Joint Crediting Mechanism Approved Methodology PH_AM004
"Methane Emission Reduction by Water Management in Rice Paddy Fields"

A. Title of the methodology

Methane Emission Reduction by Water Management in Rice Paddy Fields, Version 01.0

B. Terms and definitions

Terms	Definitions
Drainage	A drainage*[1,2] is considered fully completed when the water level is observed to reach 15 cm below the soil surface. **1: The above requirements do not apply to the end-of-season drainage.* **2: In case the water level does not reach 15 cm below the soil surface, a drainage may be deemed fully completed under the following condition, however, such drainage is only perceived as a single drainage even if the conditions are met multiple times in one cropping season.* *The water level is below the soil surface between 0 cm and −15 cm for a total of 10 days consisting of at least 3 consecutive days. This condition is demonstrated by observation on the first and last days of consecutive days when the water level is observed to be below the soil surface, and either 1) observation on every 3 days when the water level stays below the soil surface or 2) precipitation data which indicates there is no precipitation during those consecutive days.*
Single Drainage	Fields have a single drainage event and period of time without flooded conditions during the cropping season at any growth stage, in addition to the end-of-season drainage.
Multiple Drainage	Fields have more than one drainage event and period of time without flooded conditions during the cropping season, in addition to the end-of-season drainage, including alternate wetting and drying (AWD).

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	CH_4 emission reductions achieved through change of water management scheme of rice paddy field, while increases/decreases of N_2O and CO_2 emissions are also considered. Uncertainty concerning both reference and project emissions are conservatively addressed through Uncertainty deduction (Ud) values.
Calculation of reference emissions	Reference emissions are calculated based on CH_4 and N_2O emissions in reference fields in the same cultivation and environmental conditions including pre-season water regime, soil type, and type and amount of organic amendment of project rice paddy field. Direct measurement is used to estimate reference CH_4 and N_2O emissions. Country specific values for calculating CH_4 emissions can also be used subject to cross-checking of the values obtained from direct measurement. N_2O emissions can also be calculated from the amount of fertilizer applied. CO_2 emissions from the use of irrigation and drainage pumps are optional for counting and calculated based on fuel consumption of the pumps.
Calculation of project emissions	Project emissions are calculated based on CH_4 and N_2O emissions in project fields. Direct measurement is used to estimate project CH_4 and N_2O emissions. Country specific values for calculating CH_4 emissions can also be used subject to cross-checking of the values obtained from direct measurement. N_2O emissions can also be calculated from the amount of fertilizer applied. CO_2 emissions from the use of drainage pumps for draining water from rice paddy fields are counted while those from the use of irrigation pumps are optional for counting. CO_2 emissions are calculated based on fuel consumption of the pumps.
Monitoring parameters	● CH_4 and N_2O emission factors from rice paddy fields from both reference and project water regimes ● Areas of project fields of each stratum and/or each filed ● Total number of days under the project in a cropping season, when applicable

	● Application rate of organic amendment, when applicable ● Application rate of nitrogen fertilizer, when applicable ● Fuel consumption of drainage pumps for the project field (Fuel consumption of drainage pumps for the reference field and fuel consumption of irrigation pumps are optional).

D. Eligibility criteria

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

Criterion 1	The project field is rice paddy field that changes water regime [1] during cultivation period from continuously flooded to single or multiple drainage, or from single to multiple drainage. For the former, farmers have not conducted single or multiple drainage, as defined in Section B above, in the past 2 years prior to the start of the project, and for the latter, project participants have not conducted multiple drainage in the past 2 years prior to the start of the project* **If a pilot study is carried out on the same field as the project field, project participants have not conducted single and/or multiple drainage in the past 2 years prior to the start of the pilot study.* *See Appendix C for the method to demonstrate water management in the past 2 years prior to the start of the project.*
Criterion 2	A drainage*1,2 is considered fully completed when the water level is observed to reach 15 cm below the soil surface. To maintain yield, an irrigation is carried out within 2 days after the completion of the drainage. If the irrigation, to be conducted within 2 days after the completion of drainage, fails, project participants demonstrate that yield reduction*3 has not resulted in significant difference between the reference and project field or has resulted from causes beyond the reasonable control of the project participants. Any evidence of the drainage not causing yield reduction*3 is to be submitted. **1: The above requirements do not apply to the end of season drainage.* **2: In case the water level does not reach 15 cm below the soil surface, a drainage may be deemed fully completed under the following condition, however, such drainage is only perceived as a single drainage even if the conditions are met multiple times in one cropping season.:*

[1] For supplemental information on water management of rice paddy fields in this methodology, refer to Appendix B

	The water level is below the soil surface between 0 cm and −15 cm for a total of 10 days consisting of at least 3 consecutive days. This condition is demonstrated by observation on the first and last days of consecutive days when the water level is observed to be below the soil surface, and either 1) observation on every 3 days when the water level stays below the soil surface or 2) precipitation data which indicates there is no precipitation during those consecutive days. *Methods to demonstrate conditions for water level of 15 cm below the soil surface or periods in which the water level stays below the soil surface are detailed in Appendix C.* *Methods other than those mentioned above may be applied subject to prior expert review as described in the Appendix C.* **3: See Appendix C for the method to demonstrate no significant rice yield reduction. A proposed project may be considered eligible if yield reduction arises from causes beyond the reasonable control of the project participants.*
Criterion 3	Single or multiple drainage is not required by the local or national legislation at the project field.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
CH_4 generated from rice paddy field due to activity of microorganism under anaerobic soil condition.	CH_4
N_2O emissions from fertilizer application.	N_2O
CO_2 emissions due to the utilization of drainage pumps used to drain water from rice paddy fields are optional.	CO_2
CO_2 emission due to utilization of irrigation pumps are optional.	CO_2
Project emissions	
Emission sources	GHG types
CH_4 generated from rice paddy field due to activity of microorganism under anaerobic soil condition.	CH_4
N_2O emissions from fertilizer application.	N_2O
CO_2 emissions due to the utilization of drainage pumps used to drain water from rice paddy fields.	CO_2
CO_2 emission due to utilization of irrigation pumps are optional.	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated based on CH_4 and N_2O emissions in reference fields in the same conditions including pre-season water regime, soil type, and type and amount of organic amendment of project rice paddy field. Direct measurement is used to estimate reference CH_4 and N_2O emissions. Country specific values for calculating CH_4 emissions can also be used subject to cross-checking of the values obtained from direct measurement.

In the Philippines, continuous flooding, or single drainage in some limited regions, for rice cultivation is commonly practiced as the multiple drainage method for rice cultivation requires additional project site preparation. In addition, there are farmers who perceive the drainage of water from rice paddies could potentially reduce yields. As a result, water management schemes which involve drainage have not been practiced in many parts of the country.

Business as usual (BaU) practice, which is continuous flooding, or single drainage in some limited regions, results in CH_4 emissions due to anaerobic decomposition of organic matter from flooded rice paddies and N_2O emissions from fertilizer application.

CO_2 emissions from drainage pumps and irrigation pumps are optional for counting, as emissions from the use of irrigation pumps tend to decrease when drainage is conducted. CO_2 emissions from the utilization of mechanical devices and farm equipment are not counted as such emissions occur both in reference and project cases.

To assure conservativeness of the methodology, an uncertainty deduction factor is applied to emission reductions.

F.2. Calculation of reference emissions

$$RE_p = RE_{CH4,p} + RE_{N2O,p} + RE_{CO2,p}$$

Where:

RE_p = Reference emissions during the period p (tCO_2e/period)

$RE_{CH4,p}$ = Reference emissions of CH_4 during the period p (tCO_2e/period)

$RE_{N2O,p}$ = Reference emissions of N_2O during the period p (tCO_2e/period)

$RE_{CO2,p}$ = Reference emission of CO_2 during the period p (tCO_2/period)

1. CH_4 emissions

Regarding CH_4 emissions, project participants may choose one option from 1) or 2) below. Frequency and interval of measurements for both 1) and 2) are explained in 3) below.

1) Direct Measurement

Reference emissions are calculated based on the monitored CH_4 emissions measured at reference field in the same condition (stratum) of pre-season water regime, soil type, and type and amount of organic amendment of the project site. Reference emissions are calculated separately for the dry and wet seasons if both seasons are targeted.

