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

TYPE I - RENEWABLE ENERGY PROJECTS

Note: Categories I.A, I.B and I.C involve renewable energy technologies that supply electricity, mechanical and thermal energy, respectively, to the user directly. Renewable energy technologies that supply electricity to a grid fall into category I.D.

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

I.B. Mechanical energy for the user with or without electrical energy

Technology/measure

1. This category comprises renewable energy generation units that supply individual households or users or groups of households or users with ~~a small amount of~~ mechanical energy who otherwise would have been supplied with fossil fuel based energy. These units include technologies such as hydropower, wind power, and other technologies that provide mechanical energy, all of which is used on-site by the individual household(s) or user(s), such as wind-powered pumps, solar water pumps, water mills and wind mills.

2. Where generation capacity is specified, it shall be less than 15MW. If the generation capacity is not specified, the estimated diesel-based electricity generating capacity that would be required to provide the same service or mechanical energy shall be less than 15 MW. In the case of irrigation where diesel-fuelled pumps are used directly, the cumulative rating of diesel-fuelled pumps shall not exceed 15 MW. The size of a diesel-based generator or a diesel pump that would be required shall be justified.

3. For irrigation applications involving replacement of the pump in addition to renewable energy use, the operating characteristics (head v/s discharge and efficiency) of the new pump should be similar to or better than the system being replaced or would have been replaced. In irrigation applications where the water distribution system is replaced or modified, the new system should have distribution efficiency similar to or better than the replaced system.

4. If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires [non-] renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.

5. Project activities adding renewable energy capacity should consider the following cases:

Case 1) Adding new units;

Case 2) Replacing old units for more efficient units.

To qualify as a small scale CDM project activity, the aggregate installed capacity after adding the new units (case 1) or installed capacity of the more efficient units (case 2) should be lower than 15 MW[1].

[1] Ex: 5 MW of new capacity is added to existing 9 MW to make the aggregate capacity of 14 MW which is within the allowed limits 15 MW capacity.

Boundary

6. The physical, geographical site of the renewable energy technology and the equipment that uses the mechanical energy produced delineates the project boundary.

Baseline

7. The simplified baseline is the estimated emissions due to serving the same load with a diesel generator consumption saved times the emission coefficient for diesel. The diesel emissions displaced annually are calculated either as:

(a) The power requirements times hours of operation per year times the emission factor for diesel generator systems in Table I.D.I under category I.D.

OR

(b) The diesel fuel consumption per hour times hours of operation per year times the default value for the emission coefficient for diesel fuel (3.2 kg CO_2 per kg of diesel fuel).

8. If the application involves generation of electricity in addition to mechanical energy, one of the following options shall be used to calculate the baseline emissions for the electricity generated:

(i) Where electricity production is on an off-grid/stand-alone mode or an isolated[2] mini-grid, the baseline emissions for the electricity use will be determined according to procedures specified in AMS I.A;

(ii) Where electricity production is on a grid connected mode, the baseline emissions for the electricity use will be determined according to procedures specified in AMS I.D.

9. In the case of project activities adding renewable energy capacity, if the availability of renewable resources is limited, the impact of a decrease in energy production from the units installed before the project implementation must be considered.

For the specific case of hydropower plants this effect could be considered calculating the production of energy that must be used for emission reduction calculation with the following procedure:

1) To estimate every year during the crediting period, the energy that would have been produced in the same hydrological conditions by the units installed before the project;
2) The energy production EGy (MWh/ year) that must be considered to calculate emission reductions is calculated with the following formula:

$$\mathbf{EGy = TEy - WTEy}$$

Where:
TEy actual energy produced in the year y in the plant (all units)

[2] Not connected to the regional or national grids and not exporting and/or importing power from the national/regional grids.

WTEy energy that would have been produced by the units installed before the project under the hydrological conditions of the year y

Leakage

10. If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

Monitoring

11. Monitoring shall consist of:

(a) Recording annually the number of systems operating (evidence of continuing operation, such as on-going rental/lease payments could be a substitute); and

(b) Estimating the annual hours of operation for the equipment that uses the mechanical energy produced, if necessary using sampling methods. Annual hours of operation can be estimated from total output (tonnes of grain milled) and output per hour if an accurate value of output per hour is available.

12. In the case of applications involving mechanical and electrical energy, the electrical energy generation should be metered.

13. For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.

14. For projects consuming biomass a specific fuel consumption[3] of each type of fuel (biomass or fossil) to be used should be specified ex-ante. The consumption of each type of fuel shall be monitored.

15. If fossil fuel is used the energy produced metered should be adjusted to deduct production from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

16. If more than one type of biomass fuel is consumed each shall be monitored separately.

17. The amount of energy produced using biomass fuels calculated as per paragraphs above shall be compared with the amount of energy calculated using specific fuel consumption and amount of each type of biomass fuel used. The lower of the two values should be used to calculate emission reductions.

