

CDM-MP73-A04

Information note

Determination of standardized baselines for energy efficient appliances - refrigerators and air conditioners

Version 01.0



United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The CDM Executive Board at its 94th meeting (EB 94) considered a draft new methodological tool: "TOOL00XX: Determination of standardized baselines for energy efficient refrigerators and air conditioners", and requested the MP and the SSC WG to further work on the draft new tool and develop a draft new methodology that is compatible with the tool. In doing so, the MP and the SSC WG shall address the following issues:
 - (a) Allow for refrigerator testing requirements with "IEC standard IEC 62552-1:2015 Household refrigerating appliances - Characteristics and test methods";
 - (b) Include additional guidance on accounting for any minimum efficiency performance standard in the host country;
 - (c) Include provisions to address autonomous efficiency improvements of appliances and to ensure that the service level of project and baseline equipment are comparable;
 - (d) Reconsider guidance in the case of replacement baseline on the definition of new baseline when the lifetime of the replaced refrigerator has expired;
 - (e) Further assess the proposed efficiency thresholds against the CDM modalities and procedures;
 - (f) Carry out road testing for the air-conditioner component in collaboration with relevant organizations that have expressed interest to contribute (i.e. German Agency for International Cooperation (GIZ), and the Gulf Organization for Research & Development (GORD)).

2. Purpose

2. This document provides an analysis and recommendation on the issues raised by the Board (EB 94) as mentioned above.

3. Key issues and proposed solutions

3. This document proposes a draft tool and a methodology to cover energy-efficient residential/household air conditioners and refrigerators. It follows on the work carried out under annex 1-3 of MP 72 meeting report (<https://cdm.unfccc.int/Panels/meth/index.html>).

4. Impacts

4. Simplified and standardized methods recommended under the draft methodological tool: Determination of standardized baselines for energy efficient refrigerators and air conditioners" (annex 3 of the MP73) and a new draft methodology "Methodology for energy efficient refrigerators and air conditioners" (annex 5 of the MP73) are likely to

result in positive impacts on CDM project and programme development, as well as reduced costs of the development of standardized baselines in the RAC sector.

5. The proposed work does not foresee any cost implications for third-parties/stakeholders and with no potential for any negative impacts.

5. Subsequent work and timelines

6. The information note is recommended by the MP and SSC WG for consideration by the Board at its eighty-fifth meeting. No further work is envisaged.

6. Recommendations to the Board

7. The Board may wish to consider this document in conjunction with a draft new tool TOOL00XX: "Determination of standardized baselines for energy efficient refrigerators and air conditioners", and a new methodology "Draft methodology for energy efficient refrigerators and air conditioners" as contained in Annex 03 and 05 of the MP73 meeting report respectively.

TABLE OF CONTENTS		Page
1.	INTRODUCTION	5
2.	PURPOSE	5
3.	ANALYSIS AND RECOMMENDATIONS.....	5

1. Introduction

1. The Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) at its ninety-fourth meeting (EB 94) considered a draft new methodological tool TOOL00XX "Determination of standardized baselines for energy efficient refrigerators and air conditioners", and requested the Methodologies Panel (MP) and the Small-Scale Working Group (SSC WG) to further work on the draft new tool and develop a draft new methodology that is compatible with the tool. In doing so, the MP and the SSC WG shall address the following issues:
 - (a) Allow for refrigerator testing requirements with "IEC standard IEC 62552-1:2015 Household refrigerating appliances - Characteristics and test methods";
 - (b) Include additional guidance on accounting for any minimum efficiency performance standard in the host country;
 - (c) Include provisions to address autonomous efficiency improvements of appliances and to ensure that the service level of project and baseline equipment are comparable;
 - (d) Reconsider guidance in the case of replacement baseline on the definition of new baseline when the lifetime of the replaced refrigerator has expired;
 - (e) Further assess the proposed efficiency thresholds against the CDM modalities and procedures;
 - (f) Carry out road testing for the air-conditioner component in collaboration with relevant organizations that have expressed interest to contribute (i.e. German Development Agency (GIZ), and the Gulf Organization for Research & Development (GORD)).

2. Purpose

2. This document aims to address the issues raised by the Board (EB 94) as mentioned above and proposes a revised draft tool together with a new methodology.

