13. Energy / Distribution System Efficiency Improvement

1. Typical Project Outline

- Enhancement of efficiency of existing distribution systems.
- Addition of high efficient distribution systems.

2. Applicability

(1) Replacement, repairing and improvement of existing low efficient transformers in a distribution system.

(2) Introduction of high efficient transformers along with expansion of a distribution system.

3. Methodology of Emission Reduction Calculation

The emission reduction from the project activity is determined as the differences between the GHG emission of baseline scenario (transmission system with low efficiency) and project scenario (transmission system with high efficiency).

$$ER_y = BE_y - PE_y$$

ER_y : Emission reduction through the projet in a year y (t-CO_2e/y)

BE_y : GHG emission from the baseline scenario in a year y (t-CO_2e/y)

PE_y : GHG emission from the project scenario in a year y (t-CO_2e/y)

(1) Calculation of Baseline Emission

Baseline GHG emission is calculated based on the amount of electricity to the transmission system in the project, transmission loss of the baseline transmission system and CO_2 emission factor the electricity generation system.

$$BE_y = DE_{PJ,y} \times DLR_{BL,y} \times EF_{elec}$$

$DE_{PJ,y}$: Amount of electricity to the distribution system in the project in a year y (MWh/y)

$DLR_{BL,y}$: Distribution loss rate of the baseline distribution system in a year (%)

EF_{elec} : CO_2 emission factor of the electricity (t-CO_2/MWh)

(2) Calculation of Project Emission

Project GHG emission is calculated based on the electricity loss of the project transmission system and CO_2 emission factor of the electricity generation system.

$$PE_y = DL_{PJ,y} \times EF_{elec}$$

$DL_{PJ,y}$: Electricity loss of the project distribution system in a year y (MWh/y)

EF_{elec} : CO_2 emission factor of the electricity (t-CO_2/MWh)

4. Data and Parameters Estimated and Need Monitoring

Data	Description	Data Sources			
		For baseline emission calculation		For project emission calculation	
		Ex-ante	Ex-post	Ex-ante	Ex-post
$DLR_{BL,y}$	Distribution loss rate of the baseline distribution system in a year (%)	A value of historical performance		N/A	
$DE_{PJ,y}$	Amount of electricity to the distribution system in the project in a year y (MWh/y)	A planned value	A monitored value	A planned value	A monitored value
$TL_{PJ,y}$	Electricity loss of the project distribution system in a year y (MWh/y)	N/A		A planned value	A monitored value
EF_{elec}	In the case of a grid CO_2 emission factor (t-CO_2/MWh)	A default value (Table 4, Appendix) If there is no default value applied or if there is another appropriate value, that value may be used.			
	In the case of standalone power generation or mini grid: CO_2 emission factor of diesel generator (t-CO_2/MWh)	A default value (Table 5, Appendix) If there is no default value applied or if there is another appropriate value, that value may be used.			

5. Others

(1) Project Boundary

The physical boundary for measuring GHG emissions includes power transmission system where project activity is implemented.

(2) Leakage

There are probably indirect emissions that potentially lead to leakage due to activities such as product manufacturing or transport of materials. However, the kind of emission is temporary and negligible compare to the project scale. Therefore, it can be ignored.

(3) Comparison with existing CDM methodologies

There are CDM methodologies such as AM0067 (Methodology for installation of energy efficient transformers in a power distribution grid, Version 02) and AMS-II.A. (Supply side energy efficiency improvements – transmission and distribution, Version 10) can be references for development of the methodology.

The logic of emission reduction calculation in the methodology is almost the same as that of the AMS-II.A. However, this methodology tries to apply distribution loss rate of the baseline transmission system and amount of electricity into the project transmission system in order to reflect any change of electricity in the system by expansion of the distribution system. Moreover, there is no limitation for the emission reduction in the methodology like the CDM methodologies did.