CLEAN DEVELOPMENT MECHANISM
PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

This form is for the submission of a CDM PoA whose CPAs apply a large scale approved methodology.

At the time of requesting registration this form must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case).

SECTION A. General description of programme of activities (PoA)

A.1 Title of the programme of activities:

Waste electricity recovery from performance tests of diesel engine generators at a railway locomotive manufacturing factories in China

A.2. Description of the programme of activities:

The locomotive market in China has been oligopoly situation by the two state-owned enterprises, Company A and Company B. The PoA introduces energy-conservation equipment to recover and utilize waste electricity which has been abandoned during performance tests of diesel engine generators at railway locomotive manufacturing factories at the affiliated enterprises of Company A and Company B.

First candidates are 5 sites (Beijing, Liaoning, Sichuan, Henan, Hubei). At the moment, the electricity generated in the performance test before shipping diesel generating unit is abandoned by water rheostat. By this project, the electricity is recovered by the inverter (rating capacity is 3,000kW) installed with Japanese technological assistance and the recovered electricity is utilized in the factories. It replaces a part of the electricity purchased from the network. While each factory practices individual CDM program activities (CPAs) under programmatic CDM, Energy Service Company (ESCO) will be a Coordinating/Managing Entity of Program of Activities (PoA) and will conduct the project together with the factories. The equipment will be installed at the first factory in June 2010.

Baseline Scenario
The electricity generated at a performance test is not utilizable because the frequency/voltage of the electricity generated during performance tests varies widely due to testing load change according to test requirements. The ‘waste electricity’ is not historically used for any purpose; it is just abandoned into water (i.e. ‘waste electricity’ is disappeared by water rheostat). Without the proposing project activity, the waste electricity cannot cover any power demand of the facility.

Project Scenario
This project activity recovers and stabilizes the waste electricity and converts from direct current to alternating current for use at the power network. An inverter has been developed for this project. The inverter needs to adjust to a wide range of load changes and convert it to utilizable electricity at a power network. The water rheostat system will be no longer used in the project activity unless more than two diesel generators are tested at the same time. All the recovered electricity will be utilized within the plant and replace the electricity from the grid.

The project supports sustainable development in China, reducing coal consumption, as well as SO_2 and NO_x emissions. Additionally, the project will contribute to China’s further sustainable development by a reduction in coal ash production from the power plant, which is currently a serious environmental problem in China.

The proposed PoA is a voluntary action by the coordinating/managing entity.

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

Coordinating or managing entity of PoA as the entity which communicates with the Board
ESCO Company

Project participants being registered in relation to the PoA
The locomotive market in China has been oligopoly situation by the two state-owned enterprises, Company A and Company B. The target railway locomotive manufacturing factories under the PoA are affiliated enterprises of either Company A or Company B.

First candidates are as follows:
Factory A
Factory B
Factory C
Factory D
Factory E

A.4. Technical description of the programme of activities:

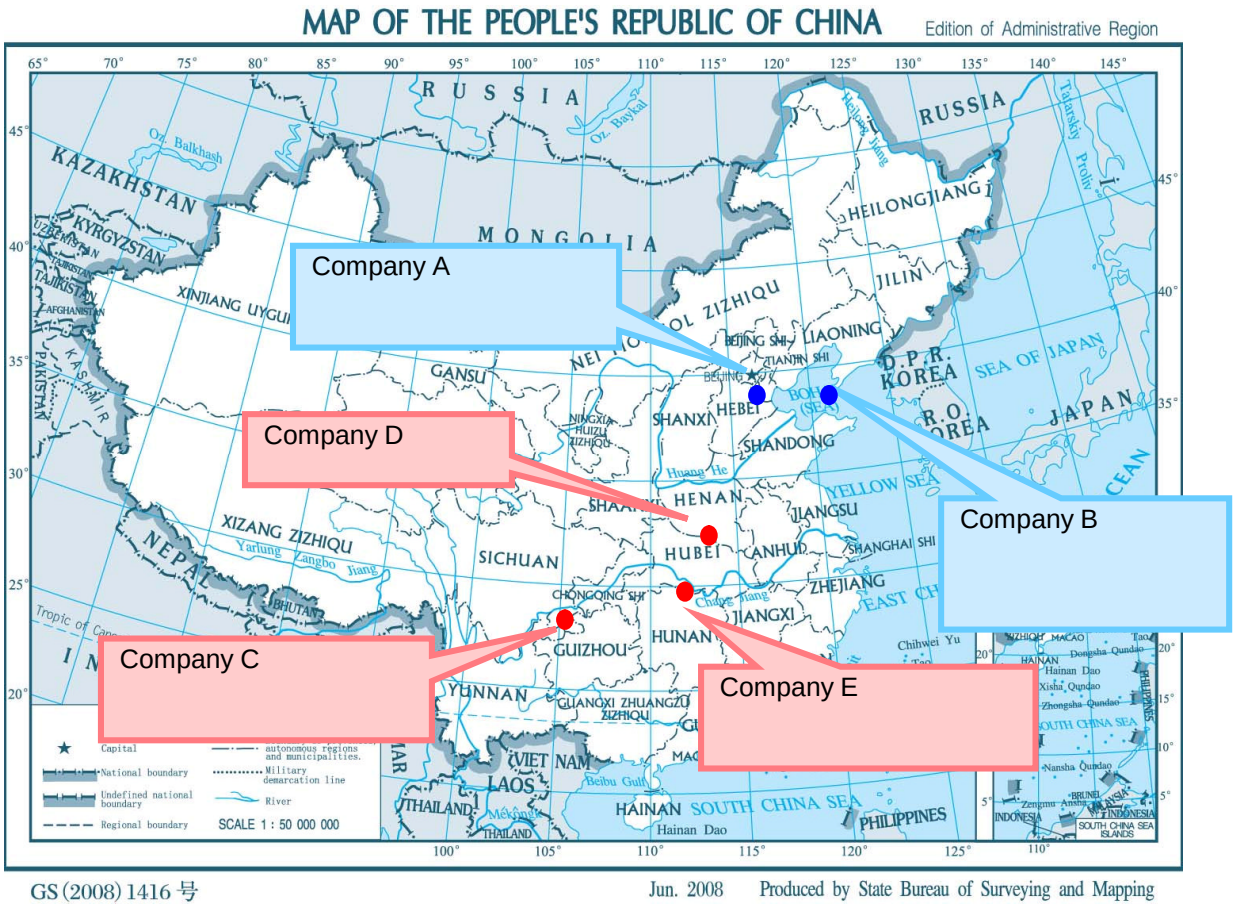
A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

