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

CONTENTS

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

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

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Siteki and Plumbungan Hydroelectric Power Project in Indonesia

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

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The Siteki and Plumbungan Hydroelectric Power Project (hereinafter referred to as "the Siteki and Plumbungan project" consists of two small run-of-river hydroelectric projects located in the Banjarnegara regency area, Central Java Province of the Republic of Indonesia. The projects is made up of two power plants that are located 1 km from one another and will utilize the water flowing in the Banjarcahyana Irrigation channel, which is come from the existing Sudirman dam. Together these projects will have a total installed capacity of 2.8MW (Siteki with 1.2MW and Plumbungan with 1.6MW) and an estimated annual generation of 18.63GWh. The objective of the project is to generate electricity and sell it to the grid of the Java-Bali system that is operated by PLN (Persero) Penyaluran Dan Pusat Pengatur Beban Jawa Bali (hereinafter referred to as "P3B"), which is the Java-Bali transmission company and a subsidiary of PT.PLN (Persero) (hereinafter referred to as "PLN"), Indonesian electricity state-owned enterprise. The duration of the Power Purchase Agreement (hereinafter referred to as "PPA") with PLN is to be 1 year. The PPA will be extended every year. The irrigation is controlled by the Banjarnegara Public Works Office Irrigation Branch.

PT. Indonesia Power (hereinafter referred to as "PT.IP"), one of the subsidiaries of PLN in the power generation sector, is the owner and developer of the Siteki and Plumbungan project. In order to avoid unnecessary construction costs, both projects will begin at almost the same time. For this reason the two are being developed as one CDM activity.

Development of the Siteki and Plumbungan project will directly reduce greenhouse gas emissions produced by thermal energy using fossil fuels that are currently in operation in the Java-Bali grid in Indonesia. With an average annual generation of 18.63GWh, the Project will reduce emissions by 14,587 tons of CO_2 per year.

The purpose of the project is to generate electricity by using the renewable hydraulic resources to meet the increasing regional and national demand in the Java-Bali grid system. Furthermore, the project aims to contribute to reduce heavy oil consumption on electric power generation owned by the Indonesian electricity state owned enterprise, PLN. the sustainable socio-economic development of the country and reduce the dependence on fossil fuels that currently dominate the energy composition of the national grid.

Since the Indonesian government implemented biggest reduction of fuel subsidy on October 1, 2005, the use of heavy oil as a fuel in power generation has become unprofitable. Therefore, to decrease financial loss in power generation fuelled by heavy oil, PT.IP has reduced the time of operation and they have accelerated proved changing the fuel in existing power generations fuelled by heavy oil. The change is promoted as one from heavy oil to natural gas. By utilizing renewable energy potentials for electric power generation, PT.IP plans to decrease a use of heavy oil fuel. PT.IP is the largest heavy oil consumer, after the Indonesian transportation sector. The latter makes up 20% of the total Indonesian heavy oil consumption, and PT.IP consumes 17%. Fossil fuel contributes to about 94% of primary energy consumption in Indonesia (Indonesia 2000, Energy Outlook and Statistics). The project will contribute to

the use of sustainable renewable energy sources in the electricity generation system. The Indonesian's government supports the use of environmentally sound renewable energy sources. In addition to providing renewable energy, the project activity will have an additional contribution to Indonesian's sustainable development. PT.IP will implement various community and environmental projects to benefit the surrounding community. Direct benefits from the project to the local community include: digging work and concrete placement during the construction phase; improvement of the local road across the irrigation canal; increased funding for local education.

A.3. Project participants:

>>

PT. Indonesia Power (PT.IP)

PT.IP is an owner and developer of the Siteki and Plumbungan project. The company manages and operates eight Generation Business Units in Java Island: Priok, Suralaya, Saguling, Kamojang, Mrica, Semarang, Perak and Grati, and Bali. As a whole, the company has dependable generating capacity of 8,327 MW. The company privatizes equally among environmental protection, development of the citizen, maximum security, highly qualified product, and optimum commercial efficiency. Those activities reflect its attention to the future. The company also continuously tries to make use of new environmentally sound energy to reduce oil consumption.

The Chugoku Electric Power Co., Inc. (hereinafter referred to as "Chugoku EPCO")

Chugoku EPOCO is a private company in the Chugoku region which is located in west part of the Honshu Island of Japan. The main business actions of the company are generation, transmission, and distribution of electric power. The company focuses on specific themes, including response to global and regional environmental problems, conserving resources and recycling, and developing and adopting new technologies.

Center for Application and Assessment of Energy Resources Technology, Agency for the Application and Assessment of Technology (P3TPSE-BPPT) in Indonesia

P3TPSE-BPPT is a department of Indonesian government which implements the CDM project in Indonesia.

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):

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Republic of Indonesia

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

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Banjarnegara Regency, Province of Central Java

A.4.1.3. City/Town/Community etc:

>>

Rakit sub-District

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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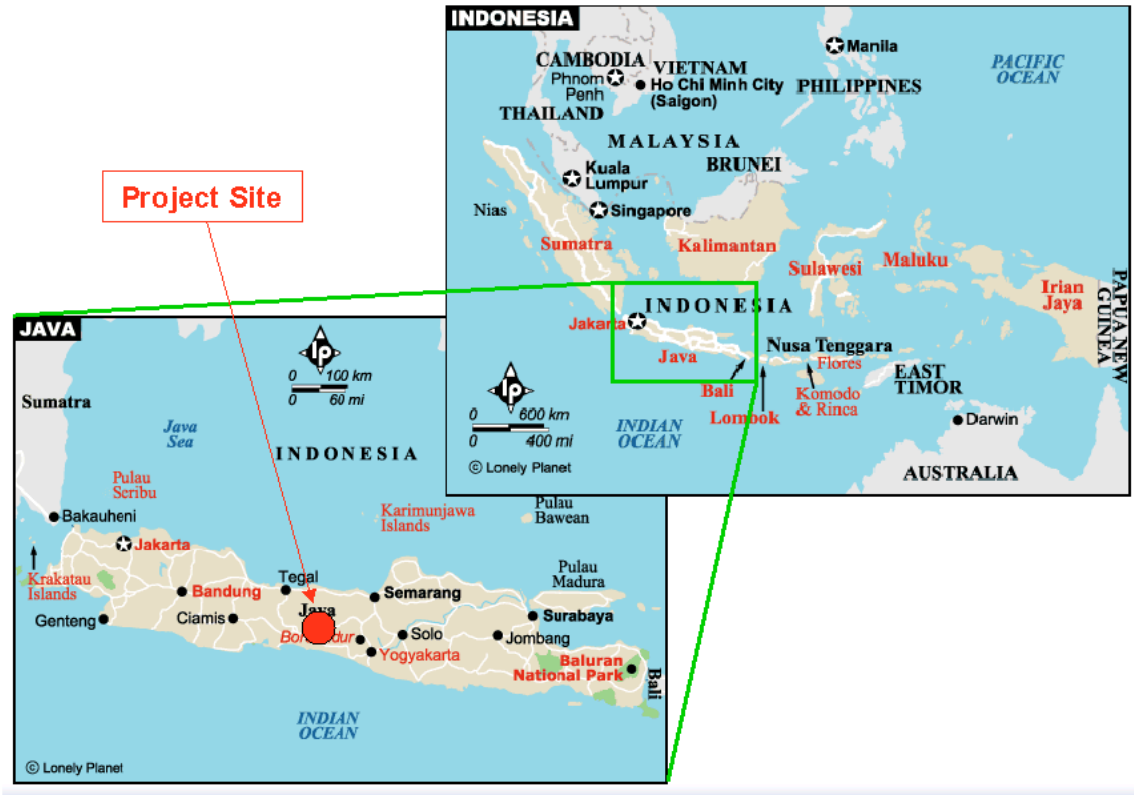
Both Siteki hydropower plant and Plumbungan hydropower plant are located on the Banjarcahyana Irrigation Channel, which is located on the boundary between Tanjunganom Village on the west side and Kincang Village on the east side. Both villages are in Rakit sub-District, Banjarnegara Regency, Province of Central Java, Republic of Indonesia. The location map is shown in the following.

Coordinates of the site:

The powerhouse of Siteki: 7° 24' 19.1" South, 104° 34' 03.4" East.
The power house of Plumbungan: 07º24'42.8" South, 109º34'03.6" East



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

>>

Type: TYPE I - RENEWABLE ENERGY PROJECTS (hereinafter referred to as "Type I")
Category: *I.D. 'Grid Connected renewable electricity generation'* (hereinafter referred to as "*Type I.D.*")

The Siteki and Plumbungan project conforms to the *Type I.D.* of the small-scale project since the nominal installed capacity of the project is below the 15MW thresholds and the plant will evacuate the generated electricity to the existing grid system owned by PLN.

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 resource for electricity generation that will be connected to the Java-Bali grid system. Hence, the generation by the proposed project activity is non-GHG source and it is expected hydropower 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:

Emission reductions due to the project activity mainly depend on the energy exported to the Java-Bali grid system 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.

Project description:

Siteki Project:

The Siteki project mainly consists of an intake (width= 5.5m and height= 4.73m), headrace (length= 13m, width= 5.5m, height= 4.73m), a head tank (length= approx.35m, width= 10m and height= 3.7m), a penstock (length=35m and inner diameter= 2.2m), a powerhouse (length=10.5m, width=10m) and outlet.

Nominal Data for the Siteki Projects:

Installed Capacity: 1.2MW
Average annual generation: 6,967MWh
Maximum Discharge: 9.00CMS
Effective head: 16.65m
Number of units: 1 Kaplan S-type Turbines
Power line: 20kV, 3phases, 4.3km (from the P/H to the Mrica sub station)

Plumbungan Project:

The Plumbungan project mainly consists of a sand basin (length= 46.6m, width= 18m and height= 2.59m), a head tank (length= 7.2m and height= 5.9m), a penstock (length=75m and inner diameter= 2.0m), a powerhouse (length=13m, width=12m) and tailrace (length= 26m and width= 5.0m).

Nominal Data for the Plumbungan Project:

Installed Capacity: 1.6MW
Average annual generation: 11,662MWh
Effective head: 19.93m
Number of units: 1 Kaplan S-type Turbines
Power line: 20kV, 3phases, 1.0km (from the P/H to the P/H of Siteki)

Nominal Data for the Siteki and Plumbungan Projects:

Installed Capacity: 2.8MW
Average annual generation: 18,629MWh (18.63GWh)
Number of units: 2 Kaplan S-type Turbines (1 for each power station)
Power line: 20kV, 3phases, 5.3km (from the P/H of the Plumbungan to the Mrica sub station)

Less environmental Impacts:

Both power stations divert the irrigation canal and the water is drained back to the same canal immediately downstream the cascades. Hence, the impact to the water environment is estimated to be little. Moreover, transmission lines will be installed next to the irrigation canal and the existing roads. The places where facilities will be installed are located in developed zone, and the involuntary resettlement will not be occurred. Therefore, the adverse affects to natural environment and the social surroundings are estimated to be extremely small.

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

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The project activity will generate 2.8MW and export about 18.63GWh every year. Considering the present energy mix in the grid system, it is estimated that about 14,587 tons of CO_2 will be reduced every year. The total GHG emission reductions over one crediting period (7 years) estimated from the baseline analysis are 102,109tons of CO_2.

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

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There is no public funding involved in financing this 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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The two small-scale activities are being presented as a CDM project. The total installed capacity of the projects is still under 15MW, therefore the project is classified as small-scale. Based on the information provided in Annex C, this project is not a debundled component of a larger project activity since the project participants do not have a registered small-scale CDM project activity or an application to register another small-scale CDM project activity in the region surrounding the project site.

