Project design document form
(Version 10.1)

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

BASIC INFORMATION	
Title of the project activity	West Nile Electrification Project (WNEP)
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	8
Completion date of the PDD	12/08/2019
Project participants	• West Nile Rural Electrification Company Limited (WENRECo) • Government of Sweden - Swedish Energy Agency • GDF Suez • Chubu Electric Power Co., Inc. • Japan International Cooperation Agency (JICA) • Kyushu Electric Power Co., Inc. • Mitsubishi Corporation • Tohoku Electric Power Co. Inc. • The Tokyo Electric Power Co., Inc. • The Chugoku Electric Power Co., Inc. • Mitsui & Co. Ltd. • Electrabel S. A. • Netherlands' Ministry of Infrastructure and the Environment (IenM) • Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I) • Government of Norway - Ministry of Foreign Affairs • Norsk Hydro ASA • Equinor ASA • BP Alternative Energy International Ltd. • Deutsche Bank AG • Fortum Corporation • Government of Finland - Ministry of Foreign Affairs • RWE Power AG • International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)
Host Party	Uganda
Applied methodologies and standardized baselines	AMS I.A – Electricity generation by the user, Version 16.0
Sectoral scopes linked to the applied methodologies	1. Energy industries (renewable/non-renewable)
Estimated amount of annual average GHG emission reductions	14,885 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

This Project Design Document (PDD) is a revised version of the registered PDD, prepared to request renewal of the crediting period, at the end of the first crediting period.

The overall objectives of the West Nile Electrification Project (WNEP) are to promote socio-economic development in rural Uganda and to reduce energy-related CO_2 emissions causing global climate change. The main project component of the WNEP is:

Project Component #1: Installation and operation of a 3.5 MW (2 units of 1.75 MW) hydroelectric power plant, which became operational in September 2012.

The project also upgrades and extends the distribution networks in Paidha, Nebbi, and Arua municipalities, in order to connect 4,000 additional customers, who would otherwise operate small, privately-owned generation facilities.

In 2001, the WNEP was identified as a potential CDM project and the original financial plan for the project includes carbon finance revenue from sales of CO_2 emission reductions. The starting date of the project is April 1, 2003. The WNEP is part of a ten-year World Bank lending program entitled Energy for Rural Transformation (ERT) that is being undertaken in the context of the on-going power sector reform in Uganda (pls. see Section A.5). The objectives of the ERT are to assist Uganda's rural energy sector in contributing to rural transformation and poverty alleviation and, at the same time, to protect the global environment through implementation of CO_2-neutral hydropower displacing diesel and petrol based electricity generation. As a complement to this project an 80 km sub-transmission line connecting Nebbi and Arua has been built with financial support from Norway. This line is transferred to the WNEP operator. The government of Uganda has developed the WNEP with assistance from the ERT program.

Significant barriers and extended delays have resulted in a long gestation time for the WNEP. The original intention in 2001 was to install two new, efficient diesel generators (1.5 MW and 1.0 MW), and to construct one 5.1 MW hydropower plant at the Nyagak site in the Nebbi District in Phase I of the ERT, plus an optional 1.5 MW hydropower plant in Olewa in the Arua District two years later. However, given an unanticipated low level of power demand in the project area, the project sponsor has subsequently redesigned the original project design in line with a more realistically expectable load in the West Nile region. The redesigned project initially included a 1.5 MW HFO-fired generator located in Arua, which was in operation since May 2005 but stopped regular operation once the hydro power plant was commissioned, and a 3.5 MW hydroplant at Nyagak, which has been put into operation since September 2012. This project activity comprises renewable energy generation units (Type I project) that provides electricity to the mini grid. The power plant capacity is less than 5 MW and therefore is a micro-scale project.

Taken together, Arua, Nebbi, and Paidha constitute the largest load centre in the West Nile region. The WNEP helps developing the hydropower potential of the West Nile region by installing one run-of-river hydro plant and by operating the power distribution system with a focus on these three regional urban centres.

In essence, the proposed project activity will be contributing to the development of Uganda's indigenous renewable energy basis while meeting the growing demand for energy in the West Nile region. Diesel and petrol-based energy supply which currently is dominant in the project area is both insufficient and unreliable, whereas hydroelectric power will reliably deliver electricity that will stimulate economic development locally while reducing both local air pollution problems and CO_2 emissions contributing to global warming.

The project activity will contribute to an average GHG emission reduction of 14,885 tCO_2 per annum with a total of 104,196 tCO_2 for the entire crediting period.

A.2. Location of project activity

The West Nile Region borders to the west on the Democratic Republic of Congo and to the north on Sudan. It comprises the districts of Nebbi, Arua, Moyo and Adjumani. Arua has a population of 850,000, Nebbi 450,000, and Moyo and Adjumani 110,000. The proposed project activity covers both urban and peri-urban areas. The West Nile Region has the potential to become one of Uganda's more productive agricultural areas, but insufficient and unreliable electricity supply has seriously constrained regional development, particularly in the agro-processing areas (e.g. coffee processing, cotton ginning, tea processing, edible oil extraction and grain milling).

The hydroelectric plant with an installed capacity of 3.5 MW using the waters of the Nyagak River is located close to the Paidha village at coordinates +2.429053, +30.975695.

Figure 1 gives a schematic depiction of the West Nile region. It shows the three population centres Arua, Nebbi, and Paidha, the hydropower station at Nyagak and the sub-transmission lines (dotted lines).

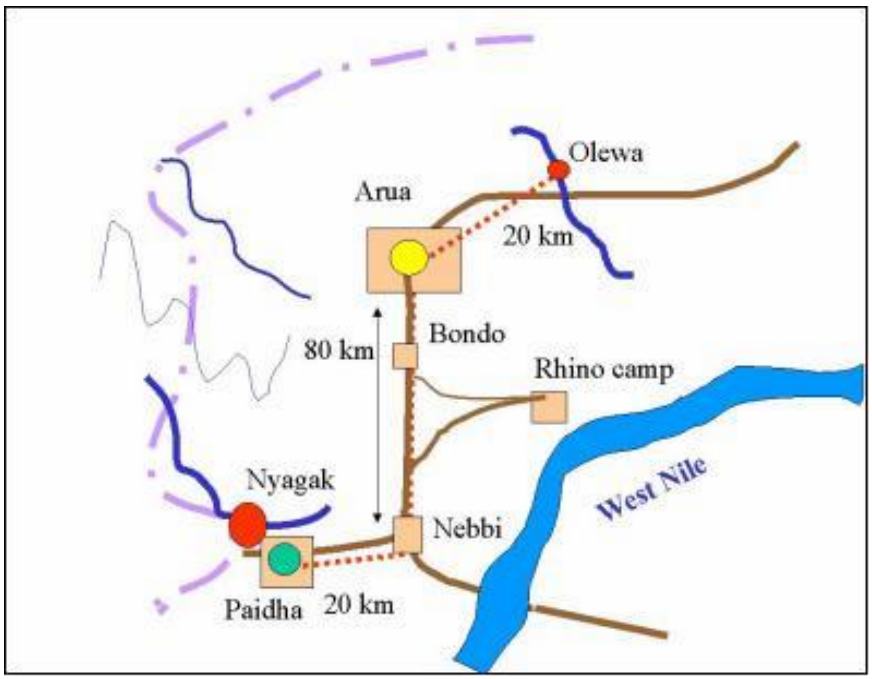

Figure 1. Schematic representation of location of the project

A.3. Technologies/measures

The proposed project activity now consists of one project component that is eligible under the simplified modalities and procedures for small-scale CDM projects:

Project Type I - Renewable Energy Projects. Category I.A. Electricity generation by the user

The hydroelectric plant has an installed capacity of 2 x 1.75 MW (for a total rated discharge of 5.57 m^3/s and a gross head of 77.5 m) and will operate for a period of at least 25 years using the waters of the Nyagak River. The proposed Project Component # 1 falls into project category I.A given that it entails construction and operation of one 3.5 MW hydroelectric plant that will export its generation output to a new mini-grid, thus displacing generation from fossil fuel-fired generators and engines. Two 1.75 MW Francis turbines manufactured by Mavel and supplied by Skoda were selected through a competitive bidding process, constituting technology transfer to the host country. The hydroelectric plant includes a diversion weir and a run of river reservoir with live storage volume of 150,600 m^3

equivalent to 7.5 hours of storage, leading to a penstock and a powerhouse with transformers and switchgear. The estimated net power output of 20.65 GWh per year will be fed to the existing grid though a 33 kW over-head line. The hydroelectric station has been operational since September 2012. Two electricity meters have been installed on-site - one to measure gross generation after both generators (M1), and one at the site to measure the auxiliary consumption (M2). Additionally, later two meters were installed to measure the net electricity exported to the mini-grid, one in the feeder of Nebbi line and other one in the feeder of Vurra line (M3 and M4).