People's Republic of China

A.4.1.2. Physical/ Geographical boundary:

The geographical boundary for the PoA is People's Republic of China



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

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

The project activity introduces an inverter to recover and utilize electricity which has been abandoned during performance tests of diesel engine generators at railway locomotive manufacturing factories in China. All the recovered electricity replaces electricity from power grid.

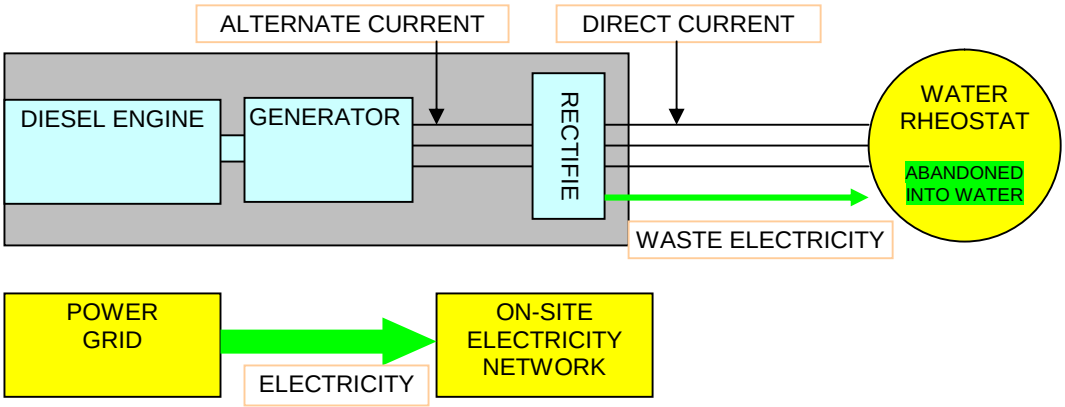


Figure 1: Conceptual Diagram of the Baseline Scenario

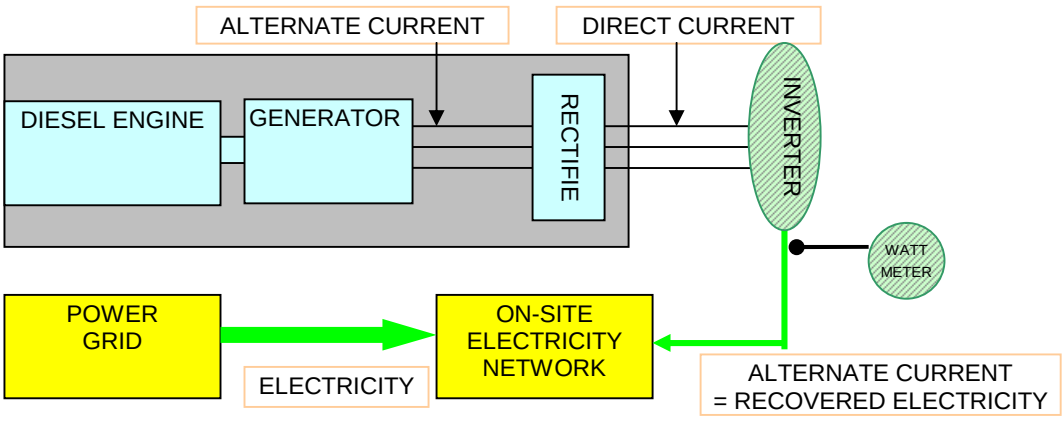


Figure 2: Conceptual Diagram of the Project Activity

Note: A rectifier is needed to generate DC output because DC motor has been used in the diesel-electric locomotives as drive force. The factory must test diesel electric generation systems under as the same condition as actual way of usage. Therefore, the output of current diesel electric generation test system is DC to test the frequency and the voltage of DC output of diesel electric generation system. On the other hand, AC is used in on-site electricity network, so an inverter is necessary to convert DC to AC so as to utilize waste DC output from the diesel electric generation system. In addition, the 'waste electricity' is not historically used for any purpose; it is just abandoned into water (i.e. 'waste electricity' is disappeared by water rheostat). The water rheostat system has been only used for disappearance of electric current or 'waste electricity' and the system will be not used in the project activity. However, it will be not taken out but just disconnected from the test stand in case the system is in need of repair.

An inverter has been developed for this project. The frequency/voltage of the electricity generated during performance tests varies widely since testing load is changed according to test requirements. The inverter needs to adjust to a wide range of changes and convert it to utilizable electricity at a power network.

