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| **Proposed standardized baseline submission form**  **(Version 04.0)** | |
| *To be used by a designated national authority (DNA) when submitting a proposed standardized baseline in accordance with the “Procedure: Development, revision, clarification and update of standardized baselines” (CDM-EB63-A28-PROC).* | |
| 1. **information to be completed by the dna** | |
| **Title of the proposed standardized baseline:** | Standardised Baseline on Grid Emission Factor for the Republic of Kenya |
| **Name(s) of the Party or Parties to which the proposed standardized baseline applies:** | Kenya |
| **DNA submitting this form:** | CDM DNA: National Environment Management Authority (NEMA-Kenya) |
| **Is the proposed standardized baseline submitted by a single Party or group of Parties?** | 🗷 Single Party  ☐ Group of Parties |
| 1. **Attachments:** | |
|  A spreadsheet containing all data used and the calculations performed for the establishment of the standardized baseline, where applicable   A quality control report prepared in accordance with the “Guideline: Quality assurance and quality control of data used in the establishment of standardized baselines”, where applicable  ☐ An assessment report prepared by a designated operational entity (DOE), where applicable   Additional documentation supporting the submission (e.g. statistics and/or, studies, etc.), where applicable (Please specify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)  ☐ Letters of approval on the proposed standardized baseline from all the DNAs of the Parties to which it applies (excluding the letter of the DNA submitting this proposed standardized baseline) | |
| **Name of authorized officer signing for the DNA:** | Dr Anne Omambia |
| **Date (DD/MM/YYYY) and signature for the DNA:** | 07/10/2020 |
| **Contact information of the focal point(s) of the DNA:** *(Names, e-mail addresses and phone contacts for procedural and technical communication on the submission)* | Mamo Boru  Ag Director General  National Environment Management Authority  (NEMA-Kenya)  P.O. BOX 67839-00200  **NAIROBI, KENYA**  Email: [dgnema@nema.go.ke](mailto:dgnema@nema.go.ke)  Dr Anne Nyatichi Omambia  Chief Compliance Officer/  Climate Change Coordinator  National Environment Management Authority  (NEMA-Kenya)  P.O. BOX 67839-00200  **NAIROBI, KENYA**  Email: [anomambia@nema.go.ke/](about:blank) [anomambia2002@yahoo.co.uk](mailto:anomambia2002@yahoo.co.uk) |
| **Name(s) of the proponent(s) of the proposed standardized baseline:** | CDM DNA: National Environment Management Authority (NEMA-Kenya) |
| **Affiliation of the proponent(s):**  *(The definition of “admitted observer organization” can be found at* [*https://cdm.unfccc.int/Reference/Guidclarif/glos\_CDM.pdf*](https://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf)*)* | 🗷 Party  ☐ Project Participant (PP)  ☐ International Industry Organization  ☐ Admitted Observer Organization |
| **Contact information of the focal point(s) of the proponent(s):**  *(Names, e-mail addresses and phone contacts for procedural and technical communication on the submission. This section does not need to be completed if the DNA(s) is (are) the proponent(s) of the proposed standardized baseline.)* | Timothy Cowman  Director  Carbon Africa Ltd  P.O Box 14938-00800,  Nairobi, Kenya  Email:tim@carbonafrica.co.ke |

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| --- | --- | --- | --- | --- |
| 1. **Findings and resolutions** | | | | |
| **Reference number of the proposed standardized baseline:** | | |  | |
| *To be used when requesting further input or providing the requested input in accordance with the “Procedure: Development, revision, clarification and update of standardized baselines” (CDM-EB63-A28-PROC).* | | | | |
| **No.** | **Request for Input**  *(To be filled by the secretariat, two selected members of the panel/working group or the panel/working group)* | **Response**  *(To be filled by the DNA and proponent)* | | **Assessment of the response**  *(To be filled by the secretariat, two selected members of the panel/working group or the panel/working group)* |
| 1 | Date – (DD/MM/YYYY)  *Request for input –* | Date – (DD/MM/YYYY)  *Response from DNA –* | | Date – (DD/MM/YYYY)  *Assessment of DNA’s response –* |
| 2. | Date – (DD/MM/YYYY)  *Request for input –* | Date – (DD/MM/YYYY)  *Response from DNA –* | | Date – (DD/MM/YYYY)  *Assessment of DNA’s response –* |
| 3. | Date – (DD/MM/YYYY)  *Request for input –* | Date – (DD/MM/YYYY)  *Response from DNA –* | | Date – (DD/MM/YYYY)  *Assessment of DNA’s response –* |