In the first crediting period, the project also included a new 1.5 MW HFO-fired generator that qualified as a project Type II - Energy Efficiency Improvement Project, and issued emission reductions applying Category II. B: Supply side energy efficiency improvements – generation. However the generator will be shut down or used only as a back-up now that the hydroelectric plant is operational. Hence the generator is excluded from the project for this subsequent crediting period.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Uganda (host)	West Nile Rural Electrification Company Limited (WENRECo)	No
Sweden	Government of Sweden - Swedish Energy Agency	Yes
France	GDF Suez	No
Japan	• Chubu Electric Power Co., Inc. • Japan International Cooperation Agency (JICA) • Kyushu Electric Power Co., Inc. • Mitsubishi Corporation • Tohoku Electric Power Co. Inc. • The Tokyo Electric Power Co., Inc. • The Chugoku Electric Power Co., Inc. • Mitsui & Co. Ltd.	No
Netherlands	• Electrabel S.A • Netherlands Ministry of Infrastructure and the Environment (IenM) • Netherlands Ministry of Economic Affairs, Agriculture and Innovation (EL&I)	Yes
Norway	• Government of Norway - Ministry of Foreign Affairs • Norsk Hydro ASA • Equinor ASA	Yes

United Kingdom of Great Britain and Northern Ireland	• BP Alternative Energy International Ltd. • Deutsche Bank AG	No
Finland	• Fortum Corporation • Government of Finland - Ministry of Foreign Affairs	Yes
Germany	RWE Power AG	No
Finland; The Netherlands	International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)	No

A.5. Public funding of project activity

The Government of Uganda, through the Rural Electrification Fund (REF), supports the WNEP with underlying project financing. The REF is a Ugandan government fund established under the Uganda Electricity Act of 1999 which supports rural electrification in Uganda. Uganda, the World Bank (through IDA), and bilateral donors (Norway) contribute resources to the fund, and a number of eligible activities, including the WNEP, are supported through the REF. The WNEP receives a subsidy from the REF to help cover the capital cost of the 33/11 kW substation, the internal combustion unit, and the hydropower plant at Nyagak, as well as a subsidy per new connection[1]. But the project activity will be driven by the private sector, and a concessionaire, the West Nile Rural Electrification Company (WENRECo), will build, operate and own the project.

The public-funding resources available for the underlying project financing will not purchase any GHG emission reductions (ERs) generated by the proposed project. Instead, the Prototype Carbon Fund (PCF) — the World Bank is acting as trustee for the multilateral fund PCF — will purchase the ERs generated from the project activity. The financial resources of the PCF are exclusively private sector and non-ODA government resources.

The use of public funds for the underlying project financing will not result in a diversion of ODA resources.

[1] Information on subsidy available for validation.

A.6. History of project activity

The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA) nor a project activity that has been deregistered.

It was neither a CPA that has been excluded from a registered CDM PoA nor a registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired in the same geographical location as the proposed CDM project activity.

A.7. Debundling

The proposed project activity is not a de-bundled component of a large-size hydroelectric project undertaken in the West Nile region because all the debundling rules in "Guidelines on Assessment of Debundling for SSC Project Activities" Version 03 are met. It is eligible as a small-scale project activity for the following reasons:

- Project Component #1: the WNEP will build the first hydroelectric power plant on the Nyagak River with a total nominal capacity of 3.5 MW, which is below the 15 MW threshold value.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

The approved methodology applied to the project activity is:

AMS-I.A: Electricity generation by the user. Version 16.0[2]

The approved tool applied to the project activity is:

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period. Version 3.0.1[3]

B.2. Applicability of methodologies and standardized baselines

The proposed project activity consists of one project component, eligible under the simplified modalities and procedures for small-scale CDM projects:

Component 1

Project Type I - Renewable Energy Projects. Category I.A. Electricity generation by the user

For the first crediting period, the project applied the methodology AMS-I.D. ver. 9 - Grid connected renewable electricity generation. According to para. 230(a) of the *Clean Development Mechanism Project Standard* Version 05.0, the latest version of this methodology shall be used for the new crediting period, whenever applicable. The latest version is AMS-I.D Version 17. The applicability of this methodology is assessed as follows:

[2] http://cdm.unfccc.int/methodologies/DB/8FKZFJ7SG551TS2C4MPK78G12LSTW3

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf/history_view

Table 1: Compliance of the project Component 1 with the applicability criteria of AMS-I.D

Methodology criteria	Fulfilment by the Project
Para. 1) This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	No. The project activity is an integrated power utility license concession granted to a private investor and includes the creation and operation of a mini-grid in the West Nile region supplied by a new hydro-power plant (Component 1). The mini-grid is not connected to the national grid and rather displaces electricity from isolated diesel stations operated by the Uganda Electricity Board (UEB) and private owned fossil fuel gen-sets or engines.
Para. 2) Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2.	The new hydropower plant does not supply to a national/regional grid (1), does not displace grid electricity consumption (2), does not supply to an identified customer via a national/regional grid (3), and does not supply to an existing mini-grid previously fed by fossil fuel generators (4). Instead, it will supply electricity to a new mini grid system where previously individual users relied on gen-sets or engines using fossil fuels for electricity (off-grid). Hence, case 5 of Table 2 applies, and the applicable methodology is AMS-I.A.

Table 2: Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types (source: Table 2 of the approved methodology AMS-I.D version 17)

No.	Project type	AMS I.A	AMS I.D	AMS I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

Given that AMS-I.D Version 17 does not apply to the project, in line with para. 230(C) of the Clean Development Mechanism Project Standard, another applicable approved methodology is selected. In this case, the respective situations described in Table 2 of AMS-I.D Version 17 are considered, and AMS-I.A Version 16.0 is selected.

