Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Carbon Capture and Storage and Carbon Capture, Utilization and Storage (CCS and CCUS)

CONTENTS

1. Scope and applicability

1. Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Carbon Capture and Storage and Carbon Capture, Utilization and Storage (CCS and CCUS) (hereinafter referred to as "these Guidelines") are intended to assist each side or project participants (hereinafter referred to as "methodology proponents") in preparing proposed methodologies for the Joint Crediting Mechanism (hereinafter referred to as "JCM") (hereinafter referred to as "proposed methodologies").
2. These Guidelines are also to be referred to by the Joint Committee in developing and assessing proposed methodologies.
3. These Guidelines describe standards which are requirements to be met, except guidance indicated with terms "should" and "may" as defined in paragraph 5 below.
4. Submission and subsequent assessment of a proposed methodology are conducted in line with the procedure delineated in Joint Crediting Mechanism Project Cycle Procedure.

2. Terms and definitions

5. The following terms apply in this Guidelines:
   (a) "Should" is used to indicate that among several possibilities, one course of action is recommended as particularly suitable;
   (b) "May" is used to indicate what is permitted.
6. Terms in the Proposed Methodology Form are defined in JCM Glossary of Terms available on the JCM website.

3. Key concepts

3.1. Reference emissions

7. In the JCM, emission reductions to be credited are defined as the difference between reference emissions and project emissions.
8. The reference emissions are established in a manner that the proposed project contributes to the achievement of the latest nationally determined contributions of the Republic of Indonesia under the Paris Agreement.
9. CCS and CCUS projects under the JCM may apply at least one of the methods listed below to calculate emission reductions.

   Option (1): Establish reference emissions lower than business-as-usual (BaU):

   (1) In establishing reference emissions, functional equivalence* with project case is to be considered, and adjustment factor for reference scenario is to be applied if necessary. (Example of Option (1))
   (2) Reference emissions should be established by excluding recycle CO_2 and/or non-anthropogenic CO_2. (Example of Option (1))

Option (2): Establish project emissions higher than actual emissions:

(1) In establishing project emissions, in cases such as there is a range of emission factors available, a higher value should be selected. (Example of Option (2))

Option (3): Multiply emissions reduction by discount factor.

* Functional equivalence refers to situations where project and reference provide the same function while delivering comparable products in quality and quantity. In case of CCS and CCUS projects, increase in energy consumption and/or product output may result in increase in quantity of GHG emissions produced at the capture site. It refers to adjustment of applied data as necessary in such cases, since using actual capture data in calculating reference emissions may result in over-estimation of emissions reduction from the CCS and CCUS project if applied data is not appropriately adjusted.

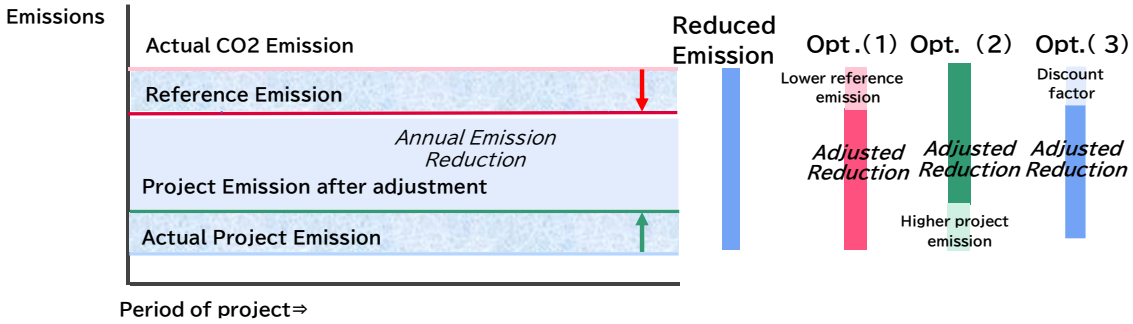

Figure: Concept of ensuring net emission reduction

3.2. Eligibility criteria

10. Eligibility criteria in proposed methodologies contain the following:
    (a) Requirements for the project in order to be registered as a JCM project.
    (b) Requirements for the project to be able to apply the approved methodology.

3.3. Eligible Projects for CCS and CCUS Projects

11. Eligible Projects are Carbon Capture and Storage and Carbon Capture, Utilization and Storage (CCS and CCUS) activities which result in associated storage of CO_2.

3.4. Project Lifecycle and Methodology for CCS and CCUS

12. In general, the CCS and CCUS project life cycle from the project planning / development, start of the project operation, completion of CO_2 injection, and to the termination of the project is shown below.
13. For each stage of the project, (1) site selection, reservoir characterization, and risk

assessment at the project planning / development stage, (2) monitoring and accounting of GHG emissions reduction at the injection stage, and (3) project termination criteria and monitoring during termination preparatory period may be considered in methodologies of CCS and CCUS.

