical survey. Among administrative source there are: QKR (National Registering Center), DPT (General Tax Office), file (card index) of VAT, annual account of enterprises, etc.

  Among the statistical sources the following can be mentioned: Newly Created Enterprises survey, Annual Structure Survey (ASN), quarterly survey (STS), Production Price survey (PPI), and other surveys.

  The use of the Business Register was considered to be the most appropriate source for off-grid survey usage since it minimizes the coverage errors.

  Additionally, see also description of the stratification in Step 1.3 of above.

- *The results of the survey should be used to derive global estimates adjusted for their uncertainty at a 95% confidence level in a conservative manner (using the upper or lower uncertainty bound whatever is conservative);*

  In order to stay conservative the lower levels (according to the uncertainty at a 95% confidence level as required in Annex 2 of the "Tool" of the finally extrapolated amounts

of the off-grid electricity generation of the identified UNFCCC classes were considered in the calculation of the Combined Margin (CM) emission factor.

- *The methods used to collect data should strive to avoid any bias and should ensure random sampling in the various strata;*

  By application of the sampling frame described above under Steps 1.3 and 1.4 any bias in data collection is avoided.

  The actual drawing of the random sample according to the details of the sampling scheme has been performed within INSTAT applying a systematic random sampling scheme within strata.

- *Provide objective and transparent methods for data collection;*

  The data collection was done according to the following procedure:

Survey instrument

A first draft questionnaire according to the requirements of Annex 2 of the "Tool" was prepared in October 2010. The VeVe team in collaboration with the Austrian experts have reviewed the drafts and provided comments on the selection of questions. So the final questionnaire was improved several times in order to correspond to the requirements of the UNFCCC.

Questionnaire Content

The questionnaire is organized in different sections:

- Identifying questions: This group is composed by Id Questionnaire, Response Indicator, Address of the enterprises and Characteristics of enterprises
- The characteristics of every off-grid power plants disposable at the enterprise
- The data regarding the usage of off-grid power plants in the years 2007 and 2008
- Additionally the maintenance manner of off-grid-power plants was surveyed as well.

Pilot survey

The first draft of the questionnaire was tested through a pilot survey in 10 enterprises, including a government institution (Ministry of Finance). The pilot test survey has been conducted from the well trained and experienced interviewers (enumerators) and it was monitored by the VeVe team. The results of the pilot survey served for improvement of the questionnaires.

Interviewer recruiting and training

The field survey was conducted by 85 interviewers in total. 40 interviewers were employed in the Tirana district and 45 interviewers for the field work in all the other Albanian districts. The distribution was based on the number of the questionnaires per districts. (A training list of all the interviewers can be provided by VeVe on request).

In total four supervisors for the supervising the field survey were hired. The interviewers and the supervisors have been selected in close collaboration with INSTAT. The supervisors previously have worked in other INSTAT surveys.

The interviewers and supervisor recruitment was done by INSTAT based on the criteria normally applied for other enterprise surveys. As former INSTAT employees for the enterprises census all the interviewers have previous experience in doing statistical surveys. Thus, the interviewers know the enterprises (location; addresses...), which simplified the field survey and raised the amount of filled out questionnaires.

In order to be familiar with the questionnaire and the manner it should be filled, the VeVe team has organized training sessions before start of the field work. The training has been organized in 2 different sessions, one day each. The interviewers were divided in 2 groups. The first group composed by the Tirana interviewers and the second session has included the rest of interviewers from other districts. The training session was realized by the project team in collaboration with INSTAT specialists.

The training laid a focus on the following 3 issues:

First issue: Gaining more knowledge regarding the survey and the questionnaire. During this period the interviewers got information regarding the reasons for the survey and every question in the questionnaire. Every interviewer got additional (explanatory) information to every single question of the questionnaire.

Second issue: Role plays were done how to fill the questionnaire. After the interviewers were familiar with the questions, the second period was an interactive communication (under the supervision of VeVe staff), where the interviewers played the role of interviewers and the respondents.

Third issue: The practice how to fill the questionnaires was discussed.

Field work

Collection of filled questionnaires has been done in every Albanian district. In average every interviewer had to fill approx. 40 questionnaires during a period of 3 weeks, so they had to fill in average 3 questionnaires per day.

The field survey has started by training interviewers on 26th January 2011 and lasted approximately one month. Every Monday VeVe got in touch with the interviewers to get feedback regarding the progress of the survey and the occurred problems during the survey.

The most frequent questions raised have been:

- Missing the data label on the off-grid power plant
- Net Caloric Values figures of the fuels were not known by all the respondents.
- No info regarding the energy generated by the off grid power plants during a year could be provided.

There have been some cases where the interviewers had problems to collect the requested data, especially in the state institutions, because they have asked for an official letter from the company conducting the survey (VeVe), but these problems could be solved subsequently.

- *Ensure that appropriate procedures for data verification are in place, including relevant quality assurance and quality control methods.*

All the survey data were collected first in paper format by filled questionnaires. Afterwards the data entry process on PC had to be conducted in order to be further elaborated by the statistical computer program SPSS.

Before recording, a qualitative check of all the questionnaires was done in order to be sure that they were filled properly and also according to some other standard procedures to support the data entry.

The data entry process was done in Excel because for some categorical data during the recording, the Excel gives the possibility for data validation.

At a later stage the data have been transferred into SPSS (version 17) using the standard procedures offered by SPSS.

Also in the SPSS software VeVe has done quality check, e.g. the data range control for categorical data.

Both electronic data and the whole off- grid survey were provided to the Client and to the Austrian statistic expert Univ. Prof. Dr. Marcus Hudec (DATA TECHNOLOGY Betriebsberatungs GmbH & Co KG) for Quality Assurance (QA) and further Quality Control (QC) in the following way:

- Transparent documentation of all procedures and methods applied during the whole process from the planning phase to the calculation of final results
- SPSS – Syntax Files, which provide the documentation of all data transformation and calculation steps
- SPSS – System Files, which contain all data necessary for the examination of the derived results and allows the reproduction of the results by an IE

DATA TECHNOLOGY Betriebsberatungs GmbH & Co KG conducted parallel a calculation (extrapolation) of the provided SPSS data in and received the same results as VeVe.

The DOE should carefully evaluate and confirm that the survey was conducted in accordance with these principles and best practices for conducting and evaluating surveys.

Step 1.5: Collect the data or use existing data sources

Collect the data or use relevant existing data sources. Exclude all plants for the sample for which not all necessary data (as identified in Step 1.1 of this annex) could be collected.

The following data were collected during the field survey:

Sample size

At the beginning of the survey a sample size of approx. 3,000 to 3,500 enterprises was considered sufficient.

Sample allocation

With the chosen stratification, a proportional allocation was not practicable because of the very different number of enterprises in the strata. Therefore for the sample allocation a disproportionate allocation was chosen. Thus the number of enterprises in the strata is different.

The decision regarding the selection rate was:

- All the companies having over 50 employees were selected.
- 14% of the companies having between 10 to 49 employees were selected.
- 9% of the companies having between 4 to 9 employees were selected.
- 2% of the small companies having between 1 to 4 employees were selected.