The applicability of the methodology AMS-I.A is assessed as follows:

Table 3: Compliance of the project Component 1 with the applicability criteria of AMS-I.A

Methodology criteria	Fulfilment by the Project
Para. 1) This category comprises renewable electricity generation units that supply individual households/users or groups of households/users included in the project boundary. The applicability is limited to individual households and users that do not have a grid connection except when: (a) A group of households or users are supplied electricity through a standalone mini-grid powered by renewable energy generation unit(s) where the capacity of the generating units does not exceed 15 MW (i.e. the sum of installed capacities of all renewable energy generators connected to the mini-grid is less than 15 MW) e.g. a community based stand-alone off-the-grid renewable electricity systems; or (b) The emissions reduction per renewable energy based lighting system is less than 5 tonnes of CO2e a year and where it can be shown that fossil fuel would have been used in the absence of the project activity by (i) A representative sample margin) of target households; or (ii) Official statistics from the host country government agencies (c) A group of households or users are connected to a grid prior to the start date of the project activity (or the start date of validation with due justification), however the electricity from the grid is available for the households and users for less than 36 hours in any given calendar month during the crediting period. If based on actual monitoring it can be demonstrated that during a specific month the power supply from the grid to the households and users is for less than 36 hours, emission reductions can be calculated for that specific month. The methodology is not applicable in cases where, the project activity plant, which supplies electricity to this category of users, is connected to the grid at any time during the crediting period The renewable energy generation units include technologies such as solar, hydro,	Component 1 is renewable energy generation by a new run-of-river hydropower plant. The households and users did not have a connection to the national grid; prior to the project their electricity came from isolated diesel stations operated by the Uganda Electricity Board (UEB) and private owned fossil fuel gen-sets or engines. Component 1 supplies electricity to individual households/users, who are supplied electricity through a new mini-grid, operated through a power utility license concession for generation and distribution of electricity, powered by renewable energy generation units of 3.5 MW total installed capacity, hence satisfying para. 1(a). Para. 1(b) and 1(c) do not apply. The renewable energy generation units are hydro technology that produces electricity, all of which is used by the individual households/users, from a greenfield installation of less than 15 MW (3.5 MW).

Methodology criteria	Fulfilment by the Project
wind, biomass gasification and other technologies that produce electricity all of which is used on-site/locally by the user, e.g. solar home systems, wind battery chargers. The renewable generating units may be new installations (Greenfield) or replace existing onsite fossil-fuel-fired generation. To qualify as a small-scale project, the total output of the unit(s) shall not exceed the limit of 15 MW.	
Para. 2) 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 • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2	The project hydropower plant does not include an accumulation reservoir. It includes a new run-of-river reservoir and the power density of the power plant is 59.2 W/m^2, greater than 4 W/m^2.
Para. 3) Combined heat and power (cogeneration) systems are not eligible under this category.	The project is a hydropower plant, N/A.
Para. 4) If the unit added 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 unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW	Component 1 is a renewable unit and the 3.5 MW Nyagak hydropower plant has a capacity below 15 MW.
Para. 5) Project activities that involve retrofit or replacement of an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	The project is a Greenfield plant, N/A.
Para. 6) 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	The project installs a new power plant at a site where no renewable energy power plant operated prior to the implementation of the

Methodology criteria	Fulfilment by the Project
of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units	project activity, and hence is a Greenfield plant.

The total new power generation of the project activity Component 1, is 3.5 MW; which is below the 15 MW threshold value of Type I small-scale projects.

B.3. Project boundary, sources and greenhouse gases (GHGs)

In accordance with the methodology AMS-I.A, regarding Project Component #1, "The physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced delineates the project boundary," in this case the hydro plant developed and operated by the proposed project and the individual households/users connected to the mini-grid supplied by the hydro plant. The figure 2 represents the baseline and project condition of the proposed project.

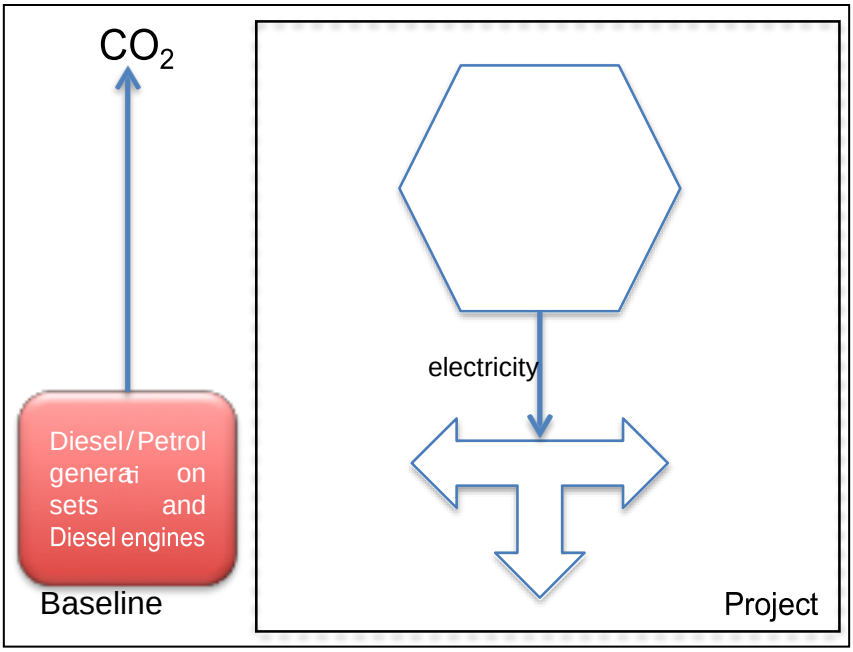

Figure 2. Schematic representation of baseline and project condition

It is expected that the proposed project will supply power to a number of current and future consumers who would otherwise be operating their own private diesel gen-sets and engines. By installing grid- connected capacity and by interconnecting Nebbi and Paidha in the south to Arua in the north through a sub-transmission line, the project connects and serves consumers currently generating power on-site to an isolated electric mini-grid. The project therefore signifies a change from a system of many, widely dispersed, small stand-alone power generators to an isolated mini-grid system.

Source		GHG	Included?	Justification/Explanation
Baseline	Existing and new diesel/petrol generation sets and diesel engines	CO_2	Yes	Carbon dioxide is the main GHG from combustion of fossil fuel
		CH_4	No	Minor emission source; this is conservative
		N_2O	No	Minor emission source; this is conservative
Project activity	For hydro power plants (run-of-river projects)	CO_2	No	N/A – run of river project.
		CH_4	No	N/A – run of river project.
		N_2O	No	N/A – run of river project.

The hydroelectric station has four electricity meters which have been installed on-site, one meter to measure gross generation (M1) and one to measure consumption at the site (M2). There is two additional meters (M3 and M4) to measure the net electricity export to mini-grid. The figure 3 represents the metering points in the project activity.

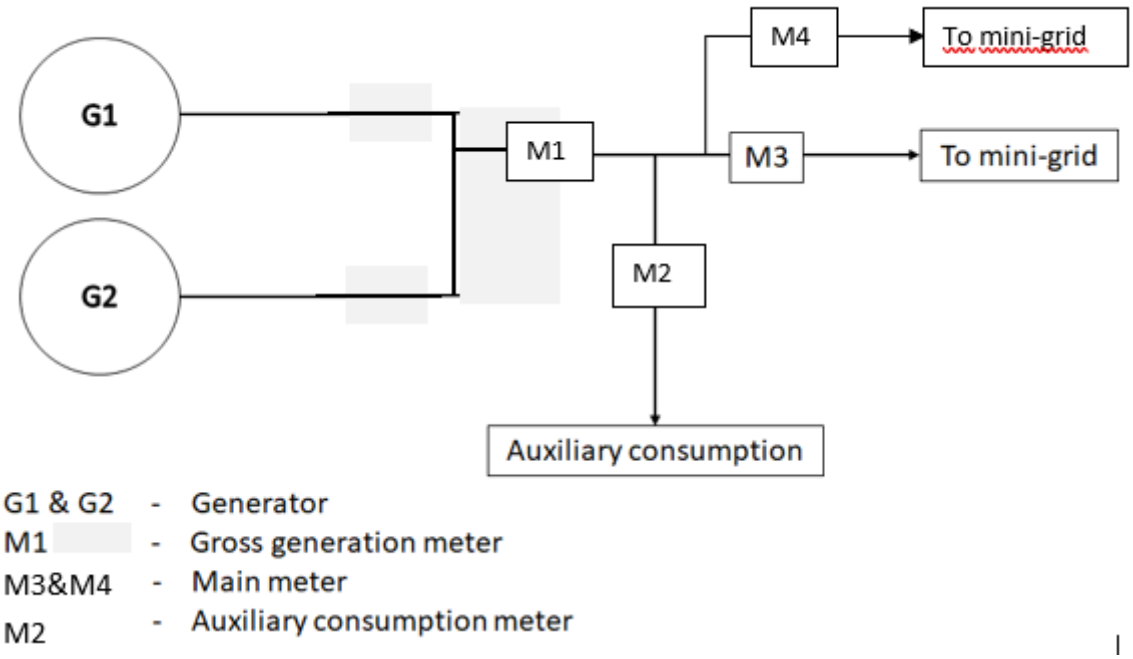

Figure 3. Schematic representation of metering points in the project activity

B.4. Establishment and description of baseline scenario

Project Component # 1, using methodology AMS-I.A. Electricity generation by the user.

The energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy, estimated using one of three options. In this case, Option 2 is selected: the energy baseline is calculated based on annual electricity generation from project renewable energy technologies.

Diesel/petrol generation sets and diesel engines are the only sources of electricity generation in Arua, Nebbi, and Paidha prior to the implementation of this project component. This simplified methodology defines the baseline as the product of the electricity delivered by the renewable generating unit and an emission factor, where the emission factor is 0.8 $kgCO_2e/kWh$, the default factor provided in AMS-I.A.

According to the para. 232 of the Clean Development Mechanism Project Standard, Project participants shall assess and incorporate the impact of national and/or sectoral policies and circumstances existing at the time of requesting renewal of the crediting period on the current baseline GHG emissions, without reassessing the baseline scenario.

The Tool for the "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 3.0.1 is applied to do so.

Validity of the Baseline and its Updating, if not valid

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

On the policy and regulatory front, the only relevant, significant new development in Uganda's energy sector, after registration of the project in 2006, is the introduction of the Renewable Energy Policy 2007. The following paragraphs analyze the impact of the policy on the project activities and the baseline.

Renewable Energy Policy 2007

This is the most recent policy enacted for the Ugandan electricity sector. The Renewable Energy Feed-in-tariff (RE-FIT) is one of the main components, established under the Renewable Energy Policy. The overall aim of the RE-FIT is to encourage and support greater private sector participation in power generation from renewable energy technologies. It covers small-scale renewable projects (0.5 to 20 MW), and applies in its current version to projects connected to the national grid only. Hence, stand-alone technologies and off-grid projects are not embedded under the RE-FIT. Therefore the baseline is not affected at all for both the components of the project.

Further, the baseline complies with the current regulations dealing with power generation. In particular, there are no new mandatory national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. The regulatory framework remains the same. But the market structure may have been impacted by the policy in place that promotes rural electrification (see Step 1.2).

Step 1.2: Assess the impact of circumstances

Under the Rural Electrification Agency (REA), there was no new grid-based (mini-grid or national grid) electricity project implemented in the region than provided by the project activity available. Some solar PV systems were installed in the Arua district in the health and education sectors, and potentially very few in the residential sector (4,500 nation-wide)[4]. Hence, in the absence of the project activity, fossil fuel generators would still have been the main source of electricity in the project area.

Considering the impact of circumstances, the fundamental elements of the baseline have not changed since the project was registered in 2006.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

[4] http://www.rea.or.ug/userfiles/Project%20Status.pdf

This sub-step is applicable to the project activity since the baseline is the continuation of the current practice.

Diesel generator lifetime is long and spreads beyond the first crediting period of the project activity. In the absence of regulation on diesel generators and the very low market penetration of solar PV, diesel generator owners would have continued use of their current baseline equipment, or if having made an investment would still have bought a new diesel generator to replace their old unit if this were to break down. Furthermore investment by a private company in a regional power plant and mini-grid is no more likely than it was at the time of the original project validation, due to no change in the relevant policy for this type of context, as described in Step 1.1. Hence the continuation of use of baseline equipment is the most likely scenario for the second crediting period in the absence of the project activity.

Step 1.4: Assessment of the validity of the data and parameters

There are some parameters, which were determined at the start of the first crediting period and not monitored during the first crediting period, which are not valid anymore. Namely, Component 2 included in the first crediting period has been eliminated for the second crediting period. So the current baseline is updated for the second crediting period. This update includes baseline emission factor and quantity of net electricity generation.

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period but data and parameters needs to be updated. Therefore step 2 is used.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period is updated, without reassessing the baseline scenario, based on the latest approved version of the methodology AMS-I.A. This update is applied in the context of the sectoral policies and circumstances that are applicable at the time of requesting for renewal of the crediting period. More details for the updated baseline emissions for the second crediting period can be seen in section B.6.

Step 2.2: Update the data and parameters

As mentioned in step 1.4 above, some data and parameters are updated for this second crediting period. More details can be seen in section B.6 and B.7.

B.5. Demonstration of additionality

According to para. 230 of the Clean Development Mechanism Project Standard, to support a request for renewal of the crediting period of a registered CDM project activity, project participants shall update the sections of the PDD of the project activity relating to the baseline, estimated GHG emission reductions and the monitoring plan using a baseline and monitoring methodology. Therefore section B.5, Demonstration of additionality, is not updated.

While off-grid electricity in rural Uganda is supplied mainly by diesel and gasoline (petrol) gen-sets, there has been considerable interest among donors in harnessing the local hydropower resources as part of an electrification scheme for the West Nile at least since the 1990s[5]. But political, financial,

[5] few off-grid renewable energy resources (less than 1 MW nationally) supported by major international (donor) subsidies have been developed (e.g., church missions). No private hydro investments have been made in Uganda; hydropower in Uganda to date has been funded either by governments or by international NGOs. Private hydropower investments have been considered in Uganda only in the past several years, but none have been financed thus far.

social and institutional barriers have so far precluded small hydropower development in this region. In particular, the lack of a capital market accessible to IPPs, the utility company's inability to provide the required financing, the consumers' low ability-to-pay, and the high up-front investment would preclude the WNEP from coming to fruition. Moreover, energy sector and infrastructure investments in Uganda are considered highly risky. The economic, political, inflation and currency risks for the most part cannot be mitigated and they therefore raise the required discount rate significantly and reduce the business prospects for power development investments in the West Nile region. These barriers fall under eligible barrier Class A ("Investment barrier"), Class C ("Barrier due to prevailing practice") and Class D ("Other barriers") identified for small-scale CDM projects.

The proposed project activity has been tendered internationally on a "build, own and operate" basis, with two 20-year licences (generation and distribution) granted to the winning bidder by the Electricity Regulatory Authority (ERA). WNEP has received financial assistance because of high project costs and risks – and in order to make the project sufficiently attractive to an IPP. The Rural Electrification Fund in Uganda, which has been established with ERT support, will provide a "smart subsidy". The smart subsidy is a capital investment subsidy for investment in generation, sub-transmission lines, distribution lines, and customer connections. Additionally, the Government of Uganda (GOU) completed an 80 km sub-transmission line connecting Nebbi and Arua, which has been transferred to the WNEP operator (WENRECo).

The number of privately-owned diesel and petrol generation sets in the West Nile region has grown consistently since the late 1990s[6]. This trend will most likely prevail until substantial investments are made in an alternative regional electricity supply system. However, it is unlikely that the UEB would increase its generation capacity in the region any time soon. Thus, the business-as-usual scenario, i.e. increased private sector generator and mill engine ownership, is the most plausible option for future electrification of the West Nile in the absence of the proposed project activity.

The key national and regional level barriers to the WNEP are described below. Additionally, the implications of these barriers for the WNEP are examined. Over 30 businesses operating in Uganda, including the largest commercial banks, the largest multinational corporations and Ugandan businesses, were interviewed in order to understand the barriers to the proposed project activity. As well, interviews were conducted with regional and international development banks, investment and export credit insurance and guarantee agencies[7].