3. Analysis and recommendations

3. This section presents analysis and recommendation on issues raised by EB 94.

3.1. Issue 1:

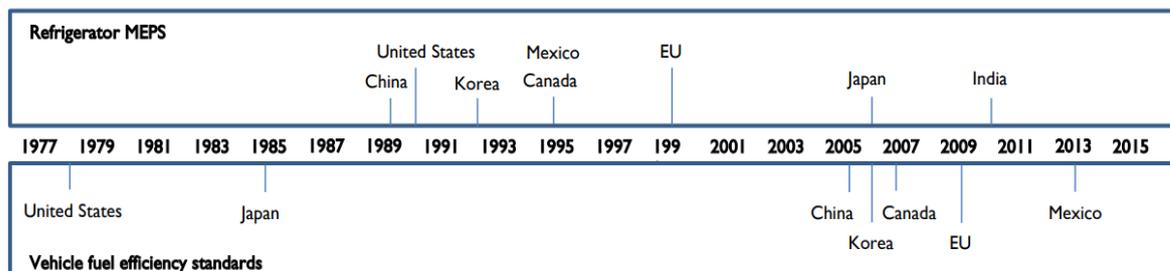
4. Allow for refrigerator testing requirements with "IEC standard IEC 62552-1:2015 Household refrigerating appliances - Characteristics and test methods".
5. *Analysis:* The tool already required application of IEC 62552 for new equipment. The IEC standard is now also referenced as an option along with the procedures of appendix 5 for testing of used refrigerators. This is because IEC 62552 concerns testing new refrigerators while Appendix 5 is focussed on testing used refrigerators. For the replacement baseline, typically the stock of baseline refrigerators would have undergone maintenance or repairs of varied quality i.e. key components such as compressors may have been repaired or replaced with parts that are not recommended

by the manufacturers. Therefore, a considerable share of the used refrigerators could not possibly be tested with any existing standards because they cannot achieve the IEC temperature requirements for the refrigerator or freezer compartment (e.g. 5°C for the refrigerator compartment). Appendix 5 does not contain new elements or definitions but brings together the necessary elements of current practices and contains the minimal elements of IEC 62552 for a cost-effective testing that is feasible for a recycling facility.

3.2. Issue 2:

6. Include additional guidance on accounting for any minimum efficiency performance standards (MEPS) in the host country;
7. *Analysis:* The MP noted that the procedures for the SB require that the SB is updated periodically (e.g. every 3 years) which will ensure that changes in the stock of RAC equipment on the market owing to the introduction of a performance standard in the host country or country of import is reflected in the updated standardised baseline. The MP is of the view that the approach that it had proposed is consistent with the guidance by the Board on the consideration of E+/E- policies in the host country (see CDM Project Standard paragraphs 63 and 64, EB 73 report paragraph 70). However, considering that the Board has specifically raised this issue the MP has introduced an additional step in the establishment of the baseline that the benchmark value of the efficiency parameter (e.g. 80th or 90th percentile) is checked against any MEPS that has been introduced in the country and the more conservative value is chosen.
8. The MP also considered an analysis of literature on the issue of impacts of introduction of MEPS as below, which indicate that efficiency improvements happen over a period. Therefore, it is appropriate to rely on the SB updates to reflect changes in the market.
9. Per International Energy Agency many countries began implementing energy performance standards since 1970s albeit in limited way. Over time most countries expanded the number of end uses regulated (coverage) and reduced the allowable quantity of energy consumed to provide a given unit of service (performance level). Figure 1 is an illustration with standards for refrigerators and vehicles sourced from IEA Energy Efficiency Market Report 2016.

Figure 1. Timeline of standards for refrigerators and vehicles for selected countries



10. The effects of mandatory efficiency policies have been captured under *World Energy Outlook and Energy Technology Perspective* series that IEA publishes regularly. In the IEA approach, the implementation dates of mandatory standards and targets around the world are identified and then the volume of equipment sold since policies and

standards were implemented and their associated energy consumption are estimated. This energy consumption is considered to be “covered” by mandatory energy efficiency policies. This approach is detailed in ‘Energy Efficiency Market Report 2016’ by IEA on pages 64-75. IEA also proposes ‘the Efficiency Policy Progress Index’ (EPPI) to track progress of mandatory energy efficiency regulations, the EPPI uses the following steps:

- (a) Establish a list of relevant end uses for which sufficient data are available on coverage and performance levels;
 - (b) Calculate the amount of energy consumption by end use covered by mandatory standards;
 - (c) Calculate the performance level increase of mandatory standards by energy end use;
 - (d) Multiply the energy consumption by coverage and the performance-level improvement over the period analysed;
 - (e) Weight the energy use by end use, sector or country, depending on the desired scope. For example, the EU refrigerator MEPS requires a minimum energy efficiency index of 95 in 2005 and 42 in 2015, an improvement of 56%. The European Union has had refrigerator MEPS since 1999, so almost 100% of the refrigerator stock is covered. Hence, all EU refrigerator energy use is included, leading to an EPPI of $56\% \times 100\% = 56\%$. Weighted for a specific EU country, refrigerators in Germany use around 34 PJ, which is 1.1% of German TFC (total fuel consumption) covered by mandatory standards. This adds $1.1\% \times 56\% = 0.6\%$ to the German EPPI.
11. EPPI index changes are illustrated in the below figures. IEA estimated the average total efficiency improvement over the last ten years (2005-15) for the specific products to which standards and labels have been applied in IEA member countries and key emerging economies. It determined that the figure was 16% for refrigerator-freezers and 23% for room air conditioners.

