Assessment Report for CDM proposed standardized baseline (Version 02.0)

*(To be **used** by the **UNFCCC secretariat** in assessing the quality of a proposed standardized baseline only when requested by eligible DNAs.)*

Title of proposed standardized baseline:	**Grid Emission Factor for the Electricity System of the Republic of Armenia for 2016**
Reference of proposed standardized baseline:	ASU_007: Request for update of ASB0038-2018 ver. 01.0
Name(s) of the Party or Parties to which the proposed standardized baseline applies:	Republic of Armenia
Name(s) of the proponent(s) of the proposed standardized baseline:	The Designated National Authority (DNA) of the Republic of Armenia
History of the submission & assessment:	1) 25/10/2020: first submission was received • 05/01/2021: initial assessment was finalized and the request to update the standardized baseline (PSB) was uploaded on the UNFCCC website. • 08/01/2021: additional information was requested to the DNA by e-mail. 2) 12/01/2021: second submission was received • Additional submission was considered to be compliant with the approach used to update the PSB (documents translated to English). The submission was sufficient to prepare a final recommendation. • 27/01/2021: The draft standardized baseline (DSB) was sent to the DNA, which agreed to recommend the DSB to the Board for approval.

Conclusion: **(a) The quality assurance and quality control system complied with the provisions and data quality objectives of the valid "Guidelines for quality assurance and quality control of data in the establishment of standardized baselines"**	☒ Yes ☐ No ☐ N/A
(b) The approach used by this proposed standardized baseline complied with one of the approaches referred to in the valid "Procedure for development, revision, clarification and update of standardized baselines":	☒ Yes ☐ No One of the four approved approaches: ☐ The "Guidelines for the establishment of sector specific standardized baselines"; ☐ A methodological approach contained in an approved baseline and monitoring methodology; ☒ A methodological approach contained in an approved methodological tool "TOOL07 : Tool to calculate the emission factor for an electricity system" (version 07.0); ☐ The "Guideline: Establishment of standardized baselines for afforestation and reforestation project activities under the CDM".
Date when the assessment report is completed:	26/01/2021

SECTION A. Summary of Proposed Standardized Baseline

A.1. Scope and application of the proposed standardized baseline

1. The proposed standardized baseline (PSB) is developed for

   (a) ☐ Additionality demonstration;

   (b) ☐ Baseline identification;

   (c) ☒ Baseline emission estimation

2. This updated ASB0038 applies to the energy industries sector, which includes electricity generation/ consumption in the Republic of Armenia.

3. Projects shall use the standardized baseline together with the approved methodologies where the "TOOL07: Tool to calculate the emission factor for an electricity system" (version 07.0) (hereinafter referred to as "the grid tool") is referred.

A.2. Description of the proposed standardized baseline

4. Key data parameters and data sources:

Key data parameters	Data sources
Fuel properties (NCV, emission factor)	For NCV: The "Public Services Regulatory Commission of RA (PSRC) For EF (lower limit of 95% C.I.): IPCC 2006 Guidelines, Vol. 2, Table 1.4
Fuel consumption	Settlement Center (SC)
Electricity generation in the national grid	SC
Electricity imports/exports	SC

5. The scope and coverage of the data:

(a) The updated ASB0038 identifies, as part of the relevant electricity system:

(i) 1 nuclear power plant

(ii) 199 hydropower plants, including two cascades and 168 small HPP

(iii) 4 thermal power plants

(iv) 2 cogeneration plants

(v) 4 wind power plants

(vi) 13 solar power plants

(vii) 1 biogas plant

(viii) Electricity imports from Iran and Georgia;

(b) The data include key information of each power plant (name, technology, electricity generation, fuel type/consumption and commissioning data)

(c) The data represent all regions in the country

(d) The data represent three years (2017, 2018 and 2019).

6. The DNA its own template to determine the combined margin emission factor.

7. The development of the updated ASB0038 includes only grid-connected power plants.

8. As the total low-cost/must-run (LCMR) average from 2015 to 2019 is above 50 per cent, Simple Adjusted OM method is applied.