Overview of Barriers in Uganda

Although Uganda has experienced dramatic economic growth over the past fifteen years, dependency on neighbouring countries (Congo, Sudan and Rwanda) and regional instability has

[6] Indeed, between the August-September 2000 West Nile surveys and interviews with municipal authorities during the ERT April-May 2001 appraisal mission, at least another 30 gen-sets, with a total installed capacity of 1 MW, have been installed within the system boundary. In contrast, effectively no new consumers have been added to the local grid for over 20 years. West Nile had over 2,000 customers in 1979 compared to fewer than 1,000 in 2001.

[7] Institutions consulted included the East Africa Association (in Uganda and the UK), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), the Oversees Private Investment Corporation (US), the Commonwealth Development Corporation (UK), the Export Credit Guarantee Department (UK), the Kreditanstalt für Wiederaufbau (Germany), the International Bank for Reconstruction and Development (World Bank) including the World Bank's Uganda Resident Representative Office and Country Team, the European Investment Bank (EIB), commercial banks, the Uganda Investment Authority, the Uganda Manufacturers Association, Uganda's Private Sector Foundation, among others. Some information was provided on a confidential basis and cannot be attributed to specific sources in many cases. Yet, detailed information can be provided for validation purposes.

resulted in economic insecurity[8]. Security is the primary barrier in Uganda today, particularly in the western and northern regions where small rebel groups continue to operate in opposition to the current government. Relations with Sudan and Congo have been poor for a number of years. This has frequently fed internal instability (fuelled and supported by antagonistic neighbours) and has led to insecurity in border areas.

Dependence and energy security in Uganda are important issues, particularly with regard to fuel supplies. Uganda is land-locked and depends upon its petroleum supplies transiting through Kenya from the Indian Ocean port of Mombassa. Political tensions between Kenya and Uganda have periodically led to border closures and disruption of petroleum and other supplies to Uganda. Uganda is hoping to open up a second overland route through Tanzania. However, for the foreseeable future it will continue to import fuels such as diesel through Kenya.

Uganda follows a positive policy and attitude towards foreign direct investment. However, because of historical precedence, such as post-independence expropriation of private sector assets[9], and the perceived high risks of power generation, transmission and distribution systems, Uganda is currently not attractive to potential private sector investors. Leading credit ratings agencies (Moody's, Fitch, and S&P) do not rate Uganda — a strong indicator, in itself, of the high country risk.

Economic Barriers

The West Nile is one of the most rapidly expanding economies in Uganda but it lacks banking and other financial and economic infrastructure and intermediation[10]. The lack of adequate and reliable electricity supply has seriously constrained West Nile's development, particularly in the agro-processing sector. Most of the businesses are in the informal sector, hence almost no ties with formal credit or finance exist. Larger businesses that rely upon their own diesel or gasoline generated electricity face stiff competition from businesses connected to the main grid in other parts of Uganda (even if electricity supplies on the main grid are often unreliable and insufficient to meet business requirements). West Nile businesses in areas as diverse as welding and printing periodically shut down due to high energy costs[11]. For example, the costs of transporting welded products and printed materials from Kampala can be less than that of using own-generators to provide electricity. Increase in fuel costs caused by supply disruptions, inflation, and depreciation pose major economic risks to West Nile businesses.

Political Barriers

Civil war in Uganda in the 1970s and the early 1980s deteriorated the electricity infrastructure and supplies as well and undermined investor confidence. While the West Nile has enjoyed political stability under the current Ugandan government for fifteen years, it remains vulnerable to the insurgency in the north of Uganda in so far as traffic and transport in and out of the West Nile is affected. The Lord's Resistance Army's brutal campaign against rural communities and government supporters between Central Uganda and West Nile is expected to continue for some time. Though

[8] This section is based on discussions held with, or reviews of materials from, Economist Intelligence Unit, World Bank Uganda Country Team, IFC Uganda Resident Missions, British Foreign and Commonwealth Office (FCO), British Export Credit Guarantee Department, Commonwealth Development Corporation, European Investment Bank, US Export Import Bank and Overseas Private Investment Corporation, East African Association, Uganda Investment Authority, and the banking sector in Uganda.

[9] It should be noted, though, that under Museveni (since 1986) the GOU has not expropriated any private property and property expropriated under previous governments was restituted.

[10] There are no effective credit markets operating in the region (only two commercial banks have small branches in these two districts with three quarters of a million people); there is no financial intermediation for infrastructure investments, particularly in rural areas; and there are no insurance schemes for hydroelectric investments.

[11] Based on interviews with a number of businessmen during the course of this work and the design of the ERT.

the West Nile region is not directly affected, the major trade routes to Kampala can become insecure, making air traffic the only safe means of transport into and from the region. This, however, increases the cost of conducting business in the region, slowing down the economic activity. Civil unrest in neighbouring Congo and Sudan add further political risk.

Interference by local politicians in the operations of the WNEP could pose another political barrier. For instance, granting and maintaining rights of way to the hydropower sites, control over water resources, and tariff setting are potential political issues that any investor must take into consideration.

Corruption is unfortunately substantial and is officially cited by President Museveni as one of the major impediments to Uganda's continued growth and development. President Museveni has pledged that Government of Uganda institutions will root out corruption and some progress has been made. Nonetheless, foreign investors in Uganda perceive corruption as a growing concern[12].

Summary of barriers

In order to determine the baseline scenario, three plausible scenarios for increasing and improving the future power supply in the West Nile region should be considered. These three scenarios can be summarized as follows:

- The Business-as-Usual option is a continuation of the current trend, i.e., a demand increase would be met by an increase in privately-owned and operated petrol and diesel generators and auto- generation by business, institutions and households; in addition, the UEB (or its successor) would continue to supply the existing consumers with 4 hours of unreliable power (often load-shedded for days at a time) daily;

- Extension of the National Grid implies construction of a transmission line to the main grid at the closest point at Gulu, nearly 200 km east of the West Nile region; and

- Hydropower Mini-Grid – i.e., the proposed WNEP, which entails the refurbishment and extension of an isolated mini-grid with a 3.5 MW mini-hydro plant as source of base load power. The mini-hydro plant would be complemented by an efficient 1.5 HFO plant which would provide shoulder and peak load.

Table 4 shows that major fixed-asset investments in rural Uganda face high barriers. Foreign investors investing in rural power supply in Uganda will typically require a return on equity (RoE) around 30-35%[13]. The BAU option, in contrast, does not face these country barriers.

Table 4: Summary of country barriers to foreign direct investment in Uganda

Scenario Barrier type	Private Gen-sets	Extension of Main Grid to West Nile / WNEP
Investment barriers	Not applicable	High: • Low investor confidence due to civil war and expropriations under previous governments (till 1986); • Supply risk: Land-locked Uganda depends on imports via road through Kenya;

[12] More information on this and other aspects of this risk assessment can be provided

[13] As cited by the Utility Reform Unit, Ministry of Finance through discussions with potential investors for concessions on the main UEB grid, and reinforced through discussions with AES Nile Power (Bujagali), and members of the UK Power Sector Working Group (PSWG).

Scenario Barrier type	Private Gen-sets	Extension of Main Grid to West Nile / WNEP
		• Corruption is a growing concern.
Economic barriers	Not applicable	High: • Lack of banking, financial and economic infrastructure; • High costs in West Nile region due to poor transport links; Dependency of economy on volatile cash crops revenues.
Political barriers	Not applicable	High: • Problematic external security situation: conflicts in south Sudan and Congo could spill over into Uganda; • Internal security situation not fully under control: rebel activities in northern Uganda; and • Possible political interference with business decisions: new regulatory system is untested.
Inflation and foreign exchange barriers	Not applicable	High: • Vulnerability of Ugandan currency to external factors (ODA, world market coffee price etc.); and • Significant inflationary pressure.