The reference emissions are calculated as shown in the equations below. Reference emissions of CH_4 in cropping season *s* ($RE_{CH4,s}$) are calculated based on the averaged seasonal total emissions or by multiplying daily emissions and the number of days. The calculation method for seasonal total emissions and daily emissions based on the measured data is shown in the Appendix A.

$$RE_{CH4,p} = \sum_{s=1}^{S} RE_{CH4,s}$$

$$RE_{CH4,s} = \sum_{st=1}^{ST} \left(EF_{CH4,R,s,st} \times A_{s,st}\right) \times 10^{-3} \times GWP_{CH4}$$

or

$$RE_{CH4,s} = \sum_{st=1}^{ST} \sum_{f=1}^{F} \left(EF_{CH4,R,s,d,st} \times D_{s,st,f} \times A_{s,st,f}\right) \times 10^{-3} \times GWP_{CH4}$$

Where:

$RE_{CH4,p}$ = Reference emissions of CH_4 during the period *p* (tCO_2e/period)

$RE_{CH4,s}$ = Reference emissions of CH_4 in cropping season *s* (tCO_2e/season)

$EF_{CH4,R,s,st}$ = Reference emission factor of CH_4 in stratum *st* in cropping season *s* ($kgCH_4$/ha/season)

$A_{s,st}$ = Area of project fields of stratum *st* in cropping season *s* (ha)

$EF_{CH4,R,s,d,st}$ = Reference emission factor of CH_4 per day in stratum *st* in cropping season *s* ($kgCH_4$/ha/day)

$D_{s,st,f}$ = Total number of days under the project in cropping season *s* in field *f* of stratum *st* (days/season)

$A_{s,st,f}$ = Area of project field *f* of stratum *st* in cropping season *s* (ha)

GWP_{CH4} = Global warming potential of CH_4 (tCO_2e/tCH_4): 28.0

st = Index for stratum, covers all project fields with the same condition as determined in Table 1. (*ST* = total number of stratum)

s = Index for cropping season (*S* = total number of cropping season during a period under the project)

f = Index for project filed in stratum *st* (*F* = total number of fields in stratum *st*)

In the measurement, three representative fields need to be chosen in each stratum. At least two chambers are arranged in each of three fields, and the total area covered by the chambers in each field should be greater than or equal to 0.25 m^2. See Appendix A for more detailed information. The stratification of all project fields is defined in the following table.

Table 1: Parameters for definition of stratification

Parameter	Categories	Element
Water regime - on-season	Continuously flooded	w1
	Single Drainage	w2
	Multiple Drainage	w3
Water regime - pre-season	Flooded	p1
	Short drainage (<180 d)	p2
	Long drainage (≥180 d)	p3
Soil type	Andosols	s1
	Histosols	s2
	Thionic soils[*1]	s3
	Other soils	s4
Organic amendment (type)[*2]	Straw or upland crop residue on-season	o1
	Straw or upland crop residue off-season	o2
	Green manure	o3
	Farm yard manure	o4
	Compost	o5
	No organic amendment (only low stubbles are left after harvesting or straw is almost burnt after burning at the site)	o6
Application rate for straw amendment[*2]	Low rate (high stubbles are left after harvesting or some portion of straw is left after burning at the site)	q1
	High rate (almost all straw is left at the site)	q2

**1: Rice growth in thionic soils (actual or potential acid sulfate soils) can be inhibited by several factors, including the produced hydrogen sulfide and the lowered pH (<4) after drainage. Project participants should make a prior assessment if using fields of thionic soils to avoid rice yield loss.*
**2: If the project site is classified into two or more strata based on a type of organic amendment and/or application rates for straw amendment, the most conservative stratum (the least organic amendment rate) may be selected for all classified strata instead of setting multiple strata. However, the conservativeness of different types of organic amendments cannot be compared.*

2) Country Specific Emission Factor Combined with Direct Measurements

For each stratum, project participants select appropriate or more conservative values from either the country specific emission factors for CH_4 emission in dry season and wet season in the Philippines or the emission factor derived from direct measurement. See the section 6 of Appendix C for more detailed information on the selection.

The reference emissions are calculated as follows:

$$RE_{CH4,p} = \sum_{s=1}^{S} RE_{CH4,s}$$

$$RE_{CH4,s} = \sum_{st=1}^{ST} \sum_{f=1}^{F} \left(EF_{CH4,R,s,d,st} \times D_{s,st,f} \times A_{s,st,f}\right) \times 10^{-3} \times GWP_{CH4}$$

If the emission factor calculated by multiplying the country specific emission factors and the latest IPCC default scaling factors is selected to be used for reference emissions:

$$EF_{CH4,R,s,d,st} = EF_{CH4,c,s,d} \times SF_{R,w} \times SF_{p} \times SF_{o,s,st}$$

Where:

$RE_{CH4,p}$ = Reference emissions of CH_4 during the period *p* (tCO_2e/period)
$RE_{CH4,s}$ = Reference emissions of CH_4 in cropping season *s* (tCO_2e/season)
$EF_{CH4,R,s,d,st}$ = Reference emission factor of CH_4 per day in stratum *st* in cropping season *s* ($kgCH_4$/ha/day)
$D_{s,st,f}$ = Total number of days under the project in cropping season *s* in field *f* of stratum *st* (days/season)
$A_{s,st,f}$ = Area of project field *f* of stratum *st* in cropping season *s* (ha)
GWP_{CH4} = Global warming potential of CH_4 (tCO_2e/tCH_4): 28.0

$EF_{CH4,c,s,d}$ = Emission factor of CH_4 per day for continuously flooded fields without organic amendments in cropping season s (kgCH_4/ha/day): 1.46 (kgCH_4/ha/day) for dry season or 2.95 (kgCH_4/ha/day) for wet season in the Philippines.

$SF_{R,w}$ = Reference scaling factor to account for the differences in water regime during the cultivation period: 1 for continuous flooding.

SF_p = Scaling factor to account for the differences in water regime in the pre-season before the cultivation period: 1.00 for non-flooded pre-season <180 d, 0.89 for non-flooded pre-season >180 d, 2.41 for flooded pre-season (>30 d), and 0.59 for non-flooded pre-season >365 d

$SF_{o,s,st}$ = Scaling factor to account for the differences in both type and amount of organic amendment applied in stratum *st* in cropping season *s*

st = Index for *s*tratum, covers all project fields with the same condition as determined in Table 1. (*ST* = total number of stratum)

s = Index for cropping season (*S* = total number of cropping season during a period under the project)

f = Index for project filed in stratum *st* (*F* = total number of fields in stratum *st*)

$$SF_{o,s,st} = \left(1 + \sum_{i=1}^{I} ROA_{s,st,i} \times CFOA_i\right)^{0.59}$$

Where:

$SF_{o,s,st}$ = Scaling factor to account for the differences in both type and amount of organic amendment applied in stratum *st* in cropping season *s*

$ROA_{s,st,i}$ = Application rate of organic amendment *i*, in dry weight for straw and fresh weight for others in stratum *st* in cropping season *s* (t/ha)

$CFOA_i$ = Conversion factor for organic amendment *i* (in terms of its relative effect with respect to straw applied shortly before cultivation)

i = Index for type of organic amendment (I = total number of organic amendment types)

3) Frequency and Interval of Measurements

Measurement is conducted at least once a week (frequency) throughout each cropping season in a year.

The yearly interval of measurements is three consecutive years either from one year prior to or at the start of the project implementation. The following measurements are carried out every three to five years, and different uncertainty deduction values are applied depending on the intervals, which is detailed in Section H. below.

a) Direct Measurement

Measurement interval
Every 3 years
Every 4 to 5 years

b) Country Specific Emission Factor Combined with Direct Measurements

Measurement interval
Every 5 years

2. N_2O emissions

Regarding N_2O emissions, project participants may choose one option from 1) or 2) below.

1) Direct measurement

Reference emissions are calculated from monitored N_2O emissions measured at reference fields, in the same manner as the reference CH_4 emissions.

$$RE_{N2O,p} = \sum_{s=1}^{S} RE_{N2O,s}$$

$$RE_{N2O,s} = \sum_{st=1}^{ST} \left(EF_{N2O,R,s,st} \times A_{s,st}\right) \times 10^{-3} \times GWP_{N2O}$$

Where:

$RE_{N2O,p}$ = Reference emissions of N_2O during the period p (tCO_2e/period)

$RE_{N2O,s}$ = Reference emissions of N_2O in cropping season s (tCO_2e/season)

$EF_{N2O,R,s,st}$ = Reference emission factor of N_2O in stratum st in cropping season s (kgN_2O/ha/season)

$A_{s,st}$ = Area of project fields of stratum st in cropping season s (ha)

GWP_{N2O} = Global warming potential of N_2O (tCO_2e/tN_2O): 265

st = Index for stratum, covers all project fields with the same condition as determined in Table 1. (ST = total number of stratum)

s = Index for cropping season (S = total number of cropping season during a period under the project)

2) **Emission Factor for Fertilizer**

Reference emissions of N_2O are calculated using the application rate of N fertilizer in the reference area.

The reference emission is calculated as follows;

$$RE_{N2O,p} = \sum_{s=1}^{S} RE_{N2O,s}$$

$$RE_{N2O,s} = \sum_{st=1}^{ST} ((Q_{N2O,R,s,st} \times A_{s,st}) \times EF_{N2O,C} \times 44/28) \times 10^{-3} \times GWP_{N2O}$$

Where,

$RE_{N2O,p}$ = Reference emissions of N_2O during the period p (tCO_2e/period)

$RE_{N2O,s}$ = Reference emissions of N_2O in cropping season s (tCO_2e/season)

$Q_{N2O,R,s,st}$ = Application rate of N-input in the refence field of stratum *st* in cropping season *s* (kgN input/ha/season)

$A_{s,st}$ = Area of project fields of stratum *st* in cropping season *s* (ha)

$EF_{N2O,C}$ = Emission factor of N_2O for continuous flooding: 0.003 kgN_2O-N/kgN input

GWP_{N2O} = Global warming potential of N_2O (tCO_2e/tN_2O): 265

st = Index for stratum, covers all project fields with the same condition as determined in Table 1. (*ST* = total number of stratum)

s = Index for cropping season (*S* = total number of cropping season during a period under the project)

3) Frequency and Interval of Measurements

Measurement is conducted at least once a week (frequency) throughout each cropping season in a year.