In practical terms not a strict proportion was applied but a minimum cell size in each stratum was determined. A minimum sample size of 7 enterprises in each stratum was determined.

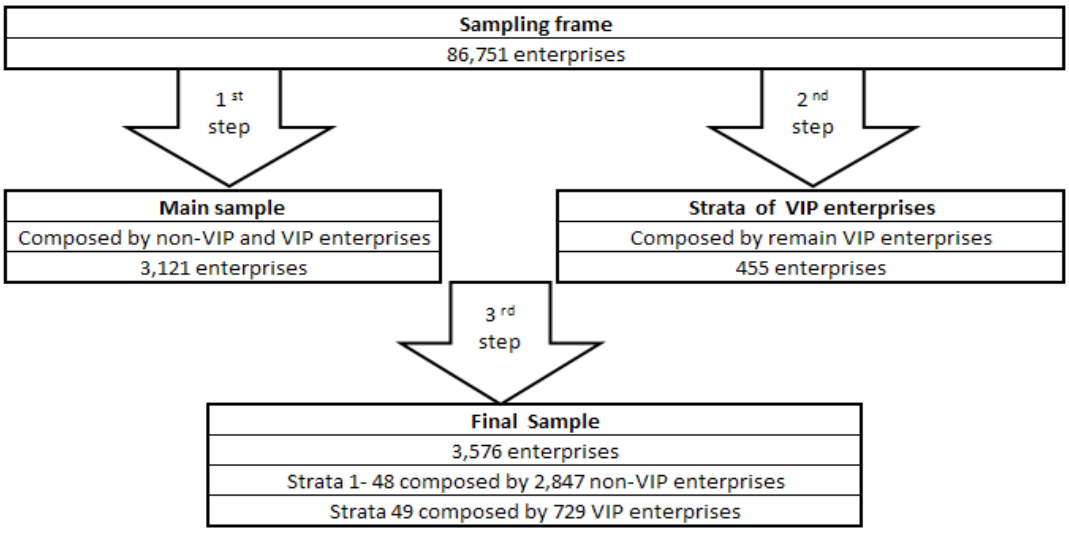
Assuming that the most important enterprises, so-called VIP enterprises, have been and still are important users of off- grid power plants in periods of power cuts, the establishment of a specific stratum for those enterprises was proposed. The stratum for the VIP enterprises includes enterprises that were randomly selected under the first selection process and those that remained unselected at the beginning and being selected after the first selection process subsequently.

Based on the Business Register of INSTAT it was possible to identify all the VIP enterprises at a later stage of surveying. In total 274 VIP enterprises were sampled during the main sampling and 455 VIP companies were sampled in a second step of the field survey. Thus in total 729 VIP companies were surveyed (see also tables below).

Sample selection

The sample selection was conducted in two steps: (i) the selection of main sample (including the randomly sampled VIP companies and (ii) the sampling of the missing identified VIP companies. The process of sampling is shown graphically in Figure 1-1.

Figure 1-1. Process of sample creation



In a first step, a sample of 3,121 enterprises was selected in an independent manner for all strata, through usage of a systematic selection (see following table 1-2). This sampling is considered the main sampling structure. In each stratum the samples are sorted according to districts to avoid a possible bias due to non representative sampling-proportions from different regions.

Table 1-2. The structure of Main sampling (including VIP-enterprises and non-VIP-enterprises)

Economic Activity (NACE Section)	*Size of company*				
	50+ employees	*10-49 employees*	*4-9 employees*	*1-4 employees*	*Total*
C-Mining and quarrying	9	8	7	7	31
D-Manufacturing	233	77	56	132	498
E-Electricity, gas and water supply	32	7	7	7	53
F-Construction	107	116	66	54	343
G-Wholesale and retail trade	48	59	89	821	1,017
H-Hotels and restaurants	16	9	26	233	284
I-Transport, storage and	41	14	21	155	231
J-Financial intermediation	28	7	7	7	49
K-Real estate, renting and business	55	26	21	76	178
M-Education	72	9	9	9	99
N-Health and social work	100	44	12	24	180
O-Other community, social and	52	19	16	71	158
Total	793	395	337	1,596	3,121

At a second step, a new stratum (stratum 49) was created (inclusion of VIP companies from the main sampling and VIP enterprises, which remained unselected in the first step (see table 1-4).

Table 1-3: The distribution of VIP-enterprises to the strata within the main sample

Economic Activity (NACE Section)	*Size of enterprises*				
	50+ employees	*10-49 employees*	*4-9 employees*	*1-4 employees*	*Total*
C-Mining and quarrying	4	1	1	0	6
D-Manufacturing	50	5	0	0	55
E-Electricity, gas and water supply	5	0	0	0	5
F-Construction	55	15	0	1	71
G-Wholesale and retail trade	39	19	0	1	59
H-Hotels and restaurants	6	0	0	0	6
I-Transport, storage and communication	19	1	1	0	21
J-Financial intermediation	25	1	0	0	26
K-Real estate, renting and business activities	4	1	3	0	8
M-Education	1	0	0	0	1
N-Health and social work	2	0	0	0	2
O-Other community, social and personal service	14	0	0	0	14
Total	224	43	5	2	274

Table 1-4: The structure of Strata 49, composed only by VIP-enterprise, not selected in the main sample

Economic Activity (NACE Section)	*Size of enterprises*				
	50+ employees	*10-49 employees*	*4-9 employees*	*1-4 employees*	*Total*
C-Mining and quarrying	0	5	0	1	6
D-Manufacturing	0	47	4	2	53
E-Electricity, gas and water supply	0	0	2	0	2
F-Construction	0	83	14	5	102
G-Wholesale and retail trade	0	168	48	20	236
H-Hotels and restaurants	0	2	0	0	2
I-Transport, storage and communication	0	9	1	2	12
J-Financial intermediation	0	2	2	1	5
K-Real estate, renting and business activities	0	15	5	10	30
M-Education	0	3	0	0	3
N-Health and social work	0	0	0	0	0
O-Other community, social and personal service	0	4	0	0	4
Total	0	338	76	41	455

Note: Step 1 and 2 has been conducted by INSTAT according to technical specification of VeVe Group, because INSTAT doesn't make available to third parties any sampling frame.

At a third step, VeVe has reallocated all VIP-enterprises in one unique stratum (Stratum 49). Thus, regarding the VIP-enterprises a census was reached with a selection probability of 1, independently of the structure of the stratum.

In the main sampling 3,121 enterprises (including 274 VIP enterprises) were surveyed with the structure presented in the table 1-3.

By analysis of the information provided in Tables 1-2, 1-3 and 1-4 a reallocation was done for non-VIP enterprises in Table 1-5.