Table 5 shows that a very high barrier for the grid extension option exists at present and most likely in the foreseeable future. This option should be regarded as infeasible. The WNEP option, however, is feasible with public support. The investment barrier is high, but due to the envisaged smart subsidy and the earnings from carbon revenue, it will be possible to lower the barriers sufficiently to make the project attractive to the private sector. Finally, the BAU option is presenting the lowest barriers. In the prevalent multi-barrier environment, it represents the most likely option in the absence of outside intervention.

Table 5: Summary of project specific barriers

Scenario Type of barrier	Private Gen-sets	Grid Extension	WNEP
Technological barriers	None	**High**: Power shortages in the main grid; Rebel activities in northern Uganda; Transport problems.	**Low**: Studies have confirmed feasibility. Engineering problems cannot be excluded.
Investment barriers	None	**High**: Opportunity costs of grid extension are large.	**Medium**: • Week economic growth (export prices, poor roads). • Demand for power too low for viable operation.

Scenario Type of barrier	Private Gen-sets	Grid Extension	WNEP
Barriers due to prevailing practice	None	**Medium:** Outcome of UEB privatisation and decentralization uncertain Political interference in business decisions possible	**High**: • No experience with new Electricity Act and regulatory system. • Political interference in tariff setting cannot be excluded. • Problems with construction and operation licenses.
Inflation and foreign exchange barriers	**Low**: impact on prices of fuel and machinery	**Medium:** Probably substantial foreign investment needed	**Medium**: • Cost of diesel in Uganda. Substantial foreign direct investment needed. • Repatriation of profits could be uncertain.
Additional investment barriers	**Low**: price increases for fuel and machinery	**High**: Opportunity costs of grid extension are high	**High**: • Investment in non-removable asset. Cost overruns (construction and operation). • Construction delays. Customers default. • Fees and licenses higher than expected.
Aggregate barriers	**Low**	**High**	**Medium**

In summary, due to preventive barriers, the WNEP would not be implemented without government support. The fact that the Government of Uganda, the World Bank and other donors are willing to provide financial assistance to the project shows that it is a widely shared view that the WNEP would not happen as a purely commercial investment. Therefore, given that the government has discarded the grid extension option as it considers that this option does not meet the requirements for secure and safe power supply, the only alternative that does not face barriers is the business-as-usual scenario and the project activity must be viewed as additional.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

Project Emissions

Project Component #1: Hydroelectric Plant

Component #1 is a run-of-river hydropower plant. Hence, according to AMS-I.A, para. 13 “For most renewable energy project activities, PEy = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002. - Emissions related to the operation of geothermal power plants (e.g.

non- condensable gases, electricity/fossil fuel consumption); - Emissions from water reservoirs of hydro power plants."

The project is a run-of-river hydropower plant and entails a run-of-river reservoir.

According to ACM0002, "Grid-connected electricity generation from renewable sources" Version 14.0, para. 36, for hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows.

If the power density of the project activity (PD) is greater than 10 W/m^2:

$PE_y = PE_{HP,y} = 0$ (Equation 4)

Para. 37 states that the power density of the project activity (PD) is calculated as follows:

$PD = (CAP_{PJ} – CAP_{BL}) / (A_{PJ} – A_{BL})$ (Equation 5)

Where:

PD	Power density of the project activity (W/m^2)
CAP_{PJ}	Installed capacity of the hydro power plant after the implementation of the project activity (W)
CAP_{BL}	Installed capacity of the hydro power plant before the implementation of the project activity (W)
A_{PJ}	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL}	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

Baseline Emissions

Project Component #1: Hydroelectric Plant

According to the approved methodology AMS-I.A, the energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy. Since it is possible to monitor annual electricity generation from project renewable energy technologies in this case, Option 2 is selected for baseline emissions calculation.

The energy baseline is calculated as follows:

$E_{BL,y} = \Sigma_i EG_{i,y} / (1 – l)$

Where:

$E_{BL,y}$	Annual energy baseline; kWh

Σ_i The sum over the group of i renewable energy technologies (e.g. renewable energy technologies for solar home systems, solar pumps) implemented as part of the project activity

$EG_{i,y}$ Annual output of the renewable energy technologies of the group of i renewable energy technologies installed; kWh

l Average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction

Since the project is described by para. 1(a), none of the provisions from the last two paragraphs of para. 8(b) apply in the case of the project.

For Option 2, the emissions baseline is the energy baseline calculated in accordance with para. 8(b) times a default emission factor:

$BE_{CO2,y} = E_{BL,y} * EF_{CO2}$

Where:

$BE_{CO2,y}$ Emissions in the baseline in year y; tCO_2

$E_{BL,y}$ Annual energy baseline; kWh

EF_{CO2} CO_2 emission factor; tCO_2/kWh; AMS-I.A. default value of 0.8 $kgCO_2e/kWh$ derived from diesel generation units is used

Leakage

Following methodology AMS-I.A: Given that the hydroelectric plant is not transferred from another activity, the possibility of leakage can be ignored.

The proposed project activity will result in a kerosene consumption reduction for lighting purposes. However, given the project participants' intention to follow a conservative approach to emission reduction determination, they will not quantify and will not claim the amount of kerosene savings achieved by the project activity.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data or parameter.)

Data/Parameter	**EF_{CO2}** (component 1)
Data unit	tCO_2e/MWh
Description	CO_2 emission factor
Source of data	Default from AMS-I.A
Value(s) applied	0.8
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comment	Component 1

Data/Parameter	*l*
Data unit	-
Description	Average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction
Source of data	Default from AMS-I.A
Value(s) applied	0
Choice of data or measurement methods and procedures	In the absence of the project activity, electricity supply would not have entailed distribution losses e.g. users are in the same location as the generator
Purpose of data	Calculation of baseline emissions
Additional comment	Component 1 - Refer to footnote 6 of AMS-I.A

Data/Parameter	CAP_{BL} (component 1)
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data	Default from ACM0002
Value(s) applied	0
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of project emissions
Additional comment	Component 1

Data/Parameter	A_{BL} (component 1)
Data unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero
Source of data	Default from ACM0002
Value(s) applied	0
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of project emissions
Additional comment	Component 1

B.6.3. Ex ante calculation of emission reductions

Project Component #1: Hydroelectric Plant

For the purpose of ex-ante calculations, it is assumed that the hydro station can deliver 20,650 MWh per year over the lifetime of the project. The project operator will continuously meter and record the net annual electricity output from the hydropower plant over the life of the project.

Considering that the Nyagak hydropower plant was commissioned in September 2012, it is assumed that the second crediting period will be entirely under Phase 2, but with only four months of generation in 2012.

Project Emissions

$PD = (CAP_{PJ} – CAP_{BL}) / (A_{PJ} – A_{BL})$

$= (3,500,000 – 0) / (59,104 – 0)$

$= 59.2 \text{ W/m}^2$

If the power density of the project activity (*PD*) is greater than 10 W/m^2:

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

Baseline Emissions

Project Component #1: Hydroelectric Plant

$E_{BL,y} = \Sigma_i EG_{i,y} / (1 – l)$

$= 20,565 \text{ MWh} / (1-0)$

$= 20,565 \text{ MWh}$

$BE_{CO2,y} = E_{BL,y} * EF_{CO2}$

$= 20,565 \text{ MWh} * 0.8 \text{ tCO}_2\text{/MWh}$

$= 16,452 \text{ tCO}_2$

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2012	5,484	0	0	5,484
2013	16,452	0	0	16,452
2014	16,452	0	0	16,452
2015	16,452	0	0	16,452
2016	16,452	0	0	16,452
2017	16,452	0	0	16,452
2018	16,452	0	0	16,452
Total	104,196	0	0	104,196
Total number of crediting years	7			
Annual average over the crediting period	14,885	0	0	14,885

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data or parameter.)