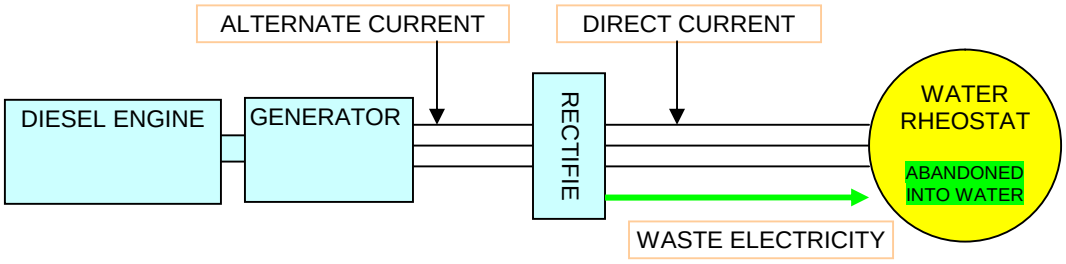
Each diesel engine generator of a locomotive manufactured or repaired at the facility must be tested its performance following test procedures. Thus, the quantity of the product manufactured/repaired equals the frequency of the performance tests. The test procedures have been developed based on standards of Union Internationale des Chemins de Fer (UIC).

Even if a facility has several sets of test stands, only one set of inverter system will be introduced. Therefore, when more than two diesel generators are simultaneously tested, waste electricity is recovered from only one diesel generator (See figures below).

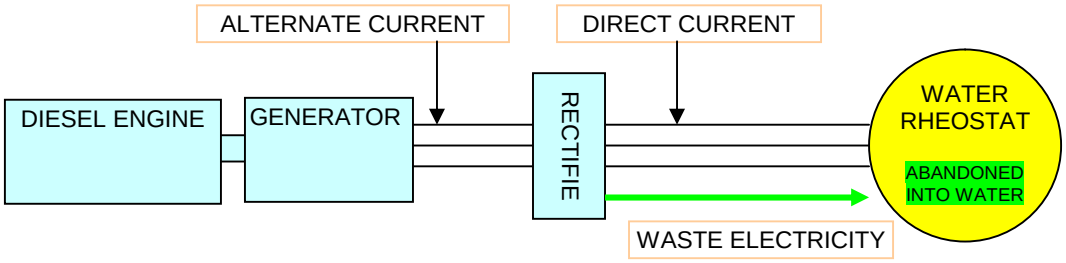
The main reason why not more than one inverter is introduced at one time is the limitation on the budget at first phase. Another reason is utilization rate of each test stand is different, thus cost-efficiency of investment for each stand is different. So we decided to introduce the new systems in series; if utilization rate and cost-efficiency of another test stand is expected to be high enough, we will introduce the new inverter system to the stand. It is planned to start with one test stand and then expands to other stands. We intend to include one inverter for each independent test stand in the future.

Baseline Scenario (In case of testing 4 DG sets)

