CONTENTS

A. General description of small-scale programme of activities (SSC-PoA)
B. Duration of the small-scale programme of activities
C. Environmental Analysis
D. Stakeholder comments
E. Application of a baseline and monitoring methodology to a typical small-scale CDM Programme Activity (SSC-CPA)

Annexes

Annex 1: Contact information on Coordinating/managing entity and participants of SSC-PoA
Annex 2: Information regarding public funding
Annex 3: Baseline information
Annex 4: Monitoring plan

NOTE:

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

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

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

KTDA Small Hydro Programme of Activities
Version 03
23/04/2012

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

1. General operating and implementing framework of PoA

The Kenya Tea Development Agency Holdings Limited (KTDA) is the single largest producer and exporter of tea in Kenya, accounting for 28% of Kenya’s export earnings, and is also the second largest exporter of black tea in the world. KTDA is involved in collaboration with a number of tea factories under its management is planning the implementation of a number of tea factories under its management. KTDA in collaboration with a number of tea factories under its management is planning the implementation of a number of tea factories under its management. KTDA has established the KTDA Power Company (KTPC) as a wholly owned subsidiary of KTDA to manage the implementation of the proposed scheme.

− Creating PoA documentation (the CDM-POA-DD and CDM-CPA-DD)
− Obtaining a Letter of Authorisation from the host country
− Obtaining a Letter of Approval from the host country and the Annex I party involved
− Coordinating and communicating with the validator and the EB
− Drafting monitoring reports for all CPAs in accordance with the methodology outlined in the POA DD
− Requesting the UNFCCC to issue CERs into a registry account of the CER buyer(s)

The individual projects will be fully owned by Regional Power Companies (RPC), which, in turn, will be owned by KTPC and one or more Tea Factories under management of KTPC. Same RPC can own one or more individual projects depending upon the location and ownership. KTPC will enter into agreements with the RPCs stipulating that the latter cede all rights over the CERs to KTPC. The overall structure of the proposed scheme is given in the figure below:

![Diagram of the proposed scheme]

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
In accordance with the scheme, an individual CPA can comprise of a single project or a combination of projects bundles together with an overall capacity not exceeding 15 MW at any time during the crediting period.

2. Policy/measure or stated goal of the PoA

The purpose of the proposed POA is the generation of electricity by utilizing the hydro power potential in the region. The electricity generated through individual project activities will be supplied to the Kenyan national electricity/energy grid under a power purchase/wheeling agreement. The implementation of the POA will result in increased availability of electricity for the tea industries in the vicinity of the projects. The tea factory owners have thus taken this initiative to jointly implement run of the river small hydro project activities in order to effectively utilize the hydro power generation potential in the existing water bodies. At present, the tea factories have been importing electricity from the national grid through the Kenya Power and Lighting Company (KPLC). The project activities will thus lead to emission reductions by replacing electricity that would have otherwise been supplied by thermal power plants connected to the Kenyan grid.

Kenya is currently in an energy deficit position both for commercial and non-commercial energy\(^1\). The electrification ratio in Kenya is low with only 20% of the population having access to electricity and a per capita consumption of 130 kWh against 550 kWh on average for Sub-Saharan Africa. Outside the main centres, access to electricity is much lower, 7-8%, with low reliability in some areas\(^2\). While large-scale hydropower development is becoming a challenge in Kenya due to environmental and socio-economic concerns and vulnerability to climate change, small hydropower development can serve as a critical part of the solution towards bridging the demand supply gap and meeting the electricity needs of the country. Further, small scale hydro projects in diversified river basins can also reduce the dependence on the fork dams which account for majority of the country’s current hydro power capacity\(^3\). Since small and micro hydro plans are disbursed over a larger geographical area, as opposed to the forks dams, they reduce the susceptibility of the country to major fluctuations in power supply in the event of depressed rainfall in any particular region. Further, the environmental impacts of small/micro hydro plants are minimal through the use of ‘run-of-the-river’ schemes in which no dam or reservoir storage is involved. Thus, minimal interference with natural habitats and productive farmlands, and no relocation of people is necessary since no large reservoirs are required. This will ensure environmental sustainability and acceptance of small hydro projects by the communities.

However, small hydro power schemes are plagued by number of barriers which hinders their development, of which, the impact of poverty is significant in limiting the country’s capacity to develop local resources. Some of the factors\(^4\) which limit large scale implementation of small hydro projects in the country are:

\(^1\) www.helio-international.org/VARKenya.En.pdf
\(^3\) www.helio-international.org/VARKenya.En.pdf
\(^4\) http://finesse-africa.org/newsletter/200604/hp_africa.php
− Lack of access to appropriate technologies in the small hydro categories- Due to small heads and high volumes or very high heads and low volumes, these schemes pose special technical challenges.

− Lack of infrastructure for manufacturing, installation and operation. Kenya suffers from the lack of facilities to manufacture turbines or parts that might be critical in maintenance of the small hydro schemes.

− Lack of local capacity to design and develop small hydropower schemes for areas sometimes considered too remote- The country lacks specialisation to undertake feasibility studies that would include detailed design and costing of the schemes to make a meaningful impact on utilisation of small hydro sites.

The PoA, through its successful implementation, would serve as a model for investors and result in perception changes that are critical to expanding the use of small hydro in Kenya. The availability of CER revenue would further provide impetus towards utilisation of small hydro potential of the country by attracting investment from the tea factories. Further, the establishment of a market for investing in small hydro power projects, would significantly impact building of capacity to manufacture system components domestically and lead to value creation and availability of job opportunities in the region.

Through the provision of a clean source of electricity in a country where less than 20% of the population has access to electricity\(^5\), it is expected that all the projects will have a positive contribution to the achievement of MDG Goal 7: Ensure environmental sustainability. The project is also consistent with the objectives of the Kenyan National Task Force on Accelerated Development of Green Energy to install 2000 MW of additional power generation by June 2012.

As per “Kenya National Guidelines on the Clean Development Mechanism (CDM)\(^6\), CDM projects must demonstrate firm and tangible contribution to sustainable development- “In elaborating the contents of CDM projects based on the stated purpose of CDM (Art.12.2, Kyoto Protocol) and in accordance with agreed criteria, the following potential benefits will accrue to Kenya:
- Job creation;
- Poverty reduction;
- Increased investment capital, over and above ODA;
- Enhanced diffusion of environmentally cleaner technologies.”

Thus, in a Component Project Activity Design Document CPA DD, the sustainable development benefits would need to be demonstrated for the above impacts. A typical CPA in the PoA is expected to contribute to sustainable development in the following manner:

**Job Creation**
- The PoA will increase employment opportunities in the area where the CPAs are located, which will increase the income of the local community.
- Especially during civil works, small hydro power projects are expected to generate considerable employment opportunities for the local population.

**Poverty reduction**


- The CPAs, by providing employment in the construction as well as operation phase of the project, will contribute to poverty reduction by empowering the local population.
- Further, the PoA will generate demand for various kinds of related services, which would generate employment on regular and permanent basis and help alleviate poverty.
- Increased electricity generation will help promote the development of sustainable commercial activities in rural areas.

**Increased investment capital, over and above ODA**
- The PoA does not lead to divergence of any Official Development Assistance (ODA) funding. Therefore, it will be ensured that all investments that take place in the various CPAs would be sans ODA.
- The PoA will promote the sustainable development of the area falling under each CPA by promoting local investment and business environment, and thereby improving the local economy.
- The PoA will reduce lead time and transaction costs associated with CDM for potential investors in future CPAs, thereby making the proposed renewable power generation activity more attractive to sources of capital or equity.
- CERs revenue generated by the first few CPAs can be a potential capital source for future CPAs at early initial stages.
- The PoA generates demand for local products when spare parts are needed, leading to promotion of business activities.

**Enhanced diffusion of environmentally cleaner technologies**
- The PoA will support the development of hydropower resources in remote regions of the host country, which may not have been supplied electricity from the national grid in absence of the PoA, thereby promoting grid connectivity and providing access to power for populations that are socially disadvantaged.
- The PoA would support transfer of technology and technical know-how from other regions or other countries.
- Small hydro is considered more environmentally friendly since it avoids the significant environmental impacts associated with large-scale hydro, including loss of habitat, change in water quality and siltation.

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

The implementation of small hydro power projects is not mandatory in the Republic of Kenya. The proposed PoA is a voluntary initiative conceived by KTPC (with no direct or indirect mandate by law) with the intent to support the objective of small hydro power development in the country.

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

<table>
<thead>
<tr>
<th>Name of Party involved (host) indicates a host party</th>
<th>Private and/or public entity (ies) Project participants (as applicable)</th>
<th>Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)</th>
</tr>
</thead>
</table>

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

Kenya

A.4.1.1. Host Party(ies):

Republic of Kenya

A.4.1.2. Physical/Geographical boundary:

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

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

A typical CPA under this PoA has an installed capacity of up to 15 MW, takes place in the boundary of Kenya and generates electricity through the utilization of hydro power potential without reservoir and will result in an increased share of renewable energy in the Kenyan Grid. Individual CPA’s are envisaged to be non-storage type run of the river hydro power schemes connected to the national grid.

Small scale hydro power plants of <15 MW are not prevailing practice in Kenya and represent only 0.9% of total electricity generation capacities. The PoA scheme will stimulate development of small hydro power throughout Kenya and overcome the barriers associated with these renewable energy generation capacities.

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

The project is in accordance with the following small-scale project category:

Project type: Type I - renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent)
Category: I.D - Grid connected renewable electricity generation
Reference: AMS LD, Version 17 (EB61, Annex 17)

The SSC CPA proposed to be employed under the PoA will be one or several run of the river hydro power scheme(s) without reservoir having a total installed capacities ≤ 15 MW (sum of the capacity of all turbines implemented as a part of the project). The electricity generated by the project will be supplied to the Kenyan National Grid. The technical details including major civil works and equipment installed will be detailed in the individual CPA DD.
A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