Figure 2. Efficiency Policy Progress index increase by sector and end use, 2005-2015

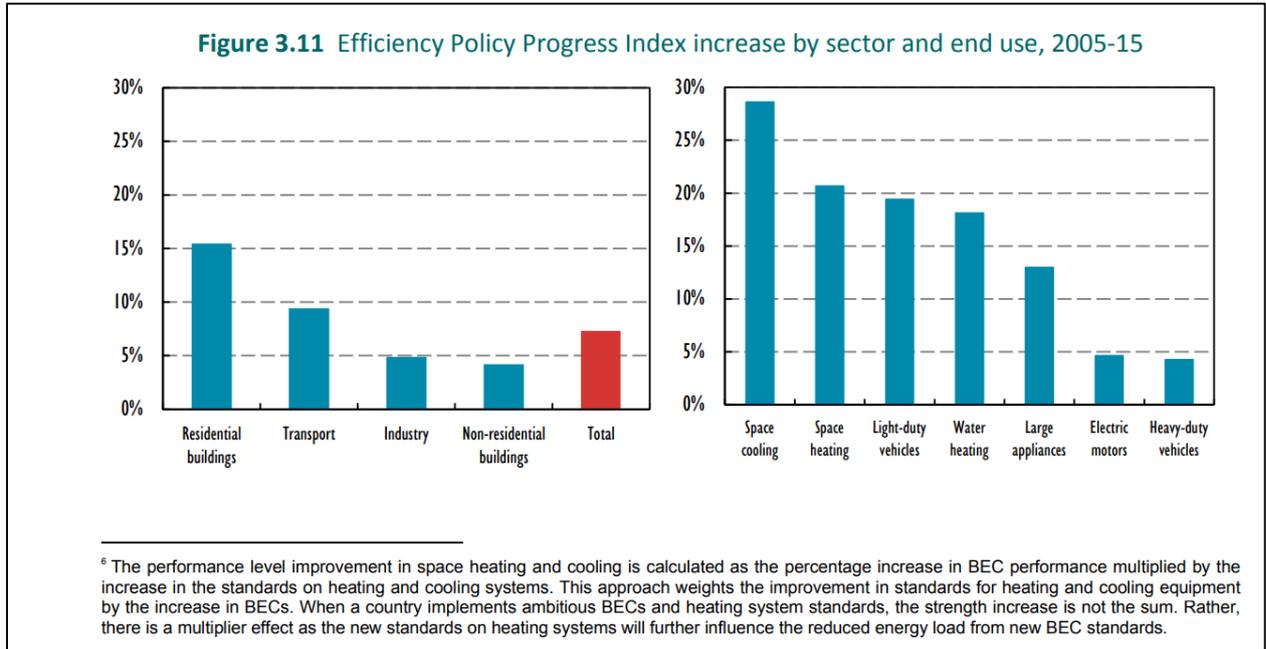
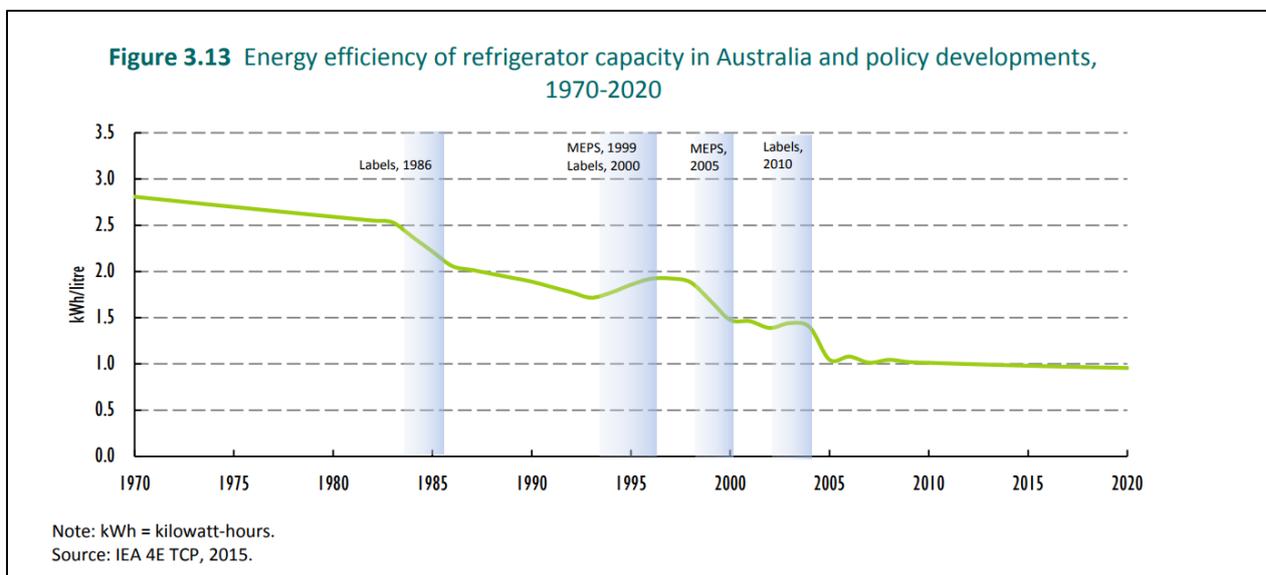