14. The project termination stage is divided into two; the termination preparatory period to which JCM project applies and the post-termination period.
15. The termination preparatory period begins after the completion of CO_2 injection and may include monitoring required in accordance with regulations or standards of the host country as well as abandonment of ground CCS and CCUS facilities related to the JCM project among CO_2 recovery, transportation, and monitoring facilities, except for some facilities which would be continued to be used after the project termination.
16. The criteria for project termination should be set by the methodology if there are no criteria in the host country.
17. Project termination refers to the termination of CO_2 injection project which is in the scope of JCM and include both projects that accompany site closure and projects that do not accompany site closure.
18. Post-project termination period begins after demonstration of compliance with the criteria for project termination and is implemented in accordance with the host country's regulations or standards outside of JCM monitoring scope.
19. Also, in case of CO_2 that are not in the scope of GHG emissions reduction under a JCM project (i.e., CO_2 transported and injected from CO_2 sources that are not part of the said JCM project) is stored using the JCM project facilities, even after the cessation of CO_2 injection under the JCM project, the project termination does not necessarily accompany injection well / site closure and/or transfer of liability to host country government.

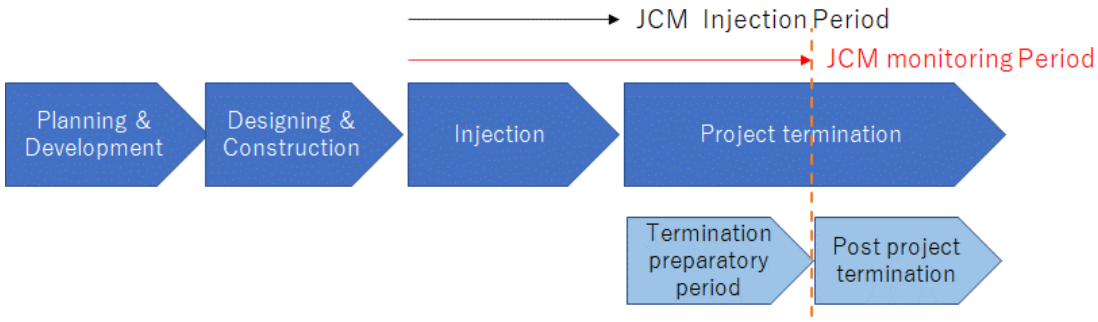

Figure: CCS and CCUS Project Life Cycle

3.5. Emission sources of CCS and CCUS Projects

20. GHG sources to be considered, in principle, are sources of anthropogenic greenhouse gases

(GHG) related to CO_2 capture, CO_2 transportation and CO_2 storage.

21. These GHG sources may include GHG emissions from fossil fuel combustion and electricity consumption associated with project activities, and greenhouse gases emissions from leakage from project facilities (including wells and storage complex).
22. Emissions from combustion of fossil fuels produced by using EOR (Enhanced Oil Recovery) and EGR (Enhanced Gas Recovery) are not included.
23. GHG sources and types are indicated in the methodology.
24. The Joint Committee may update the procedure of monitoring and accounting of methane (CH_4) according to the future rule development.

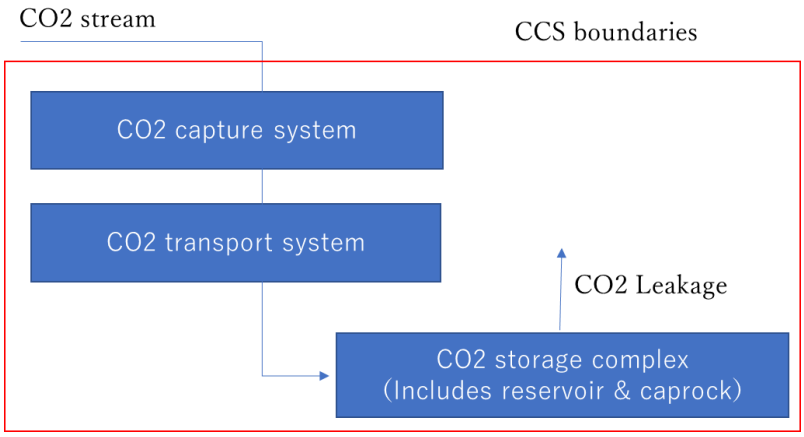

Figure: GHG Sources of CCS and CCUS Projects

3.6. Project Termination Period Monitoring for CCS and CCUS Projects

25. Criteria for project termination:

At the project planning stage, criteria for project termination that needs to be met during the project termination preparatory period are established in the JCM methodology. In doing so, the following in relation to impacts of a JCM project may be taken into account in addition to laws and regulations of host country and region*.