Based on section A.4.3 and E.5.1, it is assumed that all small hydro projects \( \leq 15 \) MW in Kenya, and hence each SSC-CPA which is going to be included in the registered PoA, is additional. A SSC-CPA is eligible for inclusion in the PoA, provided all small hydro projects under the SSCCPA fulfil the following criteria:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Criteria</th>
<th>Applicability (Yes/No)</th>
<th>Conclusion</th>
<th>Documentary Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Does the proposed CPA comprise of new run-of-river small hydro power project (s) located at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant)?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Detailed Project Report, Land Documents, Clearances, Purchase Orders</td>
</tr>
<tr>
<td>2</td>
<td>Is the installed capacity of individual project/projects bundled together under the CPA ( \leq 15 ) MW?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Purchase orders of equipment, Commissioning certificate (s) (if applicable at the time of submission), engineering report, feasibility study report, generation licence</td>
</tr>
<tr>
<td>3</td>
<td>Is the CPA located in the Republic of Kenya?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Land Documents, GPS Coordinates</td>
</tr>
<tr>
<td>4</td>
<td>Does the CPA supply electricity to the national/regional grid?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Power Purchase Agreement, Grid Evacuation approval/agreement</td>
</tr>
<tr>
<td>5</td>
<td>Has the CPA owner entered into a contractual agreement with the CME?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Contract with the CME</td>
</tr>
<tr>
<td>6</td>
<td>Is the proposed CPA a voluntary initiative, not mandated by any policy and/or regulation in the host country?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Relevant abstracts from public/regulatory sources to demonstrate that the project is not mandated by law/regulation.</td>
</tr>
<tr>
<td>7</td>
<td>Is the CPA in conformance with mandatory laws and regulations?</td>
<td>Yes</td>
<td>Eligible in the PoA</td>
<td>Relevant abstracts from public/regulatory sources or clearances to demonstrate that the project is in conformance with mandatory laws and regulations.</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Yes/No</td>
<td>Eligible in the PoA</td>
<td>Additional Information</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>--------</td>
<td>---------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Is the proposed CPA registered as a part of any other PoA or as an individual CDM project?</td>
<td>No</td>
<td>GPS coordinates, Undertaking from the CPA owner, Analysis of projects in the CDM pipeline</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Can the electricity generated from the individual CPA be accurately measured and recorded to calculate actual emission reductions according to the applied baseline and monitoring methodology?</td>
<td>Yes</td>
<td>Monitoring plan, Details of monitoring equipment</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Has the CPA conducted an environmental impact assessment for each site and achieved clearance/approval from the environmental agency?</td>
<td>Yes</td>
<td>EIA Report/clearance from the Government Agency</td>
<td></td>
</tr>
</tbody>
</table>
| 11| Does the CPA face at least one of the barriers specified below or demonstrate that EB approval for automatic addionality of micro-scale hydro power technology has been obtained. |        | ENABLED in the PoA | EXAMPLE: Yes, the addionality has been demonstrated by a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.  
AND/OR  
• The loan approval (or other significant financing decision(s)) by the lender explicitly mention the relevance of the CDM  
• A statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.  
• The loan approval (or other significant financing decision(s)) by the lender with an explicit mention of the CDM registration.  
• The loan agreement with an investor which is also the buyer of CERs (the loan agreement should have a mention of CER sale arrangement).  
• Proof that a significant part of the project investment is provided upfront by |
| ii) barrier due to prevailing practice (to demonstrate additionality of CPAs with capacity of \( \leq 5 \text{ MW} \)) | Yes the additionality has been demonstrated since according to the national statistics the installed capacity of the technology is under a 3% threshold described in the PoA DD. | Eligible in the PoA | Relevant statistical data from national and/or international statistics of the installed capacity of similar projects in the country. |
| iii) Guidelines for the demonstration of additionality of micro-scale project activity”, version 03 (to demonstrate additionality of CPAs with capacity \( \leq 5 \text{ MW} \)) | Yes, micro-scale additionality has been demonstrated through the | Eligible in the PoA | • EB approval on recommendation of DNA of Kenya
• Detailed project report or relevant purchase orders of |
<table>
<thead>
<tr>
<th>iv) Investment Barrier (application of Investment Analysis – Benchmark Analysis) (to demonstrate additionality of CPAs with capacity of ≤ 15 MW)</th>
<th>Yes</th>
<th>Eligible in the PoA</th>
<th>Financial model for a CPA illustrating calculation of a suitable financial indicator using the guidance on investment analysis which remains lower than the applicable benchmark.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDM Executive Board approval on recommendation of DNA of Kenya that micro hydro power generation technology is additional in the host country since the total installed capacity is less than or equal to 3% Or the power plant is located in a special underdeveloped zone;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

The information presented here shall constitute the demonstration of additionality on the PoA level. The following is demonstrated in this section:

(i) The proposed PoA is a voluntary coordinated action
(ii) The proposed project activity would not be implemented in the absence of the PoA
(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced
(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation

(i) The proposed PoA is a voluntary coordinated action

The implementation of small hydro power projects is not mandatory in the Republic of Kenya. The Electric Power Act, 1997\(^7\) does not restrict or empower any authority to restrict the fuel choice. The proposed PoA is a voluntary initiative conceived by KTDA to enable individual tea factories under its management to implement small hydro power projects. No obligation exists for the tea factories to utilize or develop run-of-river small/micro hydropower projects. The PoA has been conceived as an enabler to support the objective of small hydro power development in the country. The proposed SSC-PoA can therefore be regarded as a voluntary coordinated action.

In 1997, Kenya’s Electric Power Act allowed independent power producers to supply electricity to the grid, but small decentralized schemes, such as hydropower plants <10 MW\(^8\) were not fully addressed\(^9\). Although prior to the 1960s hydropower plants <10 MW were used for other purposes, mainly aimed at supplying mechanical power for agro-processing activities such as grain mills, however, these out-dated systems were quickly outpaced by the diesel engine for milling grain. Even though today, improved technology can make plants <10 MW economically viable in many situations, but the country lacks the infrastructure for production and installation of these small systems, or for repair of systems once they are installed. In addition, there are no standards or other policies to encourage and enable local investors to take advantage of this renewable and environmentally benign source of power. This is demonstrated by the fact that two major studies on potential SHP sites were carried out in 1979 and 1982. In the 1979 study, 11 out of 52 identified sites were recommended for more detailed research and 8 out of 39 identified sites in the 1982 studies. However, none of these recommended sites could be developed\(^10\).

In March 2008, a feed-in-tariffs policy (FiT) on small-hydro resource generated electricity was introduced post an assessment of small hydro resource potential carried out by the Ministry of Energy which indicated that there are suitable sites for small hydro power development in the country. However, it was also recognised that substantial investments are needed to proceed further and attract private sector capital towards small hydro resource electricity generation.

Till date, only one <10 MW hydro demonstration pilot project of Imenti Tea Factory in Meru (Imenti Mini-hydro Power Plant), which was completed in December 2009 is operational under the FiT scheme of the country. This pilot project was developed by small scale tea farmers of Imenti Tea Factory who entered into a Power Purchase Agreement with the national distributor, Kenya Power and Lighting Company (KPLC). This demonstration small hydro power plant was instrumental in highlighting the limitations and barriers faced by investors which makes it complicated for the private sector to invest in

\(^7\) [http://www.erc.go.ke/epa.pdf](http://www.erc.go.ke/epa.pdf)

\(^8\) The definition of small hydro in Kenya is limited to stations having a capacity of below 10 MW

\(^9\) Community Action to address Climate Change: Case studies linking sustainable energy use with improved livelihoods - Page 9, Case Study: Affecting Electricity Policy through a community micro hydro project, Kenya (http://sgp.undp.org/download/SGPCasestudiesBook.complete.pdf)

\(^10\) [Independent Thematic Review- UNIDO Projects for the Promotion of Small Hydro Power for Productive Use](http://www.unido.org/fileadmin/user_media/About_UNIDO/Evaluation/Project_reports/e-book_small-hydro.PDF)
small hydro power in the country and avail of this scheme. So far, no other private sector participant has commissioned an Independent Power Plant and signed a Power Purchase Agreement under this scheme despite the push provided by the government in terms of policy interventions. Thus, targets for small hydro power development have not advanced, and the commercial capacity addition remains at a standstill since 1958 when a 2MW Gogo Falls plant was added.

In this respect, the PoA is expected to provide strong incentive to potential investors leading to systematic implementation of government policy supporting small hydro power development in the country.

(ii) The proposed project activity would not be implemented in the absence of the PoA

In order to facilitate better understanding of the situation of small hydro power projects in Kenya and the reason for low penetration of small hydropower, an overview of the barriers faced by these kinds of projects is being provided below. In accordance with Attachment A of Appendix B of the simplified modalities and procedures for small scale CDM project activities, additionality is demonstrated by showing that the PoA would not have occurred anyway due to the existence of one of the following barriers:

(a) Investment barrier
(b) Technological barrier
(c) Barrier due to prevailing practice
(d) Other barriers

The barriers identified for the proposed PoA are as follows:

**Prevailing Practice barrier**
The hydro potential of Kenya with capacity of less than 10MW\(^{11}\)yr is estimated at 3,000MW, of which it is estimated that less than 30MW have been exploited and only 15MW\(^{12}\) capacity supplies to the grid. Small hydro (inclusive of mini and micro-hydro) contributes to around 1% of the electricity generation capacity of the country and thus faces prevailing practice barrier. Fossil fuel based thermal energy generation contributes to 32.5%. The high installation cost averaging US$ 2,500 per KW, inadequate hydrological data, effects of climate change, limited local capacity to manufacture small hydro power components have combined to impede exploitation of hydro-electricity from capacities of less than 10 MW. The following table compares the installed capacity of hydro < 15MW (in accordance with CDM SSC Guidelines) with respect to other power generation sources\(^{13}\) by providing a summary of national electricity percentage by each energy source category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity Installed (MW)</th>
<th>Proportion</th>
<th>Effective Capacity (MW)</th>
<th>Proportion</th>
</tr>
</thead>
</table>

\(^{11}\) The definition of small hydro in Kenya is limited to stations having a capacity of below 10 MW. However, for the purpose of illustration of contribution to the national electricity generation by small hydro power, the capacity of hydro power projects up to 15 MW (in accordance with CDM SSC Guidelines) has been considered under the small hydro category.


In contrast to small hydro power generation, the implementation of a fossil fuel based power generation projects, like diesel plants, are less afflicted by barriers considering a number of fossil fuel based power generation projects, have already been implemented in Kenya. This indicates that fossil fuel based power plants in general and diesel plants in particular are prevailing practice in Kenya. Further, given the experience with fossil fuel based power plants in Kenya, and because the investment cost for renewable energy projects are typically higher, it can be argued that fossil fuel based power projects are less affected by the access to capital barrier as well. It is a well established fact that renewable energy projects have high upfront investment costs but low operating costs. However, in Kenya, the advantage of having low operating costs is nullified because the cost of fuel is transferred directly to the consumer through the Fuel Cost Charge on the electricity bill in accordance with the 2008 Schedule of Tariffs for Supply of Electricity by the Kenya Power and Lighting Company Limited Set by the Energy Regulatory Commission under Powers Conferred under Section 45 of the Energy Act, 2006. Since the cost of fuel can be transferred to the consumer, a fossil fuel based power plant in Kenya does not only have the benefit of lower perceived risks and lower upfront investment, but can also benefit from the fact that the fuel cost charge is compensating for potentially high operating costs.

The prevailing practice in Kenya was analysed and similar project activities were defined as those that rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing etc. Therefore, the following criteria were used to define projects that can be considered similar to the proposed project activities:

<table>
<thead>
<tr>
<th>Source – Least Cost Power Development Plan 2011-2031</th>
</tr>
</thead>
</table>
| Under the Least Cost Power Development Plan (LCPDP) Study Period 2010-2030, the electricity demand of the country is forecasted to grow by an average rate of 14% increasing from a capacity and energy level of 1,205MW and 7,391GWh in 2009 to 15,065MW and 92,380 GWh by 2030 respectively. There are committed power generation projects under construction providing an extra 1,450 MW by 2013; and the period to 2030 would have added 13,370 MW comprising of 4,480 MW geothermal, 3,900 MW new coal units, 4,200 MW nuclear, 320 MW new medium speed diesel units and 270 MW of new gas turbines\(^\text{15}\). Thus, there is substantially greater thrust on fossil fuel, nuclear and geothermal based generation sources in the future.

\(^\text{14}\) The definition of small hydro in Kenya is limited to stations having a capacity of below 10 MW. However, for the purpose of illustration of contribution to the national electricity generation by small hydro power, the capacity of hydro power projects up to 15 MW (in accordance with CDM SSC Guidelines) has been considered under the small hydro category.


This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
**Grid-connected hydro power projects:** Only grid-connected hydro power projects can be considered in the analysis. A fully captive hydro power project has a different investment climate as compared to the project selling its generated output to the grid.