9. The data for 2019 is used for BM calculation.

SECTION B. Summary of Assessment

B.1. Assessment process

10. The purpose of assessment conducted by the secretariat is: i) to ensure that the QA/QC system implemented by the DNA complies with the provisions and data quality objectives of the "Guidelines for quality assurance and quality control of data used in the establishment

of standardized baselines" (hereinafter referred to as QA/QC guidelines); and ii) to ensure that the updated ASB0038 complies with the requirements of the grid tool.

11. The assessment consisted of the following:

    (a) Review of the documents submitted;

    (b) Identification of issues (assessment findings) and draft of the assessment "findings and resolution" note;

    (c) Communication of assessment findings with DNA and request for their resolution and response;

    (d) Direct communication with DNA*;*

    (e) Review of the additional documents and/or responses provided by DNA;

    (f) Closing the findings;

    (g) Conclusion of the assessment report.

12. A desk review was performed on the following data/information submitted as part of the updated ASB0038:

    (a) First submission dated 25/10/2020 included:

        (i) 'GEF SB Calculation for Armenia (2017-2019)' standardized baseline report;

        (ii) Approved standardized baseline update request form (CDM-ASU-FORM);

        (iii) Calculation sheets for ex-post GEF for 2017, 2018 and 2019;

        (iv) Calculation sheets for ex-ante GEF for the period between 2017 and 2019;

        (v) QC Report;

        (vi) Letters to submitted to PSRC and MTAI and the respective responses.

    (b) The DNA was requested to provide documents translated from Armenian to English on 08/01/2021, which were submitted on 12/01/2021;

    (c) The additional submission was sufficient to prepare a final recommendation.

B.2. Assessment opinion:

13. In accordance with the QA/QC guidelines, the secretariat concluded that the all the following requirements were met by this PSB:

    (a) QC system was implemented to check the data quality before/during/or after data collection. All primary data come directly from the SC. The information regarding plants performance (electricity generation, fuel consumption) is monitored continuously by the SC. The data is archived and maintained in such a way that allow for the reproduction of the calculation of the emission factor of the grid;

    (b) QC activities were clearly documented in the QC report. Data templates were presented to the power sector through which the required data for the GEF

calculation and renewal may be maintained and submitted to DNA to facilitate further transparency and quality control;

(c) All relevant documents and data were available for assessment. The data used in the calculation are available at the SC;

(d) The data scope was comprehensive enough to produce a “true and fair” representative standardized baseline in the particular sector;

(e) The key data and information are consistently presented;

(f) The data vintage (three years) was met as per the provisions of the grid tool;

(g) The assumptions and conservative approaches for data processing and calculations were justified;

14. No issues (assessment findings) were identified by the secretariat during the assessment of the updated ASB0038.

15. The secretariat concluded that the updated ASB0038 complied with the approach of the grid tool, the detailed assessment can be found in the table below

STEP FROM THE GRID TOOL	ASSESSMENT
Step 1: Identify the relevant electricity systems	The project electric system was determined by the dispatch center responsible for scheduling and dispatching the electricity in the project system (national dispatch center of Armenia, “Electro Power System Operator”). According to the dispatch center, the dispatch area covers the whole national power distribution grid of Armenia, therefore the Armenian power system is identified as the project electricity system for the purpose of grid emission factor calculation. The electric grid of Armenia is composed by 226 power plants, where 218 are of renewable nature (199 hydro plants, 13 solar plants, 4 wind plants and 1 biogas and 1 nuclear plant), 1 is a nuclear plant and 8 consume natural gas (among combined cycle and gas turbines). In 2019, the generation from renewables accounted for 2.3 TWh (around 32% of the total generation) whereas the generation from the nuclear plant accounted for 2.0 TWh (28% of all generation) and the fossil fuel power plants accounted for 2.9 TWh (or the remaining 40%). Electricity is also imported from Iran and Georgia that are considered connected electricity systems – the electricity imported from these Parties was equal to 2.2% in 2019 and an emission factor equals to 0 tCO2/MWh was assigned to these grids when determining the OM.
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)	The DNA selected Option I (“Only grid power plants are included in the calculation”)
Step 3: Select a method to determine the operating margin (OM)	Low-cost/must-run (LCMR) resources constituted more than 50% of the total grid generation in average of the five most recent years (2015-2019). LCMR power plants include all renewable plants (wind, solar, hydro and biogas), the nuclear plant and four CHP plants (Yerevan Medical Institute TPP, Erfrez OJSC, Lus Astgh Sugar LLC and ArmRoscogeneration CJSC). Therefore, the Simple-OM Adjusted method was selected.

