

AM0027

Large-scale Methodology

Substitution of CO₂ from fossil or mineral origin by CO₂ from biogenic residual sources in the production of inorganic compounds

Version 03.0

Sectoral scope(s): 05



United Nations
Framework Convention on
Climate Change

TABLE OF CONTENTS	Page
1. INTRODUCTION	3
2. SCOPE, APPLICABILITY, AND ENTRY INTO FORCE	3
2.1. Scope	3
2.2. Applicability	3
2.3. Entry into force	4
2.4. Applicability of sectoral scopes	4
3. NORMATIVE REFERENCES	4
3.1. Selected approach from paragraph 48 of the CDM modalities and procedures	4
4. DEFINITIONS	4
5. BASELINE METHODOLOGY	5
5.1. Identification of the baseline scenario and demonstration of additionality	5
5.2. Project boundary	5
5.3. Final use and emission reductions.....	7
5.4. Emission reductions	7
6. MONITORING METHODOLOGY	8
6.1. Parameters not monitored.....	8
6.2. Parameters monitored.....	9

1. Introduction

1. The following table describes the key elements of the methodology.

Table 1. Methodology key elements

Typical projects	Industrial processes where biogenic residual CO ₂ is used as input in the production of inorganic compounds substituting CO ₂ from fossil or mineral sources.
Type of GHG emissions mitigation action	Feedstock switch. Reduction of GHG emissions by using a biogenic residual source of CO ₂ displacing fossil/mineral sources for the production of inorganic compounds.

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology applies to project activities that substitute CO₂ obtained from fossil or mineral sources with biogenic residual CO₂ as input for the production of inorganic compounds.

2.2. Applicability

3. This methodology is applicable to industrial production processes of inorganic compounds where CO₂ from fossil or mineral sources is substituted with biogenic residual CO₂.
4. The methodology is applicable under the following conditions:
 - (a) Prior to the implementation of the project activity, the biogenic residual CO₂ was produced, but not used for any purpose;
 - (b) The process generating the biogenic residual CO₂ undergoes no changes in capacity as a result of the project activity;
 - (c) Prior to the implementation of the project activity, the fossil CO₂ used for the production of inorganic compounds was sourced from a process which does not involve energy production and will not continue under the project scenario;
 - (d) The production process of inorganic compounds does not undergo changes, such as product, energy requirement or capacity change, as a result of the implementation of the project activity;
 - (e) The biogenic residual CO₂ used by the project activity does not require preparation/purification measures. Any associated project emissions shall remain below 1 per cent of the total emission reductions;
 - (f) All the CO₂ used in the production of the inorganic compounds under the project activity is obtained from the biogenic residual source;
 - (g) The molecules of inorganic compounds dissociate and release CO₂ into the atmosphere at the final use, within the crediting period of the project activity;

- (h) The baseline scenario, as determined through the procedure in section 5.1 below, is that the inorganic compounds would continue to be produced using a fossil or mineral source of CO₂ and that the biogenic residual CO₂ would continue to be produced but not used for any purpose.

2.3. Entry into force

- 5. The date of entry into force of the methodology is the date of the publication of the EB 111 meeting report on 9 September 2021.

2.4. Applicability of sectoral scopes

- 6. For validation and verification of CDM projects and programmes of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 05 is mandatory.

3. Normative references

- 7. This methodology is based on elements from the proposed new methodology NM0115: “CO₂, electricity and steam from renewable sources in the production of inorganic compounds”.
- 8. For more information regarding the proposal and its consideration by the Executive Board (hereinafter referred as the Board) of the clean development mechanism (CDM) please refer to <<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>>.
- 9. This methodology also refers to the latest approved versions of “TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality”

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

- 10. “Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment”.

4. Definitions

- 11. The definitions contained in the Glossary of CDM terms shall apply.
- 12. For the purpose of this methodology, the following definitions apply:
 - (a) **Biogenic residual CO₂** – stream of CO₂ that is generated through a biological process (e.g. fermentation of biomass) and emitted to the atmosphere in the absence of the project activity;
 - (b) **CO₂ from fossil/mineral sources** – stream of CO₂ that is obtained from fossil/mineral sources.