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:

~~16.~~ **18.** **In the specific case of biomass project activities t**~~T~~he applicability of the methodology ~~for biomass project activities~~ is limited to either project activities that use biomass residues only or

[3] Specific fuel consumption is the fuel consumption per unit of electricity generated (e.g. tonnes of bagasse per MWh).

biomass from dedicated plantations which comply with the applicability conditions of AM0042 **as in annex 1 of this document**.

~~17.~~ **19.** **In the specific case of biomass project activities t**~~T~~he determination of leakage shall be done following the general guidance for leakage in small-scale biomass project activities (attachment C of appendix B) or following the prescriptions included in the leakage section of AM0042 **as in annex 1 of this document**.

~~18.~~ **20.** 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.

Annex 1 (applicability conditions and guidance on leakage below concerns Project activity under a programme of activities)

Applicability

1. The methodology is applicable under the following conditions:
    - The project activity involves the installation of a new grid-connected power plant that is mainly fired with renewable biomass from a dedicated plantation (fossil fuels or other types of biomass may be co-fired);
    - Prior to the implementation of the project activity, no power was generated at the project site (i.e. the project plant does not substitute or amend any existing power generation at the project site);
    - The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;
    - Biomass used by the project facility is not stored for more than one year;
    - The dedicated plantation must be newly established as part of the project activity for the purpose of supplying biomass exclusively to the project.
    - The biomass from the plantation is not chemically processed (e.g. esterification to produce biodiesel, production of alcohols from biomass, etc) prior to combustion in the project plant but it may be processed mechanically or be dried;
    - The site preparation does not cause longer-term net emissions from soil carbon. Carbon stocks in soil organic matter, litter and deadwood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity;
    - The land area of the dedicated plantation will be planted by direct planting and/or seeding;
    - After harvest, regeneration will occur either by direct planting or natural sprouting;
    - Grazing will not occur within the plantation;
    - No irrigation is undertaken for the biomass plantations;
    - The land area where the dedicated plantation will be established is, prior to project implementation, severely degraded and in absence of the project activity would have not been used for any other agricultural or forestry activity. The land degradation can be demonstrated using one or more of the following indicators:
      (a) Vegetation degradation, e.g.,
        - crown cover of pre-existing trees has decreased in the recent past for reasons other than sustainable harvesting activities;
      (b) Soil degradation, e.g.,
        - soil erosion has increased in the recent past;
        - soil organic matter content has decreased in the recent past.
      (c) Anthropogenic influences, e.g.,
        - there is a recent history of loss of soil and vegetation due to anthropogenic actions; and
        - demonstration that there exist anthropogenic actions/activities that prevent possible occurrence of natural regeneration.

Leakage

2. An important potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass ***residues*** from other uses to the project plant as a result of the project activity.

If biomass residues are co-fired in the project plant, project participants shall demonstrate that the use of the biomass residues does not result in increased use of fossil fuels or other GHG emissions elsewhere. For this purpose, project participants shall assess as part of the monitoring the supply situation for each type of biomass residue *k* used in the project plant. Table 6 below outlines the options that may be used to demonstrate that the biomass residues used in the plant did not increase fossil fuel consumption or other GHG emissions elsewhere.

Which approach should be used depends on the most plausible baseline scenario for the use of the biomass residues. Where scenarios B1, B2 or B3 apply, use approaches L_1, L_2 and/or L_3. Where scenario B4 applies, use approaches L_2 or L_3. Where scenario B5 applies, use approach L_4.

Table 6. Approaches to rule out leakage

L_1	Demonstrate that at the sites where the project activity is supplied from with biomass residues, the biomass residues have not been collected or utilized (e.g. as fuel, fertilizer or feedstock) but have been dumped and left to decay, land-filled or burnt without energy generation (e.g. field burning) prior to the implementation of the project activity. Demonstrate that this practice would continue in the absence of the CDM project activity, e.g. by showing that in the monitored period no market has emerged for the biomass residues considered or by showing that it would still not be feasible to utilize the biomass residues for any purposes (e.g. due to the remote location where the biomass residue is generated).
L_2	Demonstrate that there is an abundant surplus of the in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of available biomass residues of type *k* in the region is at least 25% larger than the quantity of biomass residues of type *k* that are utilized (e.g. for energy generation or as feedstock), including the project plant.
L_3	Demonstrate that suppliers of the type of biomass residue in the region of the project activity are not able to sell all of their biomass residues. For this purpose, project participants shall demonstrate that the ultimate supplier of the biomass residue (who supplies the project) and a representative sample of suppliers of the same type of biomass residue in the region had a surplus of biomass residues (e.g. at the end of the period during which biomass residues are sold), which they could not sell and which are not utilized.
L_4	Identify the consumer that would use the biomass residue in the absence of the project activity (e.g. the former consumer). Demonstrate that this consumer has substituted the biomass residue diverted to the project with other types of biomass residues (and not with fossil fuels or other types of biomass than biomass residues[4]) by showing that the former user only fires biomass residues for which leakage can be ruled out using approaches L_2 or L_3. Provide credible evidence

