Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall apply the general guidelines to the SSC CDM methodologies, information on additionality (attachment A to Appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis.*

III.Q. Waste energy recovery (gas/heat/pressure) projects

Technology/measure

1. The category is for project activities that utilize waste gas and/or waste heat at existing facilities[1] as an energy source for:

   (a) Cogeneration; or

   (b) Generation of electricity; or

   (c) Direct use as process heat; or

   (d) Generation of heat in elemental process[2] (e.g. steam, hot water, hot oil, hot air); or

   (e) Generation of mechanical energy.

2. The category is also applicable to project activities that use waste pressure to generate electricity at existing facilities.

3. The recovery of waste gas/heat/pressure should be a new initiative (no waste gas/heat/pressure was recovered from the project activity source prior to the implementation of the project activity).

4. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

5. The category is applicable under the following conditions:

   (a) The energy produced with the recovered waste gas/heat/pressure should be measurable;

   (b) Energy generated in the project activity may be used within the industrial facility or exported to other industrial facilities (included in the project boundary);

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[1] A facility that is existing on the starting date of the project activity (see definition in paragraph 67 of the EB 41 meeting report) and all options for demonstrating the use of waste energy in the absence of a CDM project activity shall be based on historic information and not on a hypothetical scenario.

[2] An "*elemental process*" is defined as fuel combustion or heat utilized in an equipment of an industrial facility, for the purpose of providing thermal energy. Examples of an elemental process are steam generation by a boiler and hot air generation by a furnace. Each elemental process should generate a single output (such as steam or hot air) by using mainly a single fuel (not plural energy sources). For each elemental process, energy efficiency is defined as the ratio of the useful energy (the enthalpy of the steam multiplied with the steam quantity) and the supplied energy to the elemental process (the net calorific value of the fuel multiplied with the fuel quantity).

(c) Electricity generated in the project activity may be exported to the grid or used for captive purposes;

However, the methodology is not applicable to projects where the waste gas/heat/pressure recovery project is 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. Such project activities shall consider AMS-III.AL "Conversion from single cycle to combined cycle power generation". Projects recovering waste energy from such power plants for the purpose of generation of heat only can apply this methodology;

(d) For a project activity which recovers waste gas/heat/pressure for power generation from multiple sources (e.g. kiln and single-cycle power plant), this methodology can be used in combination with AMS-III.AL provided that:

(i) Within the project activity it is possible to distinguish two distinct waste energy sources such that:

- Waste energy source-I (e.g. kiln) belongs to such waste heat sources which are eligible under AMS-III.Q;
- Waste energy source-II (e.g. single-cycle power unit) belongs to such waste heat sources which are eligible under AMS-III.AL;

(ii) It is possible, for each waste energy source, to determine the baseline according to the specific methodology referred to;

(iii) It is possible to objectively allocate the electricity produced in the project activity to each waste energy source, by means of one of the following methods:

- Through separate measurements of the electricity produced by utilizing waste energy from each waste energy source; or
- Through separate measurements of the energy content of the waste energy carrying medium (WECM)[3] streams used for electricity production; or
- Through separate measurements of the energy content of the waste energy streams that are associated with each waste energy source and used for electricity production or for the WECM generation in a common waste heat recovery system (e.g. if steam is generated by waste heat from a kiln and waste heat from an internal combustion engine in a common waste heat recovery boiler);

[3] It is the medium carrying the waste energy in the form of heat, chemical energy or pressure. Examples of WECM include gas, air, steam, etc.