SECTION B. Application of a baseline methodology:

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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
Category: *I.D. 'Grid Connected renewable electricity generation'*

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 of simplified modalities and procedures for small-scale CDM project activities (hereinafter referred to as "Appendix B"). This category comprises renewables such as photovoltaics, 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 project will utilize hydro potential as a renewable energy resource for electricity generation that will be connected to the Java-Bali grid system. The total installed capacity is 2.8 MW. The electricity output will not exceed the limit of 15 MW for small-scale CDM project.

The choice of baseline calculation is based on Appendix B, which contains two options to be applied to this project.

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as:

(a) The average of the "approximate operating margin" and the "build margin", where:

(i) The "approximate operating margin" is the weighted average emissions (in kgCO2equ/kWh) of all generating sources serving the system excluding hydro, geothermal, wind, low-cost biomass, nuclear, and solar generation;

(ii) The "build margin" is the weighted average emissions (in kg-CO_2eq/kWh) of recent capacity additions to the system, defined as the lower of most recent 20% of plants built or the 5 most recent plants;

OR

(b) The weighted average emissions (in kgCO2equ/kWh) of the current generation mix

From a conservative viewpoint, the value of the approximate emission coefficient is determined by the lowest value obtained between "the average operating margin and the build margin" and "the weighted average emissions" of the current generation mix.

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 application of simplified methodologies to the project activity

The capacity of the project is only 2.8 MW, which is less than the qualifying capacity of 15 MW to use simplified methodologies. Furthermore, the project activity is concerned with generation of electricity for a grid system using potential waterpower. Moreover, the project is not debundled from large-scale projects as shown in A4.5.

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 to establishment of additionality of the project activity as described in Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way. Project participants identified the following barriers for the proposed project activity.

Investment Barrier

The project activity already faced investment barriers because there are other perceived investment risks for investment in the project activity as described below.

Cost competitiveness: The development of small hydropower generation in Indonesia is not attractive for investors due to the low tariff set in the PPA with PLN as a single buyer in Indonesian electricity business. The investment cost based on rated output of this project is US$1,000/MW. Viewing from the perspective of investment cost, nevertheless, the small hydro power generation project has a higher investment cost per MW compared to that of coal fired power plant US$700/kW, which is currently

being developed in Indonesia. Hence, the investment in the project is not attractive in comparison with that to a coal fired power plant.

PPA condition: There is no tariff regulation or incentive for renewable energy power generation with a capacity more than 1 MW. Therefore, this condition makes the tariff of the renewable energy power generation compete to large-scale fossil fuel power generation. In order to decide the reliable tariff, negotiation with PLN is necessary.

The source of income resulted from the project activities comes from electricity sales to the Java-Bali grid system based on the PPA contract with PLN. Considering the generation capacity of each project and PLN regulation, every single year PPA contract with PLN is required, instead of a multiple year sell/buy contract. For similar reasons, a commercial bank would presumably be reluctant to approve a loan to an investor without a long-term electricity sales contract with PLN.

Annual contract will raise uncertainty and risk for a long-term project. Hence, in view of an income for a long-term project, the element of uncertainty needs to be taken into consideration. As to small hydropower developments, it takes over 10 years for investors to recoup the initial investment.

Hence, it is said that the PPA condition risk also hinders the possibility of hydropower project realization in Indonesia.

Cost Efficiency: The interest rate has increased to around 18%since the subsidy for heavy oil was reduced on October 1 2005. PT.IP has several negotiations with PLN to decide selling/buying price of electricity. The IRR of The Siteki project is 11.5% and that of the Plumbungan project is 11.9% with the price offered by PLN. As the IRRs of both projects become lower than the interest rate, the project is not feasible to implement. Although, with the latest offered tariff, the IRR improved 12.3% and 12.5% respectively, the project is not attractive enough yet.

In order to increase the IRRs of both projects more, PT.IP decided to utilize CDM scheme. The calculation results show that the IRR for the Siteki and Plumbungan project improve to 13.7% by taking US$5/t-$CO_2$ of CER revenue (21 years) into consideration. The values are not high, but overcome the lowest development criteria.

The above-mentioned paragraphs clearly explain that the project activities have various disadvantages and risks from economic perspective. This would become barriers for on investment in the proposed project if the project scheme should be BAU.

Technological Barrier

From previous studies, the predominant and known technology is thermal and all experience is oriented to that sector. The lack of available knowledge and confidence in the technology involved in small, privately built hydroelectric projects makes this type of development non-existent and difficult to establish. As a result, the government and banks assume that thermal has less risk. Such kind of risk is reflected in the fact that a few of the current hydro capacity represent small hydro plants (below 15 MW). With an aggressive schedule for future expansion of thermal power capacity, small-scale hydropower will continue to be a marginal technology with low market potential levels, unless CDM revenues enable small hydro development participants to take on the higher risks associated with investing in small-scale hydro plants.

Other Barriers

According to the latest Indonesia's power development plan (RUKN2000), renovation of the fossil power projects and construction of a large-scale pumped storage facility are planned in the Java-Bali grid. As is the case with Indonesian power sectors, the common practice is to invest only in medium or large scale fossil fuel fired power projects, which is evident from a host that comprises mostly large-scale

fossil fuel based power generation projects. This is mainly due to the assured return of investment, economy of scale and easy finances.

According to the latest published report, the total installed capacity of small hydropower projects (with the capacity of 3MW or lower) is only 10.61MW (7sites), whereas the total capacity of the power stations is around 1,948.54MW (75sites). This shows a very small share of 0.5% from small hydropower sector in the Java-Bali grid. As to the small hydropower projects in the grid, no projects in the middle of an irrigation canal are in operation and the latest one was developed over 10 years ago.
In the Banjarcahyana Irrigation Canal, only one small hydropower plant named Tapen (with the capacity of 750kW, dam type) is in operation as intake facilities of the canal. Furthermore, there are no small run-of-river type plants exist on the canal. As a result, the small hydropower project (run-of-river type) is not a common practice and would not become the norm within the hydroelectric sector.

Additionality
In the view of the above, the proposed project activity is additional and not the same as the baseline scenario, which is clearly oriented to favour large-scale thermal power investments combined with a limited number of large-scale, publicly managed hydropower investments.

Summary
The above evidence clearly shows that the CDM revenues were seriously taken into consideration at the project planning stage.

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 the renewable generation source. For the project activity under consideration, the project boundary considered encompasses the diversion structure, a head tank, a penstock, a powerhouse, a power evacuation system and a tailrace canal.

The system boundary for the proposed project is defined as the Java-Bali grid. The project boundary for the baseline includes all the direct emissions, and the emissions related to the electricity produced by the facilities and power plants to be replaced by the Siteki and Plumbungan project.

Conforming to the guidance and rules for the small-scale CDM project activities, the emissions related to production, transport and distribution of the fuel used for the power plants in the baseline are not included in the project boundary as these do not occur at the physical and geographical site of the project.

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

>>
As explained in Section B.2, the project activity is the generation of electricity system with using renewable energy for a grid, which is served electricity by other fossils and non-fossil fuels Hence, the applicable baseline methodology for the proposed project activity is described in the Clause 7 of *Type I.D.* in Appendix B, which describes that the baseline is the kWh produced by the renewable generating unit multiplied by an emission co-efficient (measured in $kgCO_2equ/kWh$).

Date of completing the final draft of this baseline section (DD/MM/YYYY):
31/12/2005

Name of person/entity determining the baseline:
The contact information of the persons/entities determining the baseline is given below.

Organization:	Center for Application and Assessment of Energy Resources Technology, Agency for the Application and Assessment of Technology
Street/P.O.Box, Building:	Jl. M.H. Thanrin no. 8
City:	Jakarta
State/Region:	Jakarta
Postfix/ZIP:	1340
Country:	INDONESIA
Telephone:	+62 (21) 3169724/3169701
FAX:	+62 (21) 3169736
E-Mail:	irhan@bandung.wasantara.net.id
URL:	http://www.bppt.co.id/
Represented by:	
Title:	Researcher
Salutation:	Dr.
Last Name:	Febijanto
First Name:	IRHAN

Organization:	The Chugoku Electric Power Co., Inc.
Street/P.O.Box, Building:	4-33, Komachi, Naka-ku
City:	Hiroshima
State/Region:	Hiroshima Prefecture
Postfix/ZIP:	730-8701
Country:	JAPAN
Telephone:	+81 (82) 523-6361
FAX:	+81 (82) 523-6367
E-Mail:	262802@pnet.energia.co.jp
URL:	http://www.energia.co.jp/
Represented by:	
Title:	Staff Assistant Manager
Salutation:	Dr.
Last Name:	Akira
First Name:	IRIE

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

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

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

>>

01-01-2008

The construction of the Siteki and Plumbungan project is scheduled to start on August 1, 2006.

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

>>

30y-0m

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

>>

The project activity will use C.2.1, a renewable crediting period.

C.2.1. Renewable crediting period:

>>

7 years for each crediting period, renewed 2 times

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:

>>

N/A

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

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:

>>

The reference to the proposed monitoring methodology is Clause 9 of *Type I.D.* in Appendix B

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

>>

The project activity is generation of electricity using hydro potential and evacuation of electricity to the existing grid system that is fed by other fossil and non-fossil sources. The project is a small project activity since the total output is 2.8MW and is not debundled. The type is *Type I.D.* since the plant will evacuate the electricity to the existing grid.

According to the Clause 9 of *TYPE I.D.* in Appendix B, the electricity generated by a technology should be monitored in case that the project activity utilizes renewable energy. Since the Siteki and Plumbungan project utilizes the hydropower technology categorized in the renewable energy and the project with run-of-river hydroelectric scheme identifies no leakage, all the data to be monitored in this project is the energy generated by the project.

D.3 Data to be monitored:

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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 achived data to be kept	Comment
1	*Power exported by the Siteki, $E_{\_S}$*		*kWh*	*M*	*Daily*	*Full (100% during the month)*	*Paper (Only sales records can be verified)*	*4 years after verification*	
2	*Power exported by the Plumbungan project, $E_{\_P}$*		*kWh*						

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

>>

The data will be continuously measured using a kWh-meter installed at each power plant. The meters will be calibrated every year by the Agency for Electricity Problems (hereinafter refer to "LMK") which is one of the affiliates of PLN, 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:

>>

The data measured by kW-meter installed just before the connection point to the grid will be transferred to the existing control office of PT.IP The office has already been established in the Seodirman hydropower plant to operate existing hydropower plants. Five operators in the office monitor continuously and record the value which is displayed on the indication system every hour. The recorded data will be recorded in a daily report and approved by an operator supervisor (SPS. OPR). The daily reports will be summarized in every-three-month-report, and they will be signed by both PT.IP and PLN. The monitoring will be executed with the same methods and system. The leakages for monitoring do not exist.

The report is considered to be creditable enough for the monitoring because the report will be used for the payment for the sold electricity from PT.IP to PLN, and the office has already been certificated by ISO9001.

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

>>

The contact information of the persons/entities determining the monitoring methodology is given below.

Organization:	The Chugoku Electric Power Co., Inc.
Street/P.O.Box, Building:	4-33, Komachi, Naka-ku
City:	Hiroshima
State/Region:	Hiroshima Prefecture
Postfix/ZIP:	730-8701
Country:	JAPAN
Telephone:	+81 (82) 523-6361
FAX:	+81 (82) 523-6367
E-Mail:	262802@pnet.energia.co.jp
URL:	http://www.energia.co.jp/
Represented by:	
Title:	Engineer
Salutation:	Dr.
Last Name:	Akira
First Name:	IRIE

SECTION E.: Estimation of GHG emissions by sources:

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E.1. Formulae used:

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E.1.1 Selected formulae as provided in appendix B:

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No formulas are provided for the baseline for the Clause 7 of Appendix B.