The yearly interval of measurements is three consecutive years either from one year prior to or at the start of the project implementation. The following measurements are carried out every three to five years, and different uncertainty deduction values are applied depending on the intervals, which is detailed in Section H. below.

a) Direct Measurement

Measurement interval
Every 3 years
Every 4 to 5 years

b) Country Specific Emission Factor

Measurement interval
Every 5 years

3. CO_2 emissions

CO_2 emissions due to drainage pumps and irrigation pumps are optional for counting.

Reference CO_2 emissions are calculated as follows:

$$RE_{CO2,p} = \sum_{i=1}^{n}(EF_{fuel,i} \times Q_{F,R,i,p})$$

Where:

$RE_{CO2,p}$ = Reference emission of CO_2 during the period p (tCO_2/period)

$Q_{F,R,i,p}$ = Quantity of fuel type i used for drainage pumps and/or irrigation pumps for the reference field during the period p (quantified as energy input) (TJ/period)

$EF_{fuel,i}$ = Emission factor of fuel type i (tCO_2e/TJ)

G. Calculation of project emissions

$$PE_p = PE_{CH4,p} + PE_{N2O,p} + PE_{CO2,p}$$

Where:

PE_p = Project emissions during the period p (tCO_2e/period)

$PE_{CH4,p}$ = Project emissions of CH_4 during the period p (tCO_2e/period)

$PE_{N2O,p}$ = Project emissions of N_2O during the period p (tCO_2e/period)

$PE_{CO2,p}$ = Project emission of CO_2 during the period p (tCO_2e /period)

1. CH_4 emissions

Regarding CH_4 emissions, project participants may choose one option from 1) or 2) below. Frequency and interval of measurements for both 1) and 2) are explained in 1. 3) in Section F.2 above.

1) Direct Measurement

Project emissions are calculated based on the monitored CH_4 emissions measured at project field, in the same manner as the reference CH_4 emissions.

$$PE_{CH4,p} = \sum_{s=1}^{S} PE_{CH4,s}$$

$$PE_{CH4,s} = \sum_{st=1}^{ST} \left(EF_{CH4,P,s,st} \times A_{s,st} \right) \times 10^{-3} \times GWP_{CH4}$$

or

$$PE_{CH4,s} = \sum_{st=1}^{ST} \sum_{f=1}^{F} \left(EF_{CH4,P,s,d,st} \times D_{s,st,f} \times A_{s,st,f} \right) \times 10^{-3} \times GWP_{CH4}$$

Where:

$PE_{CH4,,p}$ = Project emissions of CH_4 during the period p (tCO_2e/period)

$PE_{CH4,s}$ = Project emissions of CH_4 in cropping season s (tCO_2e/season)

$EF_{CH4,P,s,st}$ = Project emission factor of CH_4 in stratum st in cropping season s ($kgCH_4$/ha/season)

$A_{s,st}$ = Area of project fields of stratum st in cropping season s (ha)

$EF_{CH4,P,s,d,st}$ = Project emission factor of CH_4 per day in stratum st in cropping season s ($kgCH_4$/ha/day)

$D_{s,st,f}$ = Total number of days under the project in cropping season s in field f of stratum st (days/season)

$A_{s,st,f}$ = Area of project field f of stratum st in cropping season s (ha)

GWP_{CH4} = Global warming potential of CH_4 (tCO_2e/tCH_4): 28.0

st = Index for $s$tratum, covers all project fields with the same condition as determined in Table 1. (ST = total number of stratum)

s = Index for cropping season (S = total number of cropping season during a period under the project)

f = Index for project filed in stratum st (F = total number of fields in stratum st)

2) **Country Specific Emission Factor Combined with Direct Measurements**

Project participants select appropriate or more conservative values from either the country specific emission factors for CH_4 emission in dry season and wet season in the Philippines or the emission factor derived from direct measurements, and also from either IPCC scaling factors to account for the differences in water regime or the scaling factor derived from direct measurement. See the section 6 of Appendix C for more detailed information on the selection.

$$PE_{CH4,p} = \sum_{s=1}^{S} PE_{CH4,s}$$

$$PE_{CH4,s} = \sum_{st=1}^{ST} \sum_{f=1}^{F} \left(EF_{CH4,P,s,d,st} \times D_{s,st,f} \times A_{s,st,f}\right) \times 10^{-3} \times GWP_{CH4}$$

If the emission factor selected for reference emissions is the one calculated by multiplying the country-specific emission factors by the latest IPCC default scaling factors:

$$EF_{CH4,P,s,d,st} = EF_{CH4,c,s,d} \times SF_{P,w} \times SF_{p} \times SF_{o,s,st}$$

Where:

$PE_{CH4,p}$ = Project emissions of CH_4 during the period p (tCO_2e/period)

$PE_{CH4,s}$ = Project emissions of CH_4 in cropping season s (tCO_2e/season)

$EF_{CH4,P,s,d,st}$ = Project emission factor of CH_4 per day in stratum st in cropping season s ($kgCH_4$/ha/day)

$D_{s,st,f}$ = Total number of days under the project in cropping season s in field f of stratum st (days/season)

$A_{s,st,f}$ = Area of project field f of stratum st in cropping season s (ha)

GWP_{CH4} = Global warming potential of CH_4 (tCO_2e/tCH_4): 28.0

$EF_{CH4,c,s,d}$ = Emission factor of CH_4 per day for continuously flooded fields without organic amendments in season s ($kgCH_4$/ha/day): 1.46 ($kgCH_4$/ha/day) for dry season or 2.95 ($kgCH_4$/ha/day) for wet season in the Philippines.

$SF_{P,w}$ = Project scaling factor to account for the differences in water regime during the cultivation period: 0.55 for multiple drainage periods or 0.71 for single drainage period[2].

SF_{p} = Scaling factor to account for the differences in water regime in the pre-season before the cultivation period: 1.00 for non-flooded preseason <180 d, 0.89 for non-flooded pre-season >180 d, 2.41 for flooded preseason (>30 d), and 0.59 for non-flooded pre-season >365 d.

$SF_{o,s,st}$ = Scaling factor to account for the differences in both type and amount of organic amendment applied in stratum st in cropping season s

st = Index for *s*tratum, covers all project fields with the same condition as determined in Table 1. (ST = total number of stratum)

s = Index for cropping season (S = total number of cropping season during a period under the project)

f = Index for project filed in stratum st (F = total number of fields in stratum st)

[2] See Appendix C for more details.

$$SF_{o,s,st} = \left(1 + \sum_{i=1}^{I} ROA_{s,st,i} \times CFOA_i\right)^{0.59}$$

Where:

$SF_{o,s,st}$ = Scaling factor to account for the differences in both type and amount of organic amendment applied in stratum *st* in cropping season *s*

$ROA_{s,st,i}$ = Application rate of organic amendment *i*, in dry weight for straw and fresh weigh for others (t/ha) in stratum *st* in cropping season *s*

$CFOA_i$ = Conversion factor for organic amendment *i* (in terms of its relative effect with respect to straw applied shortly before cultivation)

i = Index for type of organic amendment (I = total number of organic amendment types)

2. N_2O emissions

Regarding N_2O emissions, project participants may choose one option from 1) or 2) below. Frequency and interval of measurements for 1) are explained in 2. 3) in Section F.2 above.

1) Direct measurement

Project emissions are calculated based on the monitored N_2O emissions measured at project field, in the same manner as the reference CH_4 emissions.

$$PE_{N2O,p} = \sum_{s=1}^{S} PE_{N2O,s}$$

$$PE_{N2O,s} = \sum_{st=1}^{ST} \left(EF_{N2O,P,s,st} \times A_{s,st}\right) \times 10^{-3} \times GWP_{N2O}$$

Where:

$PE_{N2O,p}$ = Project emissions of N_2O during the period *p* (tCO_2e/period)

$PE_{N2O,s}$ = Project emissions of N_2O in cropping season *s* (tCO_2e/season)

$EF_{N2O,P,s,st}$ = Project emission factor of N_2O in stratum *st* in cropping season *s* (kgN_2O/ha/season)

$A_{s,st}$ = Area of project fields of stratum *st* in cropping season *s* (ha)

GWP_{N2O} = Global warming potential of N_2O (tCO_2e/tN_2O): 265

st = Index for *s*tratum, covers all project fields with the same condition as determined in Table 1. (*ST* = total number of stratum)

s = Index for cropping season (*S* = total number of cropping season during a period under the project)

2) Emission Factor for Fertilizer

Project emissions of N_2O are calculated using the N fertilizer application rate in the project area, in the same manner as the reference N_2O emissions.

$$PE_{N2O,p} = \sum_{s=1}^{S} PE_{N2O,s}$$

$$PE_{N2O,s} = \sum_{st=1}^{ST} ((Q_{N2O,P,s,st} \times A_{s,st}) \times EF_{N2O,D} \times 44/28) \times 10^{-3} \times GWP_{N2O}$$

Where:

$PE_{N2O,p}$ = Project emissions of N_2O during the period p (tCO_2e/period)

$PE_{N2O,s}$ = Project emissions of N_2O in cropping season s (tCO_2e/season)

$Q_{N2O,P,s,st}$ = Application rate of N-input in the project fields of stratum st in cropping season s (kgN input/ha/period)

$A_{s,st}$ = Area of project fields of stratum st in cropping season s (ha)

$EF_{N2O,D}$ = Emission factor of N_2O for single and multiple drainage: 0.005 kgN_2O-N/kgN input.