(a) The project operator should demonstrate that the site meets established project objectives, including those relating to the absence of detectable leakage and significant impacts to human health, the environment, and economic resources based on laws and regulations of host country and region.

(b) The total CO_2 storage complex should be understood sufficiently to assess its long-term storage capability with a high degree of confidence. Particular attention should be given to the following aspects of the storage complex and evaluation criteria should be established in a JCM methodology:

(1) Ensure effective containment of the injected CO_2 for long term;

(2) Ensure environmental and human health impacts of the storage project minimized to acceptable risk for long term

26. Project termination preparatory period monitoring:
Project participants monitor during the project termination preparatory period. Required monitoring content and monitoring duration follow, in principle, laws and regulations of host country and region and are established in a JCM methodology.

27. Post termination monitoring:
The post termination monitoring is carried out in accordance with the laws and regulations of the host country or region. Project participants consent with site owner by the start of a JCM project on the handling of the period between post termination and transfer of liability taking into consideration that where project termination is not necessarily associated with sealing of injection well, site closure or procedure for transfer of liability in host country, in case CO_2 not under the scope of GHG emissions reduction of a JCM project is injected and stored using the same facility as the JCM project after the completion of CO_2 injection in the JCM project.

* It is to be noted the type and amount of information that can be gathered may be limited in case of continuation of non-JCM project related CO_2 injection using the same facilities as a JCM project after termination of the applicable JCM project and in such cases, understanding the conditions required for project completion needs to be limited to information specifically related to the impacts of the applicable JCM project.

28. The reserve rate, in principle, is established at 3% as default, however, project participants may also establish specific reserve rate in a methodology.

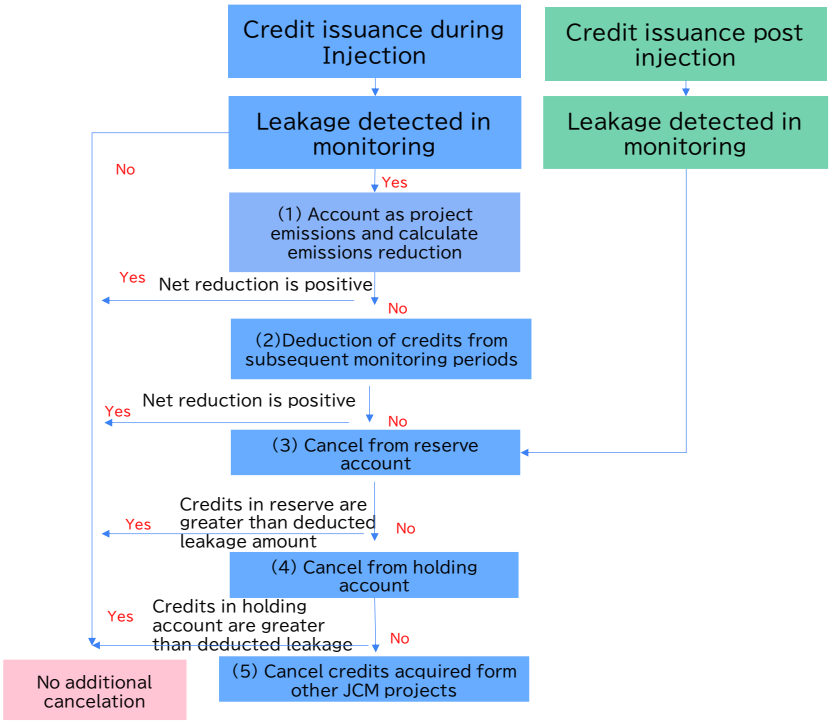

Figure: Credit cancellation procedure when leakage is detected within credit issuance

* Credit cancellation is conducted after verification by TPE.

29. Also, in case of small-scale projects with small amount of injection where monitoring during termination period is exempted, credits are issued based on emissions reduction calculated with deduction of a certain amount of emissions reduction. The amount to be deducted is established in a methodology.
30. All the credits reserved in reserve accounts should be properly adjusted from inventory of host country to prevent possible double counting and retain its environmental integrity.

3.7. Reference Documents for CCS and CCUS

31. In applying this guideline to CCS and CCUS projects, ISO27914 and ISO27916 are referred. In case of revision of ISO27914 and ISO27916, this guideline will also be reviewed.

4. General Guidelines

32. Methodology proponents prepare the proposed methodology by filling in the Proposed Methodology Form and the Proposed Methodology Spreadsheet, attached to these Guidelines.
33. These Guidelines, the Proposed Methodology Form and the Proposed Methodology Spreadsheet may be obtained electronically from the JCM website.
34. The Proposed Methodology Form and the Proposed Methodology Spreadsheet are completed

in English language.