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

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N/A

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:

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No formulas are used. Emissions by sources are zero since hydroelectric power is a CO_2-neutral source of energy.

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 SSC 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:

>>

Zero Emissions

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:

>>

Total emissions, E, is given by;

$$<E>(t\text{-}CO_2eq/yr) = \Sigma E_{i,j}(t\text{-}CO_2eq/yr) \quad \text{[Equation 1]}$$

Where, $E_{i,j}$ = CO_2emissions per year of the generation type i with fuel type j, calculated as followings:

The average of the "approximate operating margin" and "build margin"

Approximate operating margin

(i) For PT.IP, PT.PJB, PLN,

$$E_{j\_k}(t\text{-}CO_2eq/yr) = FC_{j\_k}(TJ/yr) * CEF_j(t\text{-}C/TJ) * \{FCO_j(\%)/100\} * CC(t\text{-}CO_2eq/t\text{-}C) \quad \text{[Equation 2]}$$

(ii) For IPP (IPP does not publish its fuel consumption, so the consumption is estimated from the power

generation)

E_{j_k} (t-CO_2eq/yr) = PG_{j_k} (MWh/yr) / {PE_j (%)/100} * CEF_j (t-C/TJ) * {FCO_j (%)/100} * CC (t-CO_2eq /t-C) [Equation 3]

Where,

k = power supply group, such as PT.IP, PT.PJB, PLN, IPPs

FC_{j_k} = annual consumption of fuel type j by a power supply group k

CEF_j = carbon emission factor of fuel type j

FCO_j = fraction of carbon oxidized of fuel type j

CC = carbon content conversion factor 44/12 t C to t-CO_2eq

PG_{i_k} = electricity generation with fuel type j by a power supply group k

PE_i = plant efficiency of fuel type j

Approximate operating margin, $<E_{\_OM}>$, representing the emission intensity, is given by:

$<E_{\_OM}>$ (t-CO_2eq/MWh) = $\Sigma_{(k)}[\Sigma_{(j)}[E_{j\_k}$ (t-CO_2eq/yr)] / [[1-{$PSC_{\_k}$ (%)/100}]* $\Sigma_{(j)}$ [PG_{j_k} (MWh/yr)]]] [Equation 4]

Where,

k = power supply group, such as PT.IP, PT.PJB, PLN, IPPs

E_{j_k} is given by [Equation 2] or [Equation 3]

$PSC_{\_k}$ = average percentage of self consumption to power generation of a power supply group k

PG_{j_k} = electricity generation of fuel type j by power supply group k

Build Margin

E_{i,j_k} (t-CO_2eq/yr) = PC_{i,j_k} (MW) * {CF_{i,j_k} (%)/100} *8,760 (h/yr) * UCC (TJ/MWh) / {PE_j (%)/100}* CEF_j (t-C/TJ) * {FCO_j (%)/100} * CC (t-CO_2eq /t-C) [Equation 5]

Where,

PC_{i,j_k} = capacity of power plant type i with fuel type j by power supply group k

CF_{i,j_k} = capacity factor of power plant type i with fuel type j by power supply group k

UCC = unit conversion efficient 0.00366(TJ/MWh)

PE_i = plant efficiency of fuel type j

CEF_j = carbon emission factor of fuel type j

FCO_j = fraction of carbon oxidized of fuel type j

CC = carbon content conversion factor 44/12 t C to t-CO_2eq

Build margins, $<E_{\_BM5}>$ and $<E_{\_BM20\%}>$, representing the emission intensity, are given by:

(i) The average of 5 most recent plants

$<E_{\_BM5}>$ (t-CO_2eq/MWh) = $\Sigma_{(5)}[E_{i,j\_k}$ (t-CO_2eq/yr)] / $\Sigma_{(5)}$ [{1-PSC_{i,j_k} (%)/100}* PG_{i,j_k} (MWh/yr)] [Equation 6]

(ii) The average of the greater (in MWh) of the most recent 20% of existing plants

$<E_{\_BM20\%}>$ (t-CO_2eq/MWh) = $\Sigma_{(20\%)}[E_{i,j\_k}$ (t-CO_2eq/yr)] / $\Sigma_{(20\%)}$[{1-PSC_{i,j_k} (%)/100}* PG_{i,j_k} (MWh/yr)] [Equation 7]

In [Equation 6] and [Equation 7], PG_{i,j_k} = PC_{i,j_k}(MW) * {CF_{i,j_k} (%)/100} *8,760

Where,

E_{i,j_k} is given by [Equation 5]

PSC_{i,j_k} = average percentage of self consumption to power generation of power plant type j by power supply group k

PG_{i,j_k} = electricity generation with fuel type j by a power supply group k

PC_{i,j_k} = capacity of power plant type i with fuel type j by power supply group k

CF_{i,j_k} = capacity factor of power plant type i with fuel type j by power supply group k

The build margin, $<E_{\_BM}>$, is thus obtained as:

$<E_{\_BM}>$ (t-CO_2eq/MWh) = min. {$<E_{\_BM5}>$ (t-CO_2eq/MWh), $<E_{\_BM20\%}>$ (t-CO_2eq/MWh)} [Equation 8]

The emission intensity coefficient, $<E_{\_OB}>$, is thus obtained as:

$<E_{\_OB}>$(t-CO_2eq/MWh) = {$<E_{\_OM}>$ (t-CO_2eq/MWh) + {$<E_{\_BM}>$ (t-CO_2eq/MWh)} / 2 [Equation 9]

Weighted average emission

Weighted operating margin, $<E_{\_WA}>$, representing the emission intensity, is given by:

$$<E_{\_WA}> (t\text{-}CO_2eq/MWh) = \Sigma_{(k)}[\Sigma_{(j)}\{E_{j\_k} (t\text{-}CO_2eq/yr)\} / [[1-\{PSC_{\_k} (\%)/100\}]* \Sigma_{(j)} \{PG_{j\_k} (MWh/yr)\}]] \quad \text{[Equation 10]}$$

Where,

E_{j_k} is given by [Equation 2] or; [Equation 3]

k = power supply group, such as PT.IP, PT.PJB, PLN, IPPs

$PSC_{\_k}$ = average percentage of self consumption to power generation of power supply group k

PG_{i_k} = electricity generation with fuel type j by a power supply group k

Although it is necessary for the consumption of each power plant to estimate build margin, it is not published by the owner of each plant. However, the capacity can be clearly estimated with the published information. Therefore, emission is estimated by using Equation-5. In Equation-5, capacity factor (CF) and plant efficiency (PE) are necessary to calculate emissions. The both CF and PE of each power plant are unavailable at the same time. CF and PE of PT.IP by fuel types are available at the same time, and therefore are adopted for the calculation of the amount of quantity of emission of all the power plants. Regarding PSC, the average value of each power supply group is used, because fuel consumption of each power plant is known but self-consumption is not available in published information. As for the PSC, the most conservative value is adopted for the calculation of the approximate operating margin.

The emission intensity coefficient

The emission intensity coefficient, $<E_{\_baseline}>$, is thus obtained as:

$$<E>_{baseline} (t\text{-}CO_2eq/MWh) = \min. \{<E_{\_OM}> (t\text{-}CO_2eq/MWh) + <E_{\_WA}> (t\text{-}CO_2eq/MWh)\} *[1-\{PSC_{\_IP,\,h} (\%)/100\}] \quad \text{[Equation 11]}$$

Where,

$<E_{\_OM}>$ and $<E_{\_WA}>$ are given by [Equation 9] and [Equation 11] respectively.

$PSC_{\_IP,\,h}$ = average percentage of self consumption to power generation of hydropower plant PT.IP

The GHG emission reduction

Finally, emissions reduced by the Siteki and Plumbungan project, E, are given by:

$$E (t\text{-}CO_2eq/yr) = <E>_{baseline} (t\text{-}CO_2eq/MWh) * SPCG(MWh/yr) * [1-\{PSC_{\_IP,\,h} (\%)/100\}] \quad \text{[Equation 12]}$$

Where,

SPCG = Siteki and Plumbungan s electricity generation.

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:

>>

Emission reductions are achieved from Equation 12 in section E.1.2.4. Emission reductions of the project activity are
0.783t-CO_2/MWh * 18,629MWh/y = 14,587t-CO_2eq/y

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

>>
Based on Siteki and Plumbungan s assumptions and findings in the feasibility study, the installed capacity will be 2.8 MW. The project has annual electricity generation of 18,629MWh. Based on the above formulas and collected data, the baseline is determined as follows:

Approximate operating margin:
$<E_{\_OM}>$ = 0.899 (t-CO_2/MWh)

Build margin:
$<E_{\_BM}>$ = 0.855 (t-CO_2/MWh)

Average of "approximate operating margin" and "build margin"
$<E_{\_OB}>$ = ($<E_{\_OM}>$ + $<E_{\_BM}>$)/ 2
= (0.899 + 0.855) / 2 = 0.877t-CO_2/MWh

Weighted average emissions:
$<E_{\_WB}>$ = 0.783t-CO_2/MWh

Therefore, the baseline emissions are for the conservative viewpoint:
$<E>_{baseline}$ = $<E_{\_WB}>$ = 0.783t-CO_2/MWh

SECTION F.: Environmental impacts:

>>

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

>>
As per the decree of Ministry of Environment (MENLH No.17, 2001) of Republic of Indonesia, "Environmental Impact Assessment (hereinafter referred to as AMDAL)" is not required for a small hydroelectric project whose capacity is less than 50MW. Since SITEKI's and PLUMBUNGAN's capacity are 1.2 MW and 1.6MW respectively, these projects do not call for the AMDAL.

Instead, the submission of "The Environmental Management Activity Plan and The Environmental Monitoring Activity Plan" (hereinafter referred to as UKL/UPL) is required by the MELH No.17(2001). The UKL/UKL for both projects have already been submitted by PT.IP, and permissions for developing power plants by a local government have already been granted. (SITEKI; No.660.1/3455, dated July 7, 2003, PLUMBUNGAN; 660.1/297, dated December 2004).

The scale of these projects is very small, and they utilize existing developed irrigation channels, and these don't create any reservoir, so environmental impacts are negligible. Moreover, after being used for power generation, water returns to the original canal.

Hence, in conclusion, these projects do not result in significant impacts to the environment of the region.

SECTION G. Stakeholders' comments:

>>

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

>>

The MELH No.17, 2001 requires the comment of the residents and officials around the project site should be attached to the UKL/UPL. As to the Siteki and Plumbungan project, requirements from the local stakeholders were received. UKL/UPL has already been granted. However the signed documents do not exist. Therefore, the project proponents held a consultation. Following process was used to obtain comments from stakeholders.

1. It was established how many public groups exist.
2. Political leaders were invited for opinion interviews.
3. The stakeholder consultation was conducted and the opinions to the development were received. Leaders from each of the following groups were invited to participate in the consultation:
   (1) Head of district
   (2) Head of military
   (3) Head of police district
   (4) Head of village (Tanjunganom, Lengkong)
   (5) Village house of representatives
   (6) Village board of representatives
   (7) Representatives of the residents
   (8) Representatives of youth organizations
   (9) Land owner around the projects

In addition, the interview from Serayu-Citanduy Water Resources Management Agency at Purowokerto (hereinafter referred to as "BPSDA Serayu-Citanduy di Purwokerto"), the irrigation owner, was conducted. As to the NGO which has contributed for establishment of the CDM system in Indonesia, the interviews were conducted to ask for opinions regarding if the project is suitable for the Indonesia.