**Projects implemented by private project developers:** Projects that are implemented by the government through public companies have a different investment climate. Such projects are implemented as part of the development plan of the country with an objective of welfare of the community and providing basic infrastructure. On the other hand, private investors have the objective of providing adequate returns to their investors and shareholders. Therefore, the investment climate as well as access to finance is quite different for private and public developers.

**Projects with installed capacity less than 15 MW:** The proposed project activities under the PoA are small scale projects and therefore project activities with installed capacity more than 15 MW i.e. large scale projects are excluded.

**Projects operational at the time of investment decision:** Only those projects were compared to the proposed project activity which were under operation prior to the decision to proceed with the project activity was taken by the developers.

Therefore, similar project activities are being considered as project activities that are grid-connected, small scale in nature, set up by a private investor in the host country (Kenya) and were under operation at the time when the decision to proceed with the project activity was undertaken.

The list of all the operational grid connected hydropower plants in Kenya is provided below:

<table>
<thead>
<tr>
<th>Power Plant</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gitaru Power Station</td>
<td>225</td>
</tr>
<tr>
<td>Kiambere Power Station</td>
<td>164</td>
</tr>
<tr>
<td>Turkwel Power Station</td>
<td>106</td>
</tr>
<tr>
<td>Kamburu Power Station</td>
<td>94.2</td>
</tr>
<tr>
<td>Sondu Miriu Power Station</td>
<td>60</td>
</tr>
<tr>
<td>Kindaruma Power Station</td>
<td>40</td>
</tr>
<tr>
<td>Masinga Power Station</td>
<td>40</td>
</tr>
<tr>
<td>Tana Power Station</td>
<td>20</td>
</tr>
<tr>
<td>Small Hydro Power Stations</td>
<td>14.7</td>
</tr>
<tr>
<td>IPP- Imenti Power Station (small hydro)</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>764.5</strong></td>
</tr>
</tbody>
</table>

Source: Kenya Power and Lighting Company (KPLC)\(^{16}\)

It can be observed that of the total hydropower installed capacity of 764.5 MW in the country, 749.2 MW or about 98% consists of large hydropower plants that are more than 15 MW capacities.

Further, all but one of these power plants is being operated by KenGen which is a public company with the Government of Kenya owning 70% shareholding and the public 30%\(^{17}\). With such a large stake of the government in operation of these power plants, the investment climate of these projects cannot be

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\(^{16}\) [http://www.kplc.co.ke/fileadmin/user_upload/1Report_Pages.pdf]

\(^{17}\) [http://www.kengen.co.ke/PIBO/pibo.html]
compared with that for private tea factory owners who would be setting up the proposed project activities. The government has an obligation to operate these power plants since it has to meet the growing energy demand in the country. Most of these plants have been operating for a very long time and are therefore nearing the end of their lifetime. However, even if these plants were to run into losses at any point of time, they have the backing of the government to bail them out.

The same cannot be said to be true for private project developers. Small hydro power projects are severely affected by the seasonal variations in river flow. Further, local expertise in manufacture of small hydrow power components like turbines and electronic load controllers is also not available. In case of failure or operational problems, the developers would have to bear a considerable loss of time and money leading to losses\textsuperscript{18}. CDM revenues thus become essential for the private developers in order to ensure viability of the projects.

Only one of these plants which has been undertaken as a pilot demonstration project with an installed capacity of only 0.6 MW is owned privately and has been instrumental in gaining experience and highlighting the barriers faced by mini hydro projects in the country. Hence, it can be concluded that the existing hydro power plants <5 MW represent only 0.9\% of total electricity generation capacities installed in Kenya or 0.44\% of the total installed capacity of 764.5 MW and are therefore not prevailing practice.

A buyer of the credits for the first CPAs has already been selected to provide continuous revenue flows for the CERs generated in these CPAs. These revenues provide the incentive for the CME to start the implementation of a hydro power scheme in Kenya, thus alleviating the existing prevailing practice barrier and increasing the share of small-scale hydro power technology in the country.

\textit{Investment Barrier}

One of the most significant barriers to developing small hydro projects in Kenya is difficulty in securing financing. Kenya does not have strong financial institution for long-term borrowing which creates a lack of funds for Hydro Projects. Further, many local banks don't have the capacity to structure project finance for small hydro projects. CDM could potentially overcome this access to finance barrier by attracting loans from banks that would otherwise not have invested in this type of projects.

The local financial situation has resulted in most project developers exploring international financial markets, which offer better rates and longer terms. However, international market financiers are more difficult to access given that the country risk of Kenya has been considered very high by investors. Until quite recently, reputed rating companies such as Moodys\textsuperscript{19}, Fitch, and Standard & Poor's had not even provided sovereign credit rating for Kenya. Recently, Fitch\textsuperscript{20} Ratings affirmed Kenya's Long-term foreign currency Issuer Default Rating of 'B+' and local currency rating of 'BB-' with Stable Outlooks. The Short-term rating was affirmed at 'B' and Country Ceiling at 'BB-'. However, it was also pointed out that high inflation, rising interest rates, exchange rate volatility and growing balance of payments pressures, pose a downside risk to macroeconomic stability. Standard & Poor's\textsuperscript{21} also assigned 'B+' long-term foreign currency and 'BB-' long-term local currency sovereign credit ratings to Kenya on 19\textsuperscript{th} November 2010 and 4\textsuperscript{th} February 2008 respectively however it also indicated that political risks continued to remain in the

\textsuperscript{18} http://www.gtz.de/de/dokumente/gtz2010-en-HERA-EUEL-PDF-framework-conditions-hydropower.pdf
\textsuperscript{19} http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_133633
\textsuperscript{20} http://www.fitchratings.com/creditdesk/press_releases/detail.cfm?pr_id=726085
\textsuperscript{21} http://www.standardandpoors.com/prot/ratings/entity-ratings/en/ap/?entityID=280394&sectorCode=SOV
country due to possible political infighting over passing of important legislations in the country\(^{22}\). In this circumstance, access to commercial loans for project investments becomes extremely difficult. Also, a United Nations world investment report indicated that Kenya’s ability to attract foreign direct investment is limited\(^{23}\).

Further, large international banks and financing institutions typically don’t consider small hydro projects because they are too small in capacity. With the given circumstances for financial institutions, it is a serious challenge to secure finance closures for such small hydro power projects. Most of the developers have to rely on donor funding such as those from multilateral donors like World Bank, AfDB. Others may be supported by bilateral initiatives (e.g. from Belgium, Germany, Japan, Netherlands, UK and Sweden).

Further, there has been very little equity investment in small hydro power projects in the country due to huge capital costs as well as the negative risk perception of investors. The capital intensive nature of the projects can be attributed to the necessity of overcoming problems such as lack of infrastructure, access to civil material like cement and steel, problems of transportation of material, and high cost of equipment and machinery due to low head available at sites among others. Further, unlike fossil-fuel based power generating units, construction of a hydroelectric plant requires a long lead-time for site studies, hydrological studies, and environmental impact assessment. CDM funds are required to impart feasibility to small hydro projects considering the discouraging investment environment for hydro power plants in Kenya.

The table below gives a comparison of generation cost for the various renewable energy sources\(^{24}\).

<table>
<thead>
<tr>
<th>Type</th>
<th>Unit Cost (US$/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal</td>
<td>7.0</td>
</tr>
<tr>
<td>Biomass</td>
<td>8.0</td>
</tr>
<tr>
<td>Biogas</td>
<td>8.0</td>
</tr>
<tr>
<td>Wind</td>
<td>8.8</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>12</td>
</tr>
</tbody>
</table>

From these figures, it is apparent that the cost of generation from small (including micro) hydropower plants is on a higher side compared to other possible alternatives. Even in comparison with other electricity generation sources such as geothermal power plants, the cost of hydro power generation is higher.

After registration of the PoA, an Emission Reduction Purchase Agreement will significantly improve cash flow and debt service cover ratio of the project (which is high for capital intensive projects). The hard-currency income will lower the considerable foreign exchange risks for the purchase of the turbines and spare parts and help overcome the high development costs of hydro plants.

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

\(^{22}\) [http://www.standardandpoors.com/prot/ratings/articles/en/ap/?articleType=HTML&assetID=1245240805993](http://www.standardandpoors.com/prot/ratings/articles/en/ap/?articleType=HTML&assetID=1245240805993)


The implementation of small hydro power projects is not mandatory in the Republic of Kenya. The Electric Power Act, 1997 does not restrict or empower any authority to restrict the fuel choice. The applicable environmental regulations do not restrict the use of hydro energy and there is no legal requirement on the choice of a particular technology.

(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 projects is not mandatory in the Republic of Kenya. The Electric Power Act, 1997 does not restrict or empower any authority to restrict the fuel choice.

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

#### A.4.4.1. Operational and management plan:

The PoA will be monitored at three different levels i.e. individual hydro power site, individual CPA and at the CME level. The operational and management arrangements to be established at the CME level are described in this section, and the arrangements/structure to be established at the CPA and site level are described in section E.7.2.

The operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA are as follows:

(i) **Record keeping system for each CPA:**

A record keeping system will be established by KTPC which would comprise of the following details for enabling unique identification for each CPA:

1. Name of the Regional Power Company (RPC) implementing the project
2. Shareholding pattern of the RPC describing the ownership information of the respective tea factories
3. Exact Location: City/Town/Village, State/Province
4. GPS coordinates (latitude and longitude)
5. Commissioning Details of each unit
6. The record of technical specification of each hydropower plant participating in the SSC-PoA
7. Roles and responsibilities for audit and verification of monitored parameters

A record keeping system will be established by each CPA operator and additionally manual data recording will be carried out in the plant log books. The data monitoring will primarily include the measurement of electricity exported to and imported from the grid by each CPA. The entity responsible for monitoring of CPA i.e. CPA operator, will prepare a report with the monthly records of electricity exported to and imported from the grid, gross electricity generation, transmission/transformation losses and auxiliary consumption. The CPA operator will also carry out a monthly analysis of data for the individual project and in case of any anomalies will take appropriate corrective actions. The review report will be submitted to KTPC. KTPC will maintain a record of this data which will subsequently be provided to the DOE during the verification process. Detailed description of the procedures to be followed by each CPA for monitoring and record keeping of data is provided in section E.7.2.

(ii) A system/procedure to avoid double counting:

KTPC will confirm as per EB 55 Annex 38 Paragraph 6(i), that the project activities included in the SSC-CPA are not registered in any other SSC CPA of the PoA or any other registered CDM Project activity through following procedure to avoid double counting of CPA under any other CDM or PoA activity:

- At time of CPA eligibility check, KTPC will seek confirmation in SSC-CPA and also check any double counting using public information sources like UNFCCC website data, UNEP Risoe cd4cdm data, VCS website etc.

- At the time of inclusion KTPC shall obtain a declaration from the CPA operator that “there is no double counting of CERs from this CPA under any CDM Project or CPA in another PoA”, along with the following undertakings:-
  - The CPA has not been and will not be registered as a single CDM project activity nor as a CPA under another PoA.
  - The implementing entity is aware that the CPA will be subscribed to the present PoA.
  - The implementing entity cedes its rights to claim and own emission reductions under the Clean Development Mechanism of the UNFCCC to KTPC.