GWP_{N2O} = Global warming potential of N_2O (tCO_2e/tN_2O): 265

st = Index for stratum, covers all project fields with the same condition as determined in Table 1. (ST = total number of stratum)

s = Index for cropping season (S = total number of cropping season during a period under the project)

3. CO_2 emissions

CO_2 emissions due to drainage pumps are counted, while those from irrigation pumps are optional for counting.

Project CO_2 emissions are calculated as follows:

$$PE_{CO2,p} = \sum_{i=1}^{n} (EF_{fuel,i} \times Q_{F,P,i,p})$$

Where:

$PE_{CO2,p}$ = Project emission of CO_2 during the period p (tCO_2e/period)

$Q_{F,P,i,p}$ = Quantity of fuel of type i used for drainage pumps and/or irrigation pumps for the project field during the period p (quantified as energy input) (TJ/period)

$EF_{fuel,i}$ = Emission factor of fuel type *i* (tCO_2e/TJ)

H. Calculation of emissions reductions

1) In Case When CH_4 Emissions are Calculated based on Direct Measurement

$$ER_p = (RE_p - PE_p) \times (1 - Ud_{DM})$$

Where:

ER_p = Emission reductions during period *p* (tCO_2e/period)

RE_p = Reference emissions during period *p* (tCO_2e/period)

PE_p = Project emissions during period *p* (tCO_2e/period)

Ud_{DM} = Uncertainty deduction (fraction: 0.05 for measurement interval of every three years and 0.10 for measurement interval of every four to five years)

Ud_{DM} values for case 1)

Measurement interval of CH_4	Ud_{DM} values
Every 3 years	0.05
Every 4 to 5 years	0.10

* If accuracy of measurement improves, *Ud* values of less than or equal to 0.10 may be accepted subject to consideration by the Joint Committee.

2) In Case When CH_4 Emissions are Calculated Using Country Specific Emission Factor Combined with Direct Measurements

$$ER_p = (RE_p - PE_p) \times (1 - Ud_{EF})$$

Where:

ER_p = Emission reductions during period *p* (tCO_2e/period)

RE_p = Reference emissions during period *p* (tCO_2e/period)

PE_p = Project emissions during period *p* (tCO_2e/period)

Ud_{EF} = Uncertainty deduction (fraction: 0.15 for measurement interval of every five years)

Ud_{EF} value for case 2)

Measurement interval of CH_4	Ud_{EF} value
Every 5 years	0.15

I. Data and parameters fixed *ex ante*

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

<table>
<tr><th>Parameter</th><th>Description of data</th><th>Source</th></tr>
<tr><td>$EF_{CH4,c,s,d}$</td><td>Emission factor of CH_4 per day for continuously flooded fields without organic amendments in cropping season s ($kgCH_4$/ha/day)
For dry season: 1.46 ($kgCH_4$/ha/day) For wet season: 2.95 ($kgCH_4$/ha/day)</td><td>Corton et al. (2000), Wassman et al. (2000)</td></tr>
<tr><td>$SF_{R,w}$</td><td>Reference scaling factors to account for the differences in water regime during the cultivation period: 1 for continuous flooding.</td><td>IPCC guidelines (2019)</td></tr>
<tr><td>SF_p</td><td>Scaling factors to account for the differences in water regime in the pre-season before the cultivation period: 1.00 for non-flooded pre-season <180 d, 0.89 for non-flooded pre-season >180 d, 2.41 for flooded pre-season (>30 d), and 0.59 for non-flooded pre-season >365 d</td><td>IPCC guidelines (2019)</td></tr>
<tr><td>$CFOA_i$</td><td>Conversion factor for organic amendment i (in terms of its relative effect with respect to straw applied shortly before cultivation):
<table><tr><th>Organic amendment</th><th>CFOA</th></tr><tr><td>Straw incorporated shortly (<30 days) before cultivation</td><td>1.00</td></tr><tr><td>Straw incorporated shortly (>30 days) before cultivation</td><td>0.19</td></tr><tr><td>Compost</td><td>0.17</td></tr><tr><td>Farm yard manure</td><td>0.21</td></tr><tr><td>Green manure</td><td>0.45</td></tr></table>*Straw application means that straws are incorporated into the soil. It does not include cases where straws are just placed on soil surface, and straws that were burnt on the field.</td><td>IPCC guidelines (2019)</td></tr>
</table>

$SF_{P,w}$	Project scaling factors to account for the differences in water regime during the cultivation period: 0.55 for multiple drainage periods, and 0.71 for single drainage period.	IPCC guidelines (2019)
$EF_{N2O,C}$	Emission factor of N_2O for continuous flooding: 0.003 kgN_2O-N/kgN input	IPCC guidelines (2019)
$EF_{N2O,D}$	Emission factor of N_2O for single and multiple drainage: 0.005 kgN_2O-N/kgN input	IPCC guidelines (2019)
$EF_{fuel,i}$	Emission factor of fuel type i (tCO_2e/TJ)	IPCC guidelines (2019)
Ud_{DM}	Uncertainty deduction (fraction: 0.05 for measurement interval of every three years and 0.1 for measurement interval of every four to five years)	Expert judgement * If accuracy of measurement improves, Ud values of less than or equal to 0.10 may be accepted subject to consideration by the Joint Committee
Ud_{EF}	Uncertainty deduction (fraction: 0.15 for measurement interval of every five years)	Expert judgement
GWP_{CH4}	Global warming potential of CH_4: 28.0 tCO_2e/tCH_4	Box 3.2, Table 1, Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the IPCC (2014)
GWP_{N2O}	Global warming potential of N_2O: 265 tCO_2e/tN_2O	Box 3.2, Table 1, Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the IPCC (2014)

Appendix A: Guidelines for Measuring Methane and Nitrous Oxide Emissions from Rice Paddy Fields

Appendix B: Supplement for Water Management in Rice Paddy Fields

Appendix C: Supplement for Monitoring Methods

History of the document

Version	Date	Contents revised
01.0	3 February 2025	Electronic decision by the Joint Committee Initial approval.

Appendix A: Guidelines for Measuring Methane and Nitrous Oxide Emissions from Rice Paddy Fields

This appendix explains how the methane (CH_4) and nitrous oxide (N_2O) emissions can be measured in rice paddy fields. It is necessary that the implementation of CH_4 and N_2O measurement by a closed chamber method involves technicians who have been authorized by the independent experts before the validation and operators who have been trained by the authorized technician.

In order to obtain the independent experts' advice on the competence of the technicians or to propose alternative methods other than those explained in this appendix to be included in this methodology with sufficient scientific evidence, firstly project participants need to contact the Ministry of Agriculture, Forestry and Fisheries of Japan as a representative of the Expert Committee established under the initiative of the Asian Development Bank for Climate-Resilient Agriculture and Low-Carbon Food Systems in the ASEAN Region as follows: maff_JCMTML@maff.go.jp

The following tables are arranged sequentially from the chamber design to the calculation of the seasonal CH_4 and N_2O emissions and emission factors. See also "Guidelines for Measuring CH_4 and N_2O Emissions from Rice Paddies by a Manually Operated Closed Chamber Method" (pdf file, 8.4 MB) for the scientific basis and better understanding of the following guidance through the visual presentation.

Table A-1. Chamber design

Feature	Conditions
Material, color, and shape	In general, chamber shapes and materials are inseparable factors. In addition, chamber shapes allowed are dependent on a rice planting system. Cylinder-shaped chambers with round basal area are usually made of commercially available non-transparent plastic containers. Painting those with whitish color, if not inherent, or a cover with reflective material is recommended to prevent the increase in the inside temperature. Cylinder-shaped chambers can be used only for the direct broadcast seeding system.

	Rectangular-shaped chambers with square basal area are made of transparent acrylic plates (with stainless steel frames for the reinforcement, if necessary). Rectangular-shaped chambers can be used for both transplanting system and the direct seeding system (broadcast or row). The total chamber height (including that of a chamber base) is recommended to be higher than the rice plant height. Double- or triple-deck style is available to the rectangular-shaped chambers, which are adjustable depending on the growing plant height. The constant placement of chambers equipped with upper lids that can be opened and closed is not recommended.
Base material and shape	The chamber base needs to be installed at least one day before the first gas sampling and must remain in the field throughout the season. Base materials and shapes depend on the chamber shapes. The aboveground height of the bases is recommended to be lower than or equal to 30 cm. For cylinder-shaped chambers, a round-shaped base with a water sealing is usually made of plastic materials. A cylinder-shaped base in the soil requires holes on the sidewall to allow water exchange between inside and outside the chamber area. For rectangular-shaped chambers, 4 corner pillars, made of PVC pipes or metal rods, stuck into the plow pan are sufficient when there is surface water. Top of the pillars are required to be underwater for sealing. When there is no or shallow surface water, chambers can be gently placed on the soil. CH_4 ebullition may happen after the placement, and it should be escaped from or well mixed in the

	chamber headspace before the first gas sampling. Square-shaped bases with water sealings made of plastic materials are also available temporarily or constantly during the season.
Basal area	The total area covered by chambers in one field is required to be wider than 0.25 m^2. To accommodate this area, multiple ($n \geq 2$) chambers are used in one field. The minimum distance between each chamber should be 1 m. For the transplanting system, the basal area size of a rectangular-shaped chamber should be a multiple of rice plant spacing to appropriately capture GHG emissions (diffusion and ebullition) from the soil or the surface water. For example, if the plant spacing is 30 cm × 15 cm, the basal area should be 30 cm × 30 cm (covering 2 rice hills), 30 cm × 60 cm (4 hills), or etc. For the direct row seeding system, one side length of the basal area should be a multiple of the row distance.
Accessory	A chamber needs to be equipped with a gas sampling port, an inside fan, an inside thermometer, and an air vent. The port may also serve as the vent. The port should be apart from the chamber wall by using a tube connected to a stopcock. The dead volume in the tube should be replaced before the gas sampling. A weight, such as a battery for the fan operation, can be gently placed on the upper lid to prevent the chamber from falling down in windy weather.

