CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

Siteki, Plumbungan, Ketenger #4 and Cileunca Small-Scale Hydroelectric Power Projects
Document version 1
25/10/2006

A.2. Description of the small-scale project activity:

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The project activity is a bundle of four small-scale CDM project activities of the same type power generation, exporting electricity to the Jawa Madura Bali grid (hereinafter referred to as the "JAMALI grid"). Each project activity within the bundle developed and operated by PT Indonesia Power (hereinafter referred to as "IP") is a run-of-river small-scale hydroelectric power generation project, which is further called a Small-Scale Hydro Power Plant (hereinafter referred to as "SSHPP").

The sum of the capacity of the small-scale CDM project activities within the bundle is 4.3 MW and is exported to the grid owned by PT. Perusahaan Listrik Negara (Persero) (herein after referred to as "PLN"), a state owned power utility company. The bundle consists of Siteki SSHPP, Plumbungan SSHPP, Ketenger #4 SSHPP, Cileunca SSHPP with an installed capacity of 1.2 MW, 1.6 MW, 0.5 MW and 1.0 MW respectively.

The project activity will contribute to climate change mitigation efforts through the reduction of Green House Gas (hereinafter referred to as "GHG") emissions in electrical energy generation. The estimated annual GHG emission reductions will be 21,139 t-CO_2 e.

The purpose of the project activity:

The purpose of the project activity is to generate electricity and export it to the JAMALI grid by using renewable hydro energy sources to meet the demand for energy in the Java, Madura, and Bali islands so that it will reduce GHG emissions produced in the JAMALI grid and support sustainable development related to energy generation.

View of project participants on the contribution of the project activity to sustainable development:

In addition to the generation of electric power, the project activity also contributes to the following:

Environment:

The project activity will utilize unused hydro potential for power generation. In the absence of the project, the grid will otherwise be dominated by power generations using fossil fuels such as coal and diesel oil. The project activity, which is a zero emission electricity generation, will eliminate GHG emission produced from fossil-based power generation. Apart from this, the project activity will cause no negative impact on the environment locally as well as globally.

Social:

The project activity will also assist in creating employment in the project area, for either skilled or unskilled labors during the construction and operation of the project.

Economy:

The development of the Siteki and Plumbungan SSHPPs in the Banjarcahyana irrigation canal will improve the condition of the canal, resulting in the upgraded supply of water to local farm land surrounding the SSHPPs. The project activity as in Siteki, Plumbungan, and Cileunca SSHPPs will upgrade road quality, particularly road access to the SSHPPs to be developed. This in turn will contribute to local economy improvement.

Technology:

The project activity will contribute to technology and capacity development, since part of equipment and technical maintenance will be provided from the host country. Such projects can further stimulate initiatives for innovation in the energy sector in the host country.
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A.3. Project participants:

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Table 1: Project participants of the CDM project activity

Name of party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the party involved wishes to be considered as project participants (Yes/No).
Indonesia (Host)	P.T. Indonesia Power	**No**
Indonesia (Host)	Center for Application and Assessment of Energy Resources Technology, Agency for the Application and Assessment of Technology (BPPT)	**No**
Japan	The Chugoku Electric Power Co., Inc.	**No**

The contact information for project participants in the project activity is provided in Annex 1 in this PDD.

A.4. Technical description of the small-scale project activity:

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A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

>>The Republic of Indonesia

A.4.1.2. Region/State/Province etc.:

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a. Siteki SSHPP, Plumbungan SSHPP, and Ketenger #4 SSHPP are located in Central Java province.
b. Cileunca SSHPP is located in West Java province.

A.4.1.3. City/Town/Community etc:

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a. Siteki SSHPP is located in Lengkong village, Rakit district, Banjarnegara regency.
b. Plumbungan SSHPP is located in Tanjunganom village, Rakit district, Banjarnegara regency.
c. Ketenger #4 SSHPP is located in Ketenger village, Baturaden district, Banyumas regency.
d. Cileunca SSHPP is located in Wanasari and Pulosari villages, Pangalengan district, Bandung regency.

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

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a. Siteki SSHPP is located in the existing Banjarcahyana irrigation canal about 5 km downstream from the Soedirman dam tailrace. It is located in Lengkong village, Rakit district, Banjarnegara regency, Central Java province. The Siteki SSHPP location is on 07°24’19.1” south latitude and 109º34’03.4” east longitude. The map of the location is presented in Figure 1.

b. The Plumbungan SSHPP is located about 1 km downstream from the Siteki SSHPP. The power plant is located in Tanjunganom village, Rakit district, Banjarnegara regency, Central Java. The plant is situated at the coordinate 07º24'42.8" south latitude and 109º34'03.6" east longitude. The physical location of site is given in Figure 1.

c. The Ketenger #4 SSHPP is located in the area of the existing Ketenger Hydro Power Plant owned by IP. It will be built 50 m downstream from the existing Ketenger #1, #2, and #3 SSHPP. The site location is administratively situated in the Ketenger village, Baturaden district, Banyumas regency, Central Java province. Geographically, the project is positioned at south latitude 07º20’02.6” and west longitude 109º13’11.2”. The map of the location is presented in Figure 1.

d. The Cileunca SSHPP is located at about 1.km on the tailrace downstream from the existing Playangan dam. The Cileunca SSHPP is situated in Warnasari and Pulosari villages, Pangalengan district, Bandung regency, West Java province. The coordinate is 7º33' south latitude and 107º55'. east longitude. The site location is given in Figure 1.