(iii) The SSC CPA included in the PoA is not a debundled component of another CDM Programme Activity or another CDM Project activity:

To demonstrate that the SSC CPA included in the PoA is not a debundled component of another CDM Programme Activity or another CDM Project activity, the following approach shall be applied as per the “Guidelines on assessment of debundling for SSC project activities” Version 03:

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This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
Paragraphs 8, 9 and 10 of the “Guidelines on assessment of debundling for SSC project activities” Version 03 are given below:

Paragraph 8: For the purposes of registration of 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, 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 sectoral scope?

Yes

No

Is there an activity with the same activity implementer as the proposed small scale CPA?

OR Is there an activity with the same coordinating or managing entity, which also manages a large scale PoA of same sectoral scope?

Yes

No

Is the boundary of the activity within 1 km of the boundary of the proposed small scale CPA at the closest point? (Para 10 applies for independent subsystems PoA)

Yes

No

Does the total size of the proposed small scale CPA combined with the activity exceed the limits for small scale Pas as set out in decision 4/CMP.1 and revised in 1/CMP.2 (for energy) and 5/CMP.1 (for A/R) respectively?

Yes

No

The proposed small scale CPA of a PoA is deemed to be a debundled component of a large-scale activity but can qualify to use the simplified modalities and procedures for small-scale project activities

The proposed small scale CPA of a PoA is not deemed to be a debundled component of a large scale activity, therefore is eligible to use the simplified modalities and procedures for small-scale project activities
b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

Paragraph 9: 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.

KTPC will follow the guidance provided above, in order to avoid registering a SSC CPA that is a debundled component of another CPA or CDM Project.

In relation to the paragraph 8, if CPA does not satisfy both the condition 8 (a) & 8 (b), the proposed small-scale CPA of a PoA is not deemed to be a debundled component of a large-scale activity, therefore is not eligible to use the simplified modalities and procedures for small-scale Project activities. However if CPA satisfies above conditions and the total size of the SSC CPA does not exceed the limit for SSC Project activity, the proposed small-scale CPA of a PoA is deemed to be debundled component of a large-scale activity but can qualify to use the simplified modalities and procedures for small-scale Project activities.

In relation to paragraph 9, CPA will be included if 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 Project activity.

(iv) The CPA Operators are aware and have agreed that their activity is being subscribed to the PoA:

The CPA Operators involved in any of the SSC CPA under this programme shall provide the mandate to KPTC to subscribe the project under the PoA. This will be ensured through a contractual agreement of the CPA Operators with KPTC before inclusion of the respective CPA. KPTC will be operating all the SSC CPA and no separate entity will be engaged for operating the CPA of this programme.

A.4.4.2. Monitoring plan:

Monitoring and verification shall be carried out for each CPA and the CME will request a DOE to verify and certify the emission reductions generated for each CPA. The parameters included in section E.7.1 will be monitored by the implementing entity of the CPA according to the procedures and monitoring framework established in E.7.2. The monitored data will be submitted to the managing entity and KTPC will keep a record of the same. KTPC shall also develop and maintain a database that will contain the verification status of each CPA included in the PoA separately.

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

There is no public funding involved in the proposed PoA. The required funds would be raised through various financial institutions and in-house funding. KTPC would ensure that there would be no divergence of Official Development Assistance (ODA) in any of the CPAs under PoA. This would be confirmed through undertaking / declaration from the CPA owner submitted to KTPC.
## SECTION B. Duration of the programme of activities (PoA)

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

Starting date of the PoA is the date of uploading of the PoA DD for global comment period on 27/08/2011.

### B.2. Length of the programme of activities (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 the length of the PoA shall not exceed 28 years.
SECTION C. Environmental Analysis

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

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

The environmental impact assessment/analysis will be done at the SSC CPA level for each site under it, taking into consideration the differences of socio-economic and environmental conditions at each location.

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

The environmental impact assessment/analysis will be done at the SSC CPA level. The analysis shall be carried out in accordance with the Environmental Management and Coordination Act of 1999 (EMCA), and the Environmental (Impact Assessment and Audit) Regulations, 2003, which provide the basis for procedures for carrying out Environmental Impact Assessments (EIAs).

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

As per the Environmental Management and Coordination Act of 1999, an environmental impact assessment (EIA) is required to be carried out in order to obtain the necessary statutory licenses and permits to establish a small hydro power plant and to meet the requirements of banks and financing institutions. Therefore, each CPA will be required to have undertaken an EIA for each site under it and achieved clearance/approval from the environmental agency.
## SECTION D. Stakeholders’ comments

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

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

The Local Stakeholder Consultations will be held at the SSC-CPA level, taking into consideration the differences of circumstances and opinions of each and every community in which each CPA is located. It is essential to capture each community’s view on the impact of the CPA implemented in their surroundings.

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

The requirement of stakeholder consultation under the internationally-agreed rules on CDM does not prescribe how comments by local stakeholders are to be invited, and does not exclude the possibility that such comments are simply received in writing.

Each CPA will apply the following approach as considered appropriate for stakeholder consultation and document the same in the respective CPA-DD:

a. Identification of Stakeholders. The list would normally include among others:
   1. Representatives of Indigenous communities and vulnerable groups
   2. Local inhabitants (including farmers, villagers, local contractors etc.) who have sold their land for the project activity
   3. Women stakeholders to ensure gender equity
   4. Technology providers/suppliers
   5. Participants from government agencies providing approval for the project
   6. Participants from local NGO’s (not mandatory)

b. Invitation – to be sent at least 2-3 weeks in advance
   1. Personalised invitation letters to be sent to representatives of village governing bodies or heads of local communities/groups
   2. Notification in local newspapers in regional/local language

c. Fixing time and venue for the meeting
   1. The time and venue chosen should be such that it allows maximum participation from various sections/groups

d. Conducting the meeting at the site/chosen venue keeping in mind the following:
   1. Appropriateness of location for maximum representation
   2. Availability of space to accommodate anticipated gathering

e. Address by the senior management representative of the project (in the form of a presentation) in local language, which should include:
   1. Description of the project activity
   2. Associated benefits e.g. greenhouse gas emissions mitigation, control of air pollution (including SPM and other gases), employment benefits, efficient utilization of resources etc.
   3. Associated impacts on environment/people
   4. Contribution to social/economic upliftment

f. Seeking comments from the stakeholders
   1. Open round for seeking comments/suggestions
2. Each query/comment to be noted along with the details of the stakeholder asking the question (e.g. name of the stakeholder, representative of which section/village)

g. Providing clarifications/response to the comments raised by the stakeholders

h. Preparing minutes of the proceedings in local language and English providing a summary of concerns raised and clarifications provided thereof.

i. Proof of attendance should include the following:
   1. Attendance sheets to be prepared seeking the following details of individual stakeholders:
      i. Name
      ii. Profession/occupation
      iii. Village/Town
      iv. Signature
   2. Photographs/Video recording of the proceedings

D.3. **Summary of the comments received:**

   >> The comments received during the stakeholder consultation will be properly documented in the minutes of meeting and a summary of the same will be provided under relevant sections in the CPA DD.

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

   >> A summary of responses to stakeholder comments provided during the meeting will also be presented in the individual CPA DD.
SECTION E. Application of a baseline and monitoring methodology

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

The following approved SSC baseline and monitoring methodology to all SSC-CPAs that would be included in the PoA:

Title: Grid connected renewable electricity generation
Reference: AMS I.D, Version 17, EB 61

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC/CDM (http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html) website.

The approved methodology uses the “Tool to calculate the emission factor for an electricity system” Version 02.2.1 for determination of the baseline scenario and also draws upon Appendix B of the simplified modalities and procedures for small-scale CDM project activities “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories”.

The Programme follows the latest version 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”, Version 4.1, EB 55, Annex 38 paragraphs 18, 19, 20 and 21:

18. If the approved methodology is put on hold or withdrawn, for any reason other than for the purpose of inclusion in a consolidated methodology, no new CPAs shall be included to the PoA, in accordance with the timelines indicated in the latest version of the Procedures for the revision of an approved baseline and monitoring methodology by the Executive Board.
19. If the methodology, subsequent to being placed on hold or withdrawn, is revised or replaced by inclusion in a consolidated methodology, the PoA shall be revised accordingly. The changes shall be subsequently documented in a new version of PoA (e.g Version 1.1), validated by a DOE and approved by the Board. The Board’s approval defines a new version of the PoA and the generic CDM-CPA-DD. Such revisions to the PoA are not required in cases where a methodology is revised without being placed on hold or withdrawn.
20. Once changes have been approved by the Board, the inclusion of all new CPAs shall follow the latest version of the generic CDM-CPA-DD.
21. CPAs that were included before the methodology was put on hold, shall apply the latest version of the PoA generic CDM-CPA-DD at the time of the renewal of the crediting period.

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

The methodology AMS I.D has been applied since it comprises renewable energy generation units including hydro power plants. The applicability criteria of the methodology along with project eligibility are provided in the table below:

<table>
<thead>
<tr>
<th>Applicability Criteria</th>
<th>Project eligibility</th>
</tr>
</thead>
</table>

26 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.0.pdf
27 http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf
<table>
<thead>
<tr>
<th>Applicability Criteria</th>
<th>Project eligibility</th>
</tr>
</thead>
</table>
| 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;  
| b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. | All CPAs under the PoA would be run-of-river hydro power generation units supplying electricity to the national / regional grid or supplying electricity to an identified consumer(s) via national/regional grid through a contractual arrangement like wheeling. |
| 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). | CPAs would be eligible under the PoA only if they 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 i.e. Greenfield plant. |
| Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:  
| • The project activity is implemented in an existing reservoir with no change in the volume of reservoir;  
| • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²;  
<p>| • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². | CPAs are required to be run-of-river hydro power generation units. Therefore they would not involve any reservoir and hence this criterion is not applicable. |
| 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. | CPAs would not involve any non-renewable components. Hence, this criterion is not applicable. |
| Combined heat and power (co-generation) systems are not eligible under this category. | CPAs would be run-of-river hydro power generation units. Hence, the applicability criterion is satisfied. |
| 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 | CPAs are Greenfield projects and therefore this criterion is not applicable. |</p>
<table>
<thead>
<tr>
<th><strong>Applicability Criteria</strong></th>
<th><strong>Project eligibility</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>physically distinct from the existing units.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>CPAs are Greenfield projects and therefore this criterion is not applicable.</td>
</tr>
</tbody>
</table>

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

As per the guidelines mentioned in paragraph 9 of AMS I.D, "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 host country Power Grid. The following flow chart illustrates the components of the hydro power plant as well as the output and consumers which are a part of the project boundary:
Further, the following table illustrates the emission sources and gases included in the project boundary for the purpose of calculating project emissions and baseline emissions:

<table>
<thead>
<tr>
<th>Source</th>
<th>Gas</th>
<th>Included</th>
<th>Justification / Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.</td>
<td>CO₂</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CH₄</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N₂O</td>
<td>No</td>
</tr>
<tr>
<td>Project activity</td>
<td>CO₂</td>
<td>No</td>
<td>Minor emission source.</td>
</tr>
<tr>
<td></td>
<td>CH₄</td>
<td>No</td>
<td>The proposed CPA’s will be small scale run of the river hydro power projects with no storage. Hence these emissions will not be applicable.</td>
</tr>
<tr>
<td></td>
<td>N₂O</td>
<td>No</td>
<td>Minor emission source.</td>
</tr>
</tbody>
</table>

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

The description of the baseline is provided in the corresponding methodology. According to AMS I.D., the baseline scenario is that “the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.