Table 1-5. The distribution of non-VIP-enterprises in Final sample (48 strata)

Economic Activity (NACE Section)	*Size of enterprises*				
	50+ employees	*10-49 employees*	*4-9 employees*	*1-4 employees*	*Total*
C-Mining and quarrying	5	7	6	7	25
D-Manufacturing	183	72	56	132	443
E-Electricity, gas and water supply	27	7	7	7	48
F-Construction	52	101	66	53	272
G-Wholesale and retail trade	9	40	89	820	958
H-Hotels and restaurants	10	9	26	233	278
I-Transport, storage and communication	22	13	20	155	210
J-Financial intermediation	3	6	7	7	23
K-Real estate, renting and business activities	51	25	18	76	170
M-Education	71	9	9	9	98
N-Health and social work	98	44	12	24	178
O-Other community, social and personal service	38	19	16	71	144
Total	569	352	332	1,594	2,847

Table 1-6 shows the distribution of VIP enterprises according to size and activity (only for the stratum 49).

Table 1-6. The final distribution of VIP-enterprises by economic activity and size

Economic Activity (NACE Section)	*Size of enterprises*				
	50+ employees	*10-49 employees*	*4-9 employees*	*1-4 employees*	*Total*
C-Mining and quarrying	4	6	1	1	12
D-Manufacturing	50	52	4	2	108
E-Electricity, gas and water supply	5	0	2	0	7
F-Construction	55	98	14	6	173
G-Wholesale and retail trade	39	187	48	21	295
H-Hotels and restaurants	6	2	0	0	8
I-Transport, storage and communication	19	10	2	2	33
J-Financial intermediation	25	3	2	1	31
K-Real estate, renting and business activities	4	16	8	10	38
M-Education	1	3	0	0	4
N-Health and social work	2	0	0	0	2
O-Other community, social and personal service	14	4	0	0	18
Total	224	381	81	43	729

In a further step of surveying additionally 60 off- grid power plants were surveyed within 50 enterprises (already covered during the survey. These off-grid power plants were taken into account subsequently. Thus in total 3,636 (2,847 + 729 + 60) questionnaires were collected and data were taken into account.

For the extrapolation (determination of the extrapolation weights) the numbers of VIP companies were deducted from the numbers of companies of the different strata representing the overall population. By doing this the overall population is divided in a VIP and a non VIP part.

Step 2: Exclude plants that do not qualify as off-grid power plants

The exclusion of the enterprises, which do not possess an off- grid power plant, was done in the following manner.

Referring to the question Q5 (*Do you use an off grid power plant?*) 1247 enterprises sampled do not use off- grid power plants (see following table below). These samples were considered in the extrapolation as follows:

- No reduction of the number of samples for the calculation of the weights
- No reduction of the size of the overall population (strata sizes remain unchanged)
- the corresponding electricity generation value of these off grid plants was determined with 0 MWh.

The other non applicable samples (answering was refused at 97 companies; 274 companies surveyed in 2011 have already quit their activity; 147 companies were not found on the addresses provided by INSTAT (97 + 274 + 147 = 518)).

These samples were considered in the extrapolation as follows:

- Reduction of the number of samples for the calculation of the weights
- No reduction of the size of the overall population (strata sizes remain unchanged)

Distribution of enterprises using of off-grid power plants

Q5. Do you use an off grid power plant?	***Frequency***	***Percent***
No	1,247	34.3
Yes	1,811 (+ 60) = 1,871	51.5
NA (Refused 97; Closed Activity 274; Not found 147)	518	14.2
Total	3,636	100.0

Exclusion of plants, not used during the year 2007

Referring to the question Q15 (*When you have started to use the off grid power plant?*) 109 plants have started the operation of the off- grid plant only in the year 2008. Thus these questionnaires were excluded in the database for the year 2007.

After this exclusion 1,871- 109 = 1,762 questionnaires (= off- grid power plants) were eligible and delivered values for electricity generated in the year 2007.

This step aims to exclude those power plants from the sample or other data source which cannot be considered as off-grid power plants according to the definition provided above. To this end, exclude those plants from the sample or other source of information for which one of the three following conditions is not met:

- $GRID_p$ *= true;*
- $SWITCH_p$ *= true;*
- *Whenever the grid is reliable and stable, the consumers purchase electricity only from the grid and the off-grid power plant is not operating. This can be demonstrated in one of the following ways:*

  (a) $OMC_{p,y} > T_{EL,p,y}$*; or*
  (b) Log book data on the hours of operation of the off-grid power plant p and the quality and availability of grid supply clearly shows that the plant only operated when the grid was not reliable and stable; or
  (c) Demonstrate that OMC > TEL once for all off-grid power plants included in a class of offgrid power plants and a sector by showing that this condition generally applies to all plants in the class and sector, e.g. using the fuel costs (e.g. official statistics or projections on

fuel prices), the efficiency of the plants in that class (e.g. using typical the default efficiencies provided in Annex 1) and relevant information on electricity purchase costs in the sector (e.g. statistics on electricity prices).

Exclusion of the plants, which are supplying the equipments not connected to the grid power ($GRID_p$ = true/false)

Through the question Q22 (*Are all parts (electricity consumer equipment) of your company supplied by the electricity grid?*), it was possible to identify off- grid plants without a connection to the national grid power system. There were 4 cases, which have to be excluded from the database because they are supplying some equipment not connected to the grid power system.

Thus 1758 questionnaires are eligible under the off- grid survey and are considered for determination of the extrapolation weights.

Exclusion of plants which are not able to switch from grid to off- grid and from off- grid to grid ($SWITCH_p$ = true/false)

The plants which are not able to switch from grid to off- grid and from off- grid to the grid are easily identified through the question Q23 (*Can the company switch from grid to off-grid and from off-grid to grid?*). Based on this condition, all the remaining off- grid plants were eligible. Thus, no other off- grid plant was excluded from the database.

Proof that whenever the grid power system will be stable and reliable the consumers switch to the grid power system because of lower cost.

The proof was conducted according to approach (c) of Step 2 of Annex 2 of the "Tool" in the following manner:

1. In every questionnaire the tariff class **(T_{EL})** is given (€/kWh_{el}) from the grid (see table about tariffs in Albania below for the year 2007) (1 € = 140 LEK; 10 LEK/ kWh = 7.1c€/kWh)
2. $\eta_{default}$ of the off- grid power plant (see default values for efficiencies according to Annex 1 of the "Tool"
3. $1/\eta_{default}$ ($kWh_{(PEC)}/kWh_{el\ generated}$)
4. Conversion from kWh Primary Energy Content (PEC) into liters of fuel (l) by use of NCV of the different fuels
5. Costs of Fuel in (€/l)
6. Calculation of specific costs of off- grid electricity (OMC) by multiplication of 4. with 5. (€/kWh_{el})
7. Comparison of OMC (6.) and T_{EL} (1.): **OMC has to be higher than T_{EL}**

Retail Electricity Tariffs for Tariff Customers Approved by the Decision No.84,[1] dated 14.12.2006 of ERE for the Period January 1- December 31 2007.