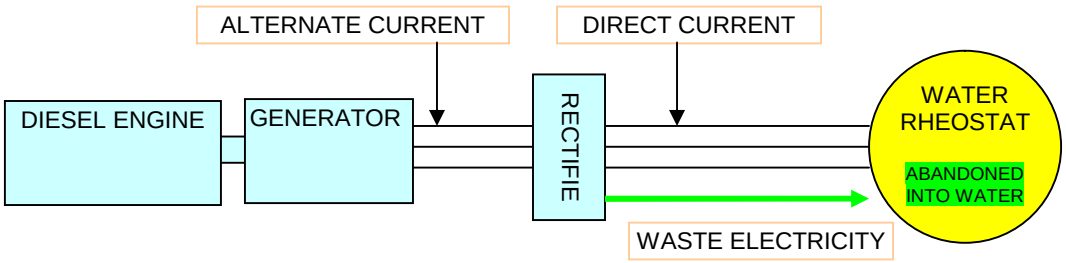
No.1 Test Stand



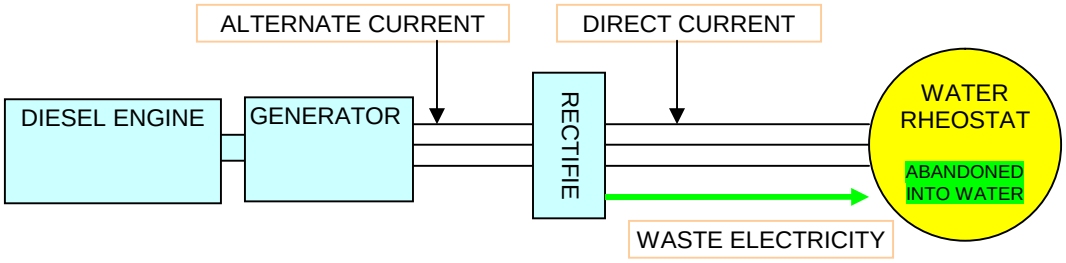
No.2 Test Stand



No.3 Test Stand

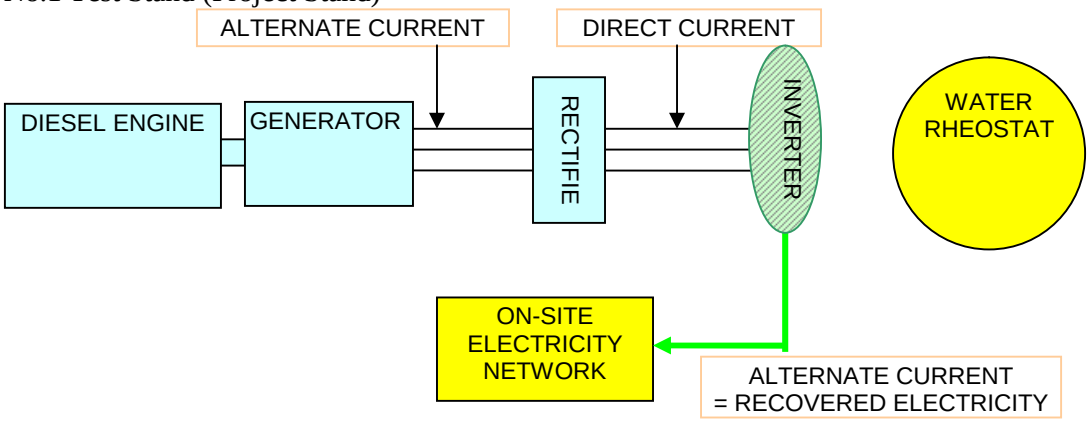


No.4 Test Stand

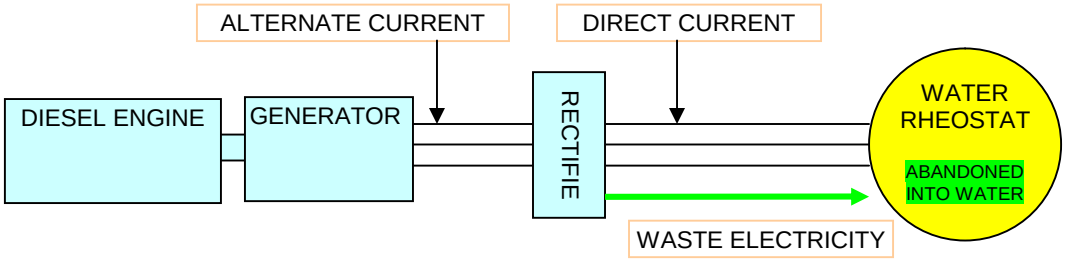


Project Activity (In case of testing 4 DG sets)

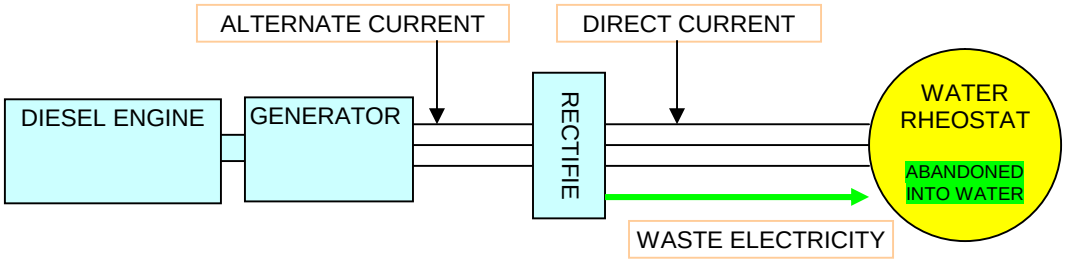
No.1 Test Stand (Project Stand)



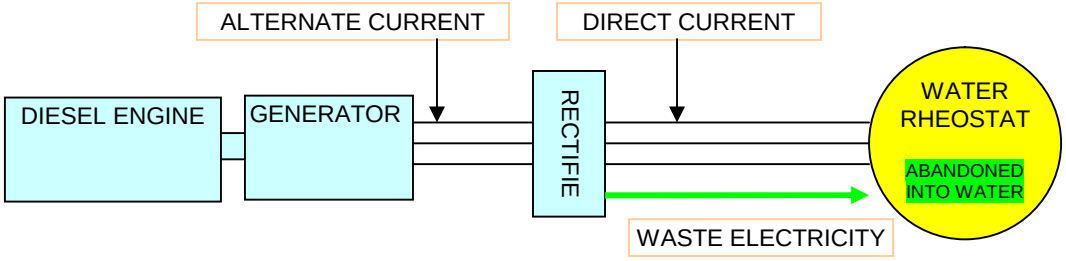
No.2 Test Stand



No.3 Test Stand



No.4 Test Stand



A.4.2.2. Eligibility criteria for inclusion of a CPA in the PoA:

Eligibility Criteria:

- Each CPA will involve waste electricity recovery at a railway locomotive manufacturing factory within the geographical boundary of China.
- Each CPA must implement the baseline and monitoring methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (*We are requesting revision*)
- No other CPA or CDM project involving the waste electricity recovery is already registered and operating at the same site.
- The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA.
- Each CPA shall be uniquely identified and defined in an unambiguous manner by providing geographic information, and the exact start date and end date of the crediting period
- Each CPA must ensure that leakage, additionality, establishment of the baseline scenario, baseline emissions, eligibility and double counting are unambiguously defined.
- Each CPA must be approved by the coordinating entity and DOE prior to its incorporation into the PoA.

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

Identification of the baseline scenario

The baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternative(s).
Realistic and credible alternatives should be determined for:

- Waste energy use in the absence of the project activity;
- Power generation in the absence of the project activity;

The project participant shall exclude baseline options that:

- Do not comply with legal and regulatory requirements; or
- Depend on fuels (used for generation of heat, power or mechanical energy), that are not available at the project site.

The project participant shall provide evidence and supporting documents to exclude baseline options that meet the above-mentioned criteria.

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations

The baseline candidates should be considered for the following facilities:

- For the industrial facility where the waste energy is generated; and
- For the facility where the energy is produced; and
- For the facility where the energy is consumed.