Figure 1. Map illustrating the locations of the project activity

A.4.2. Type and category(ies) and technology of the small-scale project activity:

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Type I: Renewable Energy Project

Category I.D. Grid connected renewable electricity generation.

The project activity is a bundle of four small-scale CDM project activities (bundled project activities) for a renewable energy generation project with a total capacity of 4.3 MW to be exported to the JAMALI grid. As the total capacity of the proposed project activity does not exceed the eligibility limit of 15 MW, the project activity is qualified as a small-scale CDM project activity to which UNFCCC indicative simplified modalities and procedures can be applied. Considering that the project activity is an energy generation from hydro potential and exports the power to a grid, based on the small scale CDM modalities, the project activity falls under Type I, Renewable Energy Project and Category I.D. Grid connected renewable electricity generation.

Technology of the small-scale project activity
The project activity applies run-of-river small-scale hydroelectric power generation technology, which converts mechanical energy available in the water flow into electrical energy using hydro turbines and alternators. This is a common technology for small-scale hydroelectric power generation and has widely been used throughout the world in many hydroelectric power plants for years.

An S-type turbine will be selected for the Siteki, Plumbungan, and Ketenger #4 SSHPPs in order to obtain higher energy efficiency due to the low head of these SSHPPs (below 20 m). The Cileunca SSHPP, which has a 40 m high head, will use a Francis type turbine. The development of SSHPP technology in Indonesia is very slow as demonstrated by only a small number of hydro power plants built so far. This has lead to inefficient production for the manufacturing of turbines. An imported S-type turbine from China is expected to trigger the manufacturing of this type of turbine. There is a plan to manufacture Francis type turbines by applying local technology.

Project description:
Siteki SSHPP:
The Siteki SSHPP mainly consists of an intake, headrace, a head tank, a penstock, a powerhouse, and an outlet.

Plumbungan SSHPP:
The Plumbungan SSHPP has a sand basin, a head tank, a penstock, a powerhouse, and a tailrace.

Ketenger #4 SSHPP:
The main components of the Ketenger #4 SSHPP are a headtank, a penstock, a power house, and a tailrace.

Cileunca SSHPP:
The Cileunca SSHPP mainly consists of a penstock (immersed under water and immersed in the ground outside the dam), a powerhouse, and a tailrace.

Table 2: The nominal data of each SSHPP

	Unit	**Siteki**	**Plumbungan**	**Ketenger #4**	**Cileunca**
Total installed capacity	MW	1.2	1.6	0.5	1.0
Average annual generation	MWh	7,805	10,407	3,417	6,407
Effective head	m	16.65	19.93	15.0	40.0
Flow rate	m^3/s	9.5	9.64	4.0	3.25
Number of units	-	1	1	1	2
Type of turbine	-	S-type	S-type	S-type	Horizontal Francis

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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Emissions Reductions from the project:

The project activity will use hydro potential as a renewable energy source for the generation of electricity, and export generated electricity to the nearest grid. Hence, the generation of electricity by the proposed project activity is a non-GHG source and it is expected that the proportion of fossil fuel based generation in the grid will be reduced by the project activity, leading to lesser carbon intensity in the grid.

Quantity of emissions reductions out of the project:

The emission reductions due to the project activity depend on the electricity exported to the JAMALI grid and the content of fossil fuel based generation in the grid system. Hence, the power exported to the grid in the baseline becomes the basis for estimating emission reductions. The emission reductions are estimated to be about 21,139 tonnes of CO_2 e/year.

With no introduction of electricity generation from renewable energy, the JAMALI grid now and in the future will mainly depend on the development of thermal power generation in order to meet electricity demand.

Within the next three years the installed electricity capacity in the JAMALI grid is planned to increase about 7000 MW through generations using coal. PLN, as an Indonesian power utility company, has been requested by the government of Indonesia to accelerate the addition of electricity generation capacity to about 10,000 MW within this period of time by developing Coal Fired Steam Power Plants (CFSPP), referred to in Presidential Regulation No. 71 of 2006 concerning the assignment given to PLN to accelerate the development of electricity generation using coal[1]. This CFSPP is expected to operate by mid 2009. Around 70% of coal fired power generations to be developed are located on Java Island.