Customer Categories	Approved Tariffs (Lek/kwh)
Customers supplied in High Voltage (400/220/110KV)with assets owned by the customer	4.5
Customers supplied in Medium Voltage (35, 20, 10, 6 KV)	
Budgetary	9.40
Water supplier (budgetary)	7.00
Water supplier (non-budgetary)	7.00
Water supplier (private)	7.00
Industry (private)	7.00
Industry (non-budgetary)	7.00
Other non-budgetary measured in MV (Medium Voltage)	7.00
Other non-budgetary measured in LV (Low Voltage)	7.00
Other private measured in MV	7.00
Other private measured in LV	7.00
Wheat industry and bakeries	7.00
Pumping stations	7.00
Religion institutions	7.00
Media	7.00
Customers supplied in Low Voltage (0.4 KV)	
Budgetary	10.00
Water supplier (budgetary)	7.50
Water supplier (non-budgetary)	7.50
Water supplier (private)	7.50
Industry (non-budgetary)	8.00
Other non-budgetary	8.00
Private	8.00
Wheat industry and bakeries	7.50
Pumping stations	7.50
Religion institutions	8.00
Media	8.00
Household customers	7.00
Tariff for electricity consumption in common spaces (in condominium)	7.00

Regarding the tariffs for the reactive power the decision no. 80, dated 14.11.2006, of ERE decided that starting from 1st of October 2006 the tariff for the reactive power is 15% of the active power tariff.

[1] This decision did not approve KESH requests for the increase in retail tariffs and left in force the tariffs approved by the decision no. 32, dated 26.05.2006.

Average Costs of diesel and gasoline for the year 2007:														
	J	F	M	A	M	J	J	A	S	O	N	D	Average (Lek)	Average (Euro)
2007														
Diesel	117.8	114.8	112.7	114.5	116.6	117.7	118.3	123.2	126.4	128.8	128.8	134.2	121.2	**0.87**
Benzena	131.4	129.8	127.5	129.2	129.9	130.4	131.7	134.7	136.4	137.8	137.8	141.3	133.2	**0.95**
2008														
Diesel	142.2	142.8	142.8	144.5	149.9	158.6	160.9	156.3	154.1	147.2	132.3	116.1	145.6	**1.04**
Benzena	134.1	133.8	134.6	136.9	146.8	156.9	158.8	153.8	149.6	139.8	127.2	109.7	140.2	**1.00**
Eurodiesel	138.7	139.8	139.9	142.5	151.7	162	164.1	158.6	154.4	146	131.3	116.3	145.4	**1.04**
Conversion:	1 Euro =	140	Lek											
(Source: Letter from INSTAT; file: Offical letter Instat about fuel costs 2007.doc)														

	Nominal capacity of off grid power plants in [kW]							
	CAP < 10	10 < CAP < 50	50 < CAP < 100	100 < CAP < 200	200 < CAP < 400	400 < CAP < 1000	CAP > 1000	
$\eta_{default}$	0.28	0.33	0.35	0.37	0.39	0.42	0.45	
$1/\eta_{default}$	3.57	3.03	2.86	2.70	2.56	2.38	2.22	kWh/kWh_{el}
NCV Diesel (lower value)	41.4	41.4	41.4	41.4	41.4	41.4	41.4	MJ/kg
Density	0.83	0.83	0.83	0.83	0.83	0.83	0.83	kg/l
	34.362	34.362	34.362	34.362	34.362	34.362	34.362	MJ/l
	9.55	9.55	9.55	9.55	9.55	9.55	9.55	kWh/l
needed Diesel for 1 kWh_{el}	0.37	0.32	0.30	0.28	0.27	0.25	0.23	[l]
Cost per l Diesel [€/l] (2007)	0.87	0.87	0.87	0.87	0.87	0.87	0.87	[€/l]
Costs per kWh_{el} [€/kWh_{el}]	**0.33**	**0.28**	**0.26**	**0.25**	**0.23**	**0.22**	**0.20**	[€/kWh_{el}]

	Nominal capacity of off grid power plants in [kW]							
	CAP < 10	10 < CAP < 50	50 < CAP < 100	100 < CAP < 200	200 < CAP < 400	400 < CAP < 1000	CAP > 1000	
$\eta_{default}$	0.28	0.33	0.35	0.37	0.39	0.42	0.45	
$1/\eta_{default}$	3.57	3.03	2.86	2.70	2.56	2.38	2.22	kWh/kWh_{el}
NCV Gasoline	44.3	44.3	44.3	44.3	44.3	44.3	44.3	MJ/kg
Density	0.72	0.72	0.72	0.72	0.72	0.72	0.72	kg/l
	31.896	31.896	31.896	31.896	31.896	31.896	31.896	MJ/l
	8.86	8.86	8.86	8.86	8.86	8.86	8.86	kWh/l
needed gasoline for 1 kWh_{el}	0.40	0.34	0.32	0.31	0.29	0.27	0.25	[l]
Cost per l gasoline [€/l] (2007)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	[€/l]
Costs per kWh_{el} [€/kWh_{el}]	**0.38**	**0.32**	**0.31**	**0.29**	**0.27**	**0.26**	**0.24**	[€/kWh_{el}]

The calculations summarized in the tables above clearly shows that $\mathbf{OMC_{p,y} > T_{EL,p,y}}$ for all the off-grid power plants by taking into consideration only the fuel costs in order to be conservative. In reality the $OMC_{p,y}$ of all the off-grid generators are even higher. The $\mathbf{OMC_{p,y}}$ costs of the off-grid generators are at least 3 times higher than the highest electricity tariff of **7.1 €ct/kWh**. This clearly shows that due to economic reasons no operator of an off-grid power plant would operate it, when the national grid is stable. Thus it can be concluded that all the off-grid power plants qualify as real off-grid power plants according to the requirements of the *"Tool"* and no off- grid power plant were excluded based on this condition.

At the end of the exclusion process the database composed of 1,762 – 4 = 1,758 eligible off- grid plants.

Step 3: Aggregate data according to classes of off-grid power plants

In the case of direct use of the data on a plant-by-plant basis (Option a in the introduction to Step 1), allocate the collected data to the classes of off-grid power plants.

The electricity generation of the directly sampled off grid power plants in the year 2007 amounts to 174,000 MWh. The sum of the capacities of all the sampled off- grid power plants amounts to 239 MW. These figures are just given for illustration. In the underlying "Off- grid study" a statistical extrapolation for the total population was performed (see following clause below).

In the case of a statistical evaluation of the data based on sampling (Option b in the introduction to Step 1), allocate the collected data to the applicable stratum. Use the results of the survey to derive global estimates for the total population, for each class of off-grid power plants m, adjusting conservatively for the uncertainty at a 95% confidence level.[42]

The extrapolation is done on strata level according to the procedure summarized in the following table:

Extrapolation weights for the 49 determined strata of the overall population

[42] Note that this should not include power plants which did not qualify as off-grid following the procedures in Step 2.