(e) The emission reductions are claimed by the generator of energy using waste energy;

(f) In cases where the energy is exported to other facilities (included in the project boundary), the following are required:

(i) All historical information from the recipient plants;

(ii) An official agreement exists between the owners of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) and the recipient plant(s) that the emission reductions would not be claimed by the recipient plant(s) for using a zero-emission energy source;

(g) For those facilities and recipients which are included in the project boundary, that prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods:

(i) The remaining lifetime of equipments currently being used; and

(ii) Crediting period;

(h) The waste gas/heat/pressure utilized in the project activity would have been flared or released into the atmosphere in the absence of the project activity. This shall be proven by one of the following options:

(i) By **direct measurements** of energy content and amount of the waste gas/heat/pressure for at least three years prior to the start of the project activity;

(ii) **Energy balance** of relevant sections of the plant to prove that the waste gas/heat/pressure was not a source of energy before the implementation of the project activity. For the energy balance representative process parameters are required. The energy balance shall demonstrate that the waste gas/heat/pressure was not used and also provide conservative estimations of the energy content and amount of waste gas/heat/pressure released;

(iii) **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 gas/heat/pressure and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities;

(iv) **Process plant** manufacturer's original specification/information, schemes and diagrams from the construction of the facility could be used as an

estimate of quantity and energy content of waste gas/heat/pressure produced for rated plant capacity per unit of product produced.

6. For the purpose of this category waste energy is defined as: a by-product gas/heat/pressure from machines and industrial processes having potential to provide usable energy, for which it can be demonstrated that it was wasted. For example gas flared or released into the atmosphere, the heat or pressure not recovered (therefore wasted). Gases that have intrinsic value in a spot market as energy carrier or chemical (e.g. natural gas, hydrogen, liquefied petroleum gas, or their substitutes) are not eligible under this category.

Boundary

7. The physical, geographical site of the facility where the waste gas/heat/pressure is produced and transformed into useful energy delineates the project boundary.

The geographical extent of the project boundary shall include the following:

(a) The industrial facility where waste energy is generated, including the part of the industrial facility where the waste gas was utilized for generation of captive electricity prior to implementation of the project activity;

(b) The facility where steam/process heat in the element process/electricity/mechanical energy is generated (generator steam/process heat/electricity/mechanical energy). Equipment providing auxiliary heat to the waste energy recovery process shall be included within the project boundary; and

(c) The facility(ies) where steam/process heat in the element process/electricity/mechanical energy is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

Baseline

8. In the situation where the electricity is obtained from a specific existing power plant or from the grid, mechanical energy is obtained by electric motors and heat from a fossil fuel based element process (e.g. steam boiler, hot water generator, hot air generator, hot oil generator), baseline emissions can be calculated as follows:

(a) Baseline emissions from electricity ($BE_{elec,y}$) generated by waste energy (e.g. waste pressure):

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

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
$EF_{Elec,i,j,y}$	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 (7). 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 (7) or (9). Note: For a project activity using waste pressure to generate electricity, electricity generated from waste pressure use should be measurable and this fraction is 1
f_{cap}	Capping factor to exclude increased waste energy utilization in the project year *y* due to increased level of activity of the plant, relative to the level of activity in the base years before project start. The ratio is 1 if the waste energy generated in project year *y* is same or less than that generated in base years. f_{cap} shall be estimated according to the corresponding section of ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"

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 baseline generation source is an identified existing plant, the CO_2 emission factor shall be determined as follows:

$$EF_{Elec,i,j,y} = \frac{EF_{CO2,i,j}}{\eta_{Plant,j}} \times 3.6 * 10^{-3} \qquad \textbf{(2)}$$

Where:

$EF_{CO2,i,j}$	The CO_2 emission factor per unit of energy of the fossil fuel used in the baseline generation source *i* in (tCO_2/TJ), obtained from reliable local or national data if available, otherwise, taken from the country specific IPCC default emission factors
$\eta_{Plant,j}$	The overall efficiency of the existing plant that would be used by j^{th} recipient in the absence of the project activity
$3.6*10^{-3}$	Conversion factor, expressed as TJ/MWh

In case, in the baseline situation, more than one type of fossil fuel is used in the captive plant, the relative contribution to the total output of each fossil fuel shall be considered and the formulas for baseline emissions shall be adjusted accordingly.