For the use of waste energy, the realistic and credible alternative(s) may include, *inter alia*:

W1: WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste electricity is released to the water or waste pressure energy is not utilized;

W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste electricity is released to the water or waste pressure energy is not utilized;

W3: Waste energy is sold as an energy source;

W4 Waste energy is used for meeting energy demand;

W5: A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared;

W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

For power generation, the realistic and credible alternative(s) may include, *inter alia:*

P1: Proposed project activity not undertaken as a CDM project activity;

P2: On-site or off-site existing/new fossil fuel fired cogeneration plant;

P3: On-site or off-site existing/new renewable energy based cogeneration plant;

P4: On-site or off-site existing/new fossil fuel based existing captive or identified plant;

P5: On-site or off-site existing/new renewable energy or other waste energy based existing captive or identified plant;

P6: Sourced Grid-connected power plants;

P7: Captive Electricity generation using waste energy (if project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency than the project activity);

P8: Cogeneration using waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity);

P9: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;

P10: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from **a captured portion** of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;

P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

The energy generator, in consultation with the waste energy generator(s) and recipient plant(s), where applicable, shall consider the above baseline options to develop a scenario matrix based on various combinations of baseline options. Exclusion of any baseline options shall be justified with documented evidence.

Step 2: Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable

Demonstrate that the identified baseline fuel is available in abundance in the host country and there is no supply constraint.
Detailed justification shall be provided for the selected baseline fuel. As a conservative approach, the available fuel with the lowest carbon emission factor (e.g., natural gas) shall be used.
In case of partial supply constraints (seasonal supply), the project participants shall consider the available alternative fuel that result in lowest baseline emissions during the period of partial supply.

Step 3: Step 2 and/or Step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used to identify the most plausible baseline scenarios by eliminating non-feasible options (e.g. alternatives where barriers are prohibitive or which are clearly economically unattractive).

Where the project participants capture and utilize a portion of the waste gas produced at the industrial facility for generation of captive electricity in the absence of the project activity and the project activity is the implementation of more energy efficient equipment either by decommissioning, modification or expansion of existing waste gas based electricity generation and increased the utilization of waste gas, the project proponents are required to use economic analysis for identification of most plausible baseline scenario.

Step 4: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario
The information of baseline for utilization of heat (or steam), and electricity or mechanical energy will be received from recipient plant(s) and the information on utilization of waste energy in baseline will be received from generator(s) of waste energy. Hence generator of heat/steam/electricity/mechanical energy, who is the CDM project proponent, shall determine baseline options, identify most appropriate baseline scenario, determine baseline fuel and demonstrate and assess additionality in consultation with the recipient plant(s) and waste energy generator(s). For this purpose, the waste energy generator(s) and recipient plant(s) that consume steam, and/or electricity or mechanical energy shall be identified at the time of preparation of PDD. The consultations with waste energy generator(s) and recipient plant(s) shall be documented.

This methodology is only applicable if the baseline scenario for all the waste energy generator(s) and the recipient plant(s) identified, is one of the two scenarios described in Table 1below. If the methodology is to be applicable to project activities where the waste energy is used for generating <u>one form of energy only</u> (electricity or mechanical energy or heat), then the baseline should be the generation of only one form of energy (electricity or mechanical energy or heat respectively).

Table 1: Combinations of baseline options and scenarios applicable to this methodology

Project Scenario: Generation of Electricity or Heat only			
Scenario	Baseline options		Description of situation
	Waste energy	Power/ Heat/mechanical energy	
1	W2	M2 and/or M5 and/or P4 or P6/ H4	Mechanical energy (that is replaced by waste heat/pressure based mechanical turbines under the CDM project activity) is obtained by electrical motors or steam turbine. The electricity is obtained from a specific existing plant or from the grid and heat from a fossil fuel based steam boiler
2	W5	P11	Existing power generating equipment is maintained and additional electricity generated by grid connected power plants

Additionality
The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, available at the UNFCCC CDM website.

A.4.4. Operational, management and monitoring plan for the programme of activities:

A.4.4.1. Operational and management plan:

Since those operating the CPA are all affiliated enterprises of either Company A or Companu B, controlling CPAs are simple.