In addition to the contribution of GHG emission reductions, the proposed project activity will extend the distribution capacity in the JAMALI grid as well as increase local electricity supply. Therefore, the project activity will displace the development or operation of thermal electricity generation, which in turn will result in GHG emission reductions.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

[1] (Peraturan Presiden Republik Indonesia Nomor 71 Tahun 2006 tentang penugasan kepada PT Perusahaan Listrik Negara (Persero) untuk melakukan percepatan pembangunan pembangkit tenaga listrik yang menggunakan batubara).

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The project activity will totally generate electricity of 4.3 MW, and export about 28,036 MWh to the JAMALI grid every year. All SSHPPs are expected to be operational by early 2008. Using an emission factor of 0.754 tonnes CO_2/MWh for the JAMALI grid released by the Indonesian DNA[2], the annual emission reductions of the project activity is estimated to be 21,139 tonnes of CO_2 e (Table 3). The total GHG emission reductions over the selected crediting periods (7 years) estimated from the baseline analysis is 147,974 t-CO_2 e.

Table 3: Estimation of electricity generation and emission reductions for each site SSHPP

Proposed hydropower plant	Average annual net electricity generated	Emissions factor	Annual emission reductions
	(MWh/year)	(t-CO_2/MWh)	(t-CO_2 e/year)
Siteki SSHPP	7,805	0.754	5,885
Plumbungan SSHPP	10,407	0.754	7,847
Ketenger #4 SSHPP	3,417	0.754	2,576
Cileunca SSHPP	6,407	0.754	4,831
Total	28,036		21,139

Table 4: Estimated amount of emission reductions over the chosen crediting period

Year	Annual estimation of emission reductions in tonnes of CO_2 e
2008	21,139
2009	21,139
2010	21,139
2011	21,139
2012	21,139
2013	21,139
2014	21,139
Total estimated reductions (tonnes CO_2 e)	147,974
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes CO_2 e)	21, 139

A.4.4. Public funding of the small-scale project activity:

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There is no public funding involved for the financing of the project activity. As such it will not result in a diversion of official development assistance.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

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Four small-scale hydroelectric power generation project activities are bundled as a single CDM project activity. The project proponent confirms that the proposed project activity is not a debundled component of a larger project activity. The project proponent further confirms that there are no other

[2] Indonesian DNA official letter concerning baseline emission factor for CDM projects connected to the JAMALI grid, September 12, 2006, No: B-5915/Dep.III/LH/09/06

small-scale CDM projects to be registered within 1km of the project boundary of the proposed activities.

SECTION B. Application of a baseline methodology:

B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:

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Type: TYPE I - RENEWABLE ENERGY PROJECTS

Project category title: Category I.D. Grid Connected Renewable Electricity Generation.
Reference: Appendix B of the Simplified Modalities and Procedures (hereinafter referred to as "Appendix B") for Small-Scale CDM project activities, Category I.D. taken from the document AMS-I.D., Version 9, Scope 1, 28 July 2006.

B.2 Project category applicable to the small-scale project activity:

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The project activity lies within the domain of Type I.D. as provided from Appendix B. This category comprises renewable power, such as photovoltaic, hydro, tidal/wave, wind, geothermal, and biomass, which supply electricity to an electricity distribution system displacing fossil fuel or non-renewable biomass fired generating unit. In this case the proposed project activity will utilize hydro potential as a renewable energy source for electricity generation connected to the JAMALI grid. The total capacity of the project activity is 4.3 MW. The electricity output will not exceed the eligibility limit of 15 MW for a small-scale CDM project activity.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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Justification for the application of simplified methodologies to the project activity
The total capacity of the project is only 4.3 MW, which is within the range of the qualifying maximum capacity of 15 MW for a small-scale CDM project activity to use simplified methodologies. The project activity is focused on the generation of electricity for a grid using potential hydropower sources. Moreover, the project is not debundled from large-scale projects as shown in paragraph A.4.5. Hence, the type and category of the project activity matches with Type I.D. as specified in Appendix B.

Justification for additionality of the project
UNFCCC's simplified modalities seek the establishment of the additionality of the small scale project activity as described in Attachment A to Appendix B, which lists various barriers, out of which at least one barrier due to which the project would not have occurred shall be identified. Evidence as to why the proposed project is additional is offered under the following categories of barriers: (a) investment barrier and (b) barrier due to prevailing practice.

(a). Investment Barrier
Competitiveness of the electricity selling price
> The unit cost of the project activity is higher than the unit cost of present coal fired power plants in Indonesia.
>The maximum electricity selling price is equal to 0.8 multiplied by provincial BPP (Biaya Pokok Produksi/Province-wide electricity production cost).