35. Methodology proponents provide supporting documents to justify key logical and quantitative assumptions regarding the choice of eligibility criteria, default values and establishment of reference emissions.
36. The Joint Committee develops the Proposed Methodology Form and the Proposed Methodology Spreadsheet and may revise them if necessary.
37. The Proposed Methodology Form is not altered, that is, is completed without modifying its format, font, headings. If sections of the Proposed Methodology Form are not applicable, it is explicitly stated that the section is left blank on purpose.
38. The Proposed Methodology Spreadsheet enables calculation of GHG emission reductions automatically through inputting values by project participants. The Proposed Methodology Spreadsheet consists of the following:
    (a) An Input Sheet containing all the parameters to be monitored *ex post*, project-specific parameters to be fixed *ex ante* by the project participants (e.g. historical data) as well as the default factors which can be changed by the project participants. For each parameter, the methodology proponents fill in all the required fields, except for those of the inputted values;
    (b) A Calculation Process Sheet containing all the default values which cannot be changed by the project participant, calculation process to derive reference emissions and project emissions, and the resulting emission reductions.
39. Estimated values of reference and project emissions are not rounded while those of emission reductions are rounded down after the decimal point in the Proposed Methodology Spreadsheet.
40. The proposed methodology:
    (a) Describes the procedures in a manner that is sufficiently explicit to enable the methodology to be used, be applied to projects unambiguously, and be reproduced by a third party;
    (b) Is possible for projects following the methodology to be subjected to JCM validation and/or verification;
    (c) Includes all algorithms, formulae, and step-by-step procedures needed to apply the methodology and validate the project, i.e., calculating reference emissions and project emissions;
    (d) Provides instructions for making any logical or quantitative assumptions that are not provided in the methodology and is made by the methodology user;
    (e) Avoids the intentional increase of credits caused by perverse incentives (e.g. when an increase in output is triggered by incentive to increase credits).
41. The presentation of values in the Proposed Methodology Form and the Proposed

Methodology Spreadsheet should be in international standard format (e.g. 1,000 representing one thousand and 1.0 representing one). The units used should be accompanied by their equivalent S.I. units/norms (thousand/million) as part of the requirement to ensure transparency and clarity.

5. Instructions for completing the Proposed Methodology Form

Instructions for completing the Proposed Methodology Form are provided below. A hypothetical proposed methodology on CCS and CCUS is inserted to enhance the clarity of these Guidelines. This methodology is purely indicative and does not imply that the methodology is to be adopted.

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	The Republic of Indonesia
Name of the methodology proponents submitting this form	ABC Company Ltd.
Sectoral scope(s) to which the Proposed Methodology applies	16. Carbon capture and storage and carbon capture, utilization and storage
Title of the proposed methodology, and version number	Capturing, Transporting, and Injecting CO_2 from a Gas Processing Plant Version 01.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☒Additional information 1) Regulation for CCS and CCUS 2) Feasibility studies and technical reports 3) Information regarding reference scenario
Date of completion	01/04/2023

- *Methodology proponents should submit the proposed methodology to the Joint Committee which is established by the Republic of Indonesia and Japan.*
- *The methodology proponents are each side, project participants, or the Joint Committee.*
- *Please identify sectoral scope(s) according to the JCM sectoral scope(s) listed in Annex I.*
- *Please indicate the following: (a) The title of the proposed methodology; (b) The version number of the document. Please provide an unambiguous title for the proposed methodology. The title should reflect the project types to which the methodology is applicable. Do not use project-specific titles.*
- *If the methodology proponents have attached additional information, please provide description of the documents.*
- *Fill in the date of completion in DD/MM/YYYY.*

History of the proposed methodology

Version	Date	Contents revised
01.0	01/04/2021	First edition

- *If the methodology proponents revise a previously submitted methodology, please provide date of revision in DD/MM/YYYY as well as a brief summary of revision.*

A. Title of the methodology

Capturing, Transporting, and Injecting CO_2 from a Gas Processing Plant Version 01.0

- *Please indicate the following: (a) The title of the proposed methodology; (b) The version number of the document. Provide an unambiguous title for the proposed methodology. The title should reflect the project types to which the methodology is applicable. Do not use project-specific titles.*
- *Please include the GHG emission reduction measures (e.g. technology, product, or service) adopted.*

B. Terms and definitions

Terms	Definitions
Breakthrough	Breakthrough is an event where a gas or fluid injected through well(s) reaches a producing well.

- *Please provide definitions of key terms that are used in the proposed methodology.*

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Reduction of CO_2 emissions by capturing CO_2 from a gas processing plant by installing a capturing equipment,

	transporting it through a pipeline, and injecting it into a producing or depleted oil field.
Calculation of reference emissions	Reference emissions are calculated on the basis of the amount of CO_2 captured and separated from the produced oil, under the assumption that CO_2 is separated from produced oil. Breakthrough emissions, if any, are subtracted from reference emissions to ensure net emissions reduction. .
Calculation of project emissions	Project emissions are calculated on the basis of energy consumption in transport and injection
Monitoring parameters	Injected CO_2, electricity and fuel consumption, oil production, and average CO_2 concentration of the produced oil are monitored and measured.
Reserve rate for risk of reversal	The reserve rate is established at 3%
Discount factor for risk of reversal (if applicable)	Not applicable for this project.