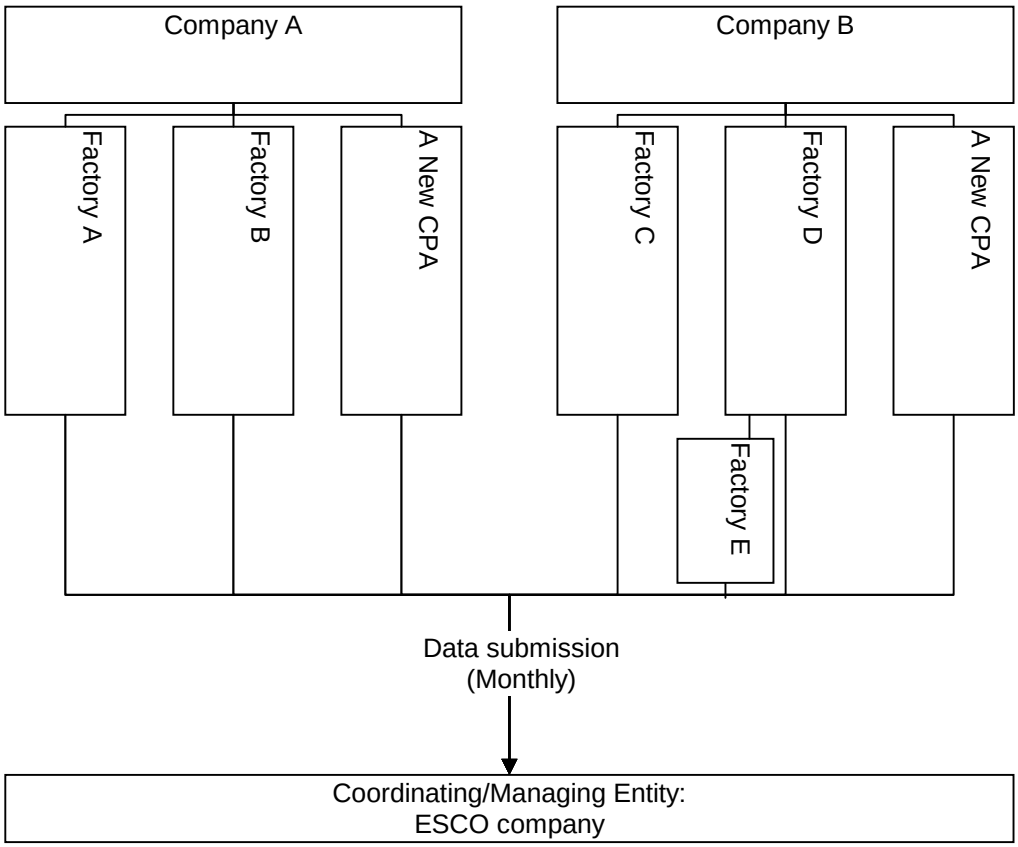


Figure 3: Operational and management structure of the PoA

A.4.4.2. Monitoring plan:

The quantity of recovered electricity will be continuously monitored with a sensor.

Data Collection
Each factory has responsibility for data collection and instrument calibration. The data monitored will be recorded and archived electronically or on paper. The quantity of recovered electricity will be logged by operator on daily basis using a pre-prepared log-sheet form, as part of the data logging system. The log book will be signed and checked by an operational manager who will compile the report on monthly basis. The operational manager is also responsible for cross-check of the amount of net electricity recovered against the calculation result of the frequency and duration of the performance tests at the project test stand. Annually the data is compiled in a monitoring report for verification by the DOE.

Maintenance and Calibration
The instrument will be calibrated on regular basis during the annual maintenance. Calibration status for all CDM-related instruments will be recorded and provided in a monitoring report.

A.4.5. Public funding of the programme of activities:

No public funding is involved.

SECTION B. Duration of the programme of activities

B.1. Starting date of the programme of activities:

01 June 2010

B.2. Length of the programme of activities:

10 years

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

>>

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at CPA level ☑

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

>> Work in progress

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

In accordance with the host Party laws/regulations, an environmental impact assessment is NOT required for a typical CPA, included in the programme of activities (PoA).

SECTION D. Stakeholders' comments

>> Work in progress

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

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

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

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

>>

D.3. Summary of the comments received:

>>

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

>>

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical - CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a CPA in this PoA (PoA specific CDM-CPA-DD).

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

ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (Version 03.2)

We are requesting revision for this project.

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

The revised consolidated methodology is for the following types of project activities:

- Type-1: All the waste energy in identified WECM stream/s, that will be utilized in the project activity, is, or would be flared or released to atmosphere/water in the absence of the project activity at the existing or new facility. The waste energy is an energy source for:
  - Cogeneration; or
  - Generation of electricity; or
  - Direct use as process heat source; or
  - For generation of heat in element process (e.g. steam, hot water, hot oil, hot air); or
  - For generation of mechanical energy.

The electricity generated at a performance test is not utilizable as it is because the frequency/voltage varies according to testing load and therefore wasted. This project activity recovers and stabilizes the waste electricity and converts from direct current to alternating current for use at the power network. It is a kind of generation of electricity.

Demonstration of use of waste energy in absence of CDM project activity

For Type-1 project activities: It shall be demonstrated that the waste energy utilized in the project activity was flared or released into the atmosphere/water (or wasted in case of project activity recovering waste pressure) in the absence of the project activity at the existing facility by either one of the following ways:

- By **direct measurements** of the energy content and amount of the waste energy produced for at least *three years* prior to the start of the project activity;
- Providing an **energy balance** of the relevant sections of the plant to prove that the waste energy was not a source of energy before the implementation of the project activity. For the energy balance applicable process parameters are required. The energy balance must demonstrate that the waste energy was not used and also provide conservative estimations of the energy content and amount of waste energy released;

- **Energy bills** (electricity, fossil fuel) to demonstrate that all the energy required for the process (e.g. based on specific energy consumption specified by the manufacturer) has been procured commercially. Project participants are required to demonstrate through the financial documents (e.g. balance sheets, profit and loss statement) that no energy was generated by waste energy and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities;

Each CPA keeps all test results, including the direct measurements of the amount of the waste electricity.

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

The geographical extent of project boundary includes the industrial facility where waste energy is generated, that is the railway locomotive manufacturing facility and the grid as defined in the "Tool to calculate the emission factor for an electricity system".

Overview of emission sources included in or excluded from the project boundary is provided in Table 2.

Table 2: Summary of gases and sources included in the project boundary, and justification explanation where gases and sources are not included

	Source	Gas	Included?	Justification / Explanation
Baseline	Electricity generation, grid or captive source	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative

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

Baseline Scenario

The baseline candidates should be considered for the following facilities:

- For the industrial facility where the waste energy is generated; and
- For the facility where the energy is produced; and
- For the facility where the energy is consumed.