Table A-2. Gas sampling

Feature	Conditions
Chamber area	A scaffold needs to be installed at least one day before the first gas sampling to reach the chamber areas without disturbing the soil. The chamber area needs to

	be apart 1.5 m from the ridge of the field.
Chamber replication per field	At least 2 chambers, depending on the basal area size (see the basal area feature in Table A-1).
Number of gas samples per chamber placement	At least 3 samples during the chamber closure time (30-40 min). The first gas sample should be collected after ≥1 min after the chamber placement to wait for the headspace gas to become well-mixed.
Gas sampling time of day	Morning, especially in the early hours (e.g., 7 am-10 am). If the sampling time must be extended to daytime, the schedule should be designed to prevent the systematic bias since CH_4 emissions are emitted more in daytime.
Frequency	At least once per week[3]. To better trace the possible temporary CH_4 emission peak during a drainage event and the possible temporary N_2O emission peak after nitrogen fertilizer topdressing, additional measurements once or twice are recommended during these events.
Gas storage	The gas sampled from the port should be stored into a glass or plastic evacuated vial (with a rubber stopper), a plastic or aluminum bag, or a plastic syringe. A gas leak test for the expected storage duration needs to be implemented before the start of the season and the gas concentration analyzed needs to be corrected

[3] In the case of force majeure events such as bad weather or natural disasters, project participants should demonstrate rational reasons for not following the proposed frequency.

	appropriately, if applicable.
Manual operation	Uniform and gentle manual operation needs to be implemented regardless of time and place. Several operators should simultaneously implement the measurement in the reference fields and project fields. When moving a chamber from one location to another, the air inside the chamber should be replaced by pushing the chamber sideways and operating the fan. It is necessary to submit a film recording a series of gas sampling operations by the technicians to the independent experts for authorization of their skill prior to validation. If the technicians' skills are insufficient, the film shall be resubmitted in accordance with the independent experts' advice.

Table A-3. Laboratory gas analysis

Feature	Conditions
Method	A CH_4 concentration needs to be analyzed by a gas chromatograph (GC) equipped with a flame ionization detector (FID) or a laser spectroscope. A N_2O concentration needs to be analyzed by a GC equipped with an electron capture detector (ECD) or a laser spectroscope. In case of using a laser spectroscope[4], project participants should follow the manufacture's instruction for the gas analysis.
GC system	A GC system consists of a gas injection port, a separation column, a gas detector, a data processor, etc. Carrier gas and the standard gas are essential for the steady operation and the analysis.

[4] A portable laser spectroscope connected online to multiple chambers is to be usable if the method is scientifically sound and if all the requirements are met.

	An ECD-GC should be equipped with a multi-port valve to remove oxygen and water vapor for the refined detection of N_2O. It is necessary to submit the specification of GC system (product, column packing material, column diagram, carrier gas and the flow rate, temperatures of injector, column, and detector) and photos of GC appearance (the entire GC from multiple angles (exterior) and columns inside the oven) to the independent experts before the validation.
Calibration line or curve	The certified standard gases need to be used to draw a calibration line or curve. 2-point calibration is sufficient for an FID-GC using the CH_4 standard gas with the atmospheric ambient concentration (e.g., ~2 ppm) and a higher concentration (e.g., 50-100 ppm). 2- or 3-point calibration is sufficient for an ECD-GC using the N_2O standard gas with the atmospheric ambient concentration (e.g., ~0.3 ppm) and higher concentrations (e.g., 2-10 ppm). Note that the linearity is not always secured for an ECD-GC to detect the higher concentration of N_2O. A calibration line or curve needs to be drawn each day before and after the analyses.
Quality control	The repeatability of the GC analysis needs to be tested before the start of the season using the certified standard gases. The coefficient of variation (CV) of 10-20 repeated analyses of the same standard gas should be ≤ 5% for all the used standard gases (i.e., ambient and higher concentrations). It is necessary to submit the results of the repeatability test to the independent experts for approval of quality control before the validation.

	If the results are poor (i.e., CV > 5%), the result of additional blind test is recommended to submit.

Table A-4. Calculation of the seasonal total emission of CH_4 or N_2O and emission factors

Order	Procedure
1	Calculate the mass of CH_4 or N_2O in the analyzed gas sample: $$m_t = c_t \times V \times M \times \frac{1atm}{R \times T_t \times 1000}$$ Where: m_t = Mass of CH_4 or N_2O in chamber at time t (mg) t = Time point of gas sampling (e.g. 1, 16, and 31 min after chamber placement in case of 3 samples for 30 min) c_t = CH_4 or N_2O concentration in chamber at time t (ppm) V = Chamber volume (L) M = Molar mass of CH_4 (16.042 g mol^{-1}) or N_2O (44.0128 g mol^{-1}) $1atm$ = Assume constant pressure of 1 atm, unless the inside pressure is recorded R = Universal gas constant: 0.08206 L atm K^{-1} mol^{-1} T_t = Temperature at time t (K)
2	Determine the slope of the line of best fit for the values of over time: $$s = \frac{\Delta m}{\Delta t}$$ Where: s = Slope of line of best fit (mg min^{-1})
3	Calculate the hourly flux for one chamber measurement:

	$$F_{ch} = s \times \frac{60min}{A}$$ Where: F_{ch} = Flux of chamber *ch* (mg m^{-2} h^{-1}) ch = Index for replicated chamber in a field A = Chamber basal area (m^2)
4	Calculate the average hourly flux in a field: $$F = \frac{\sum_{ch=1}^{n} F_{ch}}{n}$$ Where: F = Average flux of a field (mg m^{-2} h^{-1}) n = Number of replicated chambers in a field
5	Calculate the total emission in one measurement interval: $$E_i = \frac{(F_i + F_{i+1}) \times 24h \times D_i}{2}$$ Where: E_i = Total emission in interval *i* (mg m^{-2}) i = Index for measurement interval in a season F_i = Hourly flux at the start of interval *i* (mg m^{-2} h^{-1}) F_{i+1} = Hourly flux at the end of interval *i* (mg m^{-2} h^{-1}) D_i = Number of days in interval *i* (d) Note that flux on planting day and flux on harvest day can be assumed to be zero if measurement is not implemented on those days.
6	Calculate the seasonal total emission in a field: $$E = \sum_{i=1}^{N} E_i$$ Where:

	E	=	Total emission in a season (mg m^{-2})
	N	=	Number of measurement intervals in a season
7	Calculate the emission factor in stratum *st* in season *s* $$EF_{s,st} = \frac{\sum_{f=1}^{F} E_f \times 10^{-2}}{F \times 100}$$ Where:		
	$EF_{s,st}$	=	Emission factor in stratum *st* in season *s* (kg ha^{-1} season^{-1})
	E_f	=	Total emission in field *f* of stratum *st* in season *s* (mg m^{-2} season^{-1})
	F	=	Number of (representative) fields of stratum *st* in season *s*
8	Calculate the emission factor per day in stratum *st* in season *s* $$EF_{s,d,st} = \frac{\sum_{f=1}^{F} \left(\frac{E_f \times 10^{-2}}{D_f} \right)}{F \times 100}$$ Where:		
	$EF_{s,d,st}$	=	Emission factor per day in stratum *st* in season *s* (kg ha^{-1} d^{-1})
	E_f	=	Total emission in field *f* of stratum *st* in season *s* (mg m^{-2} season^{-1})
	D_f	=	Total number of rice growing days in field *f* of stratum *st* in season *s* (d season^{-1})
	F	=	Number of (representative) fields of stratum *st* in season *s*

Appendix B: Supplemental guidance for Water Management in Rice Paddy Fields

The success of water management to reduce methane (CH_4) emissions from rice paddy fields depends on weather and anthropogenic factors. Water management also needs to consider the effect on rice growth and yield. This appendix details specific requirements, recommendations, and tips to implement water management in rice paddy fields. See also the Appendix C on how to determine the SF_w in specific cases.

1. Rice growth stages not to be severely drained

Rice paddy fields do not need to be continuously flooded to produce sufficient rice yields. However, there are known specific rice growth stages in which the fields should not be severely drained. One is the rooting stage for stable plant establishment, and another is the heading stage for physiological water demand. To avoid the risk of rice yield loss, these growth stages should be taken into consideration when designing the water management plan before the project starts.

2. Artificial drainage

Artificial drainage by using pumps and/or opening water outfalls is not originally implemented under AWD for the primary purpose of water saving. However, there are cases where irrigation water is plentiful depending on the time and location. This methodology therefore does not exclude the implementation of the artificial drainage, as long as it does not cause a significant rice yield reduction.

3. Timing of implementing single drainage

Single drainage, known as midseason drainage, is a common practice in East Asia for sound rice growth and the better yields. The midseason drainage is typically implemented in the tillering stage. This period usually coincides with when the CH_4 flux (emission rate) increases, thereby it reduces the total seasonal emission. The timing of the single drainage should be decided taking into account CH_4 emission reduction as well as sound rice growth.