- *Please summarize the key elements of the proposed methodology, including brief description on:*
  - *GHG emission reduction measures;*
  - *How the proposed methodology calculates the reference emissions;*
  - *How the proposed methodology calculates the project emissions;*
  - *Key monitoring parameters and methods.*
  - *Determination of the reserve rate for risk of reversal.*
  - *Determination of the discount factor for risk of reversal.*

D. Eligibility criteria

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

Criterion 1	Currently, CO_2 is separated from the produced oil in the field and released into the atmosphere. The aim of the project is to capture, transport, and inject CO_2 into a producing or depleted oil field.
Criterion 2	The CO_2 used for raw material or injected into the ground is excluded.
Criterion 3	Measures are taken to ensure safe and long-term storage in accordance with relevant national and/or local regulations and/or international standards such as ISO27914 or any standard that standard that succeeds it. Items to be

	checked include presence of caprock, absence of active faults, information about abandoned wells, integrity of existing producing wells, well design and closure plan for injection well(s).
Criterion 4	The CCS and CCUS implementation plan requires that the amount of CO_2 injected does not exceed the maximum injection capacity, which is determined by geological information of the storage reservoir so that CO_2 plume will not reach the spill point. This is also confirmed at verification timing after the project starts. Reservoir simulations for this purpose are updated as necessary based on monitoring results on production and injection. If monitoring results such as bottomhole pressure significantly differs from initial assumptions, the simulation should be updated to improve accuracy based on newly monitored and measured data.
Criterion 5	The CCS and CCUS implementation plan requires that CO_2 injection is operated at pressure below 90% of the caprock fracturing pressure, and that the amount of injected CO_2 is less than the cumulative oil production. This is also confirmed at verification timing after the project starts.
Criterion 6	
Criterion 7	
Criterion 8	
Criterion 9	
Criterion 10	

- *Eligibility criteria are those that can be examined objectively.*
- *Eligibility criteria include:*
  - *Characteristics to identify the measures (e.g. technology, product, or service) applied to the methodology;*
  - *Conditions that are necessary in order to enable robust calculation of GHG emission reductions by the algorithm contained in the methodology, e.g. the situation before the implementation of the measure, in cases where reference emissions is calculated on the basis of historical performance of the facility.*
- *Eligibility criteria should be, to the extent possible, those that can be ascertained upon validation, i.e. eligibility criteria should avoid those which need to be monitored ex post. For example, actual performance of a measure should not be included as eligibility criteria, since it is not certain at the validation whether the stated performance can be achieved. On the other hand, performance as defined by nameplate figures can be included as eligibility criteria since it can be readily checked upon validation.*
- *Eligibility criteria may be represented by:*

- *Certain technology (e.g. geothermal power generation);*
- *Certain technology with a design efficiency or performance indicator above a certain threshold (e.g. a power plant with a thermal efficiency above X%);*
- *Certain sector to which the measure is applied.*

E. Emission Sources and GHG types

The emission sources include all the following GHG emission sources and GHG types associated with the CCS and CCUS project.

Reference emissions	
Emission sources	GHG types
CO_2 separated from the produced oil	CO_2
Breakthrough CO_2 from producing wells	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
Project emissions	
Emission sources	GHG types
CO_2 associated energy consumption in transport and injection	CO_2
CO_2 associated electricity consumption in transport and injection	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

- *Please identify all GHG emissions by sources that are significant and reasonably attributable to the JCM project.*
- *If deemed appropriate, please explain whether any sources related to the reference emissions or the project emissions have been excluded, and if so, justify their exclusion.*
- *Upstream emissions may be excluded unless they are deemed to be significant.*

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated on the basis of the amount of CO_2 separated from the produced oil, under the assumption that CO_2 is separated from the produced oil and released into the atmosphere, and the breakthrough CO_2, in case of occurrence. If the breakthrough CO_2 occurs, it is detected by monitoring the percentage increase of CO_2 in the produced oil.

The BaU emissions assume the emissions when CCS and CCUS will not be introduced in the Republic of Indonesia, which is justified since there are currently no plans to introduce CCS and CCUS.