Strata	Strata	Population Size	Sample Size	Initial Weight	Refused	Closed	Non-Contact	Do not qualify	True Sample	Weight
1 Dega = C And Size = 1	1	5	5	1.0000	0	0	0	1	4	1.2500
2 Dega = D And Size = 1	2	183	183	1.0000	3	20	8	0	152	1.2039
3 Dega = E And Size = 1	3	27	27	1.0000	0	1	1	0	25	1.0800
4 Dega = F And Size = 1	4	52	52	1.0000	1	4	2	0	45	1.1556
5 Dega = G And Size = 1	5	9	9	1.0000	0	1	1	0	7	1.2857
6 Dega = H And Size = 1	6	10	10	1.0000	1	1	0	0	8	1.2500
7 Dega = I And Size = 1	7	22	22	1.0000	1	1	1	0	19	1.1579
8 Dega = J And Size = 1	8	3	3	1.0000	1	0	1	0	1	3.0000
9 Dega = K And Size = 1	9	51	51	1.0000	1	7	1	0	42	1.2143
10 Dega = M And Size = 1	10	71	71	1.0000	1	10	1	0	59	1.2034
11 Dega = N And Size = 1	11	98	98	1.0000	1	3	0	0	94	1.0426
12 Dega = O And Size = 1	12	38	38	1.0000	2	3	0	0	33	1.1515
13 Dega = C And Size = 2	13	49	7	7.0000	0	0	0	0	7	7.0000
14 Dega = D And Size = 2	14	505	72	7.0139	2	4	4	0	62	8.1452
15 Dega = E And Size = 2	15	31	7	4.4286	0	0	1	0	6	5.1667
16 Dega = F And Size = 2	16	731	101	7.2376	1	4	8	0	88	8.3068
17 Dega = G And Size = 2	17	235	40	5.8750	1	0	0	0	39	6.0256
18 Dega = H And Size = 2	18	67	9	7.4444	0	1	0	0	8	8.3750
19 Dega = I And Size = 2	19	97	13	7.4615	0	0	0	0	13	7.4615
20 Dega = J And Size = 2	20	13	6	2.1667	0	0	0	0	6	2.1667
21 Dega = K And Size = 2	21	170	25	6.8000	0	1	1	0	23	7.3913
22 Dega = M And Size = 2	22	61	9	6.7778	0	1	0	0	8	7.6250
23 Dega = N And Size = 2	23	318	44	7.2273	0	0	1	0	43	7.3953
24 Dega = O And Size = 2	24	135	19	7.1053	1	4	0	0	14	9.6429
25 Dega = C And Size =3	25	73	6	12.1667	0	1	0	0	5	14.6000
26 Dega = D And Size = 3	26	625	56	11.1607	0	4	0	0	52	12.0192
27 Dega = E And Size = 3	27	17	7	2.4286	0	2	0	0	5	3.4000
28 Dega = F And Size = 3	28	721	66	10.9242	1	2	7	0	56	12.8750
29 Dega = G And Size = 3	29	951	89	10.6854	2	7	3	0	77	12.3506
30 Dega = H And Size = 3	30	299	26	11.5000	1	4	0	0	21	14.2381
31 Dega = I And Size = 3	31	239	20	11.9500	0	0	2	0	18	13.2778
32 Dega = J And Size = 3	32	46	7	6.5714	1	0	1	0	5	9.2000
33 Dega = K And Size = 3	33	233	18	12.9444	1	0	3	0	14	16.6429
34 Dega = M And Size = 3	34	101	9	11.2222	0	1	0	0	8	12.6250
35 Dega = N And Size = 3	35	144	12	12.0000	0	0	0	0	12	12.0000
36 Dega = O And Size = 3	36	184	16	11.5000	0	1	1	0	14	13.1429
37 Dega = C And Size = 4	37	216	7	30.8571	0	1	0	0	6	36.0000
38 Dega = D And Size = 4	38	6,629	132	50.2197	0	14	6	0	112	59.1875
39 Dega = E And Size = 4	39	30	7	4.2857	0	2	0	0	5	6.0000
40 Dega = F And Size = 4	40	2,743	53	51.7547	0	7	3	0	43	63.7907
41 Dega = G And Size = 4	41	41,039	820	50.0476	6	77	35	0	702	58.4601
42 Dega = H And Size = 4	42	11,657	233	50.0300	4	16	7	0	206	56.5874
43 Dega = I And Size = 4	43	7,778	155	50.1806	3	10	4	0	138	56.3623
44 Dega = J And Size = 4	44	227	7	32.4286	0	1	0	0	6	37.8333
45 Dega = K And Size = 4	45	3,805	76	50.0658	3	6	5	0	62	61.3710
46 Dega = M And Size = 4	46	486	9	54.0000	0	0	0	0	9	54.0000
47 Dega = N And Size = 4	47	1,212	24	50.5000	1	5	1	0	17	71.2941
48 Dega = O And Size = 4	48	3,586	71	50.5070	2	10	5	0	54	66.4074
49 Strata VIP	49	729	729	1.0000	55	37	33	1	603	1.2090
	Total	**86,751**	**3,576**	**739.4687**	**97**	**274**	**147**	**2**	3056	875.5711

Since the estimation of the variances was not satisfying a reasonable strategy to improve the estimation of variances is the collapsing of strata with few observations only. The collapsing was applied to the 4 economic sectors with least number of companies according to the scheme determined in the following table.

Number of eligible NON-VIP Companies in the Sample

		Size of company				
		50+ employees	10-49 employees	5 - 9 employees	1 - 4 employees	total
Section of Economic Activity	Mining and quarrying	2	1	1	2	6
	Manufacturing	141	49	38	70	298
	Electricity, gas and water supply	14	1	1	4	20
	Construction	33	48	29	13	123
	Wholesale and retail trade	5	25	45	284	359
	Hotels and restaurants	6	5	14	131	156
	Transport, storage and communication	11	6	4	18	39
	Financial intermediation	0	6	2	1	9
	Real estate, renting and business activities	23	11	9	26	69
	Education	30	1	4	3	38
	Health and social work	65	8	5	11	89
	Other community, social and personal service activities	14	10	10	34	68
Total		344	171	162	597	**1274**

Due to the collapsing of strata the weights had to be recalculated as for the collapsed strata extrapolation is based on the total economic sector irrespective of the size of the company. The result of this recalculation is summarized in the following table.