>The BPP in the region of Jawa-Madura-Bali approaches the electricity unit cost of a large coal-fired based power plant. The development of SSHPP is not attractive if cost competitiveness cannot be established.
>Viewing the above, the development of a small hydropower generation project in Indonesia is not attractive as a Business As Usual for investors due to the low price set in the Power Purchase Agreement (hereinafter referred to as "PPA"), with PLN as the single buyer in the Indonesian electricity business.

IRR Analysis
>The Internal Rate of Return (hereinafter referred to as "IRR") for the project activity based on the PLN purchased price of electricity is in the range of 13.90-14.64 % without taking CDM benefits into consideration (Table 5).
>This indicates that the project activity is not quite attractive for IP, owing to the statement as in the IP's Circular of Board of Directors 1999[3]. The circular of the IP's board restricts that the minimum value of IRR of the project activity should be higher than 15%, which is the value of the net certificate deposit rate of the state owned public bank plus five percent.
>In order to create higher IRR values for all four SSHPPs, IP has decided on the inclusion of a CDM scheme. The IRR of the project activity with a CDM scheme is within the range 15.03 to 15.93 % (Table 5). This is higher than the minimum IRR value set in the IP's circular statement 1999.

Table 5: Comparative financial indicators

Project	IRR without CDM revenue	IRR with CDM revenue
Siteki SSHPP	14.64%	15.93%
Plumbungan SSHPP	14.23%	15.45%
Ketenger #4 SSHPP	13.90%	15.04%
Cileunca SSHPP	13.90%	15.03%

>In a few words, it is clear that the inclusion of the CDM scheme into the project activity has increase the IRR owing to the additional revenues from the scheme. The project activity has become feasible on account of the inclusion of the CDM scheme, and this has confirmed the additionality of the CDM scheme.

Contract Period in the Power Purchase Agreement
>The source of project income by the project activity comes from electricity sales to the JAMALI grid system based on the PPA contract with PLN. In case of the project activity, the PPA for each SSHPP within the bundle will be based on an annual contract.
>In spite of a long project lifetime, an annual renewing of PPA with PLN would be required, instead of a multiple year contract.
>For this reason, a commercial bank would presumably be reluctant to approve a loan to an investor without a long-term electricity sales contract with PLN.
>The annual contract of a PPA will raise uncertainty and risk for a long-term project. In general, investors of a SSHPP would take more than 10 years to recoup a sound initial investment.
>Therefore, the risk associated with the contract period in PPA has also hindered the possibility of hydroelectric power project realization in Indonesia.

<u>**(b) Barrier due to prevailing practice**</u>

[3] PT PLN Pembangkitan Tenaga Listrik Jawa Bali I Edaran Direksi No 0014.E/012/PJB I/1999 tentang Kriteria Kelayakan Pengembangan Usaha/Proyek Ditinjau dari Aspek Keuangan (Circular of Board of Directors 1999)

>According to RUPTL 2006-2015 of PLN (Rencana Umum Pengusahaan Tenaga Listrik/General Electricity Supply Plan), the additional capacity of power generation for the JAMALI grid is focused on large scale electricity generations.
>Thermal power plants are predominant in Indonesia's power sector, which is supported by the availability of fossil fuel (particularly coal) and the vast experience with this technology. The lack of experience in the private sector in the development of small-scale hydroelectric power projects has made such projects an uncommon practice.
>Out of the existing SSHPPs potential in Indonesia of about 500 MW, up to now, only a total capacity of 84 MW[4] has been developed.
>Until now (2006), there are only eleven operated small-scale hydroelectric power plants bound with PPA in Indonesia, by IPP.
>Most small-scale hydro projects connected to the JAMALI grid were developed by KUD (Koperasi Unit Desa/Village Cooperative Unit) to which grants and the Indonesian government fund were given.
>This indicates that the development of SSHPPs is not attractive from a business point of view, and that the private financing of SSHPPs is not a common practice in Indonesia.

Conclusion
Viewing from the above, the proposed project is additional and is not the same as the baseline scenario.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