Data/Parameter	**$EG_{i,y}$**
Data unit	kWh
Description	Annual output of the renewable energy technologies of the group of *i* renewable energy technologies installed
Source of data	Plant register
Value(s) applied	20,565,000
Measurement methods and procedures	The net electricity output is the gross energy generation by the project activity power plant minus the auxiliary/station electricity consumption. This will be directly monitored using meters M3 and M4.
Monitoring frequency	Continuous monitoring, at least hourly measurement, at least monthly recording
QA/QC procedures	The value obtained from meters M3 and M4 will be cross checked with gross generation (M1) minus auxiliary consumption (M2) and the conservative value will be taken for ER calculation. **$EG_{i,y}$ = Min (M3+M4) reading or ($EG_{GROSS,y}$ - EC_{AUX})** The equipment used for monitoring is controlled and calibrated in accordance with the applied methodology, board guidance, local/national standards and as per the manufacturer's specification. As an additional quality assurance measure, the readings of the gross generation obtained from the meter installed after generation units (M1) minus the readings of the gross consumption obtained from the auxiliary meter (M2) will be cross-checked against the readings from the meters (M3 and M4) for net export to ensure the difference are within ±0.5% range (due to the transformation losses between meters M3 and M4 and meters M1 and M2). If at any instance, the variations are more than ±0.5%, then the accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter. In the case of electricity sold to a third party, measurement results shall be crosschecked with records of sold/purchased electricity (e.g. invoices/receipts).
Purpose of data	Calculation of baseline emissions
Additional comment	Archived on paper, and electronic version until 2 years after end of crediting period

Data/Parameter	**$EG_{GROSS,y}$**
Data unit	kWh
Description	Gross energy generation of the project activity
Source of data	Plant register
Value(s) applied	20,650,000
Measurement methods and procedures	One electricity meter is installed to measure the gross electricity generated by the project (M1)
Monitoring frequency	Continuous monitoring, at least hourly measurement, at least monthly recording

QA/QC procedures	The equipment used for monitoring is controlled and calibrated in accordance with the applied methodology, board guidance, local/national standards and as per the manufacturer's specification. As an additional quality assurance measure, the readings of the gross generation obtained from the meter installed after generation units (M1) minus the readings of the gross consumption obtained from the auxiliary meter (M2) will be cross-checked against the readings from the meters (M3 and M4) for net export to ensure the difference are within ±0.5% range (due to the transformation losses between meters M3 and M4 and meters M1 and M2). If at any instance, the variations are more than ±0.5%, then the accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter. If at any instance, the variations are more than ±0.5%, then accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter.
Purpose of data	Calculation of baseline emissions
Additional comment	Archived on paper and electronic version until 2 years after end of crediting period

Data/Parameter	**EC_{AUX}**
Data unit	kWh
Description	Auxiliary electricity consumption of the project activity
Source of data	Plant register
Value(s) applied	85,000
Measurement methods and procedures	One electricity meter is installed to measure the auxiliary electricity consumption of the project (M2)
Monitoring frequency	Continuous monitoring, at least hourly measurement, at least monthly recording
QA/QC procedures	The equipment used for monitoring is controlled and calibrated in accordance with the applied methodology, board guidance, local/national standards and as per the manufacturer's specification. As an additional quality assurance measure, the readings of the gross generation obtained from the meter installed after generation units (M1) minus the readings of the gross consumption obtained from the auxiliary meter (M2) will be cross-checked against the readings from the meters (M3 and M4) for net export to ensure the difference are within ±0.5% range (due to the transformation losses between meters M3 and M4 and meters M1 and M2). If at any instance, the variations are more than ±0.5%, then the accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter If at any instance, the variations are more than ±0.5%, then accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter.
Purpose of data	Calculation of baseline emissions
Additional comment	Archived on paper and electronic version until 2 years after end of crediting period.

Data/Parameter	**CAP_{PJ}**
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Value(s) applied	3,500,000

Measurement methods and procedures	Determine the installed capacity based on recognized standards
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	Component 1

Data/Parameter	**A_{PJ}**
Data unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Value(s) applied	59,104
Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	Component 1

B.7.2. Sampling plan

Not applicable

B.7.3. Other elements of monitoring plan

The operator of the West Nile Hydro Power project will have certain operational and data collection obligations to fulfil, in order to minimise greenhouse gas emissions and to ensure that sufficient information is available to calculate ERs in a transparent manner and to allow for a successful verification of these ERs.

A separate, detailed monitoring plan (MP) and work sheets has been developed specifically for this project activity. The operator shall comply with the data collection, testing and analysis, and data management obligations contained in this MP. Key parameters define the performance of the project and the operator shall integrate the data collection requirements into the company's database and information collection policies. Table 6 summarizes the management structure and the division of responsibility among the project participants.

The QC/QA procedures that will be followed by WENRECo will be fully consistent with the QC/QA procedures generally put into practice at hydroelectric stations around the world and in CDM projects in which the World Bank is a project participant. Professional support and experience will be sought when the operational and management approach is identified and put in place at the Nyagak hydro station.

Table 6: Management and operation system: Roles of project partners

	WENRECO	The World Bank
Monitoring System	• Review MP and suggest adjustments if necessary • Develop and establish management and operations system • Establish and maintain monitoring system and implement MP • Prepare for initial verification and project commissioning	• Review monitoring and management system • Ensure project meets the Bank requirements and safeguards • Arrange for initial verification
Data Collection and Provision	• Establish and maintain data measurement and collection system and collect data for all MP indicators and inputs as required • Maintain valid permits and licenses and collect information on compliance with relevant Ugandan regulations • Collect relevant information on electricity generation and fuel consumption by power plants in Uganda	Review data collection systems
Data Computation	• Enter data in MP worksheets • Use MP worksheets to calculate ERs	Review completed worksheets
Data Storage Systems	• Implement record maintenance system • Store and maintain records (paper trail) • Forward completed worksheets to the World Bank • Complete brief annual report	• Receive copies of key records and reports • Maintain the Bank records
Performance Monitoring and Reporting	• Analyze data and compare project performance with project targets • Analyze system problems, recommend and implement improvements (performance management) • Prepare and forward periodic reports	• Review reports • Evaluate performance and assist with performance management, if necessary
MP Training and Capacity Building	• Develop and establish MP training, skills review and feedback system • Ensure that operational staff is trained and enabled to meet the needs of this MP	-
Quality Assurance, Audit and Verification	• Establish and maintain quality assurance system with a view to ensuring transparency and allowing for audits and verification • Prepare for and facilitate audits and verification process	• Supervise the Project • Arrange for initial and periodic verification

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

01/04/2003

C.2. Expected operational lifetime of project activity

25 years 00 months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable, Second crediting period

C.3.2. Start date of crediting period

01/01/2012

C.3.3. Duration of crediting period

7 years 00 months

SECTION D. Environmental impacts

According to para. 230 of the Clean Development Mechanism Project Standard, to support a request for renewal of the crediting period of a registered CDM project activity, project participants shall update the sections of the PDD of the project activity relating to the baseline, estimated GHG emission reductions and the monitoring plan using a baseline and monitoring methodology. Therefore section D, Environmental impacts, is not updated.

D.1. Analysis of environmental impacts

The purpose of the project activity is to generate power safely and efficiently and in accordance with applicable environmental standards in Uganda. The design of the Nyagak hydroelectric power station will allow for a continuous ecological river flow of 100-500 l/s from the head pond, or another smaller value approved by the Ministry of Water, Lands and Environment. The head pond will have a storage capacity of at least 130,000 m^3. The expected gross head is 87 m.