Strata	Strata	Population Size	Sample Size	Initial Weight	Refused	Closed	Non-Contact	Do not qualify	True Sample	Weight
1 Dega = C And Size = 1	1	343	25	13.7200	0	2	0	1	22	15.5909
2 Dega = D And Size = 1	2	183	183	1.0000	3	20	8	0	152	1.2039
3 Dega = E And Size = 1	3	105	48	2.1875	0	5	2	0	41	2.5610
4 Dega = F And Size = 1	4	52	52	1.0000	1	4	2	0	45	1.1556
5 Dega = G And Size = 1	5	9	9	1.0000	0	1	1	0	7	1.2857
6 Dega = H And Size = 1	6	10	10	1.0000	1	1	0	0	8	1.2500
7 Dega = I And Size = 1	7	22	22	1.0000	1	1	1	0	19	1.1579
8 Dega = J And Size = 1	8	289	23	12.5652	2	1	2	0	18	16.0556
9 Dega = K And Size = 1	9	51	51	1.0000	1	7	1	0	42	1.2143
10 Dega = M And Size = 1	10	719	98	7.3367	1	12	1	0	84	8.5595
11 Dega = N And Size = 1	11	98	98	1.0000	1	3	0	0	94	1.0426
12 Dega = O And Size = 1	12	38	38	1.0000	2	3	0	0	33	1.1515
13 Dega = C And Size = 2										
14 Dega = D And Size = 2	14	505	72	7.0139	2	4	4	0	62	8.1452
15 Dega = E And Size = 2										
16 Dega = F And Size = 2	16	731	101	7.2376	1	4	8	0	88	8.3068
17 Dega = G And Size = 2	17	235	40	5.8750	1	0	0	0	39	6.0256
18 Dega = H And Size = 2	18	67	9	7.4444	0	1	0	0	8	8.3750
19 Dega = I And Size = 2	19	97	13	7.4615	0	0	0	0	13	7.4615
20 Dega = J And Size = 2										
21 Dega = K And Size = 2	21	170	25	6.8000	0	1	1	0	23	7.3913
22 Dega = M And Size = 2										
23 Dega = N And Size = 2	23	318	44	7.2273	0	0	1	0	43	7.3953
24 Dega = O And Size = 2	24	135	19	7.1053	1	4	0	0	14	9.6429
25 Dega = C And Size =3										
26 Dega = D And Size = 3	26	625	56	11.1607	0	4	0	0	52	12.0192
27 Dega = E And Size = 3										
28 Dega = F And Size = 3	28	721	66	10.9242	1	2	7	0	56	12.8750
29 Dega = G And Size = 3	29	951	89	10.6854	2	7	3	0	77	12.3506
30 Dega = H And Size = 3	30	299	26	11.5000	1	4	0	0	21	14.2381
31 Dega = I And Size = 3	31	239	20	11.9500	0	0	2	0	18	13.2778
32 Dega = J And Size = 3										
33 Dega = K And Size = 3	33	233	18	12.9444	1	0	3	0	14	16.6429
34 Dega = M And Size = 3										
35 Dega = N And Size = 3	35	144	12	12.0000	0	0	0	0	12	12.0000
36 Dega = O And Size = 3	36	184	16	11.5000	0	1	1	0	14	13.1429
37 Dega = C And Size = 4										
38 Dega = D And Size = 4	38	6,629	132	50.2197	0	14	6	0	112	59.1875
39 Dega = E And Size = 4										
40 Dega = F And Size = 4	40	2,743	53	51.7547	0	7	3	0	43	63.7907
41 Dega = G And Size = 4	41	41,039	820	50.0476	6	77	35	0	702	58.4601
42 Dega = H And Size = 4	42	11,657	233	50.0300	4	16	7	0	206	56.5874
43 Dega = I And Size = 4	43	7,778	155	50.1806	3	10	4	0	138	56.3623
44 Dega = J And Size = 4										
45 Dega = K And Size = 4	45	3,805	76	50.0658	3	6	5	0	62	61.3710
46 Dega = M And Size = 4										
47 Dega = N And Size = 4	47	1,212	24	50.5000	1	5	1	0	17	71.2941
48 Dega = O And Size = 4	48	3,586	71	50.5070	2	10	5	0	54	66.4074
49 Strata VIP	49	729	729	1.0000	55	37	33	1	603	1.2090
	Total	**86,751**	**3,576**	**596.9448**	**97**	**274**	**147**	**2**	3056	716.1880

The 1,758 eligible off-grid plants were allocated to the different UNFCCC classes defined under Step 1.2 of Annex 2 of the *"Tool"*.

The general Hansen-Hurwitz estimation principle has been applied for the extrapolation of the sampled data. For the calculation of the confidence intervals for UNFCC-Classes the estimation had to be applied to each UNFCC-Class separately, leading to domain estimation which was applied. In fact this means only observations belonging to the UNFCC-Class contribute in this case to estimation (see SPSS documentation for details and formulas).

The results of the survey were used to derive global estimates for the total population, for each class of off-grid power plants m, adjusting conservatively for the uncertainty at a 95% confidence level. The results are summarized in the following table.

Energy produced from the off grid power plants within the determined 23 UNFCCC classes

Energy produced from off- grid power plants for the year 2007 in (MWh)					
	Estimation	Standard deviation	95%-Confidence intervall		Unweighted amount of samples
			Lower Level	Upper Level	
Class 1 : Cap=1, Tech=1, Fuel=D, Age=1	38,313	2,950	32,527	44,099	282
Class 2 : Cap=1, Tech=1, Fuel=D, Age=2	9,963	1,700	6,629	13,298	79
Class 3 : Cap=1, Tech=1, Fuel=D, Age=3	1,113	657	0	2,402	7
Class 4 : Cap=1, Tech=1, Fuel=G, Age=1	19,636	3,316	13,131	26,141	197
Class 5 : Cap=1, Tech=1, Fuel=G, Age=2	2,478	720	1,066	3,891	34
Class 6 : Cap=1, Tech=1, Fuel=G, Age=3	1,539	534	493	2,586	14
Class 7 : Cap=2, Tech=1, Fuel=D, Age=1	203,883	16,522	171,478	236,287	392
Class 8 : Cap=2, Tech=1, Fuel=D, Age=2	47,732	7,853	32,329	63,135	133
Class 9 : Cap=2, Tech=1, Fuel=D, Age=3	5,500	2,448	700	10,301	24
Class 13 : Cap=3, Tech=1, Fuel=D, Age=1	8,644	2,664	3,419	13,869	87
Class 14 : Cap=3, Tech=1, Fuel=D, Age=2	3,338	774	1,820	4,856	50
Class 15 : Cap=3, Tech=1, Fuel=D, Age=3	2,072	933	242	3,901	18
Class 19 : Cap=4, Tech=1, Fuel=D, Age=1	35,931	5,448	25,247	46,615	120
Class 20 : Cap=4, Tech=1, Fuel=D, Age=2	19,996	5,032	10,126	29,866	58
Class 21 : Cap=4, Tech=1, Fuel=D, Age=3	2,594	1,197	247	4,942	10
Class 25 : Cap=5, Tech=1, Fuel=D, Age=1	47,654	9,333	29,349	65,958	62
Class 26 : Cap=5, Tech=1, Fuel=D, Age=2	23,052	7,241	8,849	37,255	34
Class 27 : Cap=5, Tech=1, Fuel=D, Age=3	2,611	481	1,668	3,554	15
Class 31 : Cap=6, Tech=1, Fuel=D, Age=1	106,646	19,735	67,940	145,352	61
Class 32 : Cap=6, Tech=1, Fuel=D, Age=2	34,497	10,335	14,227	54,766	32
Class 33 : Cap=6, Tech=1, Fuel=D, Age=3	15,640	7,051	1,811	29,469	9
Class 37 : Cap=7, Tech=1, Fuel=D, Age=1	96,181	35,544	26,466	165,896	19
Class 38 : Cap=7, Tech=1, Fuel=D, Age=2	50,580	14,091	22,944	78,217	21
	779,594	156,557	472,708	1,086,656	1758.0

Step 4: Assess the extent of off-grid power

The effects of feeding additional electricity to the grid or saving electricity demand on off-grid power plants connected to the system are associated with significant uncertainty. For this reason, a significant amount of off-grid power should exist to include these plants in the grid emission factor.