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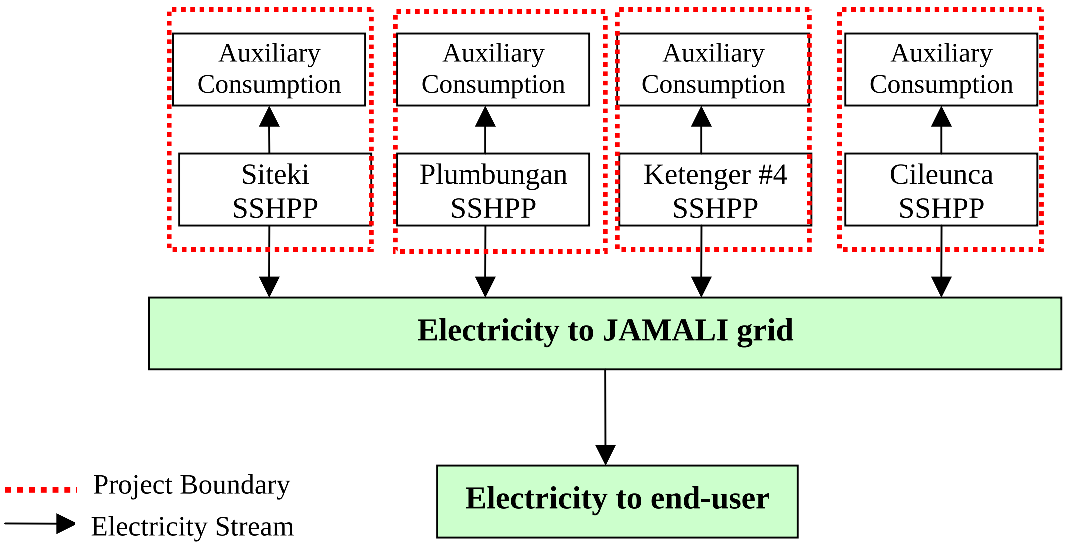
Project boundary specified in Type I.D. in Appendix B encompasses the physical, geographical site of renewable generation source. For the project activity under consideration, the project boundary considered encompasses SSHPPs facilities such as a diversion structure, penstock, powerhouse, and tailrace canal.



[4] Ratna Ariati, DGEEU (Directorate General Electricity and Energy Utilization):"Renewable Energy in Indonesia: Policies and Regulations", Symposium of Renewable Energy, June 2006)

Figure 2: Project Boundary

B.5. Details of the baseline and its development:

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According to Appendix B, there are two options that can be applied in the selected project category.

The latest version of the methodologies for small-scale CDM projects, Version 9, 28 July 2006, offers two options for calculating baseline emissions of Category I.D. projects. The baseline for this project has been estimated according to these methodologies. As a result, the baseline is the power generation by small hydropower plants multiplied by an emission coefficient (measured in $kgCO_2/kWh$) calculated in a transparent and conservative manner as follows:

The procedures to calculate the emission factor for the JAMALI grid follows the procedures conducted in the calculation of the national number released by the Indonesian DNA.

The Baseline Emission Factor is calculated as a combined margin (CM), consisting of the combination of Operating Margin (OM) and Build Margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

In the calculation of the emission factor, the average OM has been selected among the available four methods for the following reason[2].

1. The data for the Dispatch Data Analysis Emission Factor is not available to the public.
2. "Low-Cost and Must-Run" sources produce more than 50% of the total JAMALI grid generated electricity in each of the previous five years for which data is available (2000-2004).

The Average OM method is adopted for the Calculation of Operating Margin emission factor using the most recent 3 years (2002-2004).

Calculation of the Build Margin emission factor in year y, $EF_{BM,y}$ *ex-ante* is based on the most recent information available on the power plant capacity additions in the electricity system that comprises 20% of the system generation (in MWh) and that have been built most recently at the time of PDD submission.

Calculation of the baseline emission factor in year y, EF_y is the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$).

The baseline emissions are calculated by multiplying the Baseline emission factor calculated as above by the amount of electricity generation exported to the JAMALI Grid. The emission reduction (ER_y) by the project activity in year *y* is the difference between the baseline emissions (BE_y) in year y, project emissions (PE_y) in year y and emissions due to leakage (L_y) in year y.

Date for completing the final draft of this baseline section *(DD/MM/YYYY)*
25/10/2006

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SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

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C.1.1. Starting date of the small-scale project activity:

>>01-02-2007

C.1.2. Expected operational lifetime of the small-scale project activity:

>>
25y-0m

C.2. Choice of crediting period and related information:

>>

C.2.1. Renewable crediting period:

>>
7 years

C.2.1.1. Starting date of the first crediting period:

>>
01-01-2008

C.2.1.2. Length of the first crediting period:

>>7y-0m

C.2.2. Fixed crediting period:

>>
Not applicable

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Application of a monitoring methodology and plan:

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D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

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The approved monitoring methodology for renewable electricity generation for a grid is described following Appendix B of the simplified M&P for CDM small-scale project activities (Reference: amended version 09 (in effect on 28 July 2006) of Appendix B to the simplified M&P for Small-scale CDM project activities).“Monitoring shall consist of metering the electricity generated by renewable technology.”

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

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The proposed project activity is the renewable generation of energy by using hydro potential and, the export of electricity to the JAMALI grid system, which is supplied by containing fossil fuel sources. The project is a small-scale project activity, with a capacity less than 15 MW, since its total output is only 4.3MW. The proposed project activity is of Type I.D., as the plant will export the electricity to the existing grid. Thus, the monitoring methodology of AMS-I.D. is applicable to the proposed project activity.

D.3 Data to be monitored:

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The following data is to be monitored to ascertain project emission and emission reductions.