G.2. Summary of the comments received:

>>

UKL/UPLs of Siteki and Plumbungan, respectively, were granted by a local government. According to the UKL/UPLs of Siteki and Plumbungan, negative comments were not received from the stakeholders.

In the stakeholder consultation which was held by the project participants prior to the development, no negative comments were received. The requirements are summarized as followings:

(1) Generally local villages support the development of the Siteki and Plumbungan prject and they hope that the development could be implemented soon.
(2) The Siteki and Plumbungan project will contribute to the increase of the economic level of the villages by the presence of economic activities.
(3) The development of the Siteki and Plumbungan project will encourage the development of the area around the sites, which will make the site cleaner, safer, more secure and orderly..
(4) The Siteki and Plumbungan project will have no influence to the water used for fishery and agriculture.

, Only the favorable comments were received in the interviews of the NGO and BPSDA Serayu-Citanduy di Purwokerto .

As above-mentioned, the NGO and the majority of community leaders were neutral with regards to the project.

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

>>

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	PT. Indonesia Power
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NOT APPLICABLE

CLEAN DEVELOPMENT MECHANISM
FORM FOR SUBMISSION OF BUNDLED SMALL SCALE PROJECT ACTIVITIES
(SSC-CDM-BUNDLE)

SECTION A. General description of the Bundle

>>

A.1. Title of the Bundle:

>>

The bundle for Siteki and Plumbungan Hydroelectric Power Project

A.2. Version and Date:

>>

F-CDM-SSC-BUNDLE (Version 02), unknown (PDD: F-CDM-SSC-PDD (Version 02), 8 July 2005)

A.3. Description of the Bundle and the subbundles:

>>

	Type	Category	Technology/Measure
Siteki Hydropower Project	Type I.	I.D.	Renewable energy
Plumbungan Hydropower Project	Type I.	I.D.	Renewable energy

A.4. Project participants:

>>

Name of Party involved	Private/ or public entity(ies) project participants
Republic of Indonesia (host)	● PT. Indonesia Power ● Center for Application and Assessment of Energy Resources Technology, Agency for the Application and Assessment of Technology (P3TPSE-BPPT) in Indonesia
Japan	● The Chugoku Electric Power CO., Inc.

SECTION B. Technical description of the Bundle:

>>

B.1. Location of the Bundle:

>>

B.1.1. Host Party(ies):

>>

Republic of Indonesia

B.1.2. Region/State/Province etc.:

>>

Banjarnegara Regency, Province of Central Java

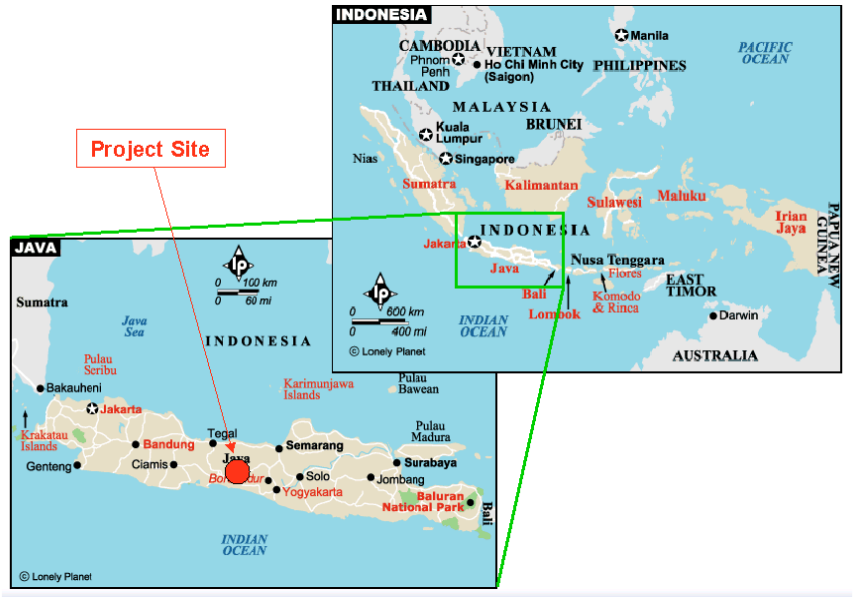
B.1.3. City/Town/Community etc:

>>
Rakit sub-District

B.1.4. Details of physical location, including information allowing the unique identification of this Bundle:

>>
Both Siteki hydropower plant and Plumbungan hydropower plant are located on the Banjarchayana Irrigation Channel, which is located on the boundary between Tanjunganom Village on the west side and Kincang Village on the east side. Both villages are in Rakit sub-District, Banjarnegara Regency, Province of Central Java, Republic of Indonesia. The location map is shown in the following. The distance between these hydropower plants is about 1km.

Coordinates of the site:
The powerhouse of Siteki: 7° 24’ 19.1" South, 104° 34’ 03.4" East.
The power house of Plumbungan: 07º24'42.8" South, 109º34'03.6" East



B.2. Type(s), category(ies) and technology/(ies)/Measure/(s) of the bundle:

>>
Type: Type (i): provide proof that the capacity of the proposed project activity will not increase beyond 15MW
Categories *Type I.D.* (*I.D: ‘Grid connected renewable electricity generation’*)
Technology: Renewable energy

The output of the Siteki hydropower plant is 1.2MW and the Plumbungan hydropower plant is 1.6MW. Hence, the total installed capacity of the Siteki and Plumbungan project is 2.8MW. It will not exceed the limit of 15 MW for small scale CDM project over crediting period.

B.3 Estimated amount of emission reductions over the chosen crediting period:

>>

Years	Annual estimation of emission reduction in tonnes of CO_2 e
2008	14,587
2009	14,587
2010	14,587
2011	14,587
2012	14,587
2013	14,587
2014	14,587
Total	102,109

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

>>

C.1. Duration of the Bundle

>>

21y-0m

C.1.1. Starting date of the Bundle:

>>

01-01-2008

C.2.1. Renewable crediting period:

>>

7 years for each crediting period, renewed 2 times

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:

>>

N/A

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

SECTION D. Application of a monitoring methodology:

>>

Two of the project activities (Siteki and Plumbungan) belong to the same type, same category and technology. Monitoring is realized by metering kWh of the both projects respectively as shown in the Appendix B to the simplified modalities and procedures for small –sale CDM project activities. The record paper is summarized in a document.

Annex 1

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

CONTENTS

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:

>>

Six sites of Mini-hydropower development project at Banjarnegara irrigation canal in Central Java, Indonesia.

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

>>

The main activity of the project is generation of electricity using hydro potential available at Tanjunganom Suburb, Rakit District, Banjarnegara Regency in Central Java. The project sites are situated lined in Banjarnegara irrigation canal in the west of Mrica dam and Banjarnegara city. The water sources are coming from irrigation canal known as Saluran Banjarcahyana.

The project consists of six small-scale cascade type and/or run-of-river hydroelectric projects named ***1.Kincang1, 2.Kinchang2, 3.Adipasir1, 4.Adipasir2, 5.Adipasir3 and 6.Rakit2***, which are made up of desilting basin, fore bay and powerhouse located on the left/right bank of canal cascade respectively. The six plants represent six distinct investment projects at different locations. The rationale for grouping of the projects in one PDD is based on the fact one company will build, own and operate all of facilities. Together these projects will have a total installed capacity of 1.36MW and an estimated annual generation of 9.931GWh/y.

The objective of the project is to generate power and sell it to the national grid owned by government owned power utility PT.Pambanghit Listrik Negara (hereinafter referred to as PT.PLN), through standard PPA (Power Purchase Agreement) contract in accordance with the Electricity Law. The payment is based on actual electricity generated by the small-scale hydropower plants and does not include a capacity charge. Currently, the marginal thermal power plants are operated by fuel oil, diesel and gas, and the share of thermal power in Java and Bali is expected to increase dramatically over the coming years. The small hydropower projects do not figure in national power development plan, nor are they factored into the annual power supply-demand forecasts. Operation of these small-scale hydropower plants will result in a displacement of power from the highest marginal cost thermal power plants.

The applicant entity of the Project is associated with PT. Indonesia Power (hereinafter referred to as PT.IP) and the Chugoku Electric Power Company Inc. (hereinafter referred to as CEPC). PT.IP is the owner and developer of the project and the other party CEPC is project proponent. As a result of contractual requirements of the energy buy/sell contract with PT. PLN, and in order to avoid unnecessary construction costs, six projects will be implemented at the same time. For this reason the Project is developed as one CDM activity.

Applying the simplified methodologies specified for small-scale projects, development of the project will directly reduce greenhouse gas emissions produced by thermal energy using fossil fuels that are currently in operation in Java and Bali, Indonesia. With an average annual generation of 10.3GWh, the project will reduce emissions by 7,776tons of CO2e per year. This figure is based on the energy weighted average emissions of grid-connected thermal power plants operating as of 2003.

The main purpose of the Project activity is to generate electrical energy through sustainable means without causing any negative impact on the environment and to contribute to climate change mitigation effects.

Apart from the generation of electricity, the project also contributes to the following.

a) Sustainable development, through utilization of renewable hydro resources available in the project region
b) Rural development due to the location of the project being in rural area
c) Capacity addition to the present installed capacity and increase in the energy availability
d) Generation of additional employment

View of the Project participants, the Project activity contributes to sustainable development.

a) The project activity results in alleviation of poverty by generating direct and indirect employment during the construction of the project as well as during operation. The project created indirect employment opportunities for about 20 persons during the construction amounting to about 4,500 man days and resulted in an investment of around $30,000 during the construction period as salaries/wages for construction workers, mostly rural poor people, otherwise would not have happened in the absence of the project. In addition, the project created direct permanent employment for about 5 persons for 30 years operation period of the plants. This brings an investment of around $90,000 per year towards salaries/ wages.

b) The project is implemented in a rural area, which is not having proper bridge across irrigation canal and other infrastructure facilities. The project developer will construct bridges and other infrastructure facilities in the village as a part of the project construction.

c) The project developer mobilises an additional investment to the region. The project developer will invest in the project about USD 4.5M$, otherwise would not have happened in the absence of the project. This is a very significant investment in an underdeveloped area.

d) More and more rural industries will be set up and new opportunities for development will be created as a consequence to the hydroelectric project in the area. This will result in infrastructure development, which ultimately lead to the rural development and prevent the migration of poor rural people to cities.

   The above benefits due to the project activity ensure that the project would contribute to the social and economic well being in the region.

e) Since the project utilises hydro potential available in the irrigation canal for power generation, otherwise, is dominated by fossil fuels, coal and gas, the project will not result in raise of GHG emissions and cause no negative impact on the environment. Further, the project does not result in to degradation of any natural resources, health standards, etc. at the project area. Hence, the project contributes to the environmental well being.

f) The project will result in utilisation of environmentally safe and sound technologies in small-scale hydroelectric power. Further, the project demonstrates harnessing hydro potential in the irrigation canal and encourages setting up such new projects in future.

g) Since the project feeds the generated power to the nearest PT.IP substation, energy availability and quality of the power improves the rural poor significantly under the service area of the substation. In fact, the service area of the substation is facing power shortages, and project activity will mitigate the power shortage situation to some extent. Hence, the project leads to the technologically well being. Namely, the purpose of the project is to generate electricity by using the renewable hydraulic resources of the area to meet the increasing regional and national demand for power. Furthermore, the project aims to contribute to the sustainable socio-economic development of the country and reduce the dependence on imported fossil fuels and gases that currently dominate the energy composition of the national grid.

