



A/R Methodological Tool

“Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”

(Version 01)

I. APPLICABILITY, DEFINITIONS AND PARAMETER

Applicability

1. This tool is applicable for estimating the increase of GHG emissions attributable to the displacement of pre-project agricultural activities due to implementation of an A/R CDM project activity, which can not be considered insignificant according to the most recent: (i) “Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant, (ii) “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant”.
2. This tool is not applicable if the displacement of agricultural activities attributable to the A/R CDM project activity is expected to cause any drainage of wetlands or peatlands.

Definitions

3. For the purpose of this tool, the following definitions apply:

Agricultural activities. Human induced activities consisting of crop cultivation activities and grazing activities.

Crop cultivation activities. Cultivation of land aimed at vegetation control for producing e.g. food, feed, forage, fiber and oilseed crops, includes harvesting of the produced crops.

Grazing activities. The human induced system of management of land in order to allow for livestock production.

Displacement of agricultural activities. The relocation of the agricultural activities from areas of land located within the project boundary to areas of land located outside the project boundary.

Parameter

4. This tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$LK_{Agric, t}$	t CO ₂ -e	Leakage due to the displacement of agricultural activities in year t



II. PROCEDURE

5. The tool provides a stepwise procedure for estimating the increase of GHG emissions attributable to the displacement of agricultural activities due to implementation of an A/R CDM project activity:

Step 1: Estimate the area subject to pre-project agricultural activities that is expected to be afforested/reforested (therefore the activities have to be displaced) during year t since the start of the A/R project activity (Ad_t).

Project participants may:

- (a) Estimate the area, Ad_t directly, e.g., using maps and/or land surveys and/or Participatory Rural Appraisal; and/or
- (b) Estimate the area, Ad_t indirectly from the data on number of head of livestock to be displaced (possibly converted to livestock equivalent units - LSU) divided by the appropriate sustainable stocking rate.

Both approaches above may be combined according to data availability.

Calculate:

$$D_{i^*} = \frac{\sum_{t=1}^{i^*} Ad_t}{A} \quad (1)$$

where:

D_t Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t ; dimensionless

A Total area of A/R CDM project activity; ha

Ad_t Area subject to pre-project agricultural activities that are displaced during year t since the start of the A/R project activity; ha

t 1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity

Step 2:

Take:

ΔC_t : - annual change in carbon stock in all selected carbon pools for year t ; t C yr⁻¹,

as calculated following requirements of the baseline and monitoring A/R CDM methodology within which this tool is used (e.g., calculated using equation 12 in the approved consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0002:

“Afforestation or reforestation of degraded land without displacement of pre-project activities” - Version 01).

For each of the planned (*ex ante*) or actual (*ex post*) verifications calculate:

$$\Delta C_{t=t_{ver}} = \sum_{t=1}^{t_{ver}} \Delta C_t * 1year \quad (2)$$

where:

$\Delta C_{t=t_{ver}}$ Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} ; t C

ΔC_t Annual change in carbon stock in all selected carbon pools for year t . Note that for each verification event data for ΔC_t will be known for each year through the year of verification; t C yr⁻¹

t_{ver} Year of verification event; yr

Step 3: For each year t take D_t and select t_{ver} which occurs immediately after the year t in order to calculate:

$$\Delta Cd_{t^*} = D_{t^*} * \Delta C_{t=t_{ver}} \quad (3)$$

where:

ΔCd_{t^*} Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} attributable to the area subject to pre-project agricultural activities that are displaced during year t^* since the start of the A/R project activity; t C

$\Delta C_{t=t_{ver}}$ Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} ; t C

D_{t^*} Fraction of the total area of A/R CDM project activity subject to displacement of agricultural activities in year t^* ; dimensionless

t_{ver} Year of verification event; yr

t 1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity

Step 4: Estimate the factor f , as the fraction of land covered by forest (according to the national definition of forest) in the region containing the A/R CDM project activity. The region shall be the smallest territorial administrative division/s encompassing all areas of land included in the A/R CDM project activity for which data on forest cover are publicly available. If more than one territorial administrative division is involved then f shall be calculated as weighted average of the individual divisions' fraction of land covered by forest using area as a weight. Satellite images or other types of remote sensing data may be used as source of data on forest cover, if available to project participants.

Step 5: Calculate average leakage due to displacement of agricultural activities in year t^* :

$$LK_{Agric, t^*} = \frac{44}{12} * \frac{f}{T_{cred}} * \Delta Cd_{t^*} \quad (4)$$



where:

LK_{Agric, t^*}	Leakage due to displacement of agricultural activities in year t^* ; t CO ₂ -e
f	Fraction of land covered by forest (according to the national definition of forest) in the region containing the A/R CDM project activity; dimensionless
T_{cred}	Number of years contained in the first crediting period; dimensionless
ΔCd_t	Sum of annual changes in carbon stock in all selected carbon pools since the start of the A/R CDM project activity to the year of verification t_{ver} , attributable to the area subject to pre-project agricultural activities that are displaced during year t since the start of the A/R project activity; t C
t	1, 2, 3, ... t^* years elapsed since the start of the A/R CDM project activity
44/12	Ratio of molecular weight of CO ₂ to carbon; t CO ₂ -e t C ⁻¹

III. APPLICATION

6. This tool supersedes the A/R methodological tool: “Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity” effective of 04 June 2011.

History of the document

Version	Date	Nature of revision(s)
01	EB 51, Annex 15 04 December 2009	Initial adoption.
Decision Class: Regulatory Document Type: Tool Business Function: Methodology		