F.2. Calculation of reference emissions

$RE_p = CO_{2inj,p} - Q_p * (\Delta C_{CO2,p}) * 0.00198$

or

$\Delta C_{CO2,p} = \max (C_{CO2,p} - C_{CO2,EST}, 0)$

RE_p	Reference CO_2 emissions during the period *p* [tCO_2/p]
$CO_{2inj,p}$	CO_2 injected during the period *p* [tCO2/p]
Q_p	Oil produced during the period *p* [kl/p]
$\Delta C_{CO2,p}$	Changes in CO_2 concentration between current and average values of the produced oil during the period *p* [-]
$C_{CO2,p}$	Average CO_2 concentration of the produced oil [-]
$C_{CO2,EST}$	Specific CO_2 concentration [-]
0.00198	CO_2 concentration in standard condition [tCO_2/Nm3]

- *Please provide only one procedure for establishing reference emissions, which, in the view of the methodology proponent, represents plausible emissions in providing the same outputs or service level of the proposed JCM project in the Republic of Indonesia.*
- *Reference emissions should be established, taking into account the following:*
  - *If the reference emissions are defined by multiplying an emission factor and an output, the output should be identical to or less than the monitored output of the project.*
  - *The reference emissions should comply with all applicable regulations of the Republic of Indonesia.*
  - *The reference emissions are established in a manner that the proposed project contributes to the achievement of the latest nationally determined contributions (NDCs) of the Republic of Indonesia under the Paris Agreement.*
- *Please provide a description on how the reference emissions are derived. Provide also a*

description of how and why the reference emissions are below the BaU emissions.

* *Rationale and justification for setting reference emissions are to be explained in additional information attached to a proposed methodology at the time of submission.*

- *Reference emissions may be derived from:*
  - *The latest NDC of the Republic of Indonesia;*
  - *The current situation and performance;*
  - *Average historical performance;*
  - *Performance of similar products and technologies which compete with the project technology;*
  - *Legal requirements;*
  - *Voluntary standards and targets;*
  - *Best available technology of the Republic of Indonesia.*
- *Please elaborate how the reference emissions contribute to the achievement of the latest NDC of the Republic of Indonesia (e.g. identification of sectors covered by the NDC, explanation of how the proposed methodology achieves emission reductions in the identified sector.)*
- *Please elaborate the method to calculate the reference emissions. Please be specific and complete, so that the procedure can be carried out in an unambiguous way, replicated, and subjected to assessment and verification:*
  - *Please explain the underlying rationale for the method to calculate (e.g. marginal vs. average, etc.);*
  - *Please use consistent variables, equation formats, subscripts, etc.;*
  - *Please number all equations in the Proposed Methodology Form;*
  - *Please define all variables, with units indicated;*
  - *Please justify the conservativeness of the method to calculate.*
- *Please elaborate all parameters, coefficients, and variables used in the calculation of reference emissions:*
  - *For those values that are provided in the methodology:*
    - *Please clearly indicate the precise references from which these values are taken (e.g. official statistics, IPCC Guidelines, commercial and scientific literature, Indonesia's NDC);*
    - *Justify the conservativeness of the values provided.*
  - *For those values that are to be provided by the project participants, please clearly indicate how the values are to be selected and justified, for example, by explaining:*
    - *What types of sources are suitable (official statistics, expert judgment, proprietary data, IPCC Guidelines, commercial and scientific literature, Indonesia's NDC, etc.);*

- *The vintage of data that is suitable;*
- *What spatial level of data is suitable (local, regional, national, international);*
- *How conservativeness of the values is to be ensured.*

- *For all data to be monitored or recorded by the project participants, please specify the procedures to be followed if expected data are unavailable. For instance, the methodology could point to a preferred data source, and indicate a priority order for use of additional data and/or fall back data sources to preferred sources (e.g. private, international statistics, etc.).*
- *Please note any parameters, coefficients, variables, etc. that are used to calculate reference emissions but should be obtained through monitoring.*
- *Please explain any parts of the method to calculate that are not self-evident. Provide references as necessary. Explain implicit and explicit key assumptions in a transparent manner.*
- *When referring to and/or making use of life cycle analysis (LCAs) and/or LCA tools, methodology proponents provide, in a transparent manner, all equations, parameterizations and assumptions used in the LCA. For example, this could be accomplished by highlighting the relevant sections in an attached copy of the referenced LCA.*
- *The most recent IPCC default values may be used as necessary, when country or project specific data are not available or difficult to obtain.*
- *Methodologies requiring sampling as a part of monitoring clearly indicate the sampling method, statistical treatment of sampled data (e.g. confidence level, margin of error). A useful reference is the statistical treatment of sampled data for large scale CDM project activities in latest version of "Standard for Sampling And Surveys For CDM Project Activities and Programme of Activities" for large-scale CDM project activities.*
- *Emission reductions from reduced consumption of international transport fuels cannot be claimed under the JCM.*

G. Calculation of project emissions

Project emissions are calculated on the basis of energy consumption in transport and injection.