<table>
<tr><td>Step 4: Calculate the operating margin emission factor according to the selected method</td><td>The calculation of the OM was performed through Option A (Based on the net electricity generation and a CO_2 emission factor of each power unit) and the $EF_{EL,m,y}$ was determined based on option A1 (data on fuel consumed and electricity generated by each power plant is available).

To determine the parameter “lambda”, the DNA provided the load duration curve of the grid for 2017, 2018 and 2019. The secretariat confirmed that the step-wise approach provided in Appendix 3 of the grid tool was correctly followed. The percentage of time when LCMR plants are on the margin is very small in each year (i.e. 0.0084475 for 2017, 0.00022831 for 2018 and 0.00068493 for 2019).

The list of power plants, including the capacity, technology and commissioning date were sourced from PSRC (Public Services Regulatory Commission) whereas the data of electricity generated and fuel consumed by each power plant and the NCV of the fuel were provided by the Settlement Center (SC), along with the hourly electricity load used to determine “lambda” was also provided by the SC. The CO_2 emission factor of the fuel was sourced from the IPCC.

The OM calculated for the period 2017-2019 is equal to 0.4426 tCO_2/MWh.</td></tr>
<tr><td>Step 5: Calculate the build margin (BM) emission factor</td><td>The set of 5 most recently built power plants ($SET_{5\text{-}units}$) include the following units:

<table><tr><th>Power Plant</th><th>Commissioning Year</th><th>Capacity (MW)</th></tr><tr><td>Aparan SHPP (Nigava LLC)</td><td>2019</td><td>1.7</td></tr><tr><td>Arsan-1 SPP (ITC LLC)</td><td>2019</td><td>1.0</td></tr><tr><td>Arsan-2 SPP (Rep Car LLC)</td><td>2019</td><td>1.0</td></tr><tr><td>Kaputjur SHPP (Arev ev Jur LLC)</td><td>2019</td><td>1.2</td></tr><tr><td>Arevadzor SPP (Arevadzor PHPP LLC)</td><td>2019</td><td>1.0</td></tr></table></td></tr>
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	The electricity generated by these set of plants in 2019 ($AEG_{SET\text{-}5\ units}$) was equal to 5,483 MWh. The set of power plants that comprises 20% of the generation in 2019 ($SET_{\geq 20\ per\ cent}$) include 134 units among small hydro (115 units), solar (13 units), wind (3 units) and fossil fuel (3 units) and the total generation from this set of units ($AEG_{SET\geq 20\ per\ cent}$) is equal to 2,997,419 MWh. Therefore, BM was determined based on the set of power units that started to supply electricity to the grid most recently and that comprise 20 per cent of the total grid generation. The secretariat confirmed that the calculation of the emission factor was made in line with equation 15 of the grid tool. The value of BM determined for 2019 was equal to 0.3441 tCO_2/MWh.
Step 6: Calculate the combined margin emissions factor	The combined margin emission factor was determined by applying different weights for OM and BM as follows: - wind and solar: OM = 0.75; BM =0.25 - other plants 1st crediting period: OM = 0.5; BM =0.5 - other plants 2nd and 3rd crediting periods: OM = 0.25; BM =0.75

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Document information

Version	*Date*	*Description*
01.0	27 May 2013	Initial publication

Version	*Date*	*Description*
02.0	01 June 2015	Modified in order to take into account the Board's decision and improve clarity and consistency

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