The inclusion of off-grid power plants in the grid emission factor is only allowed <u>if one of the following two conditions are met</u>:

- *The total capacity of off-grid power plants (in MW) is at least 10% of the total capacity of grid power plants in the electricity system; or*
- *The total power generation by off-grid power plants (in MWh) is at least 10% of the total power generation by grid power plants in the electricity system.*

<u>If one of these conditions are not met</u>, then off-grid power plants cannot be included in the calculation of the grid emission factor of the electricity system. Otherwise, proceed to next step.

There is an inconsistence in the underlined sections from above, which was not solved in the revised *"Tool to calculate the emission factor for an electricity system (Version 02.1.0)"*.

The off- grid study for Albania was done for the year 2007. According to Step 3 of the "Tool" data from one single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation has to be used. 2007 is within this timeframe, thus this requirement is fulfilled.

The extrapolated off grid generation for the year 2007 amounted to approx. 472,708 MWh (lower level of the confidence interval). This is equal to 16.3% of the total power generation of power plants connected to the Albanian grid in the year 2007. The total power generation for the year 2007 amounted to 2,892,974 MWh (inclusive thermal power; without imports).

Since the installed capacity of all (sampled) off-grid power plants in operation amounts to 239 MW, which is equal to 14.9 % of the total installed capacity of 1,605 MW both above mentioned requirements are met.

Step 5: Assess the reliability and stability of the grid and that this is primarily due to constraints in generation, and not to other aspects such as transmission capacity

It has to be demonstrated that the grid to which project participants have access is not reliable and not stable and that this is primarily due to constraints in generation and not due to other issues, such as limited transmission capacity. To this end, it needs to be demonstrated that

- *Shortages, blinks, black-outs, load shedding and/or large variations in frequency and voltage ranges are common practice in the grid operation. Supporting evidence describing the number, duration and extent of events related to instability and unreliability of the grid has to be provided based on project participants or third parties statistics or surveys; and*
- *This situation is primarily due to constraints in generation, and not to other aspects such as transmission capacity.*

The reliability and stability of the grid was discussed between VeVe and OST (KESH). It was demonstrated that the instability of the grid is (was) primarily due to constraints in generation, and not to other aspects such as transmission capacity (see attached Letter of OST) below.

ost

Bulevardi Gjergj Fishta
Tirana, Albania

Tel. +355 4 2225581
Fax. +355 4 2225581
info@ost.al
www.ost.al

Prot. No. 1402/1

Tirana, 26/05/2011

To: **Mr. Dietmar Reiner**
Managing Director of
"Energji Ashta" shpk
TIRANA

Subject: Response to your letter "Request for information – Clean Development Mechanism Project (CDM) – Ashta HPP.

In response to your letter (No. EA/OST/034/Prot. dated May 19th, 2011), where you submit your request for information, we would like to express our confirmation that the electricity supply disruption during the past years were mainly caused due to a large deficit in domestic energy production.

It is clear that an increase in domestic energy production would improve the stability of supplies in Albania.

Please find attached the balance sheet for 2007, a year with a very low domestic energy production, which caused relatively high electricity supply disruptions.

Thank you for your cooperation.

General Administrator of OST sh.a.
Sokol RAMADANI

$$EF_{grid,OMsimple,y} = \frac{\Sigma_m EG_{m,y} * EF_{EL,my}}{\Sigma_m EG_{m,y}}$$

$$EF_{EL,m,y} = \frac{\Sigma_i FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}}{EG_{m,y}}$$

$$EF_{grid,BM,y} = \frac{\Sigma_m EG_{m,y} * EF_{EL,m,y}}{\Sigma_m EG_{m,y}}$$

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

Appendix 5: Further background information on the monitoring plan

Monitoring plan is described in the Section B.7. of this PoA-DD.

Appendix 6: Demonstration of additionality of a small scale CPA

Only for CPAs <= 5MW installed capacity additionality can be demonstrated as follows:
According to the "Guidelines for Demonstrating Additionality of Microscale Project Activities" (Version 03) a CPA shall be additional if

- it is located in a special underdeveloped zone of the host country identified by the government before 28 May 2010; or
- hydropower <= 5MW installed capacity is recommended by the host country designated national authority (DNA) and approved by the Executive Board to be additional in the host country at the time of inclusion of the CPA into the PoA.

For all CPAs > 5MW additionality shall be demonstrated as follows; CPAs <= 5MW shall either apply above mentioned procedure or the one outlined below:

In accordance with the "Simplified modalities and procedures for small-scale CDM project activities", (decision 4/CMP.1, Annex II)[43], paragraph 28, *a simplified baseline and monitoring methodology may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in* the "Guidelines on the demonstration of additionality of small scale project activities" currently Version 09 (EB 68)[44] (formerly known as attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities"):

For demonstration of additionality of a typical CPA within this PoA, additional guidance or guidelines of the following documents may be used:

[43] http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=43
[44] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf
[46] http://cdm.unfccc.int/EB/035/eb35_repan34.pdf

(a) "Non-binding best practice examples to demonstrate additionality for SSC project activities" (EB 35, Annex 34)[46],
(b) "Guidelines for demonstrating additionality of microscale project activities", currently Version 03 (EB 63, Annex 23)[47]

Additionally in the case investment barrier is chosen to determine the eligibility criterion the relevant sections of the following tool and guideline shall be taken into account:

(c) „Tool for the demonstration and assessment of additionality" Version 06 (EB 65, Annex 21)[48]
(d) "Guidelines on the assessment of investment analysis" Version 05 (EB 62, Annex 05)[49]

According to "Non-binding best practice examples to demonstrate additionality for SSC project activities" (EB 35, Annex 34), best practice examples include but are not limited to CPA included under the proposed PoA shall provide an explanation to show the project activity would not have occurred anyway due to at least one of the barriers, as follows:

(a) ***Investment barrier****: a financially more viable alternative to the project activity would have led to higher emissions;*

Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency). It is recommended to use national or global accounting practices and standards for such an analysis.

Determination of eligibility criterion – Investment barrier
The proposed PoA "Small Hydropower Programme of Activities in Albania and Serbia" involves CPAs that will generate electricity and supply/sell it to the grid. Thus the CPAs will generate financial benefits other than CDM-related income; and therefore the simple cost analysis (Option I) is not applicable. Since there is an alternative to the proposed PoA – the electricity generated by CPA small hydro power plants would be otherwise delivered from the existing grid - which is outside the control of the project developers; the investment comparison analysis (Option II) is not applicable.

Therefore, **benchmark analysis (Option III)** [50] shall be chosen in the case additionality is demonstrated through investment analysis.