In addition to construction and operation of hydropower project, the project will implement various community and environmental projects to benefit the surrounding community. Direct benefits from the project to the local community include at least 30 jobs during the construction phase, improvement of the local bridge/road, increased funding for local education, improvement of the water supply etc. The project will result in the following indirect benefits: electrification of local communities, water availability and opportunity for additional job creation.

In view of the above, proposed project activity strongly contributes to the sustainable development.

A.3. Project participants:

>>

a) Project owner and developer: PT. Indonesia Power (PT.IP)

PT. Indonesia Power
A Subcidiary of PT.PLN(Persero)
Jl. Jenderal Gatot Subroto Kav.18
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PT.IP is a subsidiary company of PT. PLN undertaken by Indonesian government. It manages and operates eights generation units in Java island (Priok, Suralaya, Saguling, Kamojang, Mrica, Semarang, Perak and Grati) and one generation unit in Bali. It has dependable generation capacity of 8,327MW, and puts her priority equally on environmental protection, development of energy security, qualified power production and optimum commercial efficiency, and utilization of renewable energy due to diminish of fossil fuel resources.

b) Project proponent: The Chugoku Electric Power Company Inc.(CEPC)

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CEPC is a private power utility which is located in the west part of the Honsyus island via an integrated operating structure comprising power generation, transmission and distribution. It provides total generating capacity of 12,205MW which is composed of hydropower with 2,899MW, thermal power with 8,025MW and nuclear power with 1,280MW respectively, and generates power of 58.1 MMwh/y as of 2004.

With global warming at the forefront of world attention as known GHG, CEPC takes broad efforts to tackle such environmental issues. As a provider and supplier of electricity it is closely connected to environmental issues, and it has taken decisive steps to take the environment issues in its management to safeguard the environment. As society requires greater environmental efforts from its management, it will continue to pursue environmental management harnessing further reduce the environmental impacts from its operation, and otherwise does not contribute to the creation of a sustainable society. Therefore, one of the top management priorities of CEPC is taking action on environment issues. To prevent global warning, CEPC is taking various measures including promotion of nuclear power generation, fuel conversion of oil and coal thermal plant to LNG, utilization of renewable energy, a forestation in Australia, eco-office activity such as reduction and effective utilization of waste, cutting electricity consumption for lightening and air-conditioning, adopting new technologies for power transmission/ distribution and environmental education activities etc.

It also is one of its measures to participate in Carbon Funds (Prototype Carbon Fund, Japan GHG Reduction Fund and Greenhouse Gas-Credit Aggregation Pool) in the field of carbon markets to address the global warming issues. It is expecting that not only will it obtain certified emission reduction to assist us in meeting our business target, but also that it will also be able to contribute to sustainable development and to expand power produce/supply in our business market.

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

>>

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

>>

A.4.1.1. Host Party(ies):

>>

Republic of Indonesia

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

>>

Banjarnegara Regency, Province of Central Java

A.4.1.3. City/Town/Community etc:

>>

Rakit sub-District

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

>>

The projects are located in irrigation canal known as Saluran Banjarcahyana. Along with irrigation canal there are several water cascades such as Siteki, Pulmungan, Kinchag, Adipasir and Rakit etc. This irrigation canal is also boundary of between Tanjunganom Village on the left and Kincang Village on the right. Both villages are in Rakit sub-District, Banjarnegara Regency, Province of Central Java.

The number of customer registered at PT.IP Banjarnegara is about 95,000 with total energy consumption of 91Gwh as of 2003. Average growth of power demand is about 5% per year. Electricity generated by the project will be integrated with Java-Bali grid through 3-phase 20kv feeder parallel with existing 3-

phase 20kv Express Feeder toward Mrica Sub-station located in Lengkong Village. 20kv Express Feeder between Tapen powerstation and Mrica sub-station is SUTM 3×70qmm^2, therefore it is possible to integrate power from Tapen and the project simultaneously. At present, Mrica sub-station has a capacity of 20/150kv transformer, and it has enough capacity for the receiving of power from the project.

The town of Banjarnegara has all other civic amenities such as accommodation, communication, markets, schools, banks, hospitals and public transport facilities etc. The physical location of the project is marked in the maps (Fig.1 shows location of Java and Bali in Indonesia and Fig.2 shows the Projects sites in Banjarnegara) given below. Table.A1 shows salient feature of the project as below.

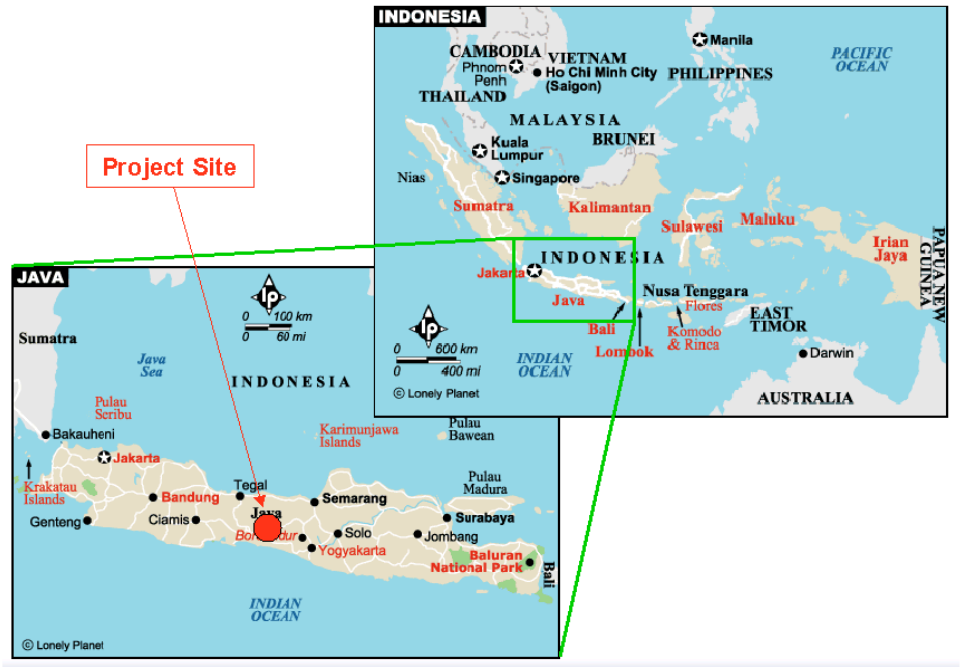

Fig.Al. The location of Java and Bali in Indonesia

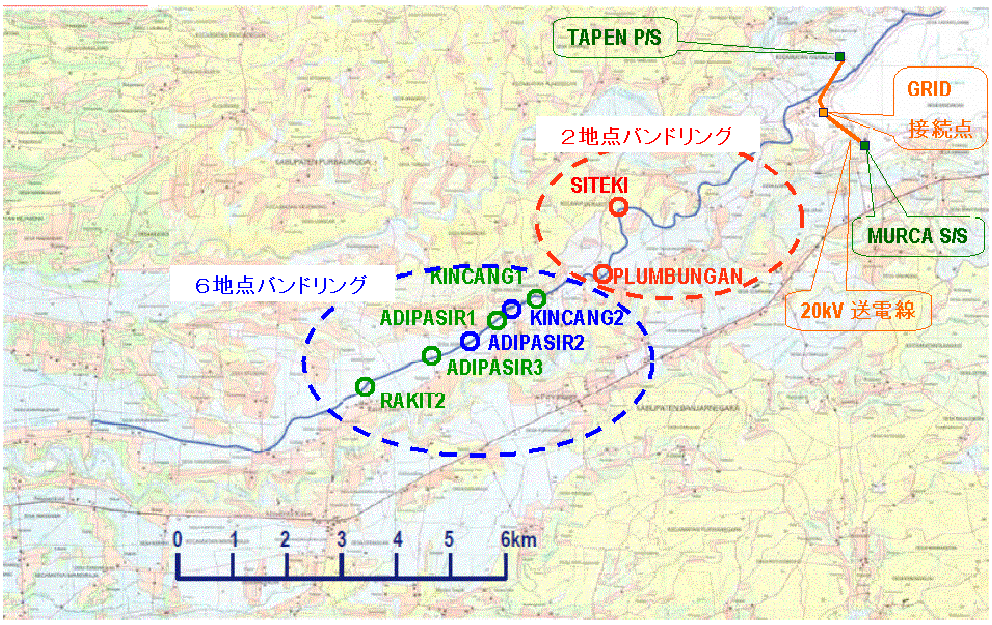

Fig.A2. The projects sites in Banjarnegara

Table.A1 The salient feature of the project

No	Name of project	Type of design	Maximum Plant discharge(m^3/sec)	Maximum installed capacity(kW)	Annual energy output(GWh/y)
1	Kincang1	Cascade	5.90	205	1.530
2	Kinchang2	Cascade	6.10	229	1.704
3	Adipasir1	Cascade	6.20	234	1.714
4	Adipasir2	Cascade	5.60	176	1.311
5	Adipasir3	Cascade	6.20	261	1.910
6	Rakit2	Cascade	6.20	250	1.762
Total				9.90	9.931

The access to the project sites is through the state road from Banyumas to Wonosobo. At the junction to PB Soedirman Dam (just beforehand of Joho village) which is located about 9 km west from Banjarnegara, it takes a turn to the north. Via Muntuk village, Tapen Krajan village, Lengkong village, then it is with a left turn just beforehand of Badamita village to Kincang village.

The project sites are located in right-hand along the road. The distance from the first junction to site of Kincang1, which is located the most upstream in the project, is about 10Km.

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

>>

(Type and Category)

The capacity of the proposed project is only a sum of 1.36MW, which is less than the qualifying capacity of 15MW, therefore the project activity could be regarded as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures could be applied.

The project activity utilizes the hydropower potential for power generation and transmits the generated power to the grid. According to small-scale CDM modalities and procedures the project activity falls under Type-1-Renewable Energy Projects and Category 1-D Renewable Electricity Generation for a grid.

(Technology)

The technology and power generation process using hydro resources are converting the potential energy available in the water cascade from mechanical energy using hydro turbine and then into electrical energy using alternator. The generated power will be transformed to match the nearest grid sub-station for proper interconnection and smooth evacuation of power.

The powerhouse comprises of asynchronous generator coupled to Tubular-type turbine. The generated voltage at the generator terminals will be 6.6 kV, which will be stepped-up to 20kv to match the nearest substation voltage level.

(Technology transfer)

No technology transfer from other countries is involved in the project.

The category for the project activity according to the UNFCCC's published simplified procedures for small-scale activities is Type 1D Renewable Electricity Generation for a Grid. The project conforms to the project category since the nominal installed capacity of the project is below 15 MW thresholds and

the plant will sell its generated electricity to PT.PLN undertaken by government under its Power Purchase Agreement (PPA).

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:

>>

(Emission reductions from the project)

The proposed project generates electricity using hydro potential and transmits the net generated power to the national grid system. Hence, the generation by the proposed project activity is 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 emission reductions out of the project)

Emission reductions due to the project activity mainly depend on the energy supply to the grid, and the generation mix in the baseline region becomes the basis for estimating emissions reductions.

The thermal energy plants use fossil fuels that are currently in operation in Indonesia. Under the business as usual scenario, there would be continuing growth in fossil fuels based electricity generation and large scale hydropower projects. The installed capacity of the project is 1.36MW, which evacuates electricity about 9.931Gwh every year. Considering the present energy mix in the grid system, it is estimated that about 7,776 tons of CO_2 will be avoided every year.

The project shall be commissioned recently during July and August 2008. Hence, the project activity will start generating emission reductions from the August 2008.

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

>>

Annual emission reduction is estimated to be 9,352 tCO2e/y, and chosen crediting period is 7 years. Hence, the estimated amount of GHG emission reductions over the chosen crediting period is 54,432 tCO_2e.