Efficiency of the power plant ($\eta_{Plant,j}$) shall be one of the following:

(i) Assume a constant efficiency of the captive plant and determine the efficiency, as a conservative approach, for optimal operation conditions i.e. design fuel, optimal load, optimal oxygen content in flue gases, adequate fuel conditioning (temperature, viscosity, moisture, size/mesh etc.), representative or favourable ambient conditions (ambient temperature and humidity); or

(ii) Highest of the efficiency values provided by two or more manufacturers for power plants with specifications similar to that which would have been required to supply the recipient with the electricity that it receives from the project activity; or

(iii) Assume a captive power generation efficiency of 60% based on the net calorific values as a conservative approach.

If the displaced electricity for the 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 "Tool to calculate the emission factor for an electricity system".

(b) Baseline emissions from electricity ($BE_{Elec,y}$) to provide mechanical energy generated by waste energy;

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j}\sum_{i}((\mathrm{MG}_{\mathrm{i,j,y,mot}}/\eta_{\mathrm{mech,mot}}) * EF_{Elec,i,j,y}) \quad \textbf{(3)}$$

Where:

$MG_{i,j,y,mot}$	Mechanical energy supplied to the recipient *j* by a generator that in the absence of the project activity would receive electricity from i^{th} source (electric motor) in the year *y*, in MWh
$\eta_{mech,mot}$	The efficiency of the baseline equipment (electric motor) that would provide mechanical power in the absence of the project activity
$EF_{Elec,i,j,y}$	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 mechanical energy generated by the project activity using waste energy. This fraction is 1 if the mechanical energy generation is purely from use of waste energy. If the boiler providing steam for mechanical energy generation uses both waste and fossil fuels, this factor is estimated using equation (7). If the steam used for generation of the mechanical energy is produced in dedicated boilers but supplied through a common header, this factor is estimated using equation (7) or (9). Note: For a project activity using waste pressure to generate mechanical energy, this energy generated from waste pressure use should be measurable and this fraction is 1
f_{cap}	Capping factor to exclude increased waste energy utilization in the project year *y* due to increased level of activity of the plant, relative to the level of activity in the base years before project start. The ratio is 1 if the waste energy generated in project year *y* is same or less than that generated in base years. f_{cap} shall be estimated according to the corresponding section of ACM0012

(c) Baseline emissions to provide thermal energy generated by waste energy ($BE_{Ther,y}$);

$$BE_{Ther,y} = f_{cap} * f_{wcm} * \sum_i \sum_j (HG_{j,y} + MG_{i,j,y,tur} / \eta_{mech,tur}) * EF_{heat,j,y} \quad \textbf{(4)}$$

Where:

$BE_{Ther,y}$	Baseline emissions from thermal energy (as steam) during the year *y* in tons of CO_2
$HG_{j,y}$	Net quantity of heat (enthalpy) supplied to the recipient plant *j* by the project activity during the year *y* in TJ (In case of steam this is expressed as the difference in energy contents between the steam supplied to the recipient plant and the feed water to the boiler. The enthalpy of feed water to the boiler takes into account the enthalpy of condensate returned to the boiler (if any) and any other waste heat recovery (including economiser, blow down heat recovery etc.). It should be noted that no additional fuel outside the boiler or hot water/oil generator should be fired to heat the feed water/oil. In case of hot water/oil generator this is expressed as the difference in energy content between the hot water/oil supplied to and returned by the recipient plant(s) to the element process of cogeneration plants). This includes steam supplied to recipients that may be used for generating mechanical energy
f_{wcm}	Fraction of total heat generated by the project activity electricity using waste energy. This fraction is 1 if the heat generation is purely from use of waste energy. If the element process providing heat uses both waste and fossil fuels, this factor is estimated using equation (7) or (9)
$EF_{heat,j,y}$	The CO_2 emission factor of the element process supplying heat that would have supplied the recipient plant *j* in the absence of the project activity, expressed in tCO_2/TJ and calculated as per equation (5) below
$MG_{i,j,y,tur}$	Mechanical energy generated and supplied to the recipient *j*, which in the absence of the project activity would receive power from a steam turbine *i,* driven by steam generated in a fossil fuel boiler (TJ)
$\eta_{mech,tur}$	The efficiency of the baseline equipment (steam turbine) that would provide mechanical power in the absence of the project activity

$$EF_{heat,j,y} = \sum_i ws_{i,j} \frac{EF_{CO2,i,j}}{\eta_{EP,i,j}} \quad \textbf{(5)}$$