5. Baseline methodology

5.1. Identification of the baseline scenario and demonstration of additionality

13. The selection of the baseline scenario and demonstration of additionality shall be conducted in accordance with “TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality”.

5.1.1. Identification of alternative scenarios

14. Project participants shall identify realistic and credible alternative scenarios, including:
 - (a) All possible sources of CO₂ for the production of inorganic compounds;
 - (b) The fate of the process generating the biogenic residual CO₂ used under the project activity;
 - (c) The fate of the process that generated the fossil/mineral CO₂ prior to the implementation of the project activity.
15. Amongst the realistic and credible alternatives, the following scenarios (and any plausible combination) shall be considered:
 - (a) C1: The proposed project activity not undertaken as a CDM project activity;
 - (b) C2: The proposed project activity, implemented at a later point in time and not undertaken as a CDM project activity;
 - (c) C3: The proposed project activity, using the same type of biogenic residual CO₂ but with a higher efficiency ;
 - (d) C4: The use of CO₂ from other renewable or biogenic residual CO₂ sources;
 - (e) C5: The use of CO₂ from fossil/mineral sources without energy outputs;
 - (f) C6: The use of CO₂ from other industrial processes that use fossil or mineral as raw materials.

5.2. Project boundary

16. Figure 1 shows the baseline boundary. Figure 2 provides an overview on the project activity boundary.

Figure 1. Baseline boundary

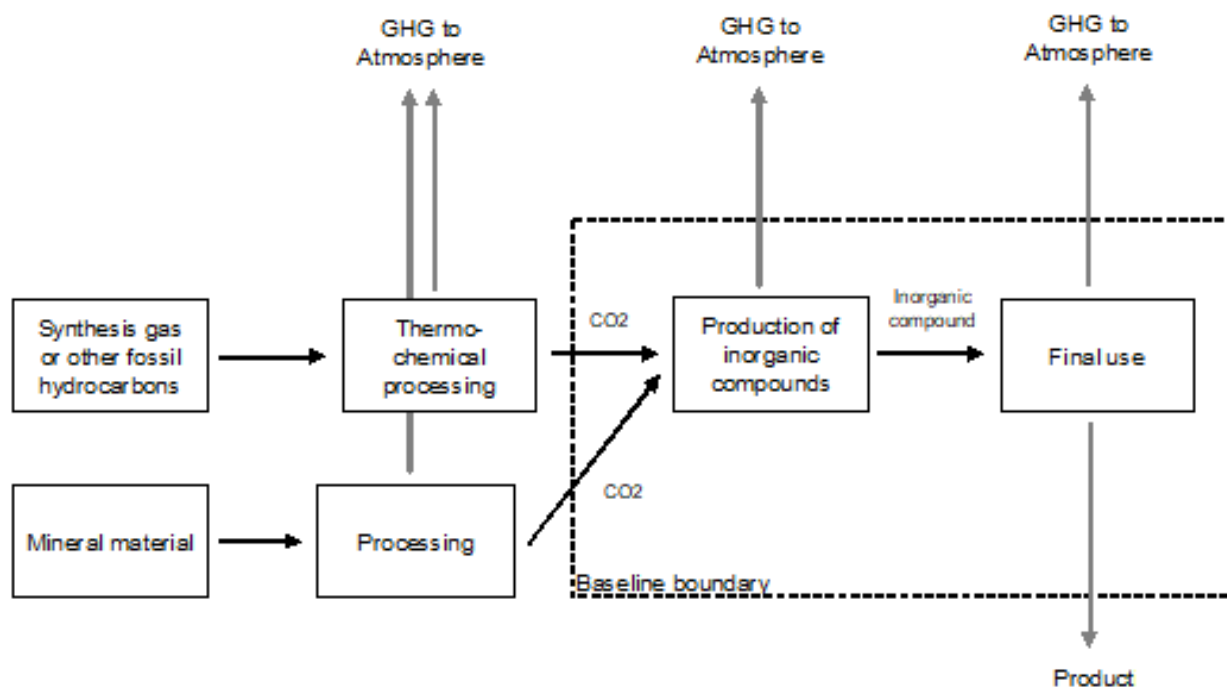
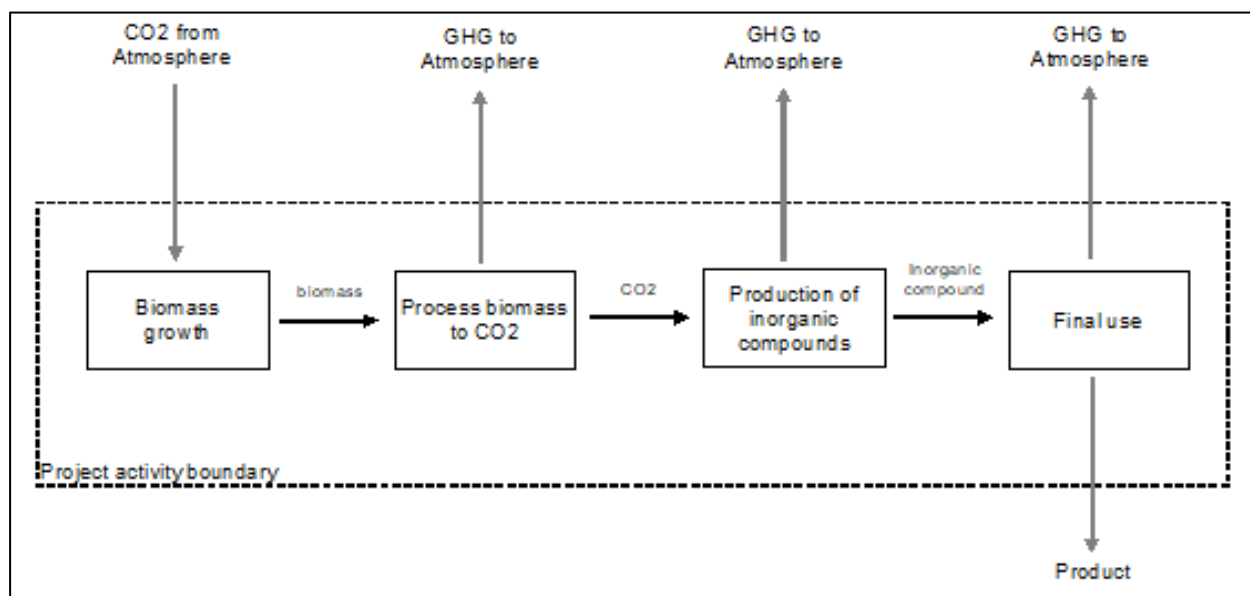