$PE_p = \Sigma_i(PFC_{i,p} * NCV_{i,p} * EF_{CO2,f,I,p}) + PEC_{i,p} * EF_{e,p}$

PE_p	Project CO_2 emissions during the period *p* [tCO_2/p]
$PFC_{i,p}$	Project consumption of fossil fuel *i* (oil) associated with transport and injection during the period *p* [kg, m3, etc./p]

$NCV_{i,p}$	Net calorific value of fossil fuel *i* (oil) during the period *p* [TJ/ton]
$EF_{CO2,f,i,p}$	GHG emission factor of fossil fuel *i* (oil) during the period *p* [tCO_2/TJ]
PEC_p	Project electricity consumption associated with transport and injection during the period *p* [MWh/p]
$EF_{e,p}$	GHG emission factor of electricity during the period *p* [tCO_2/MWh]

- *Where applicable, method to calculate project emissions should adhere to the instruction provided in the section on the reference emissions.*

H. Calculation of emissions reductions

Emission reductions are calculated as the difference between the reference emissions and project emissions, as follows.

$ER_p = RE_p - PE_p$

ER_p	GHG emission reductions during the period *p* [tCO_2/p]
RE_p	Reference emissions during the period *p* [tCO_2/p]
PE_p	Project emissions during the period *p* [tCO_2/p]

- *Please elaborate the method to calculate used to estimate, measure or calculate the emission reductions from the JCM project. In most cases, this will be simple equation with two terms: the reference emissions, and the project emissions.*

I. Data and parameters fixed *ex ante*

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

Parameter	Description of data	Source
$EF_{CO2,f,i,p}$	GHG emission factor of fossil fuel *i* (oil) during the period *p*	IPCC guideline 2006 (2019 Refinement) or calculated with oil composition
$NCV_{i,p}$	Net calorific value of fossil fuel *i* (oil) during the period *p*	IPCC guideline 2006 (2019 Refinement) or calculated with oil composition
$EF_{e,p}$	GHG emission factor of electricity during the period *p*	Emission factor of Jamali (Jawa-Madura-Bali) in the website of JCM Indonesia

		Secretariat

- *Please identify sources of default values, where default values are applied to the proposed methodology.*

J. Determination of the Reserve Rate for Risk of Reversal

The reserve rate is established at 3%.

K. Determination of the Discount Factor for Risk of Reversal

The discount factor for risk of reversal is not applicable for this project.

6. Instructions for completing the Proposed Methodology Spreadsheet

Instructions for completing the Proposed Methodology Spreadsheet are provided below. The Input Sheet of the Proposed Methodology Spreadsheet should be completed as follows. A hypothetical Input Sheet of the Proposed Methodology Spreadsheet on building energy management systems (BEMS) is inserted to enhance the clarity of these Guidelines. This is purely indicative and does not imply that the Input Sheet of the Proposed Methodology Spreadsheet is adopted.

JCM Proposed Methodology Spreadsheet Form (Input Sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$CO_{2inj,p}$	CO_2 injected during the period *p*		tCO_2/p	Option C	monitored data	- Measuring flow rate of oil injected through orifice flow meter, etc. - Measuring CO_2 concentration of oil injected through oil concentration analyzer	continuous	
(2)	Q_p	Oil produced during the period *p*		kl/p	Option C	monitored data	- Measuring produced oil data through orifice flow meter, etc.	continuous	
(3)	$C_{CO2,p}$	Average CO_2 concentration of the produced oil for the period *p*		N/A	Option C	monitored data	- Conducting oil sampling and measurement by oil chromatography, etc. - Sampling intervals are to be optimized based on changes in CO_2 concentration	periodic	
(4)	$PFC_{O,p}$	Project consumption of oil associated with transport and injection during the period *p*		kl/p	Option B	purchase records or monitored data	- Collecting purchase amount through fuel bill or changes in fuel stock	N/A	
(5)	PEC_p	Project electricity consumption associated with transport and injection during the period *p*		MWh/p	Option B or Option C	purchase records or monitored data	- Collecting electricity consumption data through electricity bill or real-time measurement by watt-hour meter	N/A	

Table 2: Project-specific parameters to be fixed *ex ante*

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	Description of data	Estimated Values	Units	Source of data	Other comments

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
0	tCO_2/p

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipment (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipment (Data used: measured values)

The Calculation Process Sheet of the Proposed Methodology Spreadsheet should be completed as follows. A hypothetical Calculation Process Sheet of the Proposed Methodology Spreadsheet on carbon capture, transport and storage and carbon capture, utilization and storage (CCS and CCUS) is inserted to enhance the clarity of these Guidelines. This is purely indicative and does not imply that the Calculation Process Sheet is adopted.