Where:

$EF_{CO2,i,j}$	The CO_2 emission factor per unit of energy of the baseline fuel used in i^{th} element process used by recipient j, in tCO_2/TJ, in absence of the project activity
$\eta_{EP,i,j}$	Efficiency of the i^{th} element process that would have been supplied heat to j^{th} recipient in the absence of the project activity
$ws_{i,j}$	Fraction of total heat that is used by the recipient j in the project that in the absence of the project activity would have been supplied by the i^{th} boiler

Efficiency of the element process ($\eta_{EP,i,j}$) shall be one of the following:

(a) Assume a constant efficiency of the element process and determine the efficiency, as a conservative approach, for optimal operation conditions i.e. design fuel, optimal load, optimal oxygen content in flue gases, adequate fuel conditioning (temperature, viscosity, moisture, size/mesh etc.), representative or favourable ambient conditions (ambient temperature and humidity); or

(b) Highest of the efficiency values provided by two or more manufacturers for element process with specifications similar to that which would have been required to supply the recipient with heat that it receives from the project activity; or

(c) Maximum efficiency of 100%.

9. In the situation where the recipient plant(s) obtains electricity (and electrical motor driven mechanical energy) and/or heat generated including steam, hot air, hot oil or hot water, etc. (and the steam generated to drive a steam turbine to supply mechanical energy) by a fossil fuel based existing cogeneration plant, baseline emissions from co-generated electricity and heat of a cogeneration plant are calculated as follows:

$$BE_{En,y} = f_{cap} * f_{wcm} * \sum_j \frac{(HG_{j,y} + (\mathrm{MG}_{j,y,tur}/\eta_{mech,tur}) * 3.6\times10^{-3}) + (EG_{j,y} + \mathrm{MG}_{j,y,mot}/\eta_{mech,mot}) * 3.6\times10^{-3})}{\eta_{Cogen}} * EF_{CO2,COGEN} \quad \textbf{(6)}$$

Where:

$BE_{En,y}$	The baseline emissions from energy that is displaced by the project activity during the year y in tons of CO_2
$EG_{j,y}$	The quantity of electricity supplied to the recipient plant j by the project activity during the year y in MWh
$3.6*10^{-3}$	Conversion factor, expressed as TJ/MWh

$HG_{j,y}$	Net quantity of heat supplied to the recipient plant *j* by the project activity during the year *y* in TJ. In case of steam this is expressed as the difference in energy contents between the steam supplied to the recipient plant and the condensate returned by the recipient plant(s) to element process of the cogeneration plant. In case of hot water/oil this is expressed as difference in energy content between the hot water/oil supplied to and returned by the recipient plant(s) to the element process of cogeneration plant
$EF_{CO2,COGEN}$	CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline cogeneration plant in (tCO_2/TJ), obtained from reliable local or national data if available, otherwise, taken from the country specific IPCC default emission factors
η_{Cogen}	Efficiency of the cogeneration plant (combined heat and power generation efficiency) using fossil fuel that would have been used in the absence of the project activity
f_{wcm}	Fraction of total energy generated by the project activity using waste energy. This fraction is 1 if the energy generation is purely from use of waste energy in the project generation unit. If the generation unit uses steam from both waste and fossil fuels, this factor is estimated using equation (7) or (9)
f_{cap}	Capping factor to exclude increased waste energy utilization in the project year *y* due to increased level of activity of the plant, relative to the level of activity in the base years before project start. The ratio is 1 if the waste energy generated in project year *y* is same or less than that generated in base years. f_{cap} shall be estimated according to the corresponding section of ACM0012
$MG_{j,y,mot}$	Mechanical energy supplied to the recipient *j* by a generator that in the absence of the project activity would have been supplied by an electric motor during the year *y*, in MWh
$\eta_{mech,mot}$	The efficiency of the baseline equipment (electric motor) that would provide mechanical power in the absence of the project activity
$MG_{j,y,tur}$	Mechanical energy generated and supplied to the recipient *j*, which in the absence of the project activity would receive power from a steam turbine, driven by steam generated in a fossil fuel boiler, during the year *y*, in MWh
$\eta_{mech,tur}$	The efficiency of the baseline equipment (steam turbine) that would provide mechanical power in the absence of the project activity

