



## NEW BASELINE AND MONITORING METHODOLOGY OR METHODOLOGICAL TOOL RECOMMENDATION FORM (Version 02.0)

### INFORMATION TO BE COMPLETED BY THE METHODOLOGICAL EXPERT PANEL (MEP)

<b>Date and number of the MEP meeting</b>	30/01/2026
<b>Type of standard</b>	New baseline and monitoring methodology
<b>Unique reference number</b>	A6.4-PNM001
<b>Title of the methodology or methodological tool</b>	Production of Ammonia through electrolysis of water, air separation and synthesis of hydrogen and nitrogen
<b>Title of underlying project activity or programme of activities</b>	AM Green Ammonia Kakinada, AP
<b>History of submission</b>	MEP011: Clarifications requested from the proponent MEP007: Clarifications/modifications requested from the proponent 21 April 2025: Submission received
<b>Is a similar methodology(ies) already under review/approved under the Article 6.4 mechanism?</b>  <b>Is the methodology similar to an approved CDM methodology?</b>	<p>The methodology encompasses the 3 processes below. Some CDM methodologies partially cover certain elements of this methodology.</p> <ul style="list-style-type: none"> <li>a) Production of hydrogen using electrolyzers; [AM0124: Hydrogen production from electrolysis of water]</li> <li>b) Production of nitrogen through air separation plants or other facilities;</li> <li>c) Synthesis of hydrogen and nitrogen to produce ammonia (Haber Bosch Process) [AM0050: Feed switch in integrated Ammonia-urea manufacturing industry].</li> </ul>

### SECTION I. INFORMATION ABOUT THE NEW BASELINE AND MONITORING METHODOLOGY

#### Short description of the types of Article 6.4 activities covered by the methodology

Activities that produce ammonia, that is less carbon intensive than conventional ammonia production, primarily through the use of renewable electricity for:

- a) Production of hydrogen using electrolyzers to separate water into H<sub>2</sub> and O<sub>2</sub>;
- b) Production of nitrogen through Air Separation Plants or other facilities that use renewable energy only;
- c) Synthesis of hydrogen and nitrogen to produce ammonia (Haber Bosch Process).

#### Conditions under which the methodology is applicable

The methodology is applicable under the following conditions:

- a) Production of green ammonia using renewable energy to power the associated processes, including the electrolyser, air separation unit, synthesis of hydrogen and nitrogen via the Haber-Bosch process, and other related utilities;
- b) This methodology applies to project activities that encompass the following scenarios:
  - i. All subprocesses involved in green ammonia production are greenfield, or

- ii. The electrolyser plant is greenfield, while other subprocesses are existing or retrofitted.
- c) In the case of a brownfield or retrofitted project activity, where the electrolyser plant is greenfield and all subprocesses are existing or retrofitted, the output(s) or level(s) of service must remain identical to those in the pre-PACM project condition.
- d) This methodology is limited to the production and storage of ammonia within the manufacturing facilities.
- e) The electricity consumed by the ammonia production plant must be primarily sourced from greenfield renewable power plants or renewable electricity supplied via the grid, with grid electricity allowed only as a supplementary source.
- f) The use of grid electricity in ammonia production and any of its subprocesses shall not exceed 10% of the total electricity consumption on an annual basis.
- g) The Renewable energy generation, its storage, and use may or may not be co-located.
- h) Project activities may consist of modular green ammonia production equipment, in the vicinity where ammonia will be used or supplement the ammonia production in existing manufacturing facilities.
- i) In cases where green ammonia production supplements an existing facility, the project must ensure clear separation and robust monitoring/metering to distinguish green ammonia from conventional output.
- j) The project shall limit the use of locally available water (whether surface or groundwater) for electrolysis to no more than 5%, ensuring minimal impact on water needed for drinking, agriculture, or livelihoods.
- k) If the project activity involves installing a greenfield electrolyser within an existing ammonia production facility, the existing equipment used for hydrogen production must be decommissioned, destroyed, or properly disposed of. Failure to do so will require that emissions associated with its continued use be fully accounted for.

**Summary of the methodology (including project boundary, baseline scenario, baseline approach, additionality, baseline emissions or removals, project emissions or removals, leakage, emission reductions or removals, non-permanence and reversals and monitoring)**

**Project Boundary:**

The project boundary includes:

- a) The location where renewable electricity is generated and supplied;
- b) The location where the hydrogen production facility consisting of electrolyser stacks; water desalination/treatment and pumping;
- c) The location where the Air Separation plants are located to produce nitrogen;
- d) The location where the hydrogen is combined/ synthesised with nitrogen to produce the green ammonia; and
- e) The boundary of the project activity is limited to the premises of production facility(ies) and the supply sources of renewable energy.