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

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

As per the decision 17/cp.7, paragraph 43, a CDM project activity is additional if anthropogenic emissions of green house gases by sources are reduced below those that would have occurred in absence of registered CDM project activity.

UNFCCC simplified modalities state that additionality of a project activity is to be established as per Attachment A to Appendix B, which lists four barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred. Since additionality is being demonstrated at PoA level, the barriers to the PoA as per guidelines has been described in section A.4.3. However, to facilitate greater understanding of CPA level barriers, a description of prohibitive barriers to a typical CPA is being provided in this section.

Additionality for CPA with capacity ≤5 MW
Any project activity ≤5 MW that employs small hydro power as its primary technology and that supplies electricity to and/or displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit will be considered additional in Kenya provided the Kenya DNA recommends and the EB approves micro hydro power generation technology to be additional in the host country.

The necessary criteria that the country would need to ascertain is that the total installed capacity of small hydro power projects ≤5 MW in the total installed grid connected power generation capacity in the host country shall be equal to or less than 3%. As illustrated earlier in section A.4.3., the total installed capacity of grid connected power projects in the host country is as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Capacity Installed (MW)</th>
<th>Proportion</th>
<th>Effective Capacity (MW)</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal (Fossil)</td>
<td>525</td>
<td>34.3%</td>
<td>448</td>
<td>31.4%</td>
</tr>
<tr>
<td>Off Grid (Fossil)</td>
<td>18</td>
<td>1.2%</td>
<td>15.6</td>
<td>1.1%</td>
</tr>
<tr>
<td>Large Hydro</td>
<td>749</td>
<td>48.5%</td>
<td>732.2</td>
<td>51.2%</td>
</tr>
<tr>
<td><strong>Hydro ≤15MW</strong></td>
<td><strong>15.3</strong></td>
<td><strong>1%</strong></td>
<td><strong>12.8</strong></td>
<td><strong>0.9%</strong></td>
</tr>
<tr>
<td>Geothermal</td>
<td>198</td>
<td>12.9%</td>
<td>189</td>
<td>13.2%</td>
</tr>
<tr>
<td>Cogeneration (Biomass)</td>
<td>26</td>
<td>1.7%</td>
<td>26</td>
<td>1.8%</td>
</tr>
<tr>
<td>Wind</td>
<td>5.1</td>
<td>0.3%</td>
<td>5.1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Solar</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>1,537</td>
<td>100%</td>
<td>1,429</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source – Least Cost Power Development Plan 2011-2031

Out of the total 15.3 MW capacity of grid connected small hydro power projects with individual <15 MW, the following table highlights the projects with capacity less than equal to 5 MW:

<table>
<thead>
<tr>
<th>Name of Small Hydro Power Station</th>
<th>Installed Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOGO Power Station</td>
<td>2</td>
</tr>
<tr>
<td>Ndula Power Station</td>
<td>2</td>
</tr>
<tr>
<td>Sagana Power Station</td>
<td>1.5</td>
</tr>
<tr>
<td>Sosiani Power Station</td>
<td>0.4</td>
</tr>
<tr>
<td>Mesco Power Station</td>
<td>0.38</td>
</tr>
<tr>
<td>Imenti Power Station</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6.88</strong></td>
</tr>
</tbody>
</table>


29 The definition of small hydro in Kenya is limited to stations having a capacity of below 10 MW. However, for the purpose of illustration of contribution to the national electricity generation by small hydro power, the capacity of hydro power projects up to 15 MW (in accordance with CDM SSC Guidelines) has been considered under the small hydro category.
The data presented in the table above clearly illustrates that the installed capacity of the small hydro power projects with an installed capacity ≤ 5 MW is just 0.44% of the total installed capacity of the national grid in Kenya. Thus, any project activity with an installed capacity ≤ 5 MW from these sources should be considered additional in accordance with “Guidelines for Demonstrating Additionality of Micro Scale Project Activities” (Version 03, EB 63).

Kenyan DNA has already submitted its request for consideration of small hydro power projects ≤ 5 MW in Kenya as being additional to the CDM Executive Board. In case the Board approves the same, every project under the PoA with installed capacity ≤ 5 MW capacity will be rendered additional as well as CPAs that are located in a special underdeveloped zone of Kenya identified by the Government before 28 May 2010.

- **Attachment A of appendix B: Barrier due to prevailing practice**
  Prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions

  If it is demonstrated that the use of the technology in the considered sector is marginal e.g. total installed capacity of the technology is below or equal to 3%, this barrier is established as per “Guidelines for Objective Demonstration and Assessment of Barriers”, Version 01. As mentioned, the contribution of small hydro generation to total grid electricity generation is lower than 1% or 0.44% of the total installed capacity of the national grid in Kenya. Further, under the Least Cost Power Development Plan (LCPDP) Study Period 2010-2030, there is substantially greater thrust on fossil fuel, nuclear and geothermal based generation sources. Thus, this contribution of small hydro power to grid connected electricity generation is not expected to increase considerably in the near future as well.

Addinality for CPA with capacity ≤ 15 MW

- **Attachment A of appendix B: Investment Barrier**
  a) The project activity could not access appropriate capital without consideration of the CDM revenues

  Studies have shown that one of the main obstacles to implementing renewable energy projects is often not the technical feasibility of these projects but the absence of low-cost, long-term financing. This problem is complicated by competition for limited funds by diverse and less risky projects and is critical since the country risk of Kenya is considered to be too high by international financial institutions. Thus, the country currently faces the challenge of creatively financing projects locally to ensure that the industry remains sustainable. Further, limited policy support for small hydro power in the country is indicated by minimal budget allocation to small hydro at government level.

---

Banking institutions have unfavourable requirements for small hydro financing. Banking institutions normally lay down strict conditions for investors deterring potential users. Conditions required include a feasibility studies conducted at the applicant’s expense, due to the limited knowledge on renewables by banks. In addition, the banks require land titles as collateral, portfolios of project sponsors and managers, data on past and current operations, approximate value of existing investment, a valuation report, and risk mitigation strategies. A major commercial bank noted that financing of renewable energy projects is seen more a donor led activity in the country rather than a commercially viable business activity\(^31\).

CDM could potentially overcome this access to finance barrier by attracting loans from banks that would otherwise not have invested in this type of projects. Thus, if a proposed SSC-CPA has limited access to capital from the financial institutions/market in the absence of the CDM then it can be concluded that the proposed project faces an access to finance barrier. The prospects of a project, that it will generate CERs, may attract financiers who would normally not finance this kind of project without CDM.

\[b) \text{ A financially more viable alternative to the project activity would have led to higher emissions}\]

If the financial returns from a proposed SSC-CPA are found to be below a minimum investment benchmark, then it can be concluded that the proposed project faces an investment barrier. This can be demonstrated as follows:

- By application of a benchmark analysis at the CPA level.

To demonstrate additionality under this barrier, a financial model needs to be developed for the proposed SSC-CPA illustrating computation of a suitable financial indicator. Subsequently, a benchmark needs to be adopted which is comparable with the chosen financial indicator (project/equity IRR). The financial indicator should be lower than the benchmark to demonstrate investment barrier.

IRR calculations will be based on a list of economic parameters provided by the CPA owner that were available at the investment decision (as per Guidance 6 of “Guidelines on the assessment of investment analysis”, Version 05). This list of parameters would include:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Source/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical lifetime</td>
<td>Year</td>
</tr>
<tr>
<td>Investment decision date</td>
<td>DD/MM/YYYY</td>
</tr>
<tr>
<td>Construction start date</td>
<td>DD/MM/YYYY</td>
</tr>
<tr>
<td>Date project starts operating</td>
<td>DD/MM/YYYY</td>
</tr>
<tr>
<td>Annual electricity generation</td>
<td>MWh/year</td>
</tr>
<tr>
<td></td>
<td>As per manufacturer specification or as per expert’s opinion.</td>
</tr>
<tr>
<td></td>
<td>As per guidelines for the reporting and validation of plant load factors (version 1):-</td>
</tr>
<tr>
<td></td>
<td>(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project</td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>Unit</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity tariff</td>
<td>Local currency/kWh As per legislation of the host country at the date of investment decision or as per PPA if already signed at date of investment decision.</td>
</tr>
<tr>
<td>Escalation in electricity tariff</td>
<td>% per year As per legislation of the host country at the date of investment decision or as per PPA if already signed at date of investment decision.</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>Foreign/local currency If some costs/revenues are provided in foreign currency the exchange rate as per date of investment decision shall be used to convert to local currency</td>
</tr>
<tr>
<td>Cost of Project</td>
<td>Local currency Pre-feasibility assessment report/Detailed Project Report/ Quotations from suppliers</td>
</tr>
<tr>
<td>Total investment</td>
<td>Local currency If the construction is expected to last several years, a yearly breakdown of investments can be provided</td>
</tr>
<tr>
<td>Other revenues</td>
<td>Local currency To be included in the calculation only if applicable to SSC-CPA</td>
</tr>
<tr>
<td>Operation &amp; Maintenance cost</td>
<td>% capital cost or local currency/year Pre-feasibility assessment/ Detailed Project Report</td>
</tr>
<tr>
<td>Other operating expenditure</td>
<td>% capital cost or local currency/year To be included in the calculation only if applicable to SSC-CPA</td>
</tr>
<tr>
<td>Insurance</td>
<td>% Capex p.a. As per legislation applicable at the date of investment decision</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>As per legislation applicable at the date of investment decision Pre-feasibility assessment/ Detailed Project Report/typical debt:equity finance structure observed in the power sector of Kenya 50% debt and 50% equity financing may be assumed as a default in case the above are not available.</td>
</tr>
<tr>
<td>Percentage of debt sourcing</td>
<td>% of total investment Pre-feasibility assessment/ Detailed Project Report/typical debt:equity finance structure observed in the power sector of Kenya 50% debt and 50% equity financing may be assumed as a default in case the above are not available.</td>
</tr>
<tr>
<td>Interest on term loan</td>
<td>Pre-feasibility assessment/ Detailed Project Report / Commercial Lending Rate prevailing at the time of investment decision</td>
</tr>
<tr>
<td>Loan Repayment Period</td>
<td>Pre-feasibility assessment/ Detailed Project Report/ typical loan repayment period observed in the power sector of Kenya</td>
</tr>
</tbody>
</table>

The applied benchmark needs to be appropriate to the type of IRR calculated and could be chosen as either of the following:-

<table>
<thead>
<tr>
<th>Indicator chosen</th>
<th>Benchmark (any one of the below)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>


| Equity IRR | a. Default benchmark of 13.25% for Kenya (as per “Guidelines on the assessment of investment analysis”, Version 05);
| b. Fixed Coupon Treasury Bonds, bearpredetermined or market derived fixed coupon (interest) which is paid semiannually on the face value held during the life of the bond, issued by the Government of Kenya and increased by a suitable risk premium (http://data.worldbank.org/indicator/FR.INR.RISK) to reflect private investment,;
| c. Government/official approved benchmark where such benchmarks are used for investment decisions; |
| Project IRR | a. Local commercial lending rates obtained after negotiations with banks;
| b. Weighted Average Costs of Capital (WACC) calculated as:-
| WACC= {D/(D+E)}*[1-T/100]*Cost of Debt + {E/(D+E)}*Cost of Equity;
| c. Government/official approved benchmark where such benchmarks are used for investment decisions; |

- The chosen financial indicator needs to be lower than the benchmark even under conditions which lead to variability of the critical parameters.