4. Number of days during which the water level is between 0 cm and −15 cm

This methodology assumes that each farmer aims at lowering the water level to −15 cm in order to achieve one drainage event as defined. However, lowering the water level to −15 cm is not always achievable because of rainfalls (especially in wet seasons), low location, etc. By compiling the scientific evidence[5], this methodology considers the following conditions are practically

[5] Jiang et al. (2019) analyzed a global dataset and reported that CH_4 emission decreased with increasing the number

equivalent to one drainage event in a conservative manner: keeping the water level between 0 cm and −15 cm for a total of 10 days, consisting of at least 3 consecutive days. This alternative index can also be used to monitor the (non-)existence of water by remote sensing if project participants demonstrate its satisfactory accuracy.

5. Water level during nitrogen fertilizer topdressing

The water level for a few days during and after the nitrogen (N) fertilizer topdressing affects the N-use efficiency of rice plants and the N_2O emission. To minimize the N loss through the ammonia volatilization and N_2O emission, fields should be kept flooded during this period, if not flooded continuously. Therefore, farmers need to pay attention to the water level when conducting N fertilizer topdressing in single- or multiple-drained fields. The water level at the basal fertilizer application can be assumed to be equivalent among the fields with different water management practices.

of unflooded days during a rice growing period except the end of season drainage. By recalculating raw data in Minamikawa et al. (2021), it is confirmed that keeping the water level between 0 cm and −15 cm for total of 10 days during a rice growing period except the end of season drainage can decrease CH_4 emission comparable to the single drainage (i.e., SF_w; reduction by 29%).

Appendix C: Supplemental Guidance for Monitoring Methods and GHG Emission Calculations in the Philippines

This appendix provides additional explanations for the monitoring parameters and methods used in this methodology. Project participants have a certain degree of freedom to select the monitoring methods depending on the situation. This appendix also explains the procedures how to calculate CH_4 and N_2O emissions in specific cases regarding the success of water management. This methodology makes much of the results.

1. Water management in the past 2 years prior to the start of the project

In order to satisfy the eligibility criterion 1 of the methodology, project participants need to demonstrate the water management practices over the past 2 years through history assessments with resources such as the following:

- "The National Irrigation Master Plan (NIMP) 2020-2030 Abridged Version" (p. 163-165; pdf file, 20.4 MB).
- "Adoption rate of selected technologies under Water Management category (2016 WS-2017 DS)" (web page by PhilRice) and the original source.
- Rotational irrigation schedule in the Philippines (data will be available by formally requesting to contact details and address found on NIA Regional Offices Website)
- Reviewing logbooks (if available) and local experts' comments.

2. Selection of representative fields in each stratum for direct measurement

As to the direct measurement of CH_4 and N_2O emissions, the 3 representative fields in terms of environmental and agronomic settings need to be prepared for both project and reference areas in every stratum. This is to avoid over- or under-estimation of the calculated CH_4 and N_2O emission reductions. A pair of project and reference fields should be provided from one farmer to avoid the effect of historical difference in agronomic practices on the CH_4 and N_2O emissions and rice yield. Each of the 3 paired fields should have the same agronomic history for ≥2 year and at least similar environmental settings (i.e., topography and soil texture). Project participants are required to provide the materials to demonstrate this.

3. Confirmation of avoidance of significant rice yield reduction

To demonstrate the eligibility criterion 2 of the methodology for maintained rice yield, rice yield sampling is implemented at the total of 6 representative fields in each stratum to confirm that there is no rice yield reduction by the project. For the direct seeding system, 1 m × 2 m area should be selected from each field whereas a rectangle area with 50 rice hills for the transplanting system. Alternatively, the comparison can be made by the yield of each field by the calculation of the field total yield/field area derived from machine harvested data only if the harvesting machine is emptied by each field before harvesting. Unhulled rice grain yield adjusted to the moisture content of 14% needs to be measured. A sampling area with normal rice growth should be visibly selected at harvest.

The 95% confidence interval (CI) of the yield in 3 fields needs to be calculated for both project and reference areas. If the intervals do not overlap each other, it is considered that there is significant change in rice yield.

The lower and upper limits of 95% CI is calculated using the CONFIDENCE.T function in Excel as follows:
Lower limit = $Y_m - CONFIDENCE.T(0.05, STDEV.S(Y_1, Y_2, Y_3), 3)$
Upper limit = $Y_m + CONFIDENCE.T(0.05, STDEV.S(Y_1, Y_2, Y_3), 3)$
Where:
$Y_m, Y_1, Y_2, and\ Y_3$ are the mean rice yield of the 3 fields, rice yield at the first field, rice yield at the second field, and rice yield at the third field, respectively.

4. Water level monitoring for confirmation of drainage

It is necessary for project participants to demonstrate the fulfillment of the eligibility criterion 2 of the methodology by submitting the followings to a Third-Party Entity at the time of verification: photos of the monitored water level with location and time information as well as a handwritten or digital logbook for the water level and/or the number of drained days. If the project participants are unable to submit above mentioned geotagged photos, they should provide rational reasons along with their alternative supplementary information that meets the eligibility criterion. In the specific cases listed in Table C-1, daily rainfall data recorded using an on-site weather station or at the nearest metrological station also needs to be provided to ensure that the water level during non-monitoring days is within the allowed range. Remote sensing can be an option for monitoring water existence (>0 cm) and non-existence (≤0 cm) when project participants demonstrate its sufficient accuracy and reliability to the independent experts described in the Appendix A before the validation. In addition to remote sensing, other improved methods to monitor water level could be applied when the independent experts approve those by reviewing the submitted base data before the validation.

There are several required timings of taking photos: (1) when the water level reaches −15 cm, (2) at least 3-day interval when the water level maintains ≤0 cm for a total of 10 days consisting of at least 3 consecutive days (e.g., 3 d + 3 d + 4 d and 4 d + 6 d) in case of using the number of drained days as the index, and (3) when the water level reaches ≤0 cm for the first time.

There are 4 cases of the water level change to decide which timing photos should be taken (Table C-1). In each case, it is strongly recommended to take photos of the water level on the first day when the water level reaches below the soil surface, to secure flexibility in case the water level does not reach −15 cm. These “first day photos” must be taken in the case II and III.

*Logbook must be recorded appropriately in all the cases to support the data.

*The examples in Table C-1 are representatives and do not cover all the cases.

Table C-1. Four cases of taking photos

<table>
<tr><td>Case</td><td>Scenario, condition, and required photos</td></tr>
<tr><td>I</td><td>Expected water level: −15 cm.
Result: water level −15 cm achieved.
Applicable only in case that the water level previously reached −15 cm in the same cropping season at the same area.
➢ Photos taken when the water level reaches −15 cm.
Example I
<table>
<tr><td>Day</td><td colspan="5">Any date</td></tr>
<tr><td>Water Level</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤ −15</td></tr>
<tr><td>Photo</td><td>(X)</td><td></td><td></td><td></td><td>X</td></tr>
</table>
</td></tr>
<tr><td>II</td><td>Expected water level: −15 cm.
Result: water level −15 cm not achieved.
Applicable only in case that the water level previously reached −15 cm in the same cropping season at the same area.
➢ Principle:
Photos taken when the water level reaches ≤0 cm for the first time. Photos taken at least once every 3 days while the water level maintains ≤0 cm. The water level needs to maintain ≤0 cm for the total of 10 days consisting of at least 3 consecutive days.
Example II-A
<table>
<tr><td>Day</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Water Level</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td></tr>
<tr><td>Photo</td><td>X</td><td></td><td></td><td>X</td><td></td><td></td><td>X</td><td></td><td></td><td>X</td></tr>
</table>
➢ Alternatives:
Photos taken when the water level reaches ≤0 cm for the first time and taken to prove that the water level remains below the soil surface when the total of 10 days have passed since the first day of the water level reaching ≤0 cm. The water level needs to maintain ≤0 cm for the total of 10 days consisting of at least 3 consecutive days. The days in between two photos are deemed the water</td></tr>
</table>

level remaining below the soil surface consecutively, as long as the rainfall data indicates no rainfall (0 mm d^{-1}) during the period.

Example II-B

Day	1	2-9	10
Water Level	≤0	(≤0)	≤0
Photo	X	No rainfall (proved by data)	X

Example II-C

Day	1	2-5	6	7	8	9*	10*	11
Water Level	≤0	(≤0)	≤0	>0	≤0	≤0	≤0	≤0
Photo	X	No rainfall (proved by data)	X	Rainfall	X			X

*The water level can be deemed below the soil surface for the day 9 and 10 as these days are between the day 8 and the day 11 where photos are taken once every 3 days to indicate the water level ≤0 cm (see the Principle of Case II).

As of Example II-C and D, when there is appropriate rainfall data as well as logbook records, the water level during this period (the day 2-5) can be deemed below the soil surface. A photo of the first day of the water level reaching below the soil surface again (the day 8) must be taken for the record of the following days.

Example II-D

Day	1	2-5*	6-7	8	9	10	11	12
Water Level	≤0	≤0	>0	≤0	≤0	≤0	≤0	≤0
Photo	X	No rainfall (proved by data)	Rainfall	X			X	X

III

Expected water level: below the soil surface but above −15 cm.

Result: water level −15 cm not achieved.