Figure 2. Project activity boundary



17. Table 2 illustrates in detail which emissions sources are included and excluded from the project boundary.

Table 2. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	Production of CO ₂ from fossil/mineral sources	CO ₂	Yes	Main source of emissions
	Biogenic process producing CO ₂	CO ₂	Yes	Main source of emissions
		CH ₄	No	Excluded for simplification
		N ₂ O	No	Excluded for simplification
Project activity	Biogenic process producing CO ₂	CO ₂	No	In accordance with the applicability conditions, project emissions from the biogenic process are considered to remain the same as in the baseline
		CH ₄	No	Excluded for simplification
		N ₂ O	No	Excluded for simplification
	Production of CO ₂ from fossil/ mineral sources	CO ₂	No	All the carbon content of the inorganic compounds produced under the project activity is sourced from the biogenic residual CO ₂ supplied by the project activity
		CH ₄	No	Excluded for simplification
		N ₂ O	No	Excluded for simplification

5.3. Final use and emission reductions

18. The project activity substitutes CO₂ from fossil or mineral sources with biogenic residual CO₂ as input for the production of inorganic compounds.
19. The project activity does not affect the downstream fate of the produced inorganic compounds. Therefore, it may be assumed that the final use of the product would be the same in the baseline and project scenarios.

5.4. Emission reductions

20. Considering that methodology is only applicable if the production process of inorganic compounds does not undergo changes of product, energy requirement or capacity, it is assumed that project and leakage emissions are not affected by the implementation of the project activity. Therefore, emission reductions are calculated based on a simplified approach as follows:

$$ER_y = \min(P_{his}, P_y) \times \min(Q_{CO2,his}, Q_{CO2,y}) \quad \text{Equation (1)}$$

Where:

P_{his} = Average amount of inorganic compound produced per year in the last three years prior to the implementation of the project activity (t)

P_y	=	Amount of inorganic compound produced in year y (t)
$Q_{CO_2,his}$	=	Average amount of fossil/mineral CO ₂ used per tonne of inorganic compound produced in the last three years prior to the implementation of the project activity (tCO ₂ / t product)
$Q_{CO_2,y}$	=	Amount of biogenic residual CO ₂ used per tonne of inorganic compound produced in year y (tCO ₂ / t product)

6. Monitoring Methodology

6.1. Parameters not monitored

Data / Parameter table 1.

Data / Parameter:	P_{his}
Data unit:	t
Description:	Average amount of inorganic compound produced per year in the last three years prior to the implementation of the project activity
Source of data:	On-site records
Measurement procedures (if any):	Use calibrated mass or volume meters
Monitoring frequency:	Monthly
QA/QC procedures:	To be cross-checked with sales receipts and an energy balance that is based on purchased quantities and stock changes
Any comment:	

Data / Parameter table 2.

Data / Parameter:	$Q_{CO_2,his}$
Data unit:	tCO ₂ / t product
Description:	Average amount of fossil/mineral CO ₂ used per tonne of inorganic compound produced in the last three years prior to the implementation of the project activity
Source of data:	Project site records
Measurement procedures (if any):	
Monitoring frequency:	The amount CO ₂ per tonne of inorganic compound produced in the baseline shall be monitored for at least three years before the start of the project activity
QA/QC procedures:	
Any comment:	Based on the carbon content (i.e. the number of carbon atoms in the compound molecule) and molecular weight of the inorganic compound produced in the baseline

6.2. Parameters monitored

Data / Parameter table 3.

Data / Parameter:	P_y
Data unit:	t
Description:	Amount of inorganic compound produced in year y
Source of data:	On-site records
Measurement procedures (if any):	Use calibrated mass or volume meters
Monitoring frequency:	Monthly
QA/QC procedures:	To be cross-checked with sales receipts and an energy balance that is based on purchased quantities and stock changes
Any comment:	

Data / Parameter table 4.

Data / Parameter:	$Q_{CO_2,y}$
Data unit:	t
Description:	aAmount of biogenic residual CO ₂ used per tonne of inorganic compound produced in year y
Source of data:	On-site measurements
Measurement procedures (if any):	
Monitoring frequency:	Monthly
QA/QC procedures:	To be cross-checked with purchase/sales receipts
Any comment:	Based on the carbon content (i.e. the number of carbon atoms in the compound molecule) and molecular weight of the inorganic compound produced in year y

Data / Parameter table 5.

Data / Parameter:	<i>Product</i>
Data unit:	Description of chemical substance
Description:	Type of inorganic compound produced
Source of data:	On-site records
Measurement procedures (if any):	
Monitoring frequency:	Annually
QA/QC procedures:	
Any comment:	The type of inorganic compound produced is monitored to ensure that the product does not change during the crediting period

- - - - -

AM0027

Large-scale Methodology: Substitution of CO₂ from fossil or mineral origin by CO₂ from biogenic residual sources in the production of inorganic compounds

Version 03.0

Sectoral scope(s): 05

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	9 September 2021	EB 111, Annex 6 Revision to: <ul style="list-style-type: none">• clarify the source of baseline CO₂;• expand the eligibility of sources CO₂ in the baseline; and• address provisions that could potentially lead to claiming emission reductions from CO₂ sequestration.
02.0	29 September 2006	EB 26, Annex 10 Revision to clarify that the approved methodology is applicable to project activities where the generation of CO ₂ from fossil or mineral sources in the baseline is only for the purpose of producing CO ₂ used for the production of inorganic compounds and there is no energy by-product of CO ₂ production from fossil source and its consumption in the baseline.
01.0	25 November 2005	EB 22, Annex 12 Initial adoption.

Decision Class: Regulatory

Document Type: Standard

Business Function: Methodology

Keywords: biogas recovery, biomass, fuel switching