JCM_ID_F_PMS_CCS-CCUS_ver01.0

JCM Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period *p*		0	tCO_2/p	ER_p
2. Selected default values, etc.				
GHG emission factor of electricity during the period *p*	Electricity	0.862	tCO_2/MWh	$EF_{e,p}$
GHG emission factor of fossil fuel during the period *p*	Oil	0.0733	tCO_2/GJ	$EF_{CO2,f,O,p}$
Net calorific value of fossil fuel during the period *p*	Oil	42.3	GJ/t	$NCV_{O,p}$
3. Calculations for reference emissions				
Reference emissions during the period *p*		0	tCO_2/p	RE_p
CO_2 injected during the period *p*	Oil	0	tCO_2/p	$CO_{2inj,p}$
Oil produced during the period *p*	Oil	0	kl/p	Q_p
Changes in CO_2 concentration between current and average values of the produced during the period *p*	Oil	0	N/A	$\Delta C_{CO2,p}$
CO_2 concentration in standard condition	Oil	0.00198	$tCO_2/Nm3$	
4. Calculations of the project emissions				
Project emissions during the period *p*		0	tCO_2/p	PE_p
Project emissions (electricity) during the period *p*		0	tCO_2e/p	
Project electricity consumption during the period *p*	Electricity	0	MWh/p	PEC_p
GHG emission factor of electricity	Electricity	0.862	tCO_2/MWh	$EF_{e,p}$
Project emissions (oil) during the period p		0	tCO_2/p	
Project oil consumption during the period *p*		0		$PFC_{O,p}$
Net calorific value of fossil fuel	Oil	42.3	GJ/t	$NCV_{O,p}$
GHG emission factor of fossil fuel	Oil	0.0733	tCO_2/GJ	$EF_{CO2,f,O,p}$

[List of Default Values]

Net calorific value of fossil fuel	$NCV_{i,p}$	
Oil	42.3	GJ/t

GHG emission factor of fossil fuel	$EF_{CO2,f,i,p}$	
Oil	0.0733	tCO_2/GJ

Units of fossil fuel	
Oil	kl

GHG emission factor of electricity	$EF_{e,p}$	
Electricity	0.862	tCO_2/MWh

- *The Input Sheet of the Proposed Methodology Spreadsheet consists of a table of parameters to be monitored ex post, and parameters to be fixed ex ante, which, combined, should provide a complete listing of the data that needs to be collected for the application of the methodology. The tables may include data that is collected from other sources (e.g. official statistics, expert judgment, proprietary data, IPCC Guidelines, commercial and scientific literature, etc.), measured, or sampled. Parameters that are calculated with equations provided in the methodology should not be included in this section.*

For the "Parameters to be monitored ex post"(table 1), the following items are filled:

- *Parameter: the variable used in equations in the proposed methodology;*
- *Description of data: a clear and unambiguous description of the parameter;*
- *Estimated value: this field is for the project participants to fill in to calculate emission reductions, and may be left blank in the proposed methodology.*
- *Unit: The International System Unit (SI units – refer to <http://www.bipm.fr/enus/3_SI/si.html>)*
- *Monitoring option: please select option(s) from below. If appropriate, please provide the order of priority and the conditions when the options are chosen.*
  - *Option A: Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)*
  - *Option B: Based on the amount of transaction which is measured directly using measuring equipment (Data used: commercial evidence such as invoices)*
  - *Option C: Based on the actual measurement using measuring equipment (Data used: measured values)*
- *Source of data: A description which data sources should be used to determine this parameter. Clearly indicate how the values are to be selected and justified, for example, by explaining:*
  - *What types of sources are suitable (official statistics, expert judgment, proprietary data, IPCC, commercial and scientific literature, etc.);*
  - *What spatial level of data is suitable (local, regional, national, international).*
- *Measurement methods and procedures: For option B and C, a description of the measurement procedures or reference to appropriate standards. Provide also QA/QC procedures.*
- *Monitoring frequency: A description of the frequency of monitoring (e.g. continuously, annually, etc).*
- *Other Comments: Other input not covered by the items above.*

- *Where applicable, the table "Parameters to be fixed ex ante"(table 2), should also adhere to the instruction provided above. Data that is determined only once and remains fixed should be considered under "I. Data and parameters fixed ex ante".*

Annex I. Sectoral Scopes for the JCM

1. Energy industries (renewable - / non-renewable sources);
2. Energy distribution;
3. Energy demand;
4. Manufacturing industries;
5. Chemical industry;
6. Construction;
7. Transport;
8. Mining/Mineral production;
9. Metal production;
10. Fugitive emissions from fuels (solid, oil and gas);
11. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride;
12. Solvents use;
13. Waste handling and disposal;
14. Reducing Emissions from Deforestation and Forest Degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD-plus);
15. Agriculture;
16. Carbon capture and storage and carbon capture, utilization and storage.