For the use of waste energy, the realistic and credible alternative(s) may include, *inter alia*:

W1: WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste electricity is released to the water or waste pressure energy is not utilized;
W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste electricity is released to the water or waste pressure energy is not utilized;
W3: Waste energy is sold as an energy source;
W4 Waste energy is used for meeting energy demand;

W5: A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared;
W6: All the waste gas produced at the industrial facility is captured and used for export electricity generation.

For power generation, the realistic and credible alternative(s) may include, *inter alia:*

P1: Proposed project activity not undertaken as a CDM project activity;
P2: On-site or off-site existing/new fossil fuel fired cogeneration plant;
P3: On-site or off-site existing/new renewable energy based cogeneration plant;
P4: On-site or off-site existing/new fossil fuel based existing captive or identified plant;
P5: On-site or off-site existing/new renewable energy or other waste energy based existing captive or identified plant;
P6: Sourced Grid-connected power plants;
P7: Captive Electricity generation using waste energy (if project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency than the project activity);
P8: Cogeneration using waste energy (if project activity is cogeneration with waste energy, this scenario represents cogeneration with lower efficiency than the project activity);
P9: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;
P10: Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from **a captured portion** of waste gas) is either decommissioned to build a new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;
P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

The baseline scenario for the waste energy generator and the recipient plant identified is the Scenario 1 described in Table 3 below.

Table 3: Combinations of baseline options and scenarios applicable to this methodology

Scenario	Baseline options		Description of situation
	Waste energy	Power/Heat/mechanical energy	
1	W2	P6	Due to their lack of experience and knowledge regarding energy saving and their shortage of funding, the waste electricity would have been released into the water rheostat in the absence of the project activity. The electricity is obtained from the grid.

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

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

Additionality

The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality".

The table below represents the financial data used in the IRR calculation for the project activity.

Table 4: Financial data for the project activity

	Values	Sources
Initial investment cost	thousand Euros (Yuan)	
Project life	years	
Revenues (electricity saving)	thousand Euros (Yuan) /year	
Average O&M costs	thousand Euros (Yuan) /year	
Income tax (China)	%	

Data assumptions:

- The calculation of revenue takes into account the quantity of grid electricity saving and the price of electricity.
- O&M costs are not considered in the IRR calculation because they will not changed by the project activity.

Table 5: IRR of the project activity with and without CER revenue

	With CER revenue	Without CER revenue	Benchmark
IRR	%	%	

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

Key additionality criteria:

- Define credible possible alternative scenarios relating to the waste electricity recovery relevant to the CPA.
- Ensure that the proposed CPA is not the only alternative amongst those considered that is in compliance with mandatory regulations.
- Complete an investment analysis to demonstrate that without CDM revenue the CPA is not a financially attractive option.
- Describe essential differences between the CPA and similar activities that are occurring.

Each CPA-DD will include a discussion of additionality addressing each of these key criteria.

NOTE: Information provided here shall be incorporated into the CDM-CPA-DD that has been specified for this PoA and shall be included in documentation submitted by project participants at registration of PoA.

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

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

ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (Version 03.2)

We are requesting revision for this project.

The revised consolidated methodology is for the following type of project activities:

- Type-1: All the waste energy in identified WECM stream/s, that will be utilized in the project activity, is, or would be flared or released to atmosphere/water in the absence of the project activity at the existing or new facility. The waste energy is an energy source for:
  - Cogeneration; or
  - Generation of electricity; or
  - Direct use as process heat source; or
  - For generation of heat in element process (e.g. steam, hot water, hot oil, hot air); or
  - For generation of mechanical energy.

A typical CPA is applicable to Type-1 of project activities under ACM0012. The electricity generated at a performance test is not utilizable as it is because the frequency/voltage varies according to testing load and therefore wasted. This project activity recovers and stabilizes the waste electricity and converts from direct current to alternating current for use at the power network. It is a kind of generation of electricity.

Demonstration of use of waste energy in absence of CDM project activity
For Type-1 project activities: It shall be demonstrated that the waste energy utilized in the project activity was flared or released into the atmosphere/water (or wasted in case of project activity recovering waste pressure) in the absence of the project activity at the existing facility by either one of the following ways:

- By **direct measurements** of the energy content and amount of the waste energy produced for at least *three years* prior to the start of the project activity;
- Providing an **energy balance** of the relevant sections of the plant to prove that the waste energy was not a source of energy before the implementation of the project activity. For the energy balance applicable process parameters are required. The energy balance must demonstrate that the waste energy was not used and also provide conservative estimations of the energy content and amount of waste energy released;
- **Energy bills** (electricity, fossil fuel) to demonstrate that all the energy required for the process (e.g. based on specific energy consumption specified by the manufacturer) has been procured commercially. Project participants are required to demonstrate through the financial documents (e.g. balance sheets, profit and loss statement) that no energy was generated by waste energy and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities;

Each CPA keeps all test results, including the direct measurements of the amount of the waste electricity.