The Environmental Impact Statement prepared for the project explains that the principal environmental impacts of a project such as the Nyagak hydro project are the construction and operation of a reservoir and a dam. However, since the project does not involve a large dam, but a relatively small regulating basin (app. 15m long, 12m deep and 9.5m wide), the environmental impacts will be low and can easily be mitigated. The land that will be inundated is cultivated except close to the riverbank, which is lined by elephant grass and Arundinaria alpina. The potential for methane release from inundation of vegetation is therefore insignificant.

In 2002, in accordance with Ugandan law, an environmental impact assessment was conducted for the Bondo-Nebbi transmission line and for the Nyagak and Olewa hydropower projects, for which the National Environmental Management Authority (NEMA) of Uganda issued a “Certificate of Approval of Environmental Impact Assessment”. Both the impact statement and the certificate of approval are on file for inspection by the validator.

D.2. Environmental impact assessment

In summary, the project activity does not involve a construction of large dam, but a relatively small regulating basin. The land that will be inundated is cultivated except close to the riverbank, which is lined by elephant grass and Arundinaria alpina. The environmental impacts for the project is very low and can easily be mitigated.

SECTION E. Local stakeholder consultation

According to para. 230 of the Clean Development Mechanism Project Standard, to support a request for renewal of the crediting period of a registered CDM project activity, project participants shall update the sections of the PDD of the project activity relating to the baseline, estimated GHG emission reductions and the monitoring plan using a baseline and monitoring methodology. Therefore section E, Local stakeholder consultation, is not updated.

E.1. Modalities for local stakeholder consultation

The World Bank contracted Action Aid (Uganda) as the lead NGO to undertake the Social Intermediation exercise for the West Nile Electrification Concession. Action Aid (Uganda) in turn contracted Community Empowerment for Rural Development (CEFORD) to carry out the Social Intermediation in the towns of Arua, Nebbi and Paidha.

The tasks of CEFORD in the Social Intermediation exercise included:

- Informing the community groups of the impending opportunities that could enable them access electricity.
- Facilitating a process through which communities can freely contribute to the business plan their opinions on power generation, transmission and distribution including strengths, weaknesses, opportunities and threats if any relating to ownership and management of the proposed investment that could impact on the successful implementation and sustainability of the project.

Feed back to the financial and technical consultants, views emanating from these consultative processes for consideration during the designing of the business plan:

For each of the towns, consultations in form of meetings were held with Local Council Executives (LC1 - LC5), Government Civil servants in the respective towns, Business Community representatives, Private Companies and individual interviews with randomly selected households.

E.2. Summary of comments received

According to the Report on Social Intermediation for the West Nile Electricity Concession (Utility) under the Energy for Rural Transformation Project (ERT) the main findings from the consultations were the following ones.

Main findings:

- People urgently want electricity power, regardless of the source. There was open sign of fatigue about the issue of providing electricity to West Nile and statements like “We now want actions instead of further talks” came from all consultations.
- There is a general feeling that the whole issue is highly political because it always comes when Elections are nearing. They expressed similar sentiments about the road issue (Karuma-Arua).
- People (both government officials and civilians) wish to be involved in the planning, implementation and management of the project through consultations and forging partnership with the main private investor.
- The population does not only want to benefit from the final service delivery in the form of electricity power but also from the implementation activities like supply of labour, materials and food. They also want to be shareholders in the project. In Arua, the proposal is to buy shares

through the West Nile Power Utility Company while Nebbi and Paidha are not very keen about this company.

- People in Arua seem to be more informed about the project and other opportunities for rural electrification than those in Nebbi and Paidha. Arua district has even gone ahead to form a Power Committee (30 members) at the district level to discuss, and create awareness on issues of power for the population.
- There is a strong recommendation to form a West Nile Power Committee to discuss and oversee the process of implementing and managing the project.
- The proposal to develop Nyagak hydro power site under survey should not bar any other interested private investor from developing other sites in West Nile like Olewa.
- While the people in Arua have no objection about the transmission line passing through Nebbi-Okollo-Bondo to Arua Municipality, there is strong objection from the people of Nebbi and Paidha. They prefer it to pass through Nyapea- Warr- Logiri.
- The people in Arua accept the installation of the 1.5 MW generator set in Arua but those in Nebbi and Paidha are against it.

The stakeholder consultation process and the comments received during the process are detailed in the Report on Social Intermediation for the West Nile Electricity Concession (Utility) under the Energy for Rural Transformation Project (ERT). The report is on file for inspection by the validator.

E.3. Consideration of comments received

The project sponsor and the World Bank have responded in detail to many comments received from stakeholders and concerned parties. World Bank staff has addressed issues concerning the project's status and CDM eligibility, as well as more technical questions concerning the design, site, generation output, environmental impacts etc.

SECTION F. Approval and authorization

Appropriate approvals are registered with the UNFCCC already.

Appendix 1. Contact information of project participants

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Appendix 2. Affirmation regarding public funding

The Government of Uganda, through the Rural Electrification Fund (REF), supports the WNEP with underlying financing. The REF is a Ugandan government fund established under the Uganda Electricity Act of 1999 which supports rural electrification in Uganda. Uganda, the World Bank (through IDA), and bilateral donors (Norway) contribute resources to the fund, and a number of eligible activities, including the WNEP, are supported through the REF. Other bilateral donors may also contribute to the on-going rural electrification activities in Uganda.

Appendix 3. Applicability of methodologies and standardized baselines

Not applicable

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

Not applicable

Appendix 5. Further background information on monitoring plan

Not applicable

Appendix 6. Summary report of comments received from local stakeholders

Not applicable

Appendix 7. Summary of post-registration changes

No.	As per registered PDD	Changes made in PDD	Relevant sections
1	Two electricity meters have been installed on-site, one to measure gross generation and one to measure consumption at the site.	Four electricity meters have been installed - one after the generators (M1) to measure gross generation, and one at the site to measure the auxiliary consumption (M2). There is also two additional meters (M3 and M4) to measure the net electricity supplied to the mini-grid.	Refer Figure 3, section "A.3. Technologies and measures" and "B.7.1 Data and parameters to be monitored" (parameter $EG_{i,y}$, $EG_{GROSS,y}$ and EC_{AUX})
2	The net electricity supplied to the mini-grid ($EG_{i,y}$) is calculated from total gross generation ($EG_{GROSS,y}$) and auxiliary plant consumption (EC_{AUX}).	The net electricity supplied to the mini-grid ($EG_{i,y}$) is measured directly from meters M3 and M4. For cross-checking, it is compared with the value from total gross generation ($EG_{GROSS,y}$) and auxiliary plant consumption (EC_{AUX}) and conservative value considered for emission reduction calculation.	"B.7.1 Data and parameters to be monitored" (parameter $EG_{i,y}$, $EG_{GROSS,y}$ and EC_{AUX})
3	Meter calibration will be conducted as per manufacturer specifications, national standards, or international guidelines as appropriate, at least every third year	The equipment used for monitoring is controlled and calibrated in accordance with the applied methodology, board guidance, local/national standards and as per the manufacturer's specification. As an additional quality assurance measure, the readings of the gross generation obtained from the meter M1 installed after generation units minus the readings of the gross consumption obtained from the auxiliary meter (M2) will be cross-checked against the readings from the net meters (M3 and M4) for net export to ensure the difference are within ±0.5% range (due to the transformation losses between meters M3 and M4 and meters M1 and M2). If at any instance, the variations are more than ±0.5%, then the accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter. If at any instance, the variations are	Refer section "B.7.1 Data and parameters to be monitored" (parameter $EG_{i,y}$, $EG_{GROSS,y}$ and EC_{AUX})

		more than ±0.5%, then accuracy test will be conducted and the faulty meter will be re-calibrated or replaced with new meter.	

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Document information

Version	*Date*	*Description*
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).

Version	*Date*	*Description*
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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