10. Efficiency of the cogeneration plant (η_{Cogen}) shall be one of the following:

(i) Assume a constant efficiency of the cogeneration plant and determine the efficiency, as a conservative approach, for optimal operational conditions i.e. designed fuel, designed steam extractions, optimal load, optimal oxygen content in flue gases, adequate fuel conditioning (viscosity, temperature, moisture, size/mesh etc.), representative or favorable ambient conditions (temperature, humidity); or

(ii) Highest of the efficiency values provided by two or more manufacturers for similar plants as used in the project activity; or

(iii) Maximum efficiency of 90%, based on net calorific values (irrespective of type of cogeneration system and type of heat generated).

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

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

Situation 1:

11. The procedure specified below should be applied when the direct measurement of the energy generated using the WECM is not possible as other fossil fuel(s) along with WECM are used for energy generation. The relative share of the total generation from WECM is calculated by considering the total electricity produced, the amount and calorific values of the other fuels and of the WECM used, and the average efficiency of the plants where the energy is produced.

The fraction of energy produced by using the WECM in the project activity is calculated as follows:

$$f_{WCM} = \frac{\dfrac{\sum_{h=1}^{8760} Q_{WCM,h} * [Cp_{wcm} * (t_{wcm,h} - t_{ref}) + NCV_{WCM,y}]}{H_r}}{EG_{tot,y}} \quad (7)$$

Where:

$Q_{WCM,h}$	Quantity of waste gas/heat recovered (kg/h) in hour *h*
$NCV_{WCM,y}$	Net Calorific Value of WECM in year *y* (TJ/kg)
H_r	Average heat rate of the power plant where electricity is produced (1/efficiency) as calculated in equation 8 below
$EG_{tot,y}$	Total annual energy produced at the power or cogeneration plants (TJ/year)
Cp_{wcm}	Specific Heat of WECM (TJ/kg-deg C or other suitable unit)
$t_{wcm,h}$	The temperature of WECM in hour *h* (deg C or other applicable unit)
t_{ref}	Reference temperature (0 deg C or any other suitable reference temperature with proper justification)

The average heat rate of the power plant is given as:

$$H_r = \frac{\sum_{h=1}^{8760}\sum_{i=1}^{I} Q_{i,h} * [Cp_i * (t_{i,h} - t_{ref}) + NCV_i]}{EG_{tot,y}} \quad \textbf{(8)}$$

Note: In cases index *i* represents fuel, the energy content corresponding to the sensible heat of fuel *i* should be zero.

$$Cp_i * (t_{i,h} - t_{ref}) = 0$$

Where:

$Q_{i,h}$	Amount of individual fuel and carrying media (WECM and other fuel(s) or non-waste carrying media) *i* consumed at the energy generation unit during hour *h* (kg)
Cp_i	Specific Heat of WECM *i* (TJ/kg - deg C or other suitable unit)
NCV_i	Net Calorific Value: annual average for each individual consumed fuel and the WECM (TJ/kg)
$EG_{tot,y}$	Total annual energy produced at the power or cogeneration plants (TJ/year)
$t_{i,h}$	The temperature of individual carrying media (WECM and other non-waste carrying media) *i* consumed at the energy generation unit during hour *h* (deg C or other applicable unit)
t_{ref}	Reference temperature (0 deg C or any other suitable reference temperature with proper justification)

Situation 2:

12. An alternative method that could be used when: (a) It is not possible to measure the net calorific value of the waste gas/heat; and (b) Steam generated with different fuels in dedicated boilers is fed to turbine/s via common steam header takes into account that the relative share of the total generation from WECM is calculated by considering the total steam produced by the waste heat recovery boiler and the amount of steam generated from each boiler. The fraction of energy produced by the waste gas/heat WECM in the project activity is calculated as follows:

$$f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}} \quad \textbf{(9)}$$

Where:

