

JCM Proposed Methodology Form**Cover sheet of the Proposed Methodology Form**

Form for submitting the proposed methodology

Host Country	Socialist Republic of Vietnam
Name of the methodology proponents submitting this form	Carbon Partners Asiatica
Sectoral scope(s) to which the Proposed Methodology applies	4. Manufacturing industries
Title of the proposed methodology, and version number	Title: Waste heat recovery for electricity generation Version number: 1.0
List of documents to be attached to this form (please check):	<input type="checkbox"/> The attached draft JCM-PDD: <input type="checkbox"/> Additional information
Date of completion	06/11/2014

History of the proposed methodology

Version	Date	Contents revised
01.0	06/11/2014	First edition

A. Title of the methodology

Waste heat recovery for electricity generation

Version 1.0

B. Terms and definitions

Terms	Definitions
Project facility	The facility that receives heat from the waste heat generation facility, recovers it and utilizes it for electricity generation, before providing electricity to the recipient facility.
Recipient facility	The facility that receives electricity from the project facility. There is no requirement that the recipient facility and the waste heat generation facility are the same, despite the expectation that they are in most cases.
Third-party entity (TPE)	As defined in the JCM Glossary of Terms.
Waste heat	Energy contained in residual streams from industrial processes in the form of heat, which would be released into the atmosphere without being utilized in the absence of the project activity.
Waste heat generation facility	The facility where the waste heat utilized by the project activity is available. The waste heat generation facility can be either an existing facility or a greenfield facility, as long as Eligibility Criterion 4 is satisfied.

C. Summary of the methodology

Items	Summary
<i>GHG emission reduction measures</i>	Recovery of waste heat to generate electricity
<i>Calculation of reference emissions</i>	Reference emissions are calculated based on the quantity of electricity provided to the recipient facility that in the absence of the project activity would have been sourced from the grid.

<i>Calculation of project emissions</i>	Project emissions are not considered as the project activity does not involve any fossil fuel consumption pursuant to Eligibility Criterion 7.
<i>Monitoring parameters</i>	<ul style="list-style-type: none"> ● Quantity of electricity provided to the recipient facility ● Quantity of actual electricity generated

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	The proposed project activity recovers waste heat (as defined in the definition section) and utilizes it for generation of electricity.
Criterion 2	The recovery of waste heat by the project activity should be a new initiative. The project activity cannot displace an on-going waste heat recovery and utilization undertaking. Prior to project implementation, the absence of equipment for recovery and utilization of the waste heat planned for use by the project activity needs to be confirmed by the TPE. ¹
Criterion 3	Regulations do not require the waste heat generation facility to recover and/or utilize the waste heat prior to the implementation of the project activity.
Criterion 4	It can be reasonably demonstrated (by for example an energy balance analysis and historical data in combination with the assessment of common industry practice) that the waste heat utilized in the project activity would have been released into the atmosphere in the absence of the project activity.
Criterion 5	An adequate measure is taken by way of a contact or other means to ensure the avoidance of double-counting among the project facility and the recipient facility, particularly when they belong to different legal entities.
Criterion 6	The proposed project activity is not implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) where heat (energy) generated on-site is not utilizable for any other purposes on-site except to generate power.
Criterion 7	Electricity generation is purely from use of waste energy, the project activity does not utilize fossil fuels for power generation.

E. Emission Sources and GHG types

Reference emissions

¹ This confirmation will be impossible if the on-site visit by the TPE is carried out subsequent to the implementation of the project activity. In such a case, confirmation on the basis of reliable documentary proof can be accepted.

Emission sources	GHG types
Electricity generation, grid source	CO ₂
Project emissions	
Emission sources	GHG types
The section is left blank on purpose, please refer to Section G.	N/A

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

When the project activity provides the recipient facility with electricity of $EG_{gr,y}$ in amount and replaces the same amount of grid import, the corresponding BaU emissions will be calculated as:

$EG_{gr,y} \times \text{the grid emission factor} / (1 - \text{TDL})$ where TDL stands for transmission and distribution losses

Reference emissions in this methodology are calculated on the assumption that the TDL value is 0, notwithstanding that fact that it is an inherent feature of grid electricity systems and can never be 0 in practice. This assumption ensures compliance with the JCM's requirement for reference emissions to be below BaU emissions.

In addition, reference emissions in the methodology are subject to a capping factor which protects the integrity of ERs against manipulation.

For details, please refer to Equation 1.

F.2. Calculation of reference emissions

The reference emissions are expressed as:

Equation 1

$$RE_{elec,y} = f_{cap} * \frac{(EG_{gr,y} * EF_{Elec,gr,y})}{(1 - TDL_y)}$$

$RE_{elec,y}$ Reference emissions due to displacement of electricity during the year y in tons of CO₂

f_{cap} A capping factor as per Equation 2 below

$EG_{gr,y}$	The quantity of electricity supplied by the project facility to the recipient facility, which in the absence of the project activity would have been sourced from grid during the year y in MWh
$EF_{Elec,gr,y}$	The carbon emission factor for the grid, import from which is displaced by the project activity, during the year y in tons CO ₂ e/MWh
TDL_y	Average technical transmission and distribution losses for the relevant grid electricity in year y , assumed to be 0 for the sake of this methodology

Determination of f_{cap}

The following equation should be used to determine f_{cap} :

Equation 2

$$f_{cap} = \frac{Q_{OE,BL}}{Q_{OE,y}}$$

Where:

$Q_{OE,BL}$	Output that can be produced, to be determined on the basis of maximum heat that could be recovered by the waste heat recovery equipment implemented under the project activity (MWh)
$Q_{OE,y}$	Quantity of actual electricity generated during year y (MWh)

The value of f_{cap} is 1 if the ratio calculated pursuant to Equation 2 is the same or greater than 1.

G. Calculation of project emissions

Project emissions due to the project activity (PE_y) are not included in the proposed methodology, given that power generation by the project activity relies solely on the recovered waste heat as the source of energy, without use fossil fuel which is prohibited by Eligibility Criterion 7.

It is added that auxiliary electricity consumption for the operation of the project activity is provided by the electricity generated by the project activity without involving grid import. The amount of auxiliary electricity consumption will have been deducted before the determination of the amount of electricity provided to the recipient facility that serves as the basis for reference emission calculation.

Thus, $PE_y = 0$

H. Calculation of emissions reductions

Emission reductions are calculated as the difference between the reference emissions and project emissions, as follows

Equation 3

$$ER_y = RE_{elec,y} - PE_y$$

ER_y Emission reductions in year y (t CO₂e/y)

$RE_{elec,y}$ Reference emissions in year y (t CO₂e/y)

PE_y Project emissions in year y (t CO₂/y)

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
$EF_{Elec,gr,y}$	The CO ₂ emission factor for grid, displaced by the project activity, during the year y	The most recent value available at the time of validation is applied and fixed for all monitoring reports.
$Q_{OE,BL}$	Output that can be produced (MWh), to be determined on the basis of maximum heat that could be recovered by the waste heat recovery equipment implemented under the project activity.	Specifications by the equipment manufacturer.