*Add rows to the tables as needed.*

**Proposed standardized baseline submission form**

**CDM-PSB-FORM (Version 04.0)**

**Title: Standardized baseline on Grid Emission Factor for the Republic of Kenya**

**Submission date (***dd/mm/yyyy)***: \_\_\_\_\_\_07/10/2020\_\_\_\_\_\_\_\_\_**

**Version number: 1.1**

**Approaches**

*Check below all the approaches used to develop the proposed standardized baseline and state the version and/or the reference (number, title, version) if applicable.*

☐ The approach contained in the “Guidelines for the establishment of sector specific standardized baselines” (reference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

☐ A methodological approach contained in an approved, proposed new or revised baseline and monitoring methodology (reference: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

🗷 A methodological approach contained in an approved, proposed new or revised methodological tool (Tool to Calculate the Emission Factor for an Electricity System Version 07.0)

☐ The approach contained in the “Guideline: Establishment of standardized baselines for afforestation and reforestation project activities under the CDM” (version: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**Combination of the approaches (if applicable)**

*Not applicable*

**New or revised methodology or methodological tool (if applicable)**

*Not applicable*

**Elements to be standardized**

*Check below all the elements to be standardized by the proposed standardized baseline:*

☐ Additionality

☐ Baseline/baseline land-use scenario

☒ Baseline emission/removal parameter

☐ Land eligibility (applicable only to afforestation and reforestation project activities)

**SECTION C: PROPOSED** **STANDARDIZED BASELINE DEVELOPED USING A METHODOLOGICAL APPROACH CONTAINED IN AN APPROVED OR PROPOSED NEW OR REVISED METHODOLOGICAL TOOL**

*Complete this section only when the proposed standardized baseline is developed using a methodological approach contained in the valid version of an approved methodological tool or in a proposed new or revised methodological tool (an example of this is the application of the “TOOL07: Tool to calculate the emission factor for an electricity system” to estimate the CO2 emission factor of an electricity grid).*

**Applicability of the proposed standardized baseline**

*State the host country(ies) or region(s) within a host country to which the proposed standardized baseline is applicable. In case of region(s) within a host country, document transparently the geographical boundaries of the region (e.g. provinces, electric grids, etc.).*

The proposed standardised baseline is applicable to CDM project activities and programmes of activities located in the country of Kenya (whole country), which use a methodology and/or tool referring to the “Tool to calculate the emission factor for an electricity system”.

**Baseline parameter standardization**

*Explain how the methodological approach contained in the valid version of the approved methodological tool or in the proposed new or revised methodological tool was applied to standardize the baseline parameter (e.g. baseline emission factor). Document all underlying data, data sources, assumptions, calculation steps and outcomes in a clear and transparent manner.*

The grid emission factor was calculated following methodological approach provided in version 07.0 of the Tool to calculate the emission factor for an electricity system (the tool).

**Step 1: Identify the relevant electricity systems**

The project electricity system is defined as the Kenyan National Grid. This was identified in line with paragraph17 (b), option 2 of the tool. The Kenyan National Grid System is the only countrywide grid system and is defined and maintained by Kenya’s national power company, Kenya Power and Lighting Company PLC, the off taker of power in the country. Kenya Power and Lighting Company PLC is also responsible for the operation of the grid system and is the sole power distribution and retailing company in the country. The dispatch area is controlled by only one dispatch centre.

In accordance with Kenya Power and Lighting Company PLC Annual Reports and Financial Statements for the year ending 2018, the Kenyan Grid System is connected to the Ugandan Grid Systems. Through this connection, Kenya Power and Lighting Company PLC transmits some of the units generated to the Uganda Electricity Transmission Company Limited (UETCL), whereas UETCL transmits back some of the power to the Company[[1]](#footnote-1).

Paragraph 24 and 25 of the tool has been applied in determining the spatial extent for the calculation of the build margin and operating margin respectively. For the build margin calculation, the project electricity system shall apply. For the operating margin, 0 t CO2 will be the CO2 emission factor applied for the net electricity imports from the connected electricity system.

Table 1 below summarizes the power plants that form the Kenyan National Grid System.