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For How long is archived data to be kept ?	Comment
D.3.1	Electricity from Siteki SSHPP	Electricity Generated	*kWh*	**m**	Daily	100%	Electronic and Paper	During the crediting period and two years after	Meter is regularly calibrated by Certification Service
D.3.2	Electricity from Plumbungan SSHPP	Electricity Generated	*kWh*	**m**	Daily	100%	Electronic and Paper	During the crediting period and two years after	Meter is regularly calibrated by Certification
D.3.3	Electricity from Ketenger #4 SSHPP	Electricity Generated	*kWh*	**m**	Daily	100%	Electronic and Paper	During the crediting period and two years after	Meter is regularly calibrated by Certification Service
D.3.4	Electricity from Cileunca SSHPP	Electricity Generated	*kWh*	**m**	Daily	100%	Electronic and Paper	During the crediting period and two years after	Meter is regularly calibrated by Certification Service

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

The metering data of each SSHPP will be continuously measured using a kWh-meter installed just before the connection point to the grid. The meters will be calibrated at installation and re-calibrated every two years by a Certification Service (Jasa Sertifikasi) that is an affiliate of PLN, and the calibration will be conducted according to PLN standards. Hence, the quality control and quality assurance procedures are already completed.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

Based on the Standard Operational Procedure (SOP) of IP, the operator of the shift will record generation production displayed in kWh meter, twice a day, and the shift engineer will verify these records.

The daily report of the kWh value \of net electricity generation will be summarized by the IP operator and verified by the supervisor every 1st day of the month.

Siteki, Plumbungan, Ketenger, and Cileunca Hydro Power Sub units are in charge of metering for project activity. The monitoring report will be submitted to the IP Business & Commerce Department through each Business Unit . The Business & Commerce Department is responsible for the verification of the monitoring.

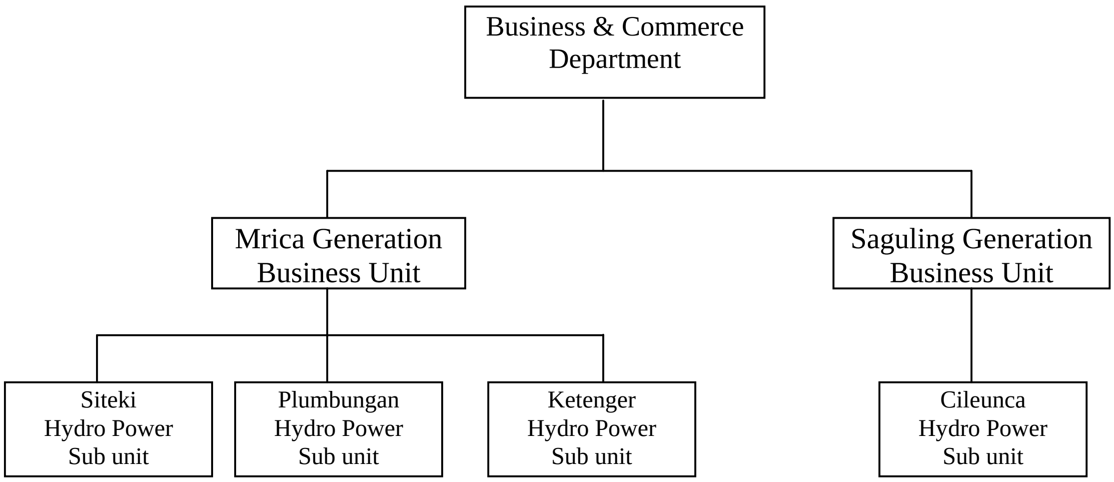

Figure 3 : Structure Organization for Monitoring

In order to maintain and upgrade the ability and skill of operators, training related to electrical engineering and operation of power generation will be performed.

The monitoring of each project activity within the bundle will be executed with the same methods and system. The result of the monitoring will be summarized in one report.

Leakage is not being considered in this project activity

D.6. Name of person/entity determining the monitoring methodology:

>>

Name of person/entity determining the monitoring methodology:

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SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>
No formulas are provided in Appendix B to calculate the GHG emission reductions by source.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>
No formulas are used. Emissions by sources are zero since the project activity is a zero emissions renewable power project.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>
This is not applicable as the renewable energy technology used is not equipment transferred from another activity. Therefore, as per the Simplified Procedures for Small Scale CDM Project Activities, no leakage calculation is required.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>>
The sum of the project emission as per E.1.2.1 and E.1.2.2 is zero.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>
As per AMS-I.D, the baseline emissions are calculated by multiplying the net electricity generation in the project activity by the baseline emission factor for the project grid.