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

>>

Total funding required for the project is around USD 2.8M$ which will be mobilised through debt financing and equity capital. Debt portion, which is around 85% of the total investment, was funded by not included any public funding from Annex I countries.

Hence, the project proponent hereby confirms that public funding from parties included in Annex-I is not involved in the project activity.

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

>>

The project proponent hereby confirms together with project developer/owner that the proposed project activity is not a de-bundled component of a larger project activity. The six projects activities are being presented as one CDM project activity. The total installed capacity of the six projects with 1.36MW is

still under 15 MW, therefore the project qualifies as small-scale CDM. The project proponent further confirms that they have not registered any small scale CDM activity or applied to register another small-scale CDM project activity within the same project boundary, in the same project category and technology/measure.

SECTION B. Application of a baseline methodology:

>>

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

>>

Title of the Project category: **TYPE I – RENEWABLE ENERGY PROJECT**

Reference for the project category: ***I.D. 'Renewable electricity generation for a grid'***

The reference has been taken from the list of the small-scale CDM project actively categories contained in Appendix B of the simplified M&P for small-scale CDM project activities.

No	Name of project	Maximum installed capacity(kw)	Annual energy output(Gwh/y)	Annual estimation of emission reductions in tones of CO_2e
1	Kincang1	205	1.530	1,198
2	Kinchang2	229	1.704	1,334
3	Adipasir1	234	1.714	1,342
4	Adipasir2	176	1.311	1,027
5	Adipasir3	261	1.910	1,496
6	Rakit2	250	1.762	1,379
Total		1,355	9.931	7,776

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

>>

The project category is renewable electricity generation for a grid system, which is also fed by both fossil fuel fired thermal generating plants (using fossil fuels such as coal, natural gas, diesel etc.) and non fossil fuel based generating plants (such as hydro, geothermal, PV, biomass and wind). Hence, the applicable baseline as per Appendix B, indicative simplified baseline and monitoring methodologies are the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2/kwh$) calculated in a transparent and conservative manner.

Under Appendix B, two methods of calculating the emission coefficient are given. First method is calculated as the average of the approximate operating margin and the build margin. The second method is the baseline as the weighted average emissions (in $kgCO_2/kwh$) of the current generation mix.

Grid system and the baseline methodology for the proposed project activity are described below.

(Grid System)

There are four power suppliers such as PT.IP, PT. PJB PT.PLN and IPPs in Indonesia. Electricity supply system in Java and Bali is the largest system in Indonesia with over 18,623 MW of installed capacity base and annual energy generation of about 93,665Gwh/y as of 2003. The electricity system comprises of both fossil fuel based generation such as oil, coal and natural gas etc. and non-fossil fuel based generation such as hydro, PV, biomass, wind etc. Java-Bali main grid system with the capacity of 500KV

dispatches power over the area of Java and Bali, and this system is controlled by central load dispatching center owned by PT.PLN. Power is generated and supplied to the grid by PT.PLN, PT.IP, PT.PJB and IPPs. Table-B1 shows allocated share of power for Java and Bali from generating stations.

Table-B1 Allocated share of power from generating stations

Java-Bali System	Capacity(MW)					Output(Gwh)				
	PT.IP	PT.PJB	IPPs	PT.PLN	Total	PT.IP	PT.PJB	IPPs	PT.PLN	Total
Hydro	1,116	1,289	180		2,585	2,968	1,925	528	6	5,427
Diesel	82				82	66			16	82
Gas Turbine	749	362	150		1,261	1,608	43	534		2,185
Geothermal	360		405		765	2,804		3,379		6,183
Steam	3,800	2,100	2,530		8,430	25,718	11,784	14,709		52,211
Combine Cycle	2,773	2,727			5,500	11,211	12,665			23,876
Total	8,880	6,478	3,265	0	18,623	44,375	26,417	19,150	22	89,964

(Emission co-efficient)

Out of the two methodologies specified in the indicative simplified baseline and monitoring methodologies, the second method viz.7(b), the weighted average emissions (in kgCO_2e/kwh), is selected for the proposed project activity due to the following reasons.

The grid system chosen for the proposed activity is presently under deficit situation, as shown in Table B2 as shown below.

Table-B2 Demand forecasting in Java and Bali

Item	2005	2006	2007	2008	2009	2010	2011	2012	2013
Demand Forecasting(gwh)	83,152.00	88,336.00	93,834.00	99,670.00	105,855.00	112,409.00	119,356.00	126,715.00	134,512.00
Growth rate(%)	5.73	6.23	6.22	6.22	6.21	6.19	6.18	6.17	6.15
Total losses and shrinkage(%)	15.40	15.00	14.40	14.30	14.30	14.20	14.10	14.10	14.00
Production(Gwh)	95,976.00	101,624.00	107,337.00	113,969.00	120,960.00	128,401.00	136,254.00	144,591.00	153,387.00
Peak load(MW)	15,217.00	16,112.00	17,018.00	18,070.00	19,178.00	20,358.00	21,601.00	22,925.00	24,319.00
Installed capacity(MW)	22,016.00	22,467.00	23,316.00	24,371.00	24,591.00	24,591.00	24,591.00	24,404.00	24,220.00
Energy deficit(Gwh)	−1,956.30	−1,955.60	−1,953.53	−1,998.57	−2,192.28	−2,240.94	−2,313.81	−2,511.33	−2,599.18
Peak deficit(MW)	194.20	−385.10	−696.80	−1,010.30	−1,964.30	−3,144.30	−4,387.30	−5,842.20	−7,365.00

The Java and Bali system supplies all provinces in Java and Bali through a 500kv transmission system, while the interconnection from the provinces in Java to provinces in Bali is connected through a sub-seacable, as is also the case to the island of Madura. Growth rate of electricity to 2013 will be expected to be about 6% per year. Assuming that the load factor for the system is about 72% and total losses and shrinkage by 2013 will come to about 14%, it is projected that the peak load for 2013 will reach 24,220MW. To meet this load demand, a number of generations, either are already under construction or have had funds allocated for their construction, of which 3,343MW is to be built by PT.IP, PT PJB and PT.PLN, and 2,590MW through private sector participation(IPPs). Assuming system reserves of 30% and attention to the committed projects above-mentioned totalling 5,933MW, additional generation will be needed starting in 2010. The total cumulative power needed by 2013 is estimated at around 7,365MW. To meet the future energy demand and growth in the energy requirement by 2013 about 9,569MW capacity shall be added which means mobilisation of huge financial resources into the power sector.
Present planned capacity additions will not be sufficient to meet the energy demand and it is most likely that all power generating plants will be in operation during the crediting period. Hence, the weighted energy average emissions of the generation mix will represent the carbon intensity of the grid system.

Non-fossil fuel energy sources such as hydro, geothermal, PV, biomass, wind etc. are very limited such that the non-fossil fuel energy development compared to the demand is very low. Total installed capacity in Java and Bali in the year 2003 is about 18,623MW.

The share of non-fossil fuel energy is targeted at least 10% through renewable energy sources. As per Policy on Renewable Energy Development and Energy Conservation dated 22nd Dec. 2003 of Ministry of Energy and Mineral Resources, the Government has targeted that the policy to encourage the development of renewable energy and energy conservation is to obligate the energy player to utilize renewable energy, to commit on application on energy efficiency and to create the energy saving culture. As of 2004, since the installed capacity in Java and Bali is 18,623MW in the year 2003, an addition of 5% of the total installed capacity in the year 2004 i.e.933MW approximately through renewable energy sources is expected to be added using renewable energy sources without hydropower. But, it is unlikely to achieve this target due to limited renewable energy sources. All major hydropower sources are already exploited and significant capacity additions to the system are not possible. Hence, the non-fossil fuel based power generation is not expected to contribute significantly so that the carbon intensity of the grid system is reduced.

In view of the above-mentioned, it is expected to be the dependent sources on fossil fuel based power generation such as oil, coal and gases. This will increase the grid system carbon intensity from the present level. Although the fossil fuel based generation mix in the grid system increases during the crediting period, choice of weighted average emissions of the current generation mix (Option 7(b) of simplified baseline methodologies) as the baseline for the proposed project activity makes the estimation of emission reductions conservative comparing to the choice of average of operating and combined margin (Option 7(a) of simplified baseline methodologies).
Hence, the baseline methodology per 7(b) is appropriate to the proposed project activity.
Since the project capacity is so small that it is resulting in a small amount of emission reductions, only the current generation mix is projected as the constant baseline during the crediting period.
This approach does not call for reviewing the grid emission co-efficient every year *ex post* and reduces transaction costs to project proponents.

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:

>>

(Justification for application of simplified methodologies to the project activity)

The capacity of the project is only 1.36MW, which is less than the qualifying capacity of 15 MW to use simplified methodologies. Further, the project activity is generation of electricity for a grid system using hydro potential. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small scale CDM project activities.

(Justification for additionality of the project)

UNFCCC's simplified modalities seek to establishment of additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way.
Project participants identified the following barriers for the proposed project activity.

(Investment Barrier)

The project activity has already faced investment barriers during construction and yet there are other perceived risks for investment in the project activity as described below.

At the time of project planning stage, there was an only one small-scale hydroelectric power plant named Tapen Power Station with capacity of 600kW is in operation, two small-scale hydroelectric power projects such as Sitek(P=1,200kw) and Plumbungan(P=1,600kw) are in under preparation stage of construction and no other similar power plants/projects are existing in Banjarnagara irrigation canal.
In the past, there was a license for Siteki project issued to private investors to set up small-scale hydropower development, but no one started for implementation due to low tariff setting with less than 5US cent/kwh offered in PPA negotiation compared to neighbouring countries with high tariff.

Indonesia has been suffering from a week financial infrastructure. Local banks charges high interest rates, up to 16% Indonesia Rupiah based loan and 8% for US$ based loan, for their limited fund resources, including at least a 100% guarantee and/or surety-ship obligation.
Foreign banks are generally not willing to lend money into Indonesia without significant levels of guarantees and/or security of hard currency.
Not blessed with access to capital, hydropower developments with high up-front capital expenditures are very difficult in this circumstance.

At present, project proponent decided to set up the proposed project activity in view of new opportunities of CDM scheme.
We believe that CER revenue provides a hard currency revenue stream that is critical to project development and allows the project developer to pay for equipment that must be sourced from hard currency countries.

(Technological Barrier)
As shown in Table.B1, the predominant and known technology is thermal and all of experiences are oriented to that sector. The lack of available knowledge and confidence in the technology involved in small and privately built hydropower project makes this type of development non-existent and difficult to establish.
With an aggressive schedule for future expansion of thermal power capacity, small-scale hydropower will continue to be a marginal technology with low market potential levels, unless CDM revenues enable small-scale hydropower development participants to take on the higher risk exposures associated with investing in small-scale hydropower plants.

(Prevailing practice)
In Indonesian power sectors, the common practice is investing in only medium or large scale fossil fuel fired power projects, and which are evident from a host of planned projects that comprise mostly large-scale fossil fuel based power generation projects. This is mainly due to the assured return on investment, economies of scale and easy availability of finances.

The share of electricity from total installed capacity of small-scale hydropower projects in Indonesia is very small. According to the latest statistics, the total installed capacity of small-scale hydropower projects is only 10.61MW whereas the Indonesia's total installed capacity is around 19,486MW as of Nov. 2005 excluding mini-scale hydro, biomass, PV and wind sources etc. This shows a very small share of 0.5% from small-scale hydro sector in Indonesia. This means that investing in the small-scale hydropower sector is not a common practice and could not diffuse in the small-scale hydropower sector.

