

A6.4-MEP010-A02

Draft Methodological tool

Determination of the technical lifetime of equipment

Version 01.0

DRAFT



United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Supervisory Body of the Article 6.4 mechanism (SBM), at its fifteenth meeting, approved its workplan for 2025 for the Methodological Expert Panel (MEP) and requested the MEP to continue working on the revision of CDM methodologies, methodological tools, standard and guidelines, including the “Methodological tool: Determination of the technical lifetime of equipment”.

2. Purpose

2. This methodological tool provides requirements and options to determine the technical lifetime of equipment and the remaining technical lifetime of equipment. The tool can be used to estimate the remaining technical lifetime of equipment used in the baseline to calculate baseline emissions. It can also be used with the “Methodological tool: Analysis of lock-in risk”¹ to estimate the technical lifetime of equipment used in A6.4 activities to evaluate the activity’s potential for lock-in risk.

3. Key issues and proposed solutions

3. Activity participants may use one of the following options to determine the technical lifetime and/or remaining technical lifetime of the equipment, in order of priority:
 - (a) Use of manufacturer’s specified technical lifetime;
 - (b) Use of an expert evaluation (for existing equipment only); or
 - (c) Use of default values.
4. The MEP has determined that, where uncertainty is involved, the technical lifetime of equipment or remaining technical lifetime of equipment may be best represented by a range of values, rather than a single parameter. When a range of values is used, the MEP notes that there are implications for the application of the conservativeness principle depending on whether the tool is used to estimate baseline emissions or address lock-in risk. In the context of estimating baseline emissions, the conservative value is the lower end of the range of values. In the context of addressing lock-in risk, the conservative value is the higher end of the range of values.
5. The MEP would like to seek public input, in particular regarding the use of default values as follows:
 - (a) Input on the proposed values and ranges for the technical lifetime of the different technologies included in Table 2 (in section 5.4 of this methodological tool);
 - (b) Input on the uncertainty associated with these default values; and

¹ Currently under development.

- (c) Input on the comprehensiveness of the list of technologies included in Table 2 (in section 5.4 of this methodological tool) and any suggestions for values for amending this list, including the underlying source of information.

4. Impacts

- 6. This methodological tool will provide clear procedures and default values to establish the remaining technical lifetime of equipment used in the baseline scenario, as well as to establish the technical lifetime for the purpose of analysing lock-in risk.

5. Subsequent work and timelines

- 7. The MEP agreed to seek public inputs from stakeholders on this draft version of the tool. The MEP will incorporate the stakeholders' inputs received and recommend a revised draft of the tool for approval by the Supervisory Body.

6. Recommendations to the Supervisory Body

- 8. Not applicable (Document is published for a call for public inputs).

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1. Introduction

1.1. Scope

1. This methodological tool provides requirements and options to determine the technical lifetime and the remaining technical lifetime of equipment used in the baseline scenario and/or in the Article 6.4 activity scenario.
2. This tool provides procedures to determine the following parameters:

Table 1. Parameters determined

Parameter	SI Unit	Description
TL	years or hours	Technical lifetime of equipment
RTL	years or hours	Remaining technical lifetime of equipment

1.2. Entry into force and validity

3. This methodological tool enters into force on XX Month 2026.
4. The methodological tool remains valid for five years, until XX Month 2031, unless an earlier date applies if the methodological tool is revised or withdrawn in accordance with the “Procedure: Development, revision and clarification of methodologies and methodological tools” (A6.4-PROC-METH-001).¹

2. Definitions

2.1. General Terms

5. The following general terms are applied to the methodological tool:
 - (a) “**Shall**” is used to indicate requirements that must be followed;
 - (b) “**Should**” is used to indicate that, among several options, one course of action is recommended as particularly suitable;
 - (c) “**May**” is used to indicate what is permitted.

2.2. Methodological terms and definitions

6. The following methodological terms and definitions are applied to this methodological tool:
 - (a) **Equipment:** Machinery and tools related to industrial, commercial, residential, agricultural facilities, e.g., power plant equipment such as boilers, turbines (steam, gas, wind, hydro), electric generators, pumps, motors, engines, and heat transfer equipment such as ovens, heaters, chillers, etc. In the context of this tool, the term equipment may refer to a single component, or an assembly of several components. The term equipment does not include (a) built infrastructure, such as

¹ See <https://unfccc.int/sites/default/files/resource/A6.4-PROC-METH-001.pdf>.

buildings, roads or railways, bridges, tunnels, hydro dams; (b) vehicles, such as cars, buses, trains; and (c) household consumer goods;

- (b) **Operational time:** The total time that the equipment has been operating since its first commissioning. The operational time is expressed in years or cumulative hours of operation;
 - (c) **Remaining technical lifetime:** The time for which the existing equipment can continue to operate before it must be replaced or discarded for technical reasons, such as the age of the equipment, safety reasons, or deteriorated performance. The remaining technical lifetime is expressed in years or cumulative hours of operation;
 - (d) **Technical lifetime:** The period during which an equipment can be expected to remain functional and deliver its intended service if maintained according to standard practices.
7. Further definitions from the “Article 6.4 Glossary of Terms”, once adopted by the Supervisory Body, shall also apply to this methodological tool.