Applicable also in case that the previous water level data are not available.

- Principle:

  Photos taken when the water level reaches ≤0 cm for the first time. Photos then taken at least once every 3 days while the water level remains ≤0 cm. These photos prove that the water level remains ≤0 cm for the total of 10 days consisting of at least 3 consecutive days.

Example III-A

Day	1	2	3	4	5	6	7	8	9	10
Water Level	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0	≤0
Photo	X			X			X			X

- Alternatives:

  Photos taken when the water level reaches ≤0 cm for the first time and taken to prove that the water level remains below the soil surface when total of 10 days have passed since the first day of the water level reaching ≤0 cm. The water level needs to maintain ≤0 cm for the total of 10 days consisting of at least 3 consecutive days. The days in between two photos are deemed the water level remaining below the soil surface consecutively, as long as the rainfall data indicates no rainfall during the period.

Example III-B

Day	1	2-9	10
Water Level	≤0	(≤0)	≤0
Photo	X	No rainfall (proved by data)	X

Example III-C

Day	1	2-5	6	7	8	9*	10*	11
Water Level	≤0	(≤0)	≤0	>0	≤0	≤0	≤0	≤0
Photo	X	No rainfall (proved by data)	X	Rainfall	X			X

*The water level can be deemed below the soil surface for the day 9 and 10 as these days are between the day 8 and the day 11 where photos are taken once every 3 days to indicate the water level ≤0 cm (see the Principle of Case III).

As of Example III-C and D, when there is appropriate rainfall data as well as logbook records, this period (the day 2-5) can be deemed the water level below the soil surface. A photo of the first day of the water level reaching below the soil surface again (the day 8) must be taken for the record of the following days.

Example III-D

Day	1	2-5*	6-7	8	9	10	11	12
Water Level	≤0	(≤0)	>0	≤0	≤0	≤0	≤0	≤0
Photo	X	No rainfall (proved by data)	Rainfall	X			X	X

<table>
<tr><td>IV</td><td>Expected water level: below the soil surface but above −15 cm.
Result: water level −15cm achieved.
Applicable also in case that the previous water level data are not available.
➢ Photos taken when the water level reaches −15 cm.
Example IV
<table>
<tr><td>Day</td><td colspan="5">Any date</td></tr>
<tr><td>Water Level</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤0</td><td>≤ −15</td></tr>
<tr><td>Photo</td><td>(X)</td><td></td><td>(X)</td><td></td><td>X</td></tr>
</table>
</td></tr>
</table>

In multiple drainage, project participants cannot start counting the days of water level until the project field is flooded (>0 cm water level) by irrigation after the completion of the previous drainage. The examples are shown in Table C-2.

As shown in the single drainage case (Table C-2), it is considered as a single drainage even if 10 days drainage (the case II or III in Table C-1) is achieved more than once during a rice season.

However, as shown in the case of multiple drainage (Table C-2), it is considered as a multiple drainage when both −15 cm drainage (the case I or IV in Table C-1) and 10 days drainage (the case II or III in Table C-1) are implemented and these two types of drainage can be distinguished by the flooding (>0 cm water level) by irrigation after the completion of the previous drainage.

Table C-2. Examples of single drainage scenario and multiple drainage scenario

<table>
<tr><th>Case</th><th>Scenario and condition</th></tr>
<tr><td>Single drainage</td><td>
<table>
<tr><td>Day</td><td>1</td><td>2-3</td><td>4</td><td>5-11</td><td>12-14</td><td>15-24</td></tr>
<tr><td>Water Level</td><td>≤0</td><td>≤0</td><td>>0</td><td>≤0</td><td>>0</td><td>≤0</td></tr>
<tr><td>Photo</td><td>X</td><td></td><td>Rainfall</td><td>X (the day 5, 8, and 11)</td><td>Irrigation</td><td></td></tr>
</table>
The day 1-3 and the day 5-11 are counted into the 10 days drainage. However, the day 15-24 cannot be counted as the 10 days drainage since it can be applied only once in a rice growing season.</td></tr>
<tr><td>Multiple drainage</td><td>
<table>
<tr><td>Day</td><td>1-5</td><td>6</td><td>7-10</td><td>11-14</td><td>15-16</td><td>17-22</td></tr>
<tr><td>Water Level</td><td>≤0</td><td>−15</td><td>>0</td><td>≤0</td><td>>0</td><td>≤0</td></tr>
<tr><td>Photo</td><td>(X)</td><td>X</td><td>Irrigation</td><td>X (the day</td><td>Rainfall</td><td>X (the day 17,</td></tr>
</table>
</td></tr>
</table>

				11 and 14)		20, and 22)

The −15 cm drainage completed on the day 6. Field is flooded for the day 7-10 by irrigation on the day 7. Then, 10 days drainage starts from the day 11 and completed on the day 22 with the interruption by rainfall on the day 15.

5. Calculation of CH_4 and N_2O emission reductions by the direct measurement

Calculation methods for CH_4 emission reductions by the direct measurement differ year by year. In the years when the direct measurement is implemented, the measured $EF_{CH4,R,s,st}$ or $EF_{CH4,R,s,d,st}$, $EF_{CH4,P,s,st}$ or $EF_{CH4,P,s,d,st}$, and $EF_{N2O,R,s,st}$ or $EF_{N2O,P,s,st}$ (hereafter, simply referred to as EF in this section) need to be used for the calculation. On the other hand, in the years when the direct measurement is not implemented, the mean EF of the previous ≥3-year measurements needs to be used[6]. The 3-year initial measurements are conducted to derive the initial daily EF. The maximum interval of the direct measurement is every 5 years after the 3-year initial measurements. The examples 1 and 2 in Table C-3 show 3-year interval measurement. More frequent measurements are available as shown in the example 3 (every 2 years) or every year after the 3-year initial measurements. If the initial measured daily EF is not reasonable for project participants due to abnormal weather conditions and/or poor water management, additional measurement is possible to derive the initial daily EF as shown in the example 4. Using the example 1, if the newly measured EF in "Y"ear 5 [Meas (in)] is with"in" of the 95% confidence interval of the previously calculated mean daily EF [Calc (B12), see table footnote for details], Calc (B12) can be still used in "Y"ears 6 and 7. On the other hand, using the example 2, if the newly measured EF in "Y"ear 6 [Meas (out)] is "out" of the 95% confidence interval of the previously calculated mean daily EF [Calc (123)], the mean daily EF needs to be recalculated by adding the newly measured EF [Meas (out) in "Y"ear 6] as Calc (1236) for "Y"ears 7 and 8. The examples of the schedule for the direct measurement of 5-year and 4-year intervals are shown in Table C-4.

Table C-3. Examples of schedule for the direct measurement at 3-year interval

Year	Example 1	Example 2	Example 3	Example 4
Before	Meas	No meas	No meas	Meas
Y1	Meas	Meas	Meas	Meas
Y2	Meas	Meas	Meas	Meas (bad weather)
Y3	Calc (B12)	Meas	Meas	Additional meas
Y4	Calc (B12)	Calc (123)	Calc (123)	Calc (B13)

[6] We assume that 3-year measurement is scientifically sound duration to derive the mean (representative) EF in a certain area in case there is no temporal change in environmental and agronomic settings. However, this assumption may not apply to several years later (due to climate change, etc.). To confirm and correct (if necessary) the initial EF, once per 3-5 years measurement is required after the 3-year initial measurement.

Y5	Meas (in)	Calc (123)	Meas (in)	Calc (B13)
Y6	Calc (B12)	Meas (out)	Calc (123)	Meas (in)
Y7	Calc (B12)	Calc (1236)	Meas (out)	Calc (B13)
Y8	Meas (in)	Calc (1236)	Calc (1237)	Calc (B13)
Y9	Calc (B12)	Meas (out)	Meas (in)	Meas (in)
Y10	Calc (B12)	Calc (12369)	Calc (1237)	Calc (B13)

Meas: Measurement, No meas: No measurement, Calc: Calculation, B: Before.

Figures in parentheses indicate the years of measurement used to calculate the mean EF. For instance, Calc (B13) is derived using the data from the year “B”efore the project, “Y”ear 1, and “Y”ear 3.

Table C-4. Examples of schedule for the direct measurement at 5-year and 4-year intervals.

Year	Example 5 (5-year)	Example 6 (5-year)	Example 7 (5-year)	Example 8 (4-year)
Before	Meas	No meas	Meas	No meas
Y1	Meas	Meas	Meas	Meas
Y2	Meas	Meas	Meas (bad weather)	Meas
Y3	Calc (B12)	Meas	Additional meas	Meas
Y4	Calc (B12)	Calc (123)	Calc (B13)	Calc (123)
Y5	Calc (B12)	Calc (123)	Calc (B13)	Calc (123)
Y6	Calc (B12)	Calc (123)	Calc (B13)	Calc (123)
Y7	Meas (in)	Calc (123)	Calc (B13)	Meas (out)
Y8	Calc (B12)	Meas (out)	Meas (in)	Calc (1237)
Y9	Calc (B12)	Calc (1238)	Calc (B13)	Calc (1237)
Y10	Calc (B12)	Calc (1238)	Calc (B13)	Calc (1237)

6. Calculation of CH_4 emission reductions by the IPCC’s factors

Calculation of CH_4 emission reductions by the IPCC’s tier-1 SF_w and tier-2 (country-specific) EF requires the direct measurement at least every 5 years to confirm its appropriateness. The year starting the direct measurement can be chosen from that before the project (before) or the first year (Y1) as shown in the examples I and II of Table C-5. However, the project area needs to be fixed before starting the project when using the example I. The appropriate or more conservative $EF_{CH4,R,s,d,st}$ and SF_w should be derived and used to calculate the CH_4 emission reduction as shown in Table C-6. If the measured $EF_{CH4,R,s,d,st}$ and/or SF_w are too conservative and not reasonable for project participants due to abnormal weather condition and/or abnormal agronomic practices, additional measurement is possible as shown in the examples III and IV of Table C-5.