The financial indicator would require to be subjected to a sensitivity analysis (±10%) by varying critical parameters in the financial model to assess the robustness of the result. The following parameters need to be subjected to the sensitivity analysis:-
- Energy generation
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

In case the financial indicator remains lower than the benchmark in spite of favourable variations, it can be confirmed that the CPA would not have been implemented without CDM revenues due to an investment barrier.

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

SSC-CPAs which are going to be included in the registered PoA are additional, if they meet the eligibility criteria for inclusion of a SSC-CPA in the PoA as set out in section A.4.2.2.

However, to further strengthen the additionality argument of Individual CPA’s under the PoA, it is prescribed that CPAs demonstrate by way of authentic documentary proofs that at least one of the following barriers is applicable. If the CPA provides the following reference/supporting document/information as given below against any one barrier, additionality will be established:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Barrier Description</th>
<th>Means of Demonstration</th>
<th>Reference/Supporting Document (Either one of the below)</th>
<th>Comments</th>
</tr>
</thead>
</table>

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
<table>
<thead>
<tr>
<th></th>
<th>Investment Barrier</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | **a)** The project activity could not access appropriate capital without consideration of the CDM revenues | • The CPA’s should demonstrate limited access to capital from the financial institutions/market in the absence of the CDM.  
• The prospects of a project, that it will generate CERs, may attract financiers who would normally not finance this kind of project without CDM | • A statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.  
• The loan approval (or other significant financing decision(s)) by the lender with an explicit mention of the CDM registration.  
• The loan agreement with an investor which is also the buyer of CERs (the loan agreement should have a mention of CER sale arrangement).  
• Proof that a significant part of the project investment is provided upfront by a company as a pre-payment for expected CERs |
|   | **b)** A financially more viable alternative to the project activity would have led to higher emissions | • By application of a benchmark analysis at the CPA level  
• The chosen financial indicator is lower than the benchmark even under conditions which lead to variability of the critical parameters. | Financial model for a CPA illustrating calculation of a suitable financial indicator which remains lower than the benchmark chosen.  
The high installation cost averaging US$ 2,500 per KW and the high per unit cost of generation i.e. 12 US$/kWh discourages the implementation of small/ micro hydro power plants in the country. The CPA will be additional if it is able to justify access to finance barrier by showing one of the listed evidences. |
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2</strong></td>
<td>Barrier due to prevailing practice (for a CPA less or equal to 5 MW)</td>
<td>• Demonstration that the use of the technology in the considered sector is marginal e.g. below 3% of total installed capacity.</td>
<td>Relevant statistical data from national and/or international statistics of the installed capacity of similar projects in the country. Currently, small hydro (inclusive of mini and micro-hydro) contributes to less than 1% of the electricity generation capacity of the country and 0.44% of total installed capacity.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Additionality for CPA less or equal to 5 MW (based on “Guidelines for the demonstration of additionality of micro-scale project activity”, version 03.0”32 ”)</td>
<td>• The geographic location of the CPA is in a special underdeveloped zone of Kenya identified by the Government before 28 May 2010; Kenya DNA recommends and the Board approves micro hydro power generation technology to be additional in the host country since the total installed capacity is below or equal to 3% of the total installed capacity. • Detailed project report or relevant purchase orders of equipment to demonstrate that the capacity of the individual project including all its units is ≤ 5 MW.</td>
<td>CDM Executive Board approval on recommendation of DNA of Kenya that micro hydro power generation technology is additional in the host country since the total installed capacity is less than or equal to 3%. The CPA will have to demonstrate prior to inclusion of the CPA into the PoA that EB approval for the Kenya DNA recommendation of micro-scale hydro power technology has been obtained. Currently, the installed capacity of small hydro power projects with an installed capacity ≤ 5 MW is just 0.44% of the total installed capacity of the national grid in Kenya.</td>
</tr>
</tbody>
</table>

---

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

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

According to approved methodology AMS I.D. (Version 17, EB 61), the baseline scenario is the electricity delivered to the grid by the project activity which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} \times EF_{CO_2, grid,y}$$

Where:
- $BE_y$: Baseline Emissions in year $y$ (t CO$_2$)
- $EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year $y$ (MWh)
- $EF_{CO_2, grid,y}$: CO$_2$ emission factor of the grid in year $y$ (t CO$_2$/MWh)

The emission factor 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 t CO$_2$/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The emission factor (tCO$_2$/MWh) for the displacement of electricity generated by power plants in the Kenyan electricity system is calculated in a transparent and conservative manner as combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the UNFCCC methodological ‘Tool to calculate the Emission Factor for an electricity system’ (Version 02.2.1 http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.2.1.pdf)

The tool calculates the combined margin emission factor (CM) which is the weighted average of the operating margin (OM) and build margin (BM) emission factors of the electricity system; the effect of a specific project upon the electricity grid can be illustrated in terms of its effect upon operations, or the “operating margin” (OM), and its effect upon capacity additions, or the “build margin” (BM). The OM is primarily a near-term effect and the BM a long-term effect. In principle, a project’s effect upon system capacity mix could be to defer new capacity additions and/or to accelerate existing capacity retirements.

According to the tool, there are 6 main steps in the process of calculating the grid emission factor:

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.

$$BE_y = EG_{BL,y} \times EF_{CO_2, grid,y}$$

Where:
- $BE_y$: Baseline Emissions in year $y$ (t CO$_2$)
- $EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year $y$ (MWh)
- $EF_{CO_2, grid,y}$: CO$_2$ emission factor of the grid in year $y$ (t CO$_2$/MWh)

The emission factor 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 t CO$_2$/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The emission factor (tCO$_2$/MWh) for the displacement of electricity generated by power plants in the Kenyan electricity system is calculated in a transparent and conservative manner as combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the UNFCCC methodological ‘Tool to calculate the Emission Factor for an electricity system’ (Version 02.2.1 http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.2.1.pdf)

The tool calculates the combined margin emission factor (CM) which is the weighted average of the operating margin (OM) and build margin (BM) emission factors of the electricity system; the effect of a specific project upon the electricity grid can be illustrated in terms of its effect upon operations, or the “operating margin” (OM), and its effect upon capacity additions, or the “build margin” (BM). The OM is primarily a near-term effect and the BM a long-term effect. In principle, a project’s effect upon system capacity mix could be to defer new capacity additions and/or to accelerate existing capacity retirements.

According to the tool, there are 6 main steps in the process of calculating the grid emission factor:
Step 1: Identify the relevant electricity systems

The national energy grid of the Republic of Kenya has been chosen as the project electricity system. In Kenya imports from Uganda and Tanzania which form a part of the connected electricity system are less than 1% of own generation imports; the emission factor is therefore considered as 0 tons CO₂ per MWh. Electricity exports are not subtracted from electricity generation data used.

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

Two options are available to calculate the build and operating margin emission factors:

a. to include only grid power plants in the calculation; or
b. to include both grid power plants and off-grid power plants.

The second option aims to reflect that in some countries off-grid power generation is significant. This is however, not the case in Kenya; e.g. in 2009/2010 off grid power stations generated 19GWh compared to a total annual generation of 6,692GWh (0.28%). Therefore off-grid power plants are excluded from the calculations and option (a) is chosen.

Step 3: Select a method to determine the operating margin (OM)

There are four methods available for calculating the OM:

- Simple OM
- Simple adjusted OM
- Dispatch data analysis OM
- Average OM

The simple OM can only be used if the low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the 5 most recent years, or 2) based on long-term averages for hydro production. In 2010 low-cost/must-run resources in Kenya constituted 66% of the total generation. The Simple OM method is therefore not applicable for Kenya.

The simple adjusted OM is effective only in cases where the total average low-cost must run capacity is significantly higher than the minimum demand load; otherwise the formula reverts to the simple OM method. In Kenya the total average low-cost must-run capacity in MW in 2010 was about 514MW and the minimum load is in the same range; the simple adjusted OM is therefore also not applicable.

This leaves the dispatch data analysis OM and average OM as the 2 applicable methods for determining the operating margin.

The CME has selected the dispatch data analysis OM to determine the Operating Margin.

Step 4: Calculate the operating margin emission factor according to the selected method.

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33 In some countries e.g. in Southern Africa, where electricity imports can constitute more than 50% of domestic electricity consumption, the grid emission factor of the exporting grid has to be determined

34 Low-cost/must-run resources are power plants with low marginal generation costs or 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 used as must-run, it should also be included in this list,
The dispatch data analysis OM is determined based on the grid power units that are actually dispatched at the margin during each hour \( h \) where the project is displacing electricity.

\[
EF_{\text{grid}, OM-DD,y} = \frac{\sum_h EG_{PJ,h} \times EF_{EL,DD,h}}{EG_{PJ,y}}
\]

Where:
- \( EF_{\text{grid}, OM-DD,y} \): Dispatch data analysis operating margin CO\(_2\) emission factor in year \( y \) (tCO\(_2\)/MWh)
- \( EG_{PJ,h} \): Electricity displaced by the project activity in hour \( h \) of year \( y \) (MWh)
- \( EF_{EL,DD,h} \): CO\(_2\) emission factor for grid power units in the top of the dispatch order in hour \( h \) in year \( y \) (tCO\(_2\)/MWh)
- \( EG_{PJ,y} \): Total electricity displaced by the project activity in year \( y \) (MWh)
- \( H \): Hours in year \( y \) in which the project activity is displacing grid electricity
- \( Y \): Year in which the project activity is displacing grid electricity

The hourly emission factor is calculated based on the energy efficiency of the grid power unit and the fuel type used since the hourly fuel consumption data is not available in Kenya for all power plants. It is calculated as follows:

\[
EF_{EL,DD,h} = \frac{\sum_n EG_{n,h} \times EF_{EL,n,y}}{\sum_n EG_{n,h}}
\]

Where:
- \( EF_{EL,DD,h} \): CO\(_2\) emission factor for grid power units in the top of the dispatch order in hour \( h \) in year \( y \) (tCO\(_2\)/MWh)
- \( EG_{n,h} \): Net quantity of electricity generated and delivered to the grid by grid power unit \( n \) in hour \( h \) (MWh)
- \( EF_{EL,n,y} \): CO\(_2\) emission factor of grid power unit \( n \) in year \( y \) (tCO\(_2\)/MWh)
- \( n \): Grid power units in the top of the dispatch (as defined below)
- \( h \): Hours in year \( y \) in which the project activity is displacing grid electricity

The CO\(_2\) emission factor of the grid power units \( n \) is determined using the options A1, A2 or A3 below.

**Option A1** – If for a power unit \( m \) data on fuel consumption and electricity generation is available the emission factor should be determined as follows

\[
EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}
\]

Where:
- \( EF_{EL,m,y} \): CO\(_2\) emission factor of power unit \( m \) in year \( y \) (tCO\(_2\)/MWh)
- \( FC_{i,m,y} \): Amount of fossil fuel type \( i \) consumed by power unit \( m \) 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...
In terms of vintage of data, project proponents 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 CPA.