3. Applicability

8. This methodological tool is applicable to Article 6.4 activities undertaken at the project level. The methodological tool may be amended in the future to expand its applicability to cover activities implemented at other scales (e.g., programmes of activities, policies, sectoral approaches, etc.).
9. Where a mechanism methodology refers to this tool, the following shall be specified in the mechanism methodology:
- (a) Whether the technical lifetime and/or the remaining lifetime is determined; and
 - (b) For which equipment the tool is to be applied.
10. This methodological tool may be used, inter alia, for the following purposes:
- (a) Estimation of the remaining technical lifetime of baseline equipment of Article 6.4 activities which replace existing equipment, and for which the baseline scenario is identified to be the continued usage of the existing equipment;
 - (b) Estimation of the technical lifetime of baseline equipment of Article 6.4 activities which install new equipment, and for which the baseline is also identified to be the installation of new equipment;
 - (c) Estimation of the remaining technical lifetime of existing equipment which is retrofitted under an Article 6.4 activity; and
 - (d) Estimation of the technical lifetime for the analysis of lock-in risk.
11. Where the mechanism methodology referring to this tool specifies approaches that differ from those described in this tool, the requirements contained in the mechanism methodology shall take precedence.

4. Normative and informative references

12. The following documents provide supporting information that may assist in the application of this methodological tool:
- (a) 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1: General guidance and reporting. Chapter 3: Uncertainties;²
 - (b) IPCC, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 1: General guidance and reporting. Chapter 3: Uncertainties.³

5. Methodological approaches

13. Activity participants using this tool shall determine the technical lifetime and/or remaining technical lifetime of relevant equipment using one of the following options, in order of preference:
- (a) Use of manufacturer's specified technical lifetime (option (a) in section 5.2);
 - (b) Use of an expert evaluation conducted by a certified or suitably qualified expert (option (b) in section 5.3), noting that this option is only available for addressing existing equipment and not new equipment; or
 - (c) Use of default values provided in Table 2 (option (c) in section 5.4).
14. Option (b) shall only be used if activity participants can demonstrate that it is infeasible to implement option (a). Option (c) shall only be used if activity participants can demonstrate that it is infeasible to implement options (a) and option (b).
15. Activity participants using this tool shall also apply the general requirements (section 5.1) to any option selected under paragraph 13.

5.1. General requirements

5.1.1. General requirements for all uses of this tool

16. Activity participants shall specify in the Article 6.4 project design document all relevant pieces of equipment, consistent with the mechanism methodology referring to this tool, and justify how the technical lifetime and/or remaining technical lifetime was conservatively determined for each relevant piece of equipment, including references to all documentation relied upon.
17. Small equipment accessories and components that are normally replaced as part of regular maintenance activities (e.g., small pumps, motors, or valves) do not need to be included in the scope of determination of the remaining technical lifetime.

² https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_3_Ch3_Uncertainties.pdf.

³ https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/1_Volume1/19R_V1_Ch03_Uncertainties.pdf.

18. If the application of this tool results in a range for the technical lifetime or for the remaining technical lifetime of equipment, rather than a single value, activity participants shall apply the conservativeness principle by selecting:
 - (a) The lower end of the range, when estimating baseline emissions (e.g., pursuant to paragraphs 10(a) through 10(c)) or in other relevant scenarios where a shorter lifetime leads to a conservative outcome; and
 - (b) The higher end of the range, when addressing lock-in risks (e.g., pursuant to paragraph 10(d)) or in other relevant scenarios where a longer lifetime leads to a conservative outcome.
19. For Article 6.4 activities that involve more than one piece of equipment, activity participants shall determine the remaining technical lifetime:
 - (a) For each piece of equipment on an individual basis; or
 - (b) By determining the most conservative remaining technical lifetime among all individual pieces of equipment and applying that parameter to all pieces of equipment.

5.1.2. General requirements for determining technical lifetime

20. In determining the remaining technical lifetime of equipment, activity participants shall demonstrate that:
 - (a) There are no periodic replacement schedules or scheduled replacement practices specific to the facility that require early replacement of the equipment before the expiry of the technical lifetime; and
 - (b) The equipment has no design fault or defect and has not experienced any industrial accident that would prevent it from operating at the rated performance levels.