**Baseline approach & baseline scenario:**

The baseline scenario is the conservative among the following three:

- a) Best Available Technology (BAT);
- b) Ambitious benchmark; and
- c) Existing actual or historical emissions corrected for downward adjustment.

**Additionality:**

The demonstration of additionality contains the following steps detailed in the methodology:

- a) Demonstration of prior consideration + Regulatory Analysis + Avoidance of locking-in the level of emissions;

<p>b) Financial additionality (Investment Analysis + Barrier Analysis) + Common practice analysis + Performance-based approach.</p>
<p><b>Baseline emissions or removals:</b></p> <p>The baseline can be chosen from either one or two of the approaches, in cases when data and information is available for conducting these approaches. All the subprocesses to produce ammonia are to be powered mainly by renewable electricity sourced from the greenfield renewable power plant. The RE supply, use of fossil fuels, and leakages arising out of diversion of RE or water, all parameters and information that is related to baseline and project scenario are comprehensively addressed within the Monitoring framework and are thoroughly accounted for in the subsequent sections on Methodology, Reporting and Verification. Life cycle emissions are considered both in baseline and activity emissions.</p>
<p><b>Baseline downward adjustment:</b></p> <p>Downward adjustment in the calendar year of the start date of the first crediting period (for approaches based on 36(iii)): not available.</p> <p>Downward adjustment in subsequent years: based on annual decrease to reach the net zero target.</p>
<p><b>Business-as-usual scenario:</b></p> <p>Reflects the most common ammonia production practices in the host country/region over the last three years, accounting for sources, and regulatory mandates. dominant subprocesses, energy sources, and regulatory mandates.</p>
<p><b>Activity emissions or removals:</b></p> <p>Activity emissions refer to the total direct and indirect greenhouse gas (GHG) emissions resulting from the implementation of the Green Ammonia production project. These emissions must be compared with baseline emissions to determine the net mitigation impact. Activity emissions sources include:</p> <ul style="list-style-type: none"> <li>a) Onsite emissions from hydrogen, nitrogen and ammonia production;</li> <li>b) Emissions from electricity consumption.</li> </ul>
<p><b>Leakage:</b></p> <p>The relevant geographical area for consideration of leakage shall not be limited to national boundaries and shall include international leakage where this can occur.</p> <p>If the sum of leakage from all greenhouse gas emissions and removals is a net decrease in greenhouse gas (GHG) emissions or increase in GHG removals, the resulting leakage shall be equal to zero in the quantification of the emission reductions or net removals.</p> <p>The activity participant in the PDD shall identify all potential sources of leakage for the type of mitigation activities covered by the methodology.</p>
<p><b>Emission reductions or net removals:</b></p> <p>Activity emissions refer to the total direct and indirect greenhouse gas (GHG) emissions resulting from the implementation of the Green Ammonia production project. These emissions must be compared with baseline emissions to determine the net mitigation impact. Activity emissions sources include:</p> <ul style="list-style-type: none"> <li>a) Direct onsite emissions from hydrogen and ammonia during ammonia production, including physical leaks of both gases;</li> <li>b) Indirect emissions resulting from electricity consumption during the ammonia production process.</li> </ul>
<p><b>Non-permanence and reversals:</b></p> <p>N/A</p>
<p><b>Monitoring:</b></p> <p><i>BAT</i> Best Available Technology.</p> <p><i>Performance Based Approach.</i></p> <p>AF Downward Adjustment Factor.</p> <p><i>Fconsume</i> Fuel consumed by the project activity.</p>

PNH3 Quantity of Green Ammonia produced in PACM project activity in year yHreqTotal hydrogen production.

PLNH3 Physical leaks of ammonia in ammonia value chain as a percentage of the total production.

PLH2 Physical leaks of Hydrogen in hydrogen value chain as a percentage of the total production Qg,y

Quantity of GHGs released.

#### Other methodologies principles:

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### SECTION II. INFORMATION ABOUT THE NEW METHODOLOGICAL TOOL

#### Conditions under which the methodological tool is applicable

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**Summary of the methodological tool (including the calculation of baseline emissions or removals, project emissions or removals, leakage, emission reductions or removals, non-permanence and reversals and monitoring)**

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### SECTION III. RECOMMENDATIONS TO THE SUPERVISORY BODY

- ☐ Approve the proposed new methodology or methodological tool ("A case")
- ☐ Reject the proposed new methodology or methodological tool ("C case")