$ST_{whr,y}$	Energy content of the steam generated in the waste heat recovery boiler and fed to the turbine via common steam header
$ST_{other,y}$	Energy content of steam generated in other boilers and fed to turbine via common steam header

Situation 2 requires that:

- All the boilers have to provide superheated steam;
- The calculation should be based on the energy supplied to the steam turbine. The enthalpy and the steam flow rate must be monitored for each boiler to determine the steam energy content. The calculation implicitly assumes that the properties of steam (temperature and pressure) generated from different sources are the same. The enthalpy of steam and feed water will be determined at measured temperature and pressure and the enthalpy difference will be multiplied with the quantity measured by steam meter;
- Any vented steam should be deducted from the steam produced with waste gas/heat.

Project emissions

13. Project emissions include emissions due to combustion of auxiliary fuel to supplement waste gas and emissions due to consumption of electricity by the project activity.

14. If the waste gas contains carbon monoxide or hydrocarbons, other than methane, and the waste gas is vented to the atmosphere in the baseline situation, project emissions have to include CO_2 emissions due to the combustion of the waste gas.

Leakage

15. If equipment to be used in the project activity is currently being utilised elsewhere and is transferred from outside the boundary to the project activity, leakage is to be considered.

Emission reductions

16. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(10)}$$

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)

Monitoring

17. Monitoring shall consist of:

(a) Metering the thermal and/or electrical energy produced. In case of thermal energy the enthalpy of the output stream (like steam/heat/hot water) should be monitored;

(b) Metering the amount of waste gas or the amount of energy contained in the waste heat or waste pressure;

(c) Metering the amount of mechanical energy generated/supplied;

(d) Metering the temperature and pressure of the WECM;

(e) In case the methodology is used in conjunction with AMS-III.AL "Conversion from single cycle to combined cycle power generation" (according to provision 5 (d) above), separate measuring of the electrical energy produced associated with the two waste energy sources or of the energy content of the two WECM streams or of the energy content of the two waste heat streams utilized for electricity production is required. Energy contents are monitored through mass flow rate and enthalpy measures. If the waste energy is used for the WECM generation in a common waste heat recovery system (e.g. if steam is generated by waste heat from a kiln and waste heat from an internal combustion engine in a common waste heat recovery boiler), the energy content of the waste heat streams is to be monitored separately, through mass flow rate and enthalpy measures.

18. For electricity or thermal energy exported to other facilities, monitoring of the use of electricity and thermal energy shall be undertaken at the recipient end. For electricity exported to a grid, the net electricity delivered shall be monitored.

19. Where applicable all the parameters mentioned above and the parameters for determination of f_{cap} shall be monitored in accordance with ACM0012.

20. For determining project emissions due to the electricity consumption (including auxiliary use) the relevant monitoring procedure in the tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" shall be followed and for calculating project emissions due to fossil fuel consumption (including auxiliary use) $PE_{fuel,y}$, the monitoring of the relevant parameters shall be conducted as per the tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

21. The applicable requirements specified in the "General Guidelines to SSC CDM methodologies" (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines.

Project activity under a Programme of Activities

The following conditions apply for use of this methodology in a project activity under a programme of activities:

22. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

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History of the document

Version	Date	Nature of revision
04	EB 60, Annex 22 15 April 2011	To include multiple fuel in the baseline and recovery of waste heat for multiple waste heat sources.
03	EB 51, Annex 17 04 December 2009	To include, *inter alia*, export of energy generated by the project activity to other facilities, definition of existing facility, procedures and formulae for the calculation of baseline emission from thermal energy generation and to exclude recovery of waste heat in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate electricity.
02	EB 42, Annex 19 26 September 2008	To broaden the applicability of the methodology to allow other fuels to supplement the use of waste energy and to include a precise definition of waste gas and further guidance on baseline emission calculations.
01	EB 35, Annex 26 19 October 2007	Initial adoption.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		