[4] The generation of other types of biomass than biomass residues may be involved with significant GHG emissions, for example, from cultivation or harvesting.

	and document the types and amounts of biomass residues used by the former user as replacement for the biomass residue fired in the project activity and apply approaches L_2 or L_3 to these types of biomass residues. Demonstrate that the substitution of the biomass residues used in the project activity with other types of biomass residues does not require a significant additional energy input except for the transportation of the biomass residues.

Where project participants wish to use approaches L_2, L_3 or L_4 to assess leakage effects, they shall clearly define the geographical boundary of the region and document it in the draft CDM-PDD. In defining the geographical boundary of the region, project participants should take the usual distances for biomass transports into account, i.e. if biomass residues are transported up to 50 km, the region may cover a radius of 50 km around the project activity. In any case, the region should cover a radius around the project activity of at least 20 km but not more than 200 km. Once defined, the region should not be changed during the crediting period(s).

Project participants shall apply a leakage penalty to the quantity of biomass residues, for which project participants cannot demonstrate with one of the approaches above that the use of the biomass residue does not result in leakage. The leakage penalty aims at adjusting emission reductions for leakage effects in a conservative manner, assuming that this quantity of biomass residues is substituted by the most carbon intensive fuel in the country.

If for a certain biomass residue type *k* used in the project leakage effects cannot be ruled out with one of the approaches above, leakage effects for the year *y* shall be calculated as follows:

$$LE_y = EF_{CO2,LE} \cdot \sum_n BF_{LE,n,y} \cdot NCV_n$$

Where:

LE_y	=	Leakage emissions during the year *y* (tCO_2/yr)
$EF_{CO2,LE}$	=	CO_2 emission factor of the most carbon intensive fuel used in the country (tCO_2/GJ)
$BF_{LE,n,y}$	=	Quantity of biomass residue type *n* used for heat generation as a result of the project activity during the year *y* and for which leakage can not be ruled out using one of the approaches L_1, L_2, L_3 or L_4 (tons of dry matter or liter)
NCV_n	=	Net calorific value of the biomass residue type *n* (GJ/ton of dry matter or GJ/liter)
n	=	Biomass residue type *n* for which leakage can not be ruled out using one of the approaches L_1, L_2, L_3 or L_4

In case of approaches L_1, $BF_{LE,n,y}$ corresponds to the quantity of biomass residue type *n* that is obtained from the relevant source or sources.

In case of approaches L_2 or L_3, $BF_{LE,n,y}$ corresponds to the quantity of biomass residue type *k* used in the project plant as a result of the project activity during the year *y* ($BF_{LE,n,y} = BF_{PJ,k,y}$, where $n=k$).

In case of approach L_4, $\left(BF_{LE,n,y} \cdot NCV_n\right)$ corresponds to the lower value of

(a) The quantity of fuel types *m*, expressed in energy quantities, that are used by the former user of the biomass residue type *k* and for which leakage can not be ruled out because the fuels used are either (i) fuels types other than biomass residues (e.g. fossil fuels or biomass types other than biomass residues) or (ii) are biomass residues but leakage can not be ruled out for those types of biomass residues with approaches L_2 or L_3; as follows:

$$BF_{LE,n,y} \cdot NCV_n = \sum_m FC_{former\ user,m,y} \cdot NCV_m$$

Where:

$BF_{LE,n,y}$	=	Quantity of biomass residue type *n* used for heat generation as a result of the project activity during the year *y* and for which leakage can not be ruled out using approach L_4 (tons of dry matter or liter)
NCV_n	=	Net calorific value of the biomass residue type *n* (GJ/ton of dry matter or GJ/liter)
n	=	Biomass residue type *n* for which leakage can not be ruled out using approach L_4
$FC_{former\ user,m,y}$	=	Quantity of fuel type *m* used by the former user of the biomass residue type *n* during the year *y* (mass or volume unit)
NVC_m		Net calorific value of fuel type *m* (GJ/ton of dry matter or GJ/liter)
m	=	Fuel type *m*, being either (i) a fuel type other than a biomass residue (e.g. fossil fuel or biomass other than biomass residues) or (ii) a biomass residues for which leakage can not be ruled out with approaches L_2 or L_3

(b) The quantity of biomass residue type *k*, expressed in energy quantities, used in the project plant during the year *y* ($BF_{LE,n,y} = BF_{PJ,k,y}$, where $n=k$).