5.1.3. General requirements for determining remaining technical lifetime

21. The remaining technical lifetime shall be determined prior to the implementation of the Article 6.4 activity. The remaining technical lifetime is determined as the difference between the technical lifetime and the operational time since the date of first commissioning. In the case of new equipment, the remaining technical lifetime is equal to the technical lifetime.
22. In determining the remaining technical lifetime of existing equipment, activity participants shall demonstrate that:
 - (a) The equipment has been operated and maintained according to the recommendations and operations manuals of the equipment supplier to ensure that the technical lifetime specified by the manufacturer is not reduced;
 - (b) There are no periodic replacement schedules or scheduled replacement practices specific to the facility that require early replacement of the equipment before the expiry of the technical lifetime;
 - (c) The equipment has no design fault or defect and has not experienced any industrial accident that would prevent it from operating at the rated performance levels; and

- (d) Either of the following conditions is true:
 - (i) The equipment has been operated and maintained according to the recommendations and operations manuals of the equipment supplier to ensure that the technical lifetime specified by the manufacturer is not reduced (options (a) and (c) below); or
 - (ii) An expert evaluation accounts for the inability to demonstrate (i) above, and incorporates the expected effects in the estimated remaining technical lifetime of the equipment (option (b)) below).
- 23. The operational time of the relevant equipment shall be determined based on the operational history of the equipment, as measured from the date of its first commissioning. In the case of relocated equipment that was operated at one or more previous sites, the operational history at the previous site(s) shall be considered when establishing the operational time.

5.2. Option (a): Use of manufacturer's specified technical lifetime

5.2.1. Requirements for determining technical lifetime

- 24. The technical lifetime of a piece of equipment shall be determined based on the manufacturer's specifications and operation manuals.
- 25. Activity participants shall also identify the uncertainty associated with the technical lifetime for the purpose of assessing overall uncertainty, consistent with the mechanism methodology referring to this tool. The uncertainty specified by the manufacturer shall be used where available. [Otherwise, other reliable data sources may be used.]

5.2.2. Requirements for determining remaining technical lifetime

- 26. The remaining technical lifetime of a piece of equipment may be different if it has been retrofitted after its original installation (e.g., where the equipment was retrofitted prior to the implementation of the Article 6.4 activity or underwent energy efficiency improvement measures that increased its remaining technical lifetime). In such cases, the original technical lifetime provided by the equipment manufacturer may no longer be accurate and activity participants shall:
 - (a) Apply a revised estimate of the technical lifetime from the equipment manufacturer, if the retrofit was undertaken by the equipment manufacturer; or
 - (b) Apply the original technical lifetime provided by the equipment manufacturer at the time of equipment installation, but only in applications where assuming a shorter lifetime than is expected would be conservative.
- 27. If the requirements of paragraph 26 cannot be satisfied, activity proponents shall follow the requirements of section 5.3 or 5.4, as applicable.

5.3. Option (b): Use of an expert evaluation

5.3.1. Requirements for determining technical lifetime

28. Activity participants shall not use this option to determine the technical lifetime of new equipment.

5.3.2. Requirements for determining remaining technical lifetime

29. For existing equipment, activity participants shall determine the remaining technical lifetime based on a third-party assessment by a certified or suitably qualified expert. The third-party expert shall provide an opinion to determine the remaining technical lifetime of equipment based on the following considerations:
- (a) The operational history of the equipment to identify the past performance, such as maintenance records, any failures or accidents, any capacity upgrades or degradations, and any equipment retrofits or replacements;
 - (b) Current operation and maintenance practices;
 - (c) Documented specific sectoral or industry practices for replacements; and
 - (d) Tests conducted on the equipment.
30. The expert shall document their methods and conclusions and provide a range for the applicable lifetime of each piece of equipment, based on the expert's judgment of the uncertainty, consistent with the guidance on expert judgement in the 2006 IPCC Guidelines for national GHG inventories and its 2019 Refinement.

5.4. Option (c): Use of default values

31. Activity participants shall use the default values for the technical lifetime provided in Table 2 below.

Table 2. Default values for the technical lifetime:⁴

Equipment	Default value for technical lifetime [and associated uncertainty range]
Boilers	25 years [\pm X years]
Steam turbines	25 years [\pm X years]
Gas turbines, up to 50 MW capacity	150,000 hours [\pm X hours]
Gas turbines, above 50 MW capacity	200,000 hours [\pm X hours]
Hydro turbines	150,000 hours [\pm X hours]
Electric generators, air cooled	25 years [\pm X years]
Electric generators, hydrogen cooled or water cooled	30 years [\pm X years]
Wind turbines, onshore	25 years [\pm X years]
Wind turbines, offshore	20 years [\pm X years]
Diesel/oil/gas fired generator sets	50,000 hours [\pm X hours]

⁴ The table does not prejudice the eligibility of the type of activities listed as Article 6.4 activities.

Equipment	Default value for technical lifetime [and associated uncertainty range]
Transformers	30 years [\pm X years]
Heaters, chillers, pumps, etc. used in HVAC systems	15 years [\pm X years]

Box 1. Questions seeking public input

The MEP would like to seek public input, in particular regarding the use of default values as follows:

- (a) Input on the proposed values and ranges for the technical lifetime of the different technologies included in Table 2 (in section 5.4 above);
- (b) Input on the uncertainty associated with these default values; and
- (c) Input on the comprehensiveness of the list of technologies included in Table 2 (in section 5.4 above) and any suggestions for values for amending this list, including the underlying source of information

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Document information

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01.0	10 December 2025	MEP 010, Annex 2. A call for input on this document will be issued following the conclusion of MEP 010 meeting. The input received will be considered by the MEP for the further development of this document at a future meeting.
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