#### Reasons for rejection if the recommendation is C case

*The reasons may include among others: (i) Misalignment with existing standards; (ii) Risks of over-crediting; (iii) Additionality-related risks; (iv) If applicable: Addressing the risk of non-permanence; (v) Other environmental integrity risks; (vi) Issues with ensuring the outcomes are real, in particular regarding monitored and non-monitored parameters; (vii) Other risks identified; (viii) Inadequate justifications.*

#### Any other issues arising from the assessment of the proposed methodology

*The reasons may include among others: (i) Misalignment with existing standards; (ii) Risks of over-crediting; (iii) Additionality-related risks; (iv) If applicable: Addressing the risk of non-permanence; (v) Other environmental integrity risks; (vi) Issues with ensuring the outcomes are real, in particular regarding monitored and non-monitored parameters; (vii) Other risks identified; (viii) Inadequate justifications.*

### SECTION IV. CLARIFICATIONS OR MODIFICATIONS REQUESTED

*PLEASE USE THIS SECTION ONLY WHEN THE FORM IS USED FOR REQUESTING CLARIFICATIONS OR MODIFICATIONS FROM THE PROPONENT ACCORDING TO THE PROCEDURE "DEVELOPMENT, REVISION AND CLARIFICATION OF BASELINE AND MONITORING METHODOLOGIES AND METHODOLOGICAL TOOLS"*

Section	Para	Questions
5. Applicability	<del>88</del> (i)	Please explain the reasons for this condition. Is there a specific methodological or environmental integrity risk it is intended to address?
	<del>7-8</del> (m)	It is stated that "If the project activity involves installing a greenfield electrolyser within an existing conventional ammonia production facility, the existing equipment used for hydrogen production must be decommissioned" This seems to be a departure from the previous submission which allowed parallel operation of existing fossil-based and new (green) hydrogen production within the same facility.  Please clarify <u>further on</u> whether the revised methodology <del>no longer</del> allows parallel operation of fossil-based and renewable hydrogen

		<p>production within the same facility for any credited ammonia output. Specifically clarify:</p> <p>a) Does the retrofit case apply only when the existing hydrogen facility is completely replaced with green hydrogen?</p> <p>b) If full replacement is required, please explain the continued relevance of the parameters “fH<sub>2</sub>,green” and “fN<sub>2</sub>,green” parameter which previously were meant to capture indicate the fractional substitution, rather than full substitution of green hydrogen may not be necessary.</p>
9.3.3 Common practice analysis	29	<p>Please explain the rationale for selecting approach B, in view of paragraph 13(a)(i) of the “A6.4-AMT-001 Methodological tool:</p> <p>Common practice analysis” which states that approach A is generally suited for discrete, large-scale activities; Given that ammonia production facilities are typically large-scale, capital-intensive, and relatively discrete industrial installations, please justify why Approach A was not considered appropriate in this case</p> <p>Please clarify how the common practice analysis distinguishes between conventional ammonia production, partially de-carbonised ammonia production, and fully renewable-based ammonia production, and how this distinction is reflected in the identification of comparable facilities.</p>
10.2. Application of the selected approach, prior to implementation of a downward adjustment	43	<p>Please substantiate the claim of footnote 4 which states “nitrogen and ammonia synthesis loops are mature processes and are not considered for BAT selection” There seems to be literature and industry guidance which mentions conventional ammonia synthesis BAT, including improvement in catalyst design, heat integration and process efficiency. Please explain why these are excluded from BAT consideration in the context of this methodology.</p>
	44, 46	<p>Would it be feasible to conduct an investment analysis of facilities that are not the activity itself? Please clarify the feasibility and methodological validity of conducting an investment analysis for facilities or technologies that are not part of the project activity itself.</p>
	47	<p>The methodology refers to calculation of the emission intensity of ‘remaining technologies’, but calculation method is not specified-. Please clarify what is considered as ‘remaining technologies’, whether the emission intensities are based on benchmarks, historical data or default values.</p>
10.4.1. Calculation of the conservative BAU emissions	72-74	<p>Similar to 10.2, The practicality of this approach may be put to question. Would it be feasible to derive the economic viability facilities that are not the activity itself?</p> <p>Please also clarify whether BAU emissions are intended to be calculated at the level of individual sub-processes (hydrogen production, nitrogen separation, ammonia synthesis) or at the level of an integrated hydrogen–ammonia facility. If sub-process-level calculations are used, please explain how potential efficiency gains from process integration are accounted for to avoid baseline inflation</p>

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### Document information

Version	Date	Description
02.0	20 August 2025	Revision to incorporate new sections and sub-sections in line with current standards.

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	18 December 2024	Initial publication of form template.
Decision Class: Regulatory Document Type: Form Business Function: Methodology Keywords: A6.4 mechanism, developing methodologies and tools, recommendations.		