The baseline emissions:
$BE_y\,(t\text{-}CO_2\ e/year) = EG_y * EF_y$

Where,
BE_y is the baseline emissions (t-CO_2 e) in year y; EG_y is the average of historical electricity (MWh) delivered by the existing facility to the grid in year y; and EF_y is the emission factor (t-CO_2 e/MWh) as the

weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$) in year *y*.

Each parameter is calculated through Step 1 to 4 as follows:

Step 1. Determining the operating margin emission factor
The Average Operating Margin emission factor ($EF_{OM,y}$) is calculated using the following equation:

$$EF_{OM,average,y}(tCO_2/MWh) = \frac{\sum_{i,j} F_{i,j,y} \bullet COEF_{i,j}}{\sum_j GEN_{j,y}} \quad \text{……………………(1)}$$

Where,
$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in years *y* (2002-2004). *j* refers to the power sources delivering electricity to the grid, including low-operating cost and must run power plants. $COEF_{i,j}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j*. $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j* in year *y*.

Based on the data from Indonesian DNA, $EF_{OM,\ average,\ y}$ is 0.688 t-CO_2 e/MWh

Step 2. Calculating the build margin emission factor
The Build Margin emission factor ($EF_{BM,y}$) is calculated using the following equation:

$$EF_{BM,y}(tCO_2/MWh) = \frac{\sum_{i,m} F_{i,m,y} \bullet COEF_{i,m}}{\sum_m GEN_{m,y}} \quad \text{……………………..….(2)}$$

Where,
$F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above for plants *m*.

Based on data from Indonesian DNA, $EF_{BM,\ y}$ is 0.820 t-CO_2 e/MWh

Step 3. Calculating the baseline emission factor (combined margin emission factor)

$EF_y = w_{OM}\, EF_{OM,y} + w_{BM}\, EF_{BM,y}$……………………………...………..(3)

where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$).

EF_y = 0.754 t-CO_2 e/MWh

Step 4, Calculating baseline emissions
Baseline emissions are calculated as follows:

$BE_y\ (t\text{-}CO_2\ e/year) = EG_y * EF_y$…………………………............…………..(4)

Where,

EG_y = 28,036 MWh/year
EF_y = 0.754 t-CO_2 e/MWh
BE_y (t-CO_2 e/year) =21,139 t-CO_2 e/year

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>
PE_y=0 and L_y=0, ER_y=BE_y,

CO_2 emission reduction due to project activity = 21,139 t-CO_2 e/year

E.2 Table providing values obtained when applying formulae above:

>>

Table 6: Estimation of GHG emission reduction for each SSHPP

Item	Unit	Siteki SSHPP	Plumbungan SSHPP	Ketenger #4 SSHPP	Cileunca SSHPP	Four SSHPPs
$EF_{OM,average,y}$	(t-CO_2 e/MWh)	0.688	0.688	0.688	0.688	0.688
$EF_{BM,y}$	(t-CO_2 e /MWh)	0.820	0.820	0.820	0.820	0.820
EF_y	(t-CO_2 e /MWh)	0.754	0.754	0.754	0.754	0.754
EG_y	MWh/year	7,805	10,407	3,417	6,407	28,036
BE_y	(t-CO_2 e /year)	5,885	7,847	2,576	4,831	21,139
PE_y	(t-CO_2 e /year)	0	0	0	0	0
L_y	(t-CO_2 e /year)	0	0	0	0	0
ER_y	(t-CO_2 e /year)	5,885	7,847	2,576	4,831	21,139

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

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As per the decree of the Minister of the Environment (MENLH No.17, 2001) of the Republic of Indonesia, an “Environmental Impact Assessment (hereinafter referred to as “AMDAL”)” is not required for a small hydroelectric power project whose capacity is less than 50 MW. Since the capacities of Siteki, Plumbungan, Ketenger #4, and Cileunca SSHPPs are 1.2 MW, 1.6 MW, 0.5 MW, and 1 MW respectively, these SSHPPs require no AMDAL. Instead, a submission of “The Environmental Management Procedure and the Environmental Monitoring Procedure” (hereinafter referred to as “UKL/UPL”) is required by MENLH No.17 (2001).

The UKL/UPKLs of all SSHPPs have already been submitted by IP, and the permissions for developing power plants by the local government have already been granted.

In the case of the Siteki and Plumbungan SSHPPs, there is no water utilization between the intake of the forebay and the tailrace, such as for channeling to farmland or for daily use by the local population. Accordingly, the utilization of water for the SSHPP would have no negative impact on the irrigation system in the canal. The water flow in the canal will still be maintained to preserve the ecosystem in the canal.

In the Ketenger #4 SSHPP, the water stream that is utilized to generate the electricity flows from the outlet of the tailrace of the existing Ketenger #1, #2, and #3 SSHPPs. The water is channeled back to the waterway and then goes to the river. There is no indication of negative impact due to the development of this SSHPP.