### Net calorific values and CO₂ emission factors of fossil fuels

Net calorific values and CO₂ emission factors of fossil fuels are derived from the 2006 Intergovernmental Panel for Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

**Option A2** – If for a power unit \( m \) only data on electricity generation and fuel types used is available the emission factor should be determined as follows

\[
EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}
\]

Where:
- \( EF_{EL,m,y} \) is CO₂ emission factor of power unit \( m \) in year \( y \) (tCO₂/MWh)
- \( EF_{CO2,m,i,y} \) is Average CO₂ emission factor of fossil fuel type \( I \) used in power unit \( m \) in year \( y \) (tCO₂/GJ)
- \( \eta_{m,y} \) is Average net energy conversion efficiency of power unit \( m \) in year \( y \) (ratio)
- \( M \) is All power units serving the grid in year \( y \) except low-cost/must-run power units
- \( I \) is All fossil fuel types combusted in power unit \( m \) in year \( y \)
- \( Y \) is The relevant year as per the data vintage

Default efficiency factors for power plants can be derived from the UNFCCC 2009 EB50 meeting report.

**Option A3** – If for a power unit \( m \) only data on electricity generation is available, an emission factor of 0tCO₂/MWh can be assumed as the simple and conservative approach.

To determine the set of grid power units \( n \) that are in the top of the dispatch, the following data is required from the national dispatch centre:

- The grid system dispatch order of operation for each grid power unit of the system including power units from which electricity is imported; and
- The amount of power (MWh) that is dispatched from all grid power units in the system during each hour \( h \) that the project activity is displacing electricity.

At each hour \( h \), each grid power unit’s generation is stacked using the merit order. The group of grid power units \( n \) in the dispatch margin includes the units in the top \( x\% \) of total electricity dispatched in the hour \( h \), where \( x\% \) is equal to the greater of either 10%; or the quantity of electricity displaced by the project activity during hour \( h \) divided by the total electricity generation by grid power plants during that hour \( h \).

### Step 5: Calculate the build margin (BM) emission factor.

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF_{CO2,i,y}</td>
<td>CO₂ emission factor of fossil fuel type ( i ) in year ( y ) (tCO₂/GJ)</td>
</tr>
<tr>
<td>EG_{m,y}</td>
<td>Net quantity of electricity generated and delivered to the grid by power unit ( m ) in year ( y ) (MWh)</td>
</tr>
<tr>
<td>m</td>
<td>All power units serving the grid in year ( y ) except low-cost/must-run power units</td>
</tr>
<tr>
<td>i</td>
<td>All fossil fuel types combusted in power unit ( m ) in year ( y )</td>
</tr>
<tr>
<td>y</td>
<td>The relevant year as per the data vintage</td>
</tr>
</tbody>
</table>
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, except, 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 PoA chooses option 1 for the vintage of data for the calculation of the build margin emission factor.

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

The sample group of power units \( n \) used to calculate the build margin for the CPA would be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET\(_{\text{5-units}}\)) and determine their annual electricity generation (AEG\(_{\text{SET\(_{\text{5-units}}\)}}\), in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG\(_{\text{total}}\), in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG\(_{\text{total}}\) (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET \( \geq 20\% \)) and determine their annual electricity generation (AEG\(_{\text{SET\(_{\geq 20\%}}\))\), in MWh);

(c) From SET\(_{\text{5-units}}\) and SET\(_{\geq 20\%}\) select the set of power units that comprises the larger annual electricity generation (SET\(_{\text{sample}}\));

Identify the date when the power units in SET\(_{\text{sample}}\) started to supply electricity to the grid. If none of the power units in SET\(_{\text{sample}}\) started to supply electricity to the grid more than 10 years ago, then use SET\(_{\text{sample}}\) to calculate the build margin. Ignore steps (d), (e) and (f).

Otherwise:

(d) Exclude from SET\(_{\text{sample}}\) the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set (SET\(_{\text{sample-CDM}}\)) the annual electricity generation (AEG\(_{\text{SET\(_{\text{sample-CDM}}\)}}\), in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. AEG\(_{\text{SET\(_{\text{sample-CDM}}\)}}\geq 0.2 \times \text{AEG}_{\text{total}}\)), then use the sample group SET\(_{\text{sample-CDM}}\) to calculate the build margin. Ignore steps (e) and (f).
Otherwise:

(e) Include in the sample group \( \text{SET}_{\text{sample-CDM}} \) the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units \( m \) used to calculate the build margin is the resulting set \( \text{SET}_{\text{sample-CDM}\rightarrow10\text{yrs}} \).

The BM emission factor is the generation-weighted average emission factor of all power units \( m \) during the most recent year \( y \)

\[
EF_{\text{grid,BM},y} = \frac{\sum m \ EF_{m,y} \times EF_{\text{EL},m,y}}{\sum m \ EF_{m,y}}
\]

Where:

- \( EF_{\text{EL},m,y} \) CO\(_2\) emission factor of power unit \( m \) in year \( y \) (tCO\(_2\)/MWh)
- \( EF_{\text{grid,BM},y} \) Build margin CO\(_2\) emission factor in year \( y \) (tCO\(_2\)/MWh)
- \( EF_{\text{grid,BM},y} \) Net quantity of electricity generated and delivered to the grid by power unit \( m \) in year \( y \) (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

The CO\(_2\) emission factor of the grid power units ‘\( m \)’ is determined using the Options A1, A2 or A3 as described above.

If the power units included in the build margin \( m \) correspond to the sample group \( \text{SET}_{\text{sample-CDM}\rightarrow10\text{yrs}} \), then, as a conservative approach, only option A2 would be used and the default values provided in Annex 1 of the tool shall be used to determine the parameter \( \eta_{m,y} \).

**Step 6: Calculate the combined margin (CM) emissions factor**

The calculation of the combined margin (CM) emission factor \( (EF_{\text{grid,CM},y}) \) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM

The weighted average CM method (option A) should be used as the preferred option. Therefore, the combined margin emission factor is calculated as follows:

\[
EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} \times W_{OM} + EF_{\text{grid,BM},y} \times W_{BM}
\]

- \( EF_{\text{grid,OM},y} \) Operating margin CO\(_2\) emission factor in year \( y \) (tCO\(_2\)/MWh)
- \( EF_{\text{grid,BM},y} \) 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 margin emissions factor (%)
The following default values should be used for $W_{OM}$ and $W_{BM}$:

$W_{OM} = 0.5$ 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

**Project emissions**

As per paragraph 20 of AMS I.D, project emissions are to be considered for emissions from water reservoirs of hydro power plants. Since all CPAs are new run-of-river small hydro power projects, they do not result in formation of reservoirs. Thus, the project emissions $(PE_y)$ are estimated to be zero.

**Leakage**

As prescribed in AMS-I.D., leakage estimation is only required if renewable energy technology is equipment transferred from another activity, or if the existing equipment is transferred to another activity. As no equipment is transferred from another activity, neither is existing equipment being transferred to another activity, hence, leakage emissions need not be accounted.

**Emission reductions**

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

- $ER_y$ = Emission reductions in year $y$ (t CO$_2$/y).
- $BE_y$ = Baseline Emissions in year $y$ (t CO$_2$/y).
- $PE_y$ = Project emissions in year $y$ (t CO$_2$/y).
- $LE_y$ = Leakage emissions in year $y$ (t CO$_2$/y).

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

Baseline Emissions:

The baseline emissions for each CPA can be estimated as below:

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

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 in year $y$ (tCO$_2$/MWh)

**Emission Reductions**

Each CPA mainly reduces CO$_2$ through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction $ER_y$ by the project activity during a given
year $y$ is the difference between baseline emissions ($BE_y$), project emissions ($PE_y$) and emissions due to leakage ($LE_y$), as follows:

$$ER_y = BE_y - PE_y - LE_y$$

where

$ER_y =$ Emission reductions in year $y$ (t CO$_2$/y).
$BE_y =$ Baseline Emissions in year $y$ (t CO$_2$/y).
$PE_y =$ Project emissions in year $y$ (t CO$_2$/y).
$LE_y =$ Leakage emissions in year $y$ (t CO$_2$/y).

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

<table>
<thead>
<tr>
<th>Data / Parameter:</th>
<th>$\eta_{m,y}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data unit:</td>
<td>MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>Average net energy conversion efficiency of power unit $m$ in year $y$</td>
</tr>
<tr>
<td>Source of data used:</td>
<td>Use either:</td>
</tr>
<tr>
<td></td>
<td>• Documented manufacturers specifications (if the efficiency of the plant is not significantly increased through retrofits or rehabilitations); or</td>
</tr>
<tr>
<td></td>
<td>• For grid power plants: data from the utility, the dispatch center or official records if it can be deemed reliable; or</td>
</tr>
<tr>
<td></td>
<td>• The default values provided in the table below in Annex 1 of the ‘Tool to calculate the emission factor for an electricity system’ (if available for the type of power plant)</td>
</tr>
<tr>
<td>Value applied:</td>
<td>Grid power plants</td>
</tr>
<tr>
<td></td>
<td>Generation Technology</td>
</tr>
<tr>
<td></td>
<td>Oil Steam turbine</td>
</tr>
<tr>
<td></td>
<td>Oil Open cycle</td>
</tr>
<tr>
<td></td>
<td>Oil Combined cycle</td>
</tr>
<tr>
<td>Justification of the choice of data or description of measurement methods and procedures actually applied:</td>
<td>Monitoring frequency: Once for the crediting period</td>
</tr>
<tr>
<td></td>
<td>If the data obtained from the manufacturer, the utility, the dispatch center of official records is significantly lower than the default value provided in Annex 1 of the ‘Tool to calculate the emission factor for an electricity system’ for the applicable technology, project proponents should assess the reliability of the values, and provide appropriate justification if deemed reliable. Otherwise, the default values provided in Annex 1 of the ‘Tool to calculate the emission factor for an electricity system’ shall be used.</td>
</tr>
<tr>
<td>Any comment:</td>
<td>--</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Data / Parameter:</th>
<th>$EG_{\text{facility,}y}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data unit:</td>
<td>MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>Quantity of net electricity supplied to the grid in year $y$</td>
</tr>
<tr>
<td>Source of data to be monitored:</td>
<td>Energy Meter readings recorded in plant log books</td>
</tr>
</tbody>
</table>
Data / Parameter: $F_{C_{\text{m},y}}$

- **Data unit:** Mass or volume unit
- **Description:** Amount of fossil fuel type $i$ consumed by power unit $m$ in year $y$ (Mass or volume unit)
- **Source of data used:** Utility or government records or official publications
- **Value applied:** The values for each power station will be different and will be provided in a separate worksheet or in the CPA DD as applicable
- **Justification of the choice of data or description of measurement methods and procedures actually applied:**

  Monitoring Frequency: Annually for the year $y$ in which the project activity is displacing grid electricity, or if available, hourly.

  Justification of choice of data or description of measurement methods and procedures will be provided in the CPA DD.

- **Any comment:**

Data / Parameter: $NCV_{i,y}$

---

35 The accuracy of measurement equipment will be in accordance with the requirements of the power purchase agreement and/or applicable grid code.

36 [https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid06.pdf](https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid06.pdf)
### Data unit:
- GJ/mass or volume unit

### Description:
- Net calorific value (energy content) of fossil fuel type \( i \) in year \( y \) (GJ/mass or volume unit)

### Source of data used:
The following data sources may be used if the relevant conditions apply:

<table>
<thead>
<tr>
<th>Data source</th>
<th>Conditions for using the data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values provided by the fuel supplier of the power plants in invoices</td>
<td>If data is collected from power plant operators (e.g. utilities)</td>
</tr>
<tr>
<td>Regional or national average default values</td>
<td>If values are reliable and documented in regional or national energy statistics / energy balances</td>
</tr>
<tr>
<td>IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td>
<td></td>
</tr>
</tbody>
</table>

### Value applied:
- NCV of each fossil fuel will be different and the values used will be provided in the CPA DD

### Justification of the choice of data or description of measurement methods and procedures actually applied:
- Monitoring Frequency: Annually for the year \( y \) in which the project activity is displacing grid electricity or, if available, hourly. Justification of choice of data or description of measurement methods and procedures will be provided in the CPA DD.

