Methodological Tool

"Tool to determine the remaining lifetime of equipment"

(Version 01)

I. SCOPE, APPLICABILITY AND PARAMETERS

Definitions

For the purpose of this tool, the following definitions apply:

Equipment. The term equipment includes all types of equipment related to industrial, commercial, residential 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 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) stationary infrastructure, such as buildings, roads or railways, bridges, tunnels, hydro dams, (b) vehicles, such as cars, buses, trains, and (c) consumer goods (except industrial appliances, such as chillers, refrigerators, etc).

Technical lifetime is defined as the total time for which the equipment is technically designed to operate from its first commissioning. The technical lifetime is expressed in years or hours of operation.

Operational time is defined as the total time that the equipment has been operating since its first commissioning. The operational time is expressed in years or hours of operation.

Remaining lifetime (RL). The remaining lifetime of the equipment is the time for which the existing equipment can continue to operate before it has to be replaced/discarded for technical reasons, such as the age of the equipment, safety reasons, or deteriorated performance. The remaining lifetime is expressed in years or hours of operation.

Scope and Applicability

The tool provides guidance to determine the remaining lifetime of baseline or project equipment. The tool may, for example, be used for project activities which involve the replacement of existing equipment with new equipment or which retrofit existing equipment as part of energy efficiency improvement activities.

Methodologies referring to this tool should clearly specify for which equipment the remaining lifetime should be determined. The remaining lifetime of relevant equipment shall be determined prior to the implementation of the project activity. Project participants using this tool shall document transparently in the CDM-PDD how the remaining lifetime of applicable equipment has been determined, including (references to) all documentation used.

Under this tool, impacts on the lifetime of the equipment due to policies and regulations (e.g. environmental regulations) or changes in the services needed (e.g. increased energy demand) are not considered. Methodologies referring to this tool shall, where applicable, provide specific guidance on how regulations that warrant the replacement of the equipment before it has reached the end of its technical lifetime should be addressed.

Parameters

This tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
RL	years or hours	Remaining lifetime of the baseline or project equipment

II. METHODOLOGY PROCEDURE

Project participants may use one of the following options to determine the remaining lifetime of the equipment:

(a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;
(b) Obtain an expert evaluation;
(c) Use default values.

Project participants should document their choice in the CDM-PDD.

If the application of this tool results in a range for the remaining lifetime rather than a single value, project participants should choose the remaining lifetime in a conservative manner by using the lower or upper end of the possible range,[1] which should be confirmed by the DOE.

For project activities that involve several equipment, project participants can either determine the remaining lifetime for each equipment or determine the remaining lifetime as the most conservative of the individual remaining lifetimes of the equipment by applying any one of the options (a) to (c).

If the remaining lifetime of existing equipment, which would continue to operate in the baseline, is extended due to the implementation of a project activity, the crediting of emission reductions should be limited to the shortest estimated remaining lifetime of the baseline equipment. In other words, the earliest point in time when any of the existing equipment would need to be replaced or retrofitted in the absence of the project activity should be used, unless the methodology specifies otherwise. Small equipment accessories/components such as small pumps, motors, valves etc. that are generally replaced as part of regular maintenance activities do not need to be included in the scope of determination of the remaining lifetime.

Option (a): Use manufacturer's information for the technical lifetime of equipment and compare to the date of first commissioning

In this option, the remaining lifetime is determined as a difference between the technical lifetime and the operational time.

[1] For example, when the tool is applied to determine the remaining lifetime of the baseline equipment for use in the investment analysis, the higher value within the range shall be considered. When the tool is applied to determine the remaining lifetime of baseline equipment for use in calculation of baseline emissions, the lower value within the range shall be considered.

This option can only be applied if:

(i) Manufacturer's information for the technical lifetime of the equipment is available;
(ii) The project participants can demonstrate that the equipment has been operated and maintained according to the recommendations of the equipment supplier to ensure that the technical lifetime specified by the manufacturer is not reduced; and
(iii) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime;
(iv) The equipment has no design fault or defect and did not have any industrial accident due to which the equipment can not operate at rated performance levels.

Documentation supporting these conditions should be provided, for example information on the operational history of the equipment.

The operational time shall be determined based on the operational history of the equipment from the date of its first commissioning. Project participants shall record the technical lifetime provided by the equipment supplier and the operational time in the CDM-PDD.

In cases where the equipment was retrofitted prior to the implementation of the project activity or energy efficiency improvement measures were undertaken which increased the remaining lifetime, the technical lifetime provided by the equipment supplier may not be valid anymore. In this case, project participants should follow one of the following approaches:

- If the retrofit was undertaken by the equipment manufacturer, the equipment manufacturer may provide a revised estimation of the technical lifetime;
- Apply the original technical lifetime provided by the equipment manufacturer at the time of equipment installation, as long as assuming a shorter lifetime is conservative (e.g. in the case of baseline equipment which is replaced under the project activity); choose other options provided in this tool to determine the remaining lifetime.

In case of relocated equipment (equipment which was already in operation at another site and which is transferred to the site of the project activity where it continues to operate), the operation history at the previous site(s) should be considered when establishing the operational time.

Option (b): Obtain an expert evaluation

In this option, an independent expert having relevant experience in evaluating the remaining lifetime for the type of equipment can be requested to determine the remaining lifetime of the equipment. The information that could be evaluated includes an analysis of

- The operational history of the equipment to identify the past performance, equipment retrofits, failures/accidents, capacity upgrades/degradations, replacements etc.;
- The current operation and maintenance practices;
- Documented specific sectoral/industry practices for replacements;
- Conducting tests on the equipment, such as magnetic particle examinations, ultrasonic testing, metallurgical analysis, etc.

The expert should document his methods and conclusions and provide an expert evaluation stating the estimated remaining lifetime of the equipment. All the relevant documentation should be presented to the DOE for validation.

Option (c): Use default values

In this option, project participants may use the following default values for the technical lifetime and determine the remaining lifetime as the difference of the technical lifetime and the operational time.

This option can only be applied if:

(i) The project participants can demonstrate that the equipment has been operated and maintained according to the recommendations of the equipment supplier;
(ii) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime; and
(iii) The equipment has no design fault or defect and did not have any industrial accident due to which the equipment can not operate at rated performance levels.

Documentation supporting these conditions should be provided, for example information on the operational history of the equipment.

The operational time shall be determined based on the operational history of the equipment from the date of its first commissioning. In case of relocated equipment (equipment which was already in operation at another site and which is transferred to the site of the project activity where it continues to operate), the operation history at the previous site(s) should be considered when establishing the operational time.

For the technical lifetime, the following default values apply:

Equipment	Default value for Technical lifetime
Boilers	25 years
Steam Turbines	25 years
Gas turbines, upto 50 MW capacity	150,000 hours
Gas turbines, above 50 MW capacity	200,000 hours
Hydro turbines	150,000 hours
Electric Generators, air cooled	25 years
Electric generators, hydrogen cooled or water cooled	30 years
Wind turbines, onshore	25 years
Wind turbines, offshore	20 years
Diesel/oil/gas fired generator sets	50,000 hours
Transformers	30 years
Heaters, chillers, pumps, etc. used in HVAC systems	15 years

Project participants may propose a revision to this tool to include default values of the technical lifetime for other equipment with justification and supporting documentation that demonstrate the appropriateness of the proposed values.

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History of the document

Version	Date	Nature of revision(s)
01	EB 50, Annex 15 16 October 2009	Initial adoption.
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