For the individual CPAs to be included under this Programme of Activities, the benchmark for the demonstration of additionality through investment analysis will be calculated in **nominal terms** according to the latest available information from the Central Bank of Albania (or in the case it is not available , 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 CPA)respectively for inflation in the long term.

As an appropriate benchmark for the demonstration of the additionality the **weighted average costs of capital (WACC)** shall be used where average cost of equity is based on default values provided by the

[47] http://cdm.unfccc.int/filestorage/W/V/I/WVI3RN692YMCGLZT40QXBOUA8H5KFP/eb63_repan23.pdf?t=alB8bTB4NTlifDAWgEvM1uR11OyTp5RT7Vdy
[48] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf/history_view
[49] http://cdm.unfccc.int/Reference/Guidclarif/index.html#meth
[50] According to the Guidelines on the assessment of the investment analysis, Version 05 (EB 62, Annex 5), *in cases where a benchmark approach is used, local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR while required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if it can be demonstrated that they are applicable to the project activity and the type of IRR calculation presented.*

"Guidelines on the assessment of investment analysis", average cost of debt is based on commercial lending rates and 0.5:0.5 are used as percentage weights.

$$WACC = w_d * K_d * (1 - T) + w_e * K_e$$

Where:

w_d	Percentage of debt financing
w_e	Percentage of equity financing
k_d	Average cost of debt financing
k_e	Average cost of equity financing
T	Applicable corporate tax rate

The WACC calculated as above is to be considered as an after-tax benchmark/discount rate i.e. the economic/financial analysis using this parameter shall include the corporate tax expense. The WACC or its components should be calculated in the same terms as in the benchmark analysis.

The CPA implementer shall use the determined WACC to compare with the **project IRR** to assess the financial attractiveness of the investment in the proposed CPA.

According to the "Guidelines for assessment of the investment analysis" the following guidance is given:

- The cost of financing expenditures (i.e. loan repayments and interest) is not allowed to be included in the calculation of the **project IRR**.
- Seeing that the WACC is applied as a post- tax benchmark, the EBIT (earnings before interest and tax) is used as a base for the calculation of income tax.

In case other financial indicators were more suitable for the demonstration of the financial additionality of individual projects, the justification will be provided in the specific CPA.

The calculation and the complete investment analysis of a specific CPA will be provided in excel format, unprotected, together with the relevant documents of the specific CPA. Assumptions included in the investment analysis will be supported on available evidences or excluded from the analysis.

As a general approach, the following procedure will be applied by the CPA:

- Period considered for investment analysis: the period considered for conducting the investment analysis should not be limited to the crediting period of the specific CPA, but will be referring to the expected operational lifetime of the main equipment, based on the indications of the technological provider;
- If any rehabilitation or maintenance is expected to occur in the period considered for assessment, the calculation of the IRR may include the costs related to these;
- Plant load factor, defined ex-ante in the CDM-PDD according to one of the following options, according to the provisions in EB48, Annex 11:
    - The PLF provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;
    - The PLF determined by a third party contracted by the project participants (e.g. an engineering company);

Based on the above assumptions and approaches, the CPA implementer will calculate the Project IRR based on the available data at the moment of the investment decision. Both, IRR without CDM expected incomes and IRR with expected CDM incomes, will be compared to the benchmark.

An investment analysis will be conducted for the specific proposed projects, including the variables and input data related with capital investment, O&M cost and the estimated savings or revenues at the time of investment decision. The following table presents the typical data used in the IRR calculation of the project and the main sources of this information. The calculation will be based on conservative assumptions all of which should be listed in the SSC-CPA-DD of the future specific project.

Table: Key assumptions for investment analysis

Input	Unit	Value	Source	Comment
Investment cost	EUR		Quotations, purchase agreements, feasibility study reports (FSR), internationally accepted values (investment/installed MW), others.	
Equity	EUR		Investment analysis, loan agreements, others.	
Project life-time (years of operation)	Years		Concession Agreement, technical specifications of main equipment, others	
Start of operational generation	Date		FSR, others	
Installed capacity	MW		FSR, others	
Annual gross generation	GWh		FSR, hydrological studies, others	
Losses (for transmission to the grid connection point)	%		FSR, others	
Wholesale Power Price (Base Load)	EUR/MWh		FSR, Power Purchase Agreement,	
OPEX	EUR/MW		FSR, others	
Income tax	%		FSR, national regulation, others, i.e.: http://www.doingbusiness.org/data/exploreeconomies/albania/paying-taxes/	
Depreciation	%		FSR, others	
Host country inflation rate	%		Inflation forecast of the central bank of the host country for the duration of the crediting period; Target inflation rate of the central bank; 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	
Project IRR (without CER)	%		Financial analysis	
Project IRR (with CERs)	%		Financial analysis	

As a result of the benchmark analysis it will be demonstrated that the proposed CPA (project) is not financially attractive.

As per the "Guidelines on the assessment of the investment analysis", *only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.*

A sensitivity analysis shows whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions. The results of the variation shall be presented in the CPA-DDs and reproduced in the associated spreadsheets. In any case the following parameters shall be part of a scenario analysis.

Table: Variations of input parameters

IRR Sensitivity Analysis	90%	95%	100%	105%	110%
Investment costs					
Generation volume					
Electricity price					

For a typical CPA even the most favorable variations, e.g. +10% electricity price or -10% investment, will not help the project to reach the required benchmark. It is hence further substantiated that the CPA is not financially attractive and therefore additional.

(b) ***Access-to-finance barrier****: the project activity could not access appropriate capital without consideration of the CDM revenues;*

Best practice examples include but are not limited to, the demonstration of limited access to capital in the absence of the CDM, such as a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.

Determination of eligibility criterion - Access-to finance barrier:

The CPA implementer shall provide a statement by a financing entity (not only banks are financing but also e.g. manufacturers or ESCOs) which contains information that associated income from CO_2 reductions is critical in the approval of the loan or other form of capital provided (such as Mezzanine or equity).

(c) Technological barrier: *a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;*

Best practice examples include but are not limited to, the demonstration of nonavailability of human capacity to operate and maintain the technology, lack of infrastructure to utilize the technology, unavailability of the technology and high level of technology risk.

Determination of eligibility criterion – Technological barrier

It is demonstrated by providing a confirmation from an independent DOE (other than the validating DOE) that the CPA is facing such barrier.

(d) ***Barrier due to prevailing practice****: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;*

Best practice examples include but are not limited to, the demonstration that project is among the first of its kind in terms of technology, geography, sector, type of investment and investor, market etc.

Determination of eligibility criterion – Barrier due to prevailing practice

It is demonstrated by providing a confirmation from an independent DOE (other than the validating DOE) that the CPA is facing such barrier.

(e) ***Other barriers*** *such as institutional barriers or limited information, managerial resources, organizational capacity, or capacity to absorb new technologies.*

It is demonstrated by providing a confirmation from an independent DOE (other than the validating DOE) that the CPA is facing such barrier.

- - - - -

History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for small-scale CDM programmes of activities" (EB 66, Annex 13).
01	EB33, Annex43 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		