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

Baseline emissions

Case 1: Waste energy is used to generate electricity

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j} \sum_{i} (EG_{i,j,y} * EF_{Elec,i,j,y}) \quad \textbf{(1a-1)}$$

Where:

$BE_{elec,y}$ = Baseline emissions due to displacement of electricity during the year *y* in tons of CO_2

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient *j* by generator, that in the absence of the project activity would have been sourced from i^{th} source (i can be either grid or identified source) during the year *y* in MWh, and

$EF_{elec,i,j,y}$ = The CO_2 emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year *y* in tons CO_2/MWh

f_{wcm} = Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy. If the boiler providing steam for electricity generation uses both waste and fossil fuels, this factor is estimated using Equation (1d). If the steam used for generation of the electricity is produced in dedicated boilers but supplied through common header, this factor is estimated using Equation (1d/1e). Note: For project activity using waste pressure to generate electricity, electricity generated from waste pressure use should be measurable and this fraction is 1

f_{cap} = Energy that would have been produced in project year *y* using waste energy generated in base year expressed as a fraction of total energy produced using waste source in year *y*. The ratio is 1 if the waste energy generated in project year *y* is same or less than that generated in base year. The value is estimated using Equations (1f), or (1f-1) or (1f-2) or (1f-3), or (1g), (1g-1) or (1h)

The proportion of electricity that would have been sourced from the i^{th} source to the j^{th} recipient plant should be estimated based on historical data of the proportion received during the three most recent years.

If the displaced electricity for recipient is supplied by a connected grid system, the CO_2 emission factor of the electricity $EF_{elec,gr,j,y}$ shall be determined following the guidance provided in the "Tool to calculate the emission factor for an electricity system". If the total electricity generated by project activity is less than 60 GWh/year, then, project proponents can use approved small-scale methodology AMS I.D to estimate the grid emission factor.

Calculation of the energy generated (electricity and/or steam) in units supplied by WECM and other fuels

Note: This is not applicable to project activities that use waste electricity/waste pressure to generate electricity; as for such project activities the electricity recovered/the electricity generated using waste pressure should be measurable.

Capping of baseline emissions

As an introduction to the element of conservativeness, this methodology requires that baseline emissions should be capped irrespective of planned/unplanned or actual increase in output of plant, change in

operational parameters and practices, change in fuel type and quantity resulting in an increase in generation of waste energy. In case of planned expansion a separate CDM project should be registered for additional capacity. The cap can be estimated using the three Methods described below. Project proponents shall use Method-1 to estimate the cap if data is available. In case of project activities implemented in a new facility, or in facilities where three-year data on production is unavailable, Method-2 shall be used. In case the project proponents demonstrate technical limitations in direct monitoring of waste heat / pressure of waste energy carrying medium (WECM), then Method-3 is used.

Method-1
Where the historical data on energy released by the waste energy carrying medium is available, the baseline emissions are capped at the maximum quantity of waste energy released into the atmosphere/water under normal operation conditions in the three years previous to the project activity. For that purpose f_{cap} is estimated as follows: The different equations are used depending upon the type of energy recovered from waste energy carrying medium (WECM) (e.g. waste gas, air, steam) in project activity.

Case 4: In case the waste electricity is recovered

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} \quad \textbf{(1f-3)}$$

Where:

$Q_{WCM,BL}$ = Average quantity of WECM released (or flared or wasted) in atmosphere/water in three years prior to the start of the project activity. (mass unit (kg) of WECM or other relevant unit)

$Q_{WCM,y}$ = Quantity of WECM used for energy generation during year *y* (mass unit (kg))

Project emissions
No project emissions for this project activity.

Leakage emissions
No leakage is applicable under this methodology.

Emission reductions
Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y Emission reductions in year *y* (t CO_2e/yr)

BE_y Baseline emissions in year *y* (t CO_2e/yr)

PE_y Project emissions in year *y* (t CO_2/yr)

LE_y Leakage emissions in year *y* (t CO_2/yr)

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

Data / Parameter:	$Q_{WCM,BL}$
Data unit:	MWh
Description:	Average quantity of waste energy released in atmosphere/water by WECM in three years prior to the start of the project activity
Source of data used:	Direct Measurements by generator of WECM through an appropriate metering device (e.g. turbine flow meter) for three years prior to implementation of project activity.
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on the frequency of the performance tests at the project test stand and the maximum amount of electricity generation during a test for each type of diesel generators. The test procedures have been developed based on standards of Union Internationale des Chemins de Fer (UIC).
Any comment:	-

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

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

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh
Description:	The quantity of electricity supplied to the recipient j by generator, that in the absence of the project activity would have been sourced from i^{th} source (i=gr (grid)) during the year y
Source of data to be used:	Wattmeter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	A wattmeter will be introduced for direct measurement of electricity from the inverter supplying to the network. Measured continuously, aggregated yearly.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$EF_{elec,i,j,y}$
Data unit:	tons CO2/MWh
Description:	The CO2 emission factor for the electricity source i (i=gr (grid)), displaced due to the project activity, during the year y
Source of data to be	The latest “Baseline Emission Factors for Regional Power Grids in China”

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	For year 2009: OM=1.0069 BM=0.7802
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$Q_{WCM,y}$
Data unit:	MWh
Description:	Quantity of WECM used for energy generation during year *y*
Source of data to be used:	Generators of energy
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Direct Measurements by project participants through an appropriate metering device (e.g. turbine flow meter). Continuously
QA/QC procedures to be applied:	Measuring equipment should be calibrated on regular equipment. During the time of calibration and maintenance, alternative equipment should be used for monitoring
Any comment:	-

E.7.2. Description of the monitoring plan for a CPA:

The quantity of recovered electricity will be continuously monitored with a sensor.

E.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

The baseline study and monitoring methodology was completed on 1 March 2010 by:

Kuniyuki Nishimura (Mr.)

Mitsubishi Research Institute, Inc.
Tokyo, Japan

Annex 1

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

COORDINATING/MANAGING ENTITY

Organization:	ESCO Company
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

PARTICIPANTS IN THE PROGRAMME OF ACTIVITIES

Organization:	Factory A
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	

First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved.

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

- - - - -