### Any comment:
The gross calorific value (GCV) of the fuel can be used, if gross calorific values are provided by the data sources used. Make sure that in such cases also a gross calorific value basis is used for \( \text{CO}_2 \) emission factor.

### Data / Parameter:
- \( \text{EF}_{\text{CO}_2,i,y} \) and \( \text{EF}_{\text{CO}_2,m,i,y} \)

### Data unit:
- tCO\(_2\)/GJ

### Description:
- \( \text{CO}_2 \) emission factor of fossil fuel type \( i \) used in power unit \( m \) in year \( y \)

### Source of data used:
The following data sources may be used if the relevant conditions apply:

<table>
<thead>
<tr>
<th>Data source</th>
<th>Conditions for using the data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values provided by the fuel supplier of the power plants in invoices</td>
<td>If data is collected from power plant operators (e.g. utilities)</td>
</tr>
<tr>
<td>Regional or national average default values</td>
<td>If values are reliable and documented in regional or national energy statistics / energy balances</td>
</tr>
<tr>
<td>IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2</td>
<td></td>
</tr>
<tr>
<td>Data / Parameter:</td>
<td>EG&lt;sub&gt;m,y&lt;/sub&gt;</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Data unit:</td>
<td>MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>Net quantity of electricity generated and delivered to the grid by power unit &lt;i&gt;m&lt;/i&gt; in year &lt;i&gt;y&lt;/i&gt;</td>
</tr>
<tr>
<td>Source of data used:</td>
<td>Utility or government records or official publications</td>
</tr>
<tr>
<td>Value applied:</td>
<td>The values for each power station will be different and will be provided in a separate worksheet or in the CPA DD as applicable</td>
</tr>
<tr>
<td>Justification of the choice of data or description of measurement methods and procedures actually applied:</td>
<td>Monitoring frequency: Hourly</td>
</tr>
<tr>
<td>Any comment:</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data / Parameter:</th>
<th>EG&lt;sub&gt;PJ,h&lt;/sub&gt; and EG&lt;sub&gt;PJ,y&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data unit:</td>
<td>MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>Electricity displaced by the project activity in hour &lt;i&gt;h&lt;/i&gt; of year &lt;i&gt;y&lt;/i&gt;, or in year &lt;i&gt;y&lt;/i&gt;</td>
</tr>
<tr>
<td>Source of data used:</td>
<td>Metering Records</td>
</tr>
<tr>
<td>Value applied:</td>
<td>-</td>
</tr>
<tr>
<td>Justification of the choice of data or description of measurement methods and procedures actually applied:</td>
<td>Monitoring frequency: Hourly or yearly, as applicable</td>
</tr>
<tr>
<td>Any comment:</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data / Parameter:</th>
<th>EF&lt;sub&gt;CO2,grid,y&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data unit:</td>
<td>tCO&lt;sub&gt;2&lt;/sub&gt;/MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>Combined Margin CO&lt;sub&gt;2&lt;/sub&gt; emission factor</td>
</tr>
<tr>
<td>Source of data used:</td>
<td>Calculated</td>
</tr>
<tr>
<td>Value applied:</td>
<td>The value will be provided in the CPA DD</td>
</tr>
<tr>
<td>Justification of the choice of data or description of</td>
<td>Calculated figure based on 50% of OM and 50% of BM values</td>
</tr>
<tr>
<td>Any comment:</td>
<td>--</td>
</tr>
</tbody>
</table>
**E.7.2. Description of the monitoring plan for a SSC-CPA:**

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting will rest with the individual CPA owner. At the CPA level, a Project Team will be formulated to ensure proper and continuous monitoring of the performance of turbines and generation of power. The operation and management structure that will be implemented by the CPA owners for the purpose of monitoring the CPA is illustrated below:

**Monitoring Plan Objective and Organisation**

The purpose of the monitoring plan is to measure the net electricity delivered to the local electricity grid by the CPA. Within the CDM team, a supervisor will be designated for each hydropower site covered under the CPA, who will be responsible for compiling, monitoring and reporting of GHG performance related parameters (Process Parameters, Procedures, Calibration) of its allotted hydropower site.

<table>
<thead>
<tr>
<th>Team</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>- Reviewing the monthly and annual generation statistics from each hydro site.</td>
</tr>
<tr>
<td>Supervisor/Engineer - 1</td>
<td>- Evaluating the GHG performance of the CPA</td>
</tr>
<tr>
<td>Supervisor/Engineer - 2</td>
<td>- Identify opportunities for further improvement in each hydro site.</td>
</tr>
<tr>
<td>Supervisor/Engineer - 3</td>
<td>- Implementation of appropriate corrective measures in case any discrepancies are identified in the reported parameters.</td>
</tr>
<tr>
<td></td>
<td>- Aggregation and review of monthly reports from each site supervisor.</td>
</tr>
<tr>
<td></td>
<td>- Ensuring calibration of the monitoring equipments as and when required.</td>
</tr>
<tr>
<td></td>
<td>- Monitoring and reporting of the GHG performance related parameters following the guidance provided in the Project Design Document.</td>
</tr>
<tr>
<td></td>
<td>- Preparation of the monthly and annual generation statistics.</td>
</tr>
<tr>
<td></td>
<td>- Reporting of any discrepancies identified in the reporting parameters.</td>
</tr>
<tr>
<td></td>
<td>- Ensuring calibration of the monitoring equipments as and when required.</td>
</tr>
</tbody>
</table>

| Any comment | The emission factor has to be determined for the year in which the project activity displaces grid electricity and needs to be updated annually during monitoring. |
This data collated from each hydropower site will be aggregated by the next superior CDM team member. The data and documents received from each site supervisor will be compiled in a format called the CDM format/report. Quality checks will also be undertaken at this level to ensure all discrepancies are addressed. The net electricity attributable to the CPA will be calculated by subtracting the total electricity imported from the total electricity exported to the grid. The onus of reviewing, storing and archiving of all CDM related information relevant to the CPA in a suitable manner would rest with this team member.

The Project Manager will aggregate and review all the data received from site supervisors. The review will be conducted to ensure compliance to the requirements of the monitoring plan and other CDM modalities and procedures including calibration frequency. Corrective measures will be applied in case any discrepancy is observed. The Project Manager will further submit a consolidated report to the Project Incharge who will finally review and sign the monthly performance from each CPA.

To ensure that the data is reliable and transparent, the project entity will establish Quality Assurance and Quality Control (QA&QC) measures to effectively control and manage data reading, recording, auditing as well as archiving data and all relevant documents.

Monitoring and Archiving of Data

The net electricity delivered to the local regional grid by the project needs to be monitored. The monitoring data is derived from periodic electricity meter records kept by the project owners and/or the grid company, which are crosschecked with actual invoices sent by project owners to the grid company.

The CDM team within the operator of the hydro plant will be responsible for collecting the monitoring data and will provide the coordinating entity with meter readings for electricity delivered and if available calibration certificates. Further, for cross checking purposes, the project proponent will also carry out measurements of gross electricity generation, auxiliary electricity consumption at each hydropower site within the CPA, which will be recorded in site log books.

The electricity data will be recorded by the shift in-charge in the site log books and would be forwarded to the site manager. On regular basis, as decided by the CDM team, the site manager would prepare and forward the reports to the designated site supervisor of the CDM team for review and archiving.

Details of the CPA monitoring plan will be described for each CPA. The data will be archived electronically and be stored for 2 years after the end of the crediting period of each CPA by the coordinating entity.

Quality Assurance and Quality Control

The installation location of the meters will be detailed in each CPA. The project entity will implement QA&QC measures to calibrate and guarantee the accuracy of metering and safety of the project operation. The metering devices will be calibrated and inspected properly and periodically as per standard industry norms and requirements of the Kenyan Electricity Grid Code. The grid company and the project owners are responsible for operation and maintenance of their respective electricity meters.

The CDM team will meet periodically to review project parameters, check data collected, emissions reduced etc. The following will be the procedure for taking corrective action and addressing any non-conformances discovered:

- All the mismatching data along with the name of the respective site manager and in-charge of logbooks name will be recorded in a Note Book.
• The respective site supervisors in the CDM team will send FAR (Forward Action Request) or CAR (Corrective Action Request) to the concerned CDM Member.
• After receipt of the communication, within one week, the concerned site in-charge will correct the data and will reply to the site supervisor in the CDM team.
• The corrected data will then be compiled by the respective site supervisors

Capacity development:

Trainings will be on the following aspects of equipments involved in the Project activity – start up techniques, operation, maintenance, monitoring of parameters, precautions, safety instructions and emergency preparedness etc. The following procedure will be followed for training:

- A copy of Operation and Maintenance manual, Safety instructions related to the equipment involved in the Project activity will be made available to all employees involved in the Project.
- During commissioning of the new equipments (of the Project activity), training on all above aspects to all employees involved in the Project activity will be provided.
- Whenever an employee handles the equipments involved in the Project activity first time, training will be provided to him on start up techniques, operation, maintenance, monitoring of parameters, precautions, safety instructions and emergency preparedness etc.
- The training will be provided by respective equipment supplier and expert O & M personnel of the company.

CDM capacity development for the Coordinating / Managing Entity (CME) will be conducted by external CDM experts. This will ensure that the CME is prepared for the responsibilities with respect to the implementation of the proposed PoA.

<table>
<thead>
<tr>
<th>E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of completion: 13/08/2011</td>
</tr>
<tr>
<td>Name of the entity: KTDA Power Company Limited</td>
</tr>
</tbody>
</table>
Annex 1

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

<table>
<thead>
<tr>
<th>Organization:</th>
<th>KTDA Power Company Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street/P.O.Box:</td>
<td>30213-00100</td>
</tr>
<tr>
<td>Building:</td>
<td>KTDA Farmers Building</td>
</tr>
<tr>
<td>City:</td>
<td>Nairobi</td>
</tr>
<tr>
<td>State/Region:</td>
<td>Nairobi</td>
</tr>
<tr>
<td>Postfix/ZIP:</td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td>Kenya</td>
</tr>
<tr>
<td>Telephone:</td>
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</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>Title:</td>
<td>Projects Manager</td>
</tr>
<tr>
<td>Salutation:</td>
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<td>Middle Name:</td>
<td>Gakori</td>
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<tr>
<td>First Name:</td>
<td>Lucas</td>
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</tr>
<tr>
<td>Personal E-Mail:</td>
<td><a href="mailto:lgmaina@ktdateas.com">lgmaina@ktdateas.com</a></td>
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</tbody>
</table>
Annex 2

INFORMATION REGARDING PUBLIC FUNDING

As discussed under section A.4.5, there is no recourse to any public funding for the proposed PoA.
Annex 3

BASELINE INFORMATION

The Baseline information has already been provided under section E.6. Further, the baseline data will be provided in each CPA at the time of its submission.
Annex 4

MONITORING INFORMATION

Detailed monitoring information with respect to metering equipment used, calibration method etc. will be provided under each CPA.