In view of the above-mentioned, the proposed project activity is additional and not the same as the baseline scenario which is clearly oriented to favour large-scale thermal power investments combined with a limited number of large-scale, publicly managed hydropower investments.

(Impact of CDM revenues)
Approval and registration of the project as a CDM activity enable CEPC (the project proponent) to secure, to assist in meeting her business target and to expand power produce/supply in her business market in Japan by CO_2 emission reductions kept in PT.IP. It is estimated that the project would generate around 7,776 tCO_2e of CERs per year. Assuming a purchase price of 5US$ per CER, PT.IP gets gross revenues from the sale of CERs account for US$ 38,880 per year.

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:

>>
Project boundary specified in the Appendix B of simplified modalities and procedures is that provided electricity to a grid encompasses the physical and geographical site of the renewable generation source.
For the project, this includes emissions from activities that occur at the project location.
For the project activity under consideration, the project boundary considered is that encompasses the desilting basin, fore bay, powerhouse, tailrace canal and power evacuation system.

The system boundary for the proposed project is defined as Java and Bali grid in Indonesia. The project boundary for the baseline will include all of the direct emissions, being the emissions related to the electricity produced by the facilities and power plants to be replaced by the project. This involves emissions from displaced facilities and power plant using fossil fuel.
Conforming to the guidance and rules for small-scale project activities, the emissions related to production, transport and distribution of the fuel used for the power plants in the baseline are not included in the project boundary, as these do not occur at the physical and geographical site of the project. For the same reason the emissions related to the transport are also excluded from the project boundary.

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

>>
As explained in Section B.2, the project activity is generation of electricity for a grid system, which is also served by other generating units based on fossil and non-fossil fuel.
Hence the applicable baseline methodology and monitoring methodologies for the proposed project activity is as per Clause 7 and 9 of simplified methodologies and procedures for small-scale CDM project activities, which describes that the baseline is kwh produced by the renewable generating unit multiplied by an emission co-efficient (measured in $kgCO_2e$/kwh).
The baseline is estimated using the method specified under 7(b) weighted average emissions of the current generation mix, which is considered appropriate to the project activity.

Date of completing the final draft of this baseline section *(21/11/2005)*

The contact information of the entity, which has determined the baseline, is given below.

Organization:	The Chugoku Electric Power Company Inc.,
Street/P.O.Box, Building:	4-33, Komachi, Naka-ku
City:	Hiroshima
State/Region:	Hiroshima Prefecture
Postfix/ZIP:	730-8701
Country:	JAPAN
Telephone:	+81(82) 523-6424
FAX:	+81(82)523-6422
E-Mail:	573788@pnet.energia.co.jp
URL:	www.energia.co.jp
Represented by:	
Title:	Expert/Engineer
Salutation:	Mr
Last Name:	Kaoru
First Name:	Nishiwaki
e-Mail:	573788@pnet.energia.co.jp

Mr.Nishiwaki is an employee of The Chugoku Electric Power Company Inc.(CEPC), and of Expert/Engineer in charge of this project.

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

>>

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

>>

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

>>

Starting date applied to the project activity is the date of recordable evacuation of power to the grid by the plant operation, which means that from the starting date, the anthropogenic emissions are considered being reduced by the project activity. The construction of project will be implemented on January 2007, and it will start the operation from the August 2008.

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

>>

30y-0m

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

>>

The project activity will use C.2.1, a renewable crediting period.

C.2.1. Renewable crediting period:

>>

7 years for each crediting period, renewed 2 times

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:

>>

N/A

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

SECTION D. Application of a monitoring methodology and plan:

>>

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

>>

The name of the methodology applied for the project activity is ***"Metering the Electricity Generated".*** This is in accordance with the Appendix B of simplified modalities and procedures for small-scale CDM project activities.

The reference to the proposed monitoring methodology is Clause 1D.9 of Appendix B of simplified modalities and procedures for small-scale CDM project activities. Detailed monitoring plan including monitoring procedures, responsibilities and GHG internal audits is furnished separately.

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

>>

The project activity is generation of electricity using hydro potential and evacuating the same amount to the grid system that is also fed by other fossil and non-fossil sources. Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Hence emissions reductions are related to the electricity evacuated by the project and the actual generation mix in the grid system. Since the baseline emission factor is estimated based on the energy weighted average emissions of the current generation mix and the same amount is applied as the constant baseline for the project activity during the crediting period, monitoring of actual generation mix in the grid system is not required. Hence the data to be monitored to ascertain emissions reductions out of the project activity is only the energy generated by the project.

The project with run-of-river type hydropower scheme identifies no leakage. Hence the proposed methodology well suits the project activity.

D.3 Data to be monitored:

>>

ID Number		Data type	Data variable	Data unit	Measured(m), Caluculated© or estimated(e)	Recording frequency	Proportion of data to be monotored	How will the data be achived? (electric/paper)	For how long is achived data to be kept?	Comment
1	Kincang 1	Project electricity output	Electricity output	kwh	m	Monthy	100%	On paper	Five years after the last issurance of CERs for each project	The data will be recorded both at project site as well as at the grid substation, which is under the conrol of PT.IP and PLN, respectively. PT.PLN will monitor and record energy output using calibrated meters at PT.PLN substation, and will submit this data to PT.IP enery mointh. Sales bills/receipts may be compared as alternative proof of the power evaculated to the grid. Records of measurements will be used for verification of emmision reductions.
2	Kincang 2			kwh	m	Monthy	100%			
3	Adipasir 1			kwh	m	Monthy	100%			
4	Adipasir 2			kwh	m	Monthy	100%			
5	Adipasir 3			kwh	m	Monthy	100%			
6	Rakit 2			kwh	m	Monthy	100%			

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

>>

For the monitoring purpose of the project, it involves a PT. IP's reading of the meter at the end of each month for determination of the power delivered to and accepted by PT. PLN under the terms of the PPA. Data records will be reviewed and validated by QA/QC personnel of the project from both parties. Power plant operators of PT. IP's hold this data by taking hourly readings of generation and recording them on site. Monitoring data adjustments and uncertainties would arise if the PT.IP does not read the meter precisely on the same date each month. In the case of payment of power supply, this is handled by the PT.PLN by double-checking by receipt of power sales and/or by prorating the reading for the number of days in the relevant month. The same approach shall be applied for emission reduction. At the point of project verification, records of generation, meter calibration and PT.PLN power purchase receipts will be available at PT.IP office in Banjarnagara. The verifier will also be invited to visit on the project sites to confirm the status of operations. The superintendent of PT.IP in Banjarnagara will be responsible for ensuring adherence and compliance with these procedures, finalizing the data reporting and recording, and responding to any issues or corrective actions identified by the project verifier.

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:

>>

The operating records will be checked by Shift staff, Plant manager and Executive director in following order.

Shift in charge → Plant manager → Executive director

Unit business PT.IP Mrica in Banjarchayana has the qualification for ISO9001, which verifies the QA/QC listed in monitoring data (D.3).

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

>>

The contact information of the entity, which has determined the monitoring methodology, is given below.

Organization:	The Chugoku Electric Power Company Inc.,
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URL:	www.energia.co.jp
Represented by:	
Title:	Expert/Engineer
Salutation:	Mr
Last Name:	Kaoru
First Name:	Nishiwaki
e-Mail:	573788@pnet.energia.co.jp

Mr.Nishiwaki is an employee of The Chugoku Electric Power Company Inc., and of Expert/Engineer in charge of this project.

SECTION E.: Estimation of GHG emissions by sources:

>>

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

No formulae are provided for the baseline for project category 1.D paragraph 7. Emissions by sources are zero since hydropower is a zero CO_2-neutral source of energy.

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

>>

N/A

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:

>>

Since the proposed project activity is run-of-river type hydropower project; no anthropogenic emissions by sources of greenhouse gases within the project boundary are identified. Hence no formulae are applied.

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

>>

The project proponent identified no anthropogenic greenhouse gases by sources outside of the project boundary that are significant, measurable and attributable to the project activity. Hence no leakage is considered from the project activity. In addition, project proponent confirms that the renewable energy technology is not equipment transferred from another activity. Therefore 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 project emission from 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 explained in Section B.2, the baseline for the project activity is kWh produced by the hydropower project multiplied by an emission co-efficient calculated in a transparent and conservative manner as the weighted average emissions (in $kgCO_2/kwh$) of the current generation mix. For the proposed project activity the current generation mix is taken for Java and Bali grid system. PT.IP publishes the annual generation statistics (Indonesia Power Statistics) from all of power stations in the grid system. The following table provides the actual generation monitored by the PT.IP from all of power sources in Java and Bali as of 2003.

Table E.1. : Project emission

Year	2008	2009	2010	2011	2012	2013	2014
Project emission (as per E..1.2.1)	0	0	0	0	0	0	0
Leakage (as per E..1.2.2)	0	0	0	0	0	0	0
Sum of above (E.1.2.1+E.1.2.2)	0	0	0	0	0	0	0

Formulae used for calculation of the baseline are given below.

Step 1: Estimation of emissions from each fuel source
Emissions from each fossil fuel source are estimated using the following formulae.

Emissions(tCO_2/yr)= Net Generation(Gwh/yr) ×CEF for fuel(tC/TJ) ×Net Heat Rate (TJ/ Gwh) × Conversion Factor(44/12)

In the above calculation, actual generation is obtained from PT.IP's reports. Carbon Emission Factor (CEF) for fuels is taken from IPCC default emission factors. Since collecting heat rates for all baseline plants is difficult, only heat rates as specified by PT.IP's are taken. This is reasonable for a small-scale project activity whose generation is negligibly small.
Using the above formulae, emissions from each type of fossil fuel source are estimated. For non-fossil fuel sources such as hydro, geothermal, PV, wind and biomass etc, GHG emissions are not applicable.

Step 2: Total Baseline emissions
Total baseline emissions are estimated by summation of emissions from all fossil fuel sources.

Step 3: Estimation of baseline or Emission Coefficient
Baseline emission factor is estimated as the weighted average of all existing generation sources using the following formulae.

Baseline Emission factor (tCO2/Gwh) = Baseline emissions (tCO_2) / Total net energy in the system (Gwh/yr)

Baseline Emission factor (tCO2/Gwh) =783 tCO_2/GWh

Step 4: Estimation of baseline emissions
Baseline emissions or emissions avoided by the project activity are estimated using the following formulae.

Baseline Emissions/avoided emissions(tCO_2/yr)**= Emission co-efficient (Step 3) × anticipated generation from project activity(Gwh/yr)**

Baseline Emissions/avoided emissions(tCO_2 /yr)= 783× 9.931= 7,776 tCO_2

Using the above formulae, baseline emissions or emissions avoided by the project activity are estimated as 7,776 tCO_2 per year. This is based on an anticipated net generation of 9.931 Gwh/yr from the project. The resulting baseline emissions during the crediting period are tabulated below.

Table E.3. Baseline emission during the 7 year crediting period

Year	2008	2009	2010	2011	2012	2013	2014
Emission co-efficient (tCO2/Gwh)	783	788	788	788	788	788	788
Anticipated generation (Gwh)	9.931	9.931	9.931	9.931	9.931	9.931	9.931
Baseline emission (tCO2))	7.776	7.776	7.776	7.776	7.776	7.776	7.776

In the above table the year 2008 represents one full year period from the project activity starting date i.e. 01 January to December 2008. Similarly other years also represent full year periods between January and December.

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:

>>

Difference between E.1.2.4 and E.1.2.3, which represent the emission reductions of the project activity are given in the table as shown below.