Table 1: Kenya Grid System Power Plant Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Name*** | ***Technology*** | ***Description*** | ***Commissioning***  ***Date*** | ***Capacity as at 30.06.2019*** |
| Biojoule Kenya Limited | Biogas | Low cost / must run | 2016 | 2.00 |
| Mumias - Cogeneration | Biomass | Low cost / must run | 2008 | 26.00 |
| Olkaria I (Units 1, 2 and 3) | Geothermal | Low cost / must run | 1981 | 45.00 |
| Eburru Hill | Geothermal | Low cost / must run | 2012 | 2.44 |
| OrPower 4 -Geothermal I | Geothermal | Low cost / must run | 2000 | 63.80 |
| OrPower 4 -Geothermal II | Geothermal | Low cost / must run | 2013 | 39.60 |
| OrPower 4 -Geothermal III | Geothermal | Low cost / must run | 2014 | 17.60 |
| OrPower 4 -Geothermal (the 4th plant) | Geothermal | Low cost / must run | 2016 | 29.00 |
| Wanjii | Hydro | Low cost / must run | 1952/1954 | 7.40 |
| Sagana | Hydro | Low cost / must run | 1956 | 1.50 |
| Mesco | Hydro | Low cost / must run | 1930 | 0.40 |
| Sosiani | Hydro | Low cost / must run | 1955 | 0.40 |
| Gogo | Hydro | Low cost / must run | 1957 | 2.00 |
| Imenti Tea Factory (Feed-in Plant) | Hydro | Low cost / must run | 2009 | 0.28 |
| Gikira small hydro | Hydro | Low cost / must run | 2014 | 0.51 |
| Regen-Terem Hydro | Hydro | Low cost / must run | 2017 | 5.00 |
| Gura | Hydro | Low cost / must run | 2019 | 2.00 |
| Strathmore | Solar | Low cost / must run | 2019 | 0.25 |
| Lake Turkana Wind Power | Wind | Low cost / must run | 2019 | 310.00 |
| New Ngong | Wind | Low cost / must run | 2008 | 5.10 |
| Ngong II (Gamesa 13.6 MW) | Wind | Low cost / must run | 2015 | 13.60 |
| Ngong Phase II (Gamesa 6.8 MW) | Wind | Low cost / must run | 2015 | 6.80 |
| Olkaria II | Geothermal | Low cost /must run | 2003/2010 | 105.00 |
| OW 37 Olkaria Well Head | Geothermal | Low cost /must run | 2012 | 15.00 |
| OW 39 Olkaria Wellhead | Geothermal | Low cost / must run | 2012 | 5.00 |
| OW43 Olkaria Mobile Wellheads | Geothermal | Low cost /must run | 2012 | 12.80 |
| OW905,OW914 ,OW915 and OW 919 Olkaria Mobile Wellheads3 | Geothermal | Low cost /must run | 2012 | 47.80 |
| Olkaria IV | Geothermal | Low cost /must run | 2014 | 140.00 |
| Olkaria I Additional Units 4 & 5 | Geothermal | Low cost /must run | 2014 | 140.00 |
| Tana | Hydro | Low cost /must run | 1955/2010 | 20.00 |
| Kamburu | Hydro | Low cost /must run | 1974/1976 | 94.20 |
| Gitaru | Hydro | Low cost /must run | 1978/1999 | 225.00 |
| Kindaruma | Hydro | Low cost /must run | 1968 | 72.00 |
| Masinga | Hydro | Low cost /must run | 1981 | 40.00 |
| Kiambere | Hydro | Low cost /must run | 1988/2009 | 168.00 |
| Turkwel | Hydro | Low cost /must run | 1991 | 106.00 |
| Sondu Miriu | Hydro | Low cost /must run | 2008 | 60.00 |
| Sangoro | Hydro | Low cost /must run | 2012 | 21.00 |
| Kipevu I Diesel | Thermal | Non low cost /must run | 1999 | 73.50 |
| Kipevu III Diesel | Thermal | Non low cost /must run | 2011 | 120.00 |
| Muhoroni Gas Turbines II | Thermal | Non low cost /must run | 1999 | 30.00 |
| Muhoroni Gas Turbines I | Thermal | Non low cost /must run | 1987/1997 | 30.00 |
| Iberafrica Existing Plant | Thermal | Non low cost /must run | 1997 | 56.35 |
| Iberafrica Additional Plant | Thermal | Non low cost /must run | 2009 | 52.50 |
| Tsavo | Thermal | Non low cost /must run | 2001 | 74.00 |
| Thika Power | Thermal | Non low cost /must run | 2014 | 87.00 |
| Rabai Power | Thermal | Non low cost /must run | 2010 | 90.00 |
| Triumph Diesel | Thermal | Non low cost /must run | 2015 | 83.00 |
| Gulf Power | Thermal | Non low cost /must run | 2014 | 80.32 |
| Aggreko Power - Muhoroni | Thermal | Non low cost /must run | 2008 | 30.00 |
| ***Total*** |  |  |  | ***2,659.15*** |

According to Kenya Power and Lighting Company PLC data, the total installed capacity as of June 2019 was 2,659.15 MW comprised of a mix of hydro, geothermal, thermal, wind, biomass and solar plants. While hydro plants comprised the larger share of the installed capacity (31.05%), geothermal plants comprised the largest generation share at 44.91% as summarized in Table 2, Figure 12 and Figure 23 below. Additionally, in the period of review, the share of low cost/must run installed capacity and generation was larger than that of non-low cost /must run plants. Low cost /must run capacity share in June 2019 was 69.66% while the generation share over the period July 2015 – June 2019 (the last 5 years) averaged at 83.25%.

Table 2: Kenyan Grid Power Plants % share per technology by capacity and