Table C-5. Examples of schedule for the direct measurement for the calculation using the IPCC's tier-1 and tier-2 default scaling factors.

Year	Example I	Example II	Example III	Example IV
Before	Meas			
Y1		Meas	Meas	Meas
Y2			Additional meas	
Y3				
Y4				
Y5	Meas			
Y6		Meas	Meas	Meas
Y7				Additional meas
Y8				
Y9				
Y10				

Table C-6. Procedures to decide the $EF_{CH4,R,s,d,st}$ and SF_w used for the calculation.

Order	Procedure
1	Calculate the 95% confidence interval (CI) of both the measured $EF_{CH4,R,s,d,st}$ and SF_w*.
2	Compare the 95% CI of the measured $EF_{CH4,R,s,d,st}$ and SF_w with the 95% CI of the tier-2 $EF_{CH4,c,s,d}$ ** and tier-1 SF_w***, respectively.
3-1	If the 95% CI of the measured $EF_{CH4,R,s,d,st}$ and the 95% CI of tier-2 $EF_{CH4,c,s,d}$[7] overlap, the tier-2 $EF_{CH4,c,s,d}$ needs to be used.
3-2	If the 95% CI of the measured $EF_{CH4,R,s,d,st}$ and the 95% CI of tier-2 $EF_{CH4,c,s,d}$ do not overlap and the measured $EF_{CH4,R,s,d,st}$ exceeds the interval, the tier-2 $EF_{CH4,c,s,d}$ needs to be used.
3-3	If the 95% CI of the measured $EF_{CH4,R,s,d,st}$ and the 95% CI of tier-2 $EF_{CH4,c,s,d}$ do not overlap and the measured $EF_{CH4,R,s,d,st}$ falls short of the interval, the measured $EF_{CH4,R,s,d,st}$ needs to be used.
4-1	If the 95% CI of the measured SF_w and the 95% CI of the tier-1 SF_w overlap, the tier-1 SF_w needs to be used.
4-2	If the 95% CI of the measured SF_w and the 95% CI of the tier-1 SF_w do not overlap and the measured SF_w falls short of the interval, the tier-1 SF_w needs to be used.
4-3	If the 95% CI of the measured SF_w and the 95% CI of the tier-1 SF_w do not overlap and the measured SF_w exceeds the interval, the measured SF_w needs to be used.

[7] In each comparisons of this table C-6, tier-2 $EF_{CH4,c,s,d}$ should be adjusted with the appropriate SF_p and SF_o under the same condition of actual measurements to be compared.

* Measured SF_w is calculated as follows:

$$SF_w = \frac{SF_{w1} + SF_{w2} + SF_{w3}}{3}$$

Where:

SF_{w1} = The ratio of CH_4 emission from the first paired project field to CH_4 emission from the first paired reference field.

SF_{w2} = The ratio of CH_4 emission from the second paired project field to CH_4 emission from the second paired reference field.

SF_{w3} = The ratio of CH_4 emission from the third paired project field to CH_4 emission from the third paired reference field.

The lower and upper limits of 95% CI of SF_w is calculated using the CONFIDENCE.T function in Excel as follows:

Lower limit = $SF_w - CONFIDENCE.T(0.05, STDEV.S(SF_{w1}, SF_{w2}, SF_{w3}), 3)$

Upper limit = $SF_w + CONFIDENCE.T(0.05, STDEV.S(SF_{w1}, SF_{w2}, SF_{w3}), 3)$

The same procedure applies to the calculation of 95% CI of $EF_{CH4,R,s,d,st}$.

** The original error range provided to tier-2 $EF_{CH4,c,s,d}$ is that between the minimum and maximum values among the seasonal data used to derive the mean [Tracking Greenhouse Gases: An Inventory Manual, 2011 (pdf file, 3.6 MB)]. This methodology therefore recalculated the 95% CI of tier-2 $EF_{CH4,c,s,d}$ with referring its source articles (Corton et al., 2000; Wassmann et al., 2000) as follows:

$EF_{CH4,c,s,d}$ for dry season rice: 1.46 (95% CI, 1.08−1.84) (kg ha^{-1} d^{-1})

$EF_{CH4,c,s,d}$ for wet season rice: 2.95 (95% CI, 1.97−3.92) (kg ha^{-1} d^{-1})

Project participants need to use these intervals to decide the EF used for the calculation of CH_4 emission reduction by the IPCC's factors.

*** IPCC's tier-1 SF_w and its 95% CI are as follows:

SF_w for multiple drainage: 0.55 (95% CI, 0.41−0.72)

SF_w for single drainage: 0.71 (95% CI, 0.53−0.94)

7. Spatial heterogeneity of water management

It is unrealistic to apply water management uniformly across all the project fields, due to factors other than stratification parameters, such as different elevation, different soil permeability, and different water availability. This may cause the spatial heterogeneity in the success of water management. For example, it could happen that multiple drainage events are achieved in the representative project fields where the direct measurement is implemented, whereas only one drainage event is achieved in other many project fields, and vice versa.

Because the former causes the overestimation of CH_4 emission reduction, it is necessary to calculate it in a conservative manner. In the case of the direct measurement, the CH_4 emission reduction by single drainage should be estimated by multiplying the measured CH_4 emission reduction by the conversion ratio derived from IPCC's SF_w [(1−0.71)/(1−0.55) = 0.29/0.45]. On the other hand, for the latter case, the measured CH_4 emission reductions by single drainage needs to be applied to all the project fields.

In the case of the calculation using the IPCC's factors, SF_w suitable to the actual situation (i.e., 0.55 or 0.71) should be used combinationally.

8. Unexpected change from multiple drainage to single drainage

It is difficult to accurately predict the success of water management before the start of the season. For example, no or only one drainage event can be achieved due to intermittent rainfalls throughout the season, even if the farmers originally had aimed for multiple drainage events. There are two unexpected changes in the planned drainage practice. One is the change from the planned multiple drainage to the resultant single drainage (M to S), and the other is the opposite change from the planned single to the resultant multiple (S to M). Project participants need to decide on the suitable SF_w following the procedures described in Table C-7.

Table C-7. Four cases to decide SF_w used for the calculation.

Case	Procedure
M to S with the direct measurement	The measured SF_w is used in that year/season. Additional measurement is possible to derive suitable calculated SF_w of multiple drainage as shown in Tables C-3 and C-4.
M to S without the direct measurement	The calculated or teir-1 SF_w of multiple drainage needs to be corrected by multiplying by 0.29/0.45.
S to M with the direct measurement	The measured SF_w is used in that year/season. However, this SF_w cannot be directly used to derive the calculated SF_w of single drainage. Instead, the measured SF_w needs to be corrected by multiplying by 0.29/0.45 for this purpose.
S to M without the direct measurement	The calculated or teir-1 SF_w of single drainage needs to be used in a conservative manner.

9. N_2O emission factor not affected by the success of water management

The description in the above sections 7 and 8 is not applied to the calculation of N_2O emission. This is because the current IPCC's N_2O emission factor (EF_{1FR}) does not distinguish between single drainage and multiple drainage. That is, the same EF_{1FR} is used without regard to the number of drainage events achieved (i.e., one or more). This is true for the direct measurement. The measured $EF_{N2O,R,s,st}$ is used in that year/season and the calculated $EF_{N2O,R,s,st}$ is derived from the previous ≥3-year measurements without regard to the number of drainage events achieved. It is possible but not necessary to implement additional measurement for deriving suitable $EF_{N2O,R,s,st}$.

10. Transitional measure for the shape of chambers
In the Philippines, cylinder-shaped chambers with round basal area are often used for the transplanting system for research purpose partly due to the limited availability of rectangular-shaped chambers. Therefore, this methodology permits cylinder-shaped chambers to be used, however limited to the direct measurement before the project (see Tables C-3 and C-4)[8].

11. Fields with crop rotation
There can be fields with crop rotation, where rice and upland crops are cultivated consecutively, in the project areas. Such fields are classified with the parameters, water regime – pre-season and organic amendment (type). However, there can be several upland crops, including dry fallow (no crop), within the same project area. This causes a problem that different quantity and quality of upland crop residues are returned to the field on-season or off-season within the same stratum. To avoid an excess number of strata, project participants can aggregate into one stratum in case there are several upland crops, including dry fallow. In this case, the representative fields for direct measurement should be established in where the quantity of crop residue is smallest among the crops, including dry fallow, in order to conservatively estimate CH_4 emissions in the following rice season. For example, if the upland crops include maize, wheat, and dry fallow within the same stratum, project participants should select the representative fields from the fields with dry fallow.

[8] Only in this paragraph, "direct measurement before the project" also applies to projects where their cultivation periods started before the date on which the methodology was announced on the website for approval by the Joint Committee, and where the use of rectangular-shaped chambers can be confirmed for the following rice growing seasons.