In the case of the Cileunca SSHPP, part of the outlet water stream from the Playangan dam flowing to the Playangan river is channeled into a water immersed penstock in the dam and a ground immersed penstock outside the dam, and thereafter directly flows through a turbine. The water stream in the river will still be maintained to preserve the ecosystem in the river. The water exiting the turbine is discharged back to the river. There are no public activities through the utilization of river water, between the outlet stream of the dam and the tailrace of the SSHPP. In view of that, there would be no negative impact through the utilization of the river water for the project activity.

The scale of the proposed project activity is small. Between the intake and tailrace of the SSHPPs there is no water utilization, so that the environmental impact related to the project activity is negligible. After being used for power generation, the water is returned to a canal or river. In brief, the project activity will not result in a significant impact to the environment.

SECTION G. Stakeholders' comments:

G.1. Brief description of how comments by local stakeholders have been invited and compiled:

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The stakeholders of this CDM project activity development constitutes the government and non-government parties of the Republic of Indonesia, such as local populations and the local government, who are either indirectly or directly involved in different roles in different stages in the project activity. All the necessary permits from the government parties have been obtained.

Indonesia Power had organized stakeholders' consultation with the villagers surrounding Siteki SSHPP, Plumbungan SSHPP, Ketenger #4 SSHPP, and Cileunca SSHPP, to inform related stakeholders on the environmental and social impacts of the project activity and to discuss their concerns (anxiety) regarding the development of the project activity. Invitations to the stakeholders' consultation meeting were sent out to the villagers, local communities, and local state governments in the SSHPPs regions, requesting their participation and any suggestions/objections regarding the project activity. The stakesholder's meetings were held on the following dates:

1. 15 November 2005 at Tanjung Anom village, Rakit District, Banjarnegara Regency for the Siteki and Plumbungan SSHPPs projects.
2. 26 September 2006 at Ketenger village, Baturaden District, Banyumas Regency for the Ketenger #4 SSHPP project.
3. 28 September 2006 at Wanasari and Pulosari villages, Pangalengan District, Bandung Regency for the Cileunca SSHPP project.

In addition, an interview was conducted with the Serayu-Citanduy Water Resources Management Agency in Purwokerto (hereinafter referred to as "BPSDA Serayu-Citanduy in Purwokerto"), as the authorized irrigation canal owner. IP has received written approval from the elected local government authorities (or

Bupati/Regent/officer in charge of a regency) representing local communities. In terms of applicable regulations, the developer must obtain approval from the Regent prior to starting the construction of any project (including small hydropower plant projects).

The details of the approval results will be available upon validation request.

G.2. Summary of the comments received:

>>

Generally, the agenda of the meeting for all four SSHPPs within the bundle was set as follows:

1. Registration
2. Introduction and welcome address
3. Description of the project activity, CDM, Environmental and Social issues
4. Discussion (question and answer session)
5. Reading the draft minutes of the meeting, and signing of the minutes of meeting.

<u>The summary of the stakeholders' comments for Siteki and Plumbungan SSHPPs is presented as follows:</u>

1. Generally, local villagers support the development of the Siteki and Plumbungan SSHPPs, and they expect that the development of the project activity could be implemented soon.
2. The Siteki and Plumbungan SSHPPs will contribute to an increase of the economic level of the villagers through the presence of economic activities during the development of the project activity.
3. The development of the Siteki and Plumbungan SSHPP will encourage the development of the area around the SSHPP sites, which will make the sites cleaner, safer/ more secure and well arranged.
4. The Siteki and Plumbungan SSHPPs will have no influence on water use for fishery and agriculture.

The interviews with BPSDA Serayu-Citanduy in Purwokerto have resulted in favorable comments.

<u>The summary of the stakeholders'comments regarding Ketenger #4 SSHPP is as follows :</u>

1. IP introduced a brief and the purpose of the meeting, the benefits of the hydropower project, and the increase in employment opportunities for the local villagers owing to the manpower required in the development of the project activity.
2. Generally, local villagers support the development of Ketenger #4 SSHPP because this would give direct as well as indirect benefits to the local community.
3. The development of the project activity will be implemented according to the prevailing regulations.

<u>The summary of the stakeholders' comment for Cileunca SSHPP :</u>

1. IP introduced a brief and the purpose of the meeting, the benefits of the hydropower project, and the increase in employment opportunities for the local villagers owing to the manpower required in the development of the project activity.
2. Generally, local villagers support the development of Cileunca SSHPP because this would give direct as well as indirect benefits to the local community.

3. This project activity will not disturb land ownership in the local community or rafting activity on the Playangan River.
4. The development of the project activity will be implemented according to the prevailing regulations.
5. Recruitment of man power will be coordinated with head of the villages of Wanasari and Pulosari.

G.3. Report on how due account was taken of any comments received:

>>

There were no negative comments received during the consultation and interviews, which were recorded and signed by the stakeholders.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NOT APPLICABLE

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