Figure 3. Energy efficiency of refrigerator capacity in Australia and policy developments, 1970-2020



3.3. Issue 3:

- 12. Include provisions to address autonomous efficiency improvements of appliances and to ensure that the service level of project and baseline equipment are comparable.
- 13. *Analysis:* The MP is of the view that rationale provided for Issue 2 would also be applicable here. The MP is of the view that requiring adjustments to account for autonomous improvements to efficiency of appliances during the crediting period may

not be consistent with the requirements of CDM M & P and has not been applied in most sectors of the CDM. Both the baseline and project equipment in the RAC sector are used for long periods of time by the end users (e.g. typically 16 years for refrigerators) once they have made the purchase. Therefore, irrespective of future efficiency improvements of similar equipment on the market the efficient project equipment will generate emission reductions due to conditions that prevailed during the time of purchase. The MP is also of the view that comparability of service level is addressed by the market factors i.e. the end user provides majority of money for the purchase RAC equipment therefore would not purchase the appliance if it does not meet their needs which itself is determined by several factors such as ambient weather conditions, purchase habits (e.g. proximity to a super market), level of income.

3.4. Issue 4:

14. Reconsider guidance in the case of replacement baseline on the definition of new baseline when the lifetime of the replaced refrigerator has expired.
15. *Analysis:* Addressed in the draft new methodology.

3.5. Issue 5:

16. Further assess the proposed efficiency thresholds against the CDM modalities and procedures.
17. *Analysis:* As per paragraph 48.c of CDM M & P one of the options for the baseline is: 'The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category' is to be taken for the baseline. The Board has translated the requirements in paragraph 48 of M&P in methodologies and guidelines it has approved. In accordance with the approved Guidelines for the establishment of sector specific standardized baseline (EB 65, annex 23 page 9 appendix 1) the applicable thresholds for energy for households is for the baseline is 80% based on a data vintage of 3 years i.e. 80% of the RAC equipment when ranked by efficiency are not eligible for the baseline. The proposed approach of using 90th and 80th percentiles based on ranking of models or ranking of sales is consistent and equally conservative. Therefore, MP has not recommended any changes in this area.

3.6. Issue 6:

18. Carry out road testing for the air-conditioner component in collaboration with relevant organizations that have expressed interest to contribute (i.e. German Development Agency (GIZ), and the Gulf Organization for Research & Development (GORD)).
19. *Analysis:* Further analysis is being carried out with the data kindly shared by GIZ for the purpose of road testing.

3.7. Other issues:

20. Justifications for approach 2 in the replacement baseline: Approach 2 of the replacement baseline is suitable when no testing is feasible. Approach 2 is conservative because nameplate corresponds to condition when the refrigerators were new and even with good quality maintenance, the electricity consumption of refrigerators is

known to increase by 23 to 33 % after 10 years and with average maintenance the consumption can double. In cases where compressors are replaced or reconditioned (disregarding manufacturers recommendations) the consumption could be much higher. Allowing the usage of brand and model data (when brand and model data can be established for 50% or even 40% of the collected refrigerators) or 25% of the nameplates data when consumption data is visible is conservative as in these cases the consumption of fridge when it is new is being considered. Requiring more than 25% of name plate energy consumption data is unrealistic since nameplates are often unreadable or removed during normal wear and tear of the refrigerators.

- - - - -

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	28 July 2017	MP 73, Annex 4 To be considered by the Board at EB96.

Decision Class: Regulatory
Document Type: Information note
Business Function: Methodology
Keywords: data collection and analysis, chiller, energy efficiency, household appliances, standardized baselines