Table E.4. : Emission reductions due to the project activity

Year	2008	2009	2010	2011	2012	2013	2014
Baseline emission (E.1.2.4 tCO2)	7.776	7.776	7.776	7.776	7.776	7.776	7.776
Project emission (E.1.2.3 tCO2)	0	0	0	0	0	0	0
Emission reduction (tCO2)	7.776	7.776	7.776	7.776	7.776	7.776	7.776

In the above table the year 2008 represents one full year period from the project activity starting date i.e. 01 January to December 2008. Similarly other years also represent full year periods between January and December.

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

>>

Values obtained when applying formulae are already shown above in various tables such as Table E-3 and E-4.

SECTION F.: Environmental impacts:

>>

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

>>

As per the decree of Ministry of Environment (KLH), Govt. of Indonesia, on "Type of business and/or activity plans that are required to be completed with Environmental Impact Assessment (AMDAL)", the project is not required EIA report. Because being run-of river type small-scale hydropower project, the project activity would not result in any adverse environmental and socio-economic impacts. Displacement of local population, disturbance to the eco-system and deforestation are not involved in due to project activity.

The project sites were already identified for the hydropower generation sites by governmental organization and they have taken due environmental care in identification of the sites. The applicant entity provides "The Environmental Management Activity Plan (UKL) and The Environmental Monitoring Activity Plan (UPL)" instead of EIA (AMDAL) submission. This project is not creating any reservoir only applying the water which is used for irrigation. For the power generation the kinetic and potential energy of the water is used and after harnessing this energy the water is routed back to the original canal. In taking other wards, this project is using canal water by bypass route along with canal and creates no negative environmental impacts.

The Ministry of Environment says that provided the project were categorized that dam height, development area without water surface and power output are equal to or less than 15m, 200ha and 50MW respectively, that project is not required to complete Environmental Impact Assessment (AMDAL, refer to Table.F1). Due to the project capacity being only 1.36MW and run-of-river type hydroelectric scheme, the proposed project may not result in adverse impacts on socio-economic environment of the region.

Environmental impacts will be analyzed from the viewpoint of potential effects to the natural resources adjoining the project, canal and communities. Those impacts are classified in the phase of construction and the phase of operation of the project. Where impacts were identified, mitigation measures should be defined immediately. Table F.1 shows comparison table of EIA for development of hydropower project below.

Table. F1 Comparison table of EIA for development of hydropower project

Evaluation items for EIA	Threshold	Kinchang1	Kinchang2	Adipasir1	Adipasir2	Adipasir3	Rakit2
Dam height(m)	Less than 15m	1.5	1.5	1.5	1.5	1.5	1.5
Development area without water surface(ha)	Less than 200ha	0.01	0.02	0.01	0.01	0.02	0.02
Output capacity(MW)	Less than 50MW	0.21	0.23	0.24	0.19	0.26	0.25

(Impacts during the construction phase)
In general, the main impact occurred during a hydro project's construction stage has potential for affecting the biological environment because interventions on the vegetation, aquatic and terrestrial populations are indispensable in nature. The project has no significant impacts because all structures such as weir, intake, fore bay, power stations and after bay will be built/arranged in the vicinity of the project sites. The impact on aquatic and terrestrial's species will be negligible since no precious species of aquatic and terrestrials are confirmed. Access roads for the project sites are locating and these existing roads are fully useful for construction without repair. Other impacts during construction include fuels and lubricants waste generation, solid waste, suspended particles and noise pollution. These impacts are easily mitigated through the application of good engineering practices such as the construction of silt trap, adequate fuels and lubricants management and waste disposal, applying sheet pile for intake construction, and interventions in only the necessary areas etc.

(Operation Phase)
In general, the main impacts will be generated from the alternation of the hydrologic conditions in the section of the river with the intake, power station and tailrace. The reduction of the present water volume in river will cause changes in the water quality and temperature and decrease of dissolved oxygen, which can negatively affect aquatic life in the section of river mentioned above. Also the fore bay in river it is possible that sedimentation accumulation and contamination concentration will occur. On the contrary above-mentioned negative impacts will not occur in the project sites because the projects are constructed along with the irrigation canal with short water way. All projects provide flush gates for silt sedimentation, and all of the facilities have chances to remove/excavate the sedimentation in front of intake and fore bay at maintenance period of canal, which is scheduled every year for about 45days.

SECTION G. Stakeholders' comments:

>>

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

>>

The following process was applied to obtain public comments based on scientific and technical criteria from local stakeholders.

First, it was established how many public groups existed. Second, these groups were analyzed from an institutional and social perspective. Third, these groups were analyzed from the perspective of sociological criteria. Fourth, economic, political, religious, professional and community leaders were invited for opinion interviews. Fifth, community opinion workshop will be conducted prior to project implementation by making interview and questions based on sociological practice.

PT.IP and CEPC have organized stakeholder consultation meeting with village people (elected body of representatives administrating the local areas) and NGOs with the objective to inform the interested stakeholders of the environmental and social impacts on the project activity and to discuss their concerns about project activity.

The other stakeholders identified for the project activity are as below:
>Local population comprises of the local people in and around the project area.
>NGO in Indonesia

>Water Resource Management Office for Serayu & Ditanduy Area

Stakeholders include precisely governmental parties, which are involved in the project activity at various stages. At the appropriate stage of the project development, would consult stakeholders/relevant bodies to get the comments.

G.2. Summary of the comments received:

>>

The results of the interviews and a consultation showed that the majority of community leaders were neutral with regards to the project. They were optimistic that it could improve deficit of electricity in Indonesia, which would help the development of economy indirectly, improve their quality of living standard directly, and would generate their income and employment opportunity.

The project does not require displacement of any local population. The distance between the power station/substation for power evacuation to grid is far from their residence and rather small, therefore installation of transmission lines would not make any inconvenience to the local population.

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

>>

In view of various direct and indirect benefits (social, economical and environmental), no objection were raised during the consultation with stakeholders. The relevant comments and important clauses for the project will reflect in the project implementation, environmental clearance, power purchase agreement, local clearance etc. will be considered in the preparation of project design document.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	PT. Indonesia Power
Street/P.O.Box:	Jl. Jend. Gatot Subroto Kav. 18
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Represented by:	
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Organization:	The Chugoku Electric Power Co., Inc.
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Direct FAX:	N/A
Direct tel:	N/A
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NOT APPLICABLE

CLEAN DEVELOPMENT MECHANISM
FORM FOR SUBMISSION OF BUNDLED SMALL SCALE PROJECT ACTIVITIES
(SSC-CDM-BUNDLE)

SECTION A. General description of the Bundle

>>

A.1. Title of the Bundle:

>>

The bundle for Six sites of Mini-hydropower development project at Banjarnegara irrigation canal

A.2. Version and Date:

>>

F-CDM-SSC-BUNDLE (Version 02), unknown (PDD: F-CDM-SSC-PDD (Version 02), 8 July 2005)

A.3. Description of the Bundle and the subbundles:

>>

	Type	Category	Technology/Measure
Kincang1 Hydropower Project	Type I.	I.D.	Renewable energy
Kinchang2 Hydropower Project	Type I.	I.D.	Renewable energy
Adipasir1 Hydropower Project	Type I.	I.D.	Renewable energy
Adipasir2 Hydropower Project	Type I.	I.D.	Renewable energy
Adipasir3 Hydropower Project	Type I.	I.D.	Renewable energy
Rakit2 Hydropower Project	Type I.	I.D.	Renewable energy

A.4. Project participants:

>>

Name of Party involved	Private/ or public entity(ies) project participants
Republic of Indonesia (host)	● PT. Indonesia Power
Japan	● The Chugoku Electric Power CO., Inc.

SECTION B. Technical description of the Bundle:

>>

B.1. Location of the Bundle:

>>

B.1.1. Host Party(ies):

>>

Republic of Indonesia

B.1.2. Region/State/Province etc.:

>>

Banjarnegara Regency, Province of Central Java

B.1.3. City/Town/Community etc:

>>

Rakit sub-District

B.1.4. Details of physical location, including information allowing the unique identification of this Bundle:

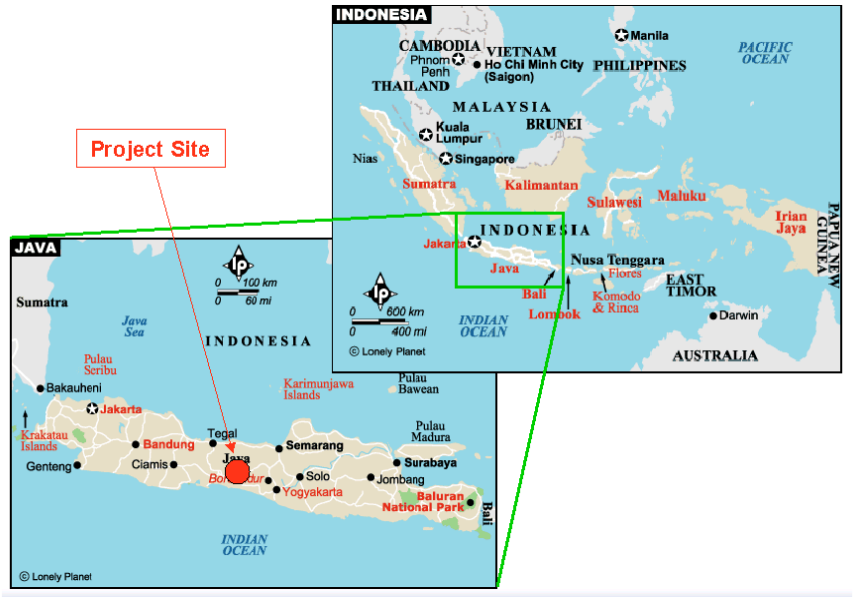
>>

All of the 6 (1.Kincang1, 2.Kinchang2, 3.Adipasir1, 4.Adipasir2, 5.Adipasir3 and 6.Rakit2) hydropower plant are located on the Banjarchayana Irrigation Channel, which is located on the boundary between Tanjunganom Village on the west side and Kincang Village on the east side. Both villages are in Rakit sub-District, Banjarnegara Regency, Province of Central Java, Republic of Indonesia. The location map is shown in the following. The distance between every two adjacent power plants is within 1km.

Coordinates of the site:

The powerhouse of Siteki: 7° 24’ 19.1" South, 104° 34’ 03.4" East.

The power house of Plumbungan: 07º24'42.8" South, 109º34'03.6" East



B.2. Type(s), category(ies) and technology/(ies)/Measure/(s) of the bundle:

>>

Type: Type (i): provide proof that the capacity of the proposed project activity will not increase beyond 15MW

Categories *Type I.D.* (*I.D: ‘Grid connected renewable electricity generation’*)

Technology: Renewable energy

The total output of six hydropower plants is 1.36MW. Hence, it will not exceed the limit of 15 MW for small scale CDM project over crediting period.

B.3 Estimated amount of emission reductions over the chosen crediting period:

>>

Years	Annual estimation of emission reduction in tonnes of CO_2 e
2008	7,776
2009	7,776
2010	7,776
2011	7,776
2012	7,776
2013	7,776
2014	7,776
Total	54,432

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

>>

C.1. Duration of the Bundle

>>

21y-0m

C.1.1. Starting date of the Bundle:

>>

01-01-2008

C.2.1. Renewable crediting period:

>>

7 years for each crediting period, renewed 2 times

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:

>>

N/A

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

SECTION D. Application of a monitoring methodology:

>>

Six of the project activities (1.Kincang1, 2.Kinchang2, 3.Adipasir1, 4.Adipasir2, 5.Adipasir3 and 6.Rakit2) belong to the same type, same category and technology. Monitoring is realized by metering kWh of the both projects respectively as shown in the Appendix B to the simplified modalities and procedures for small –sale CDM project activities. The record paper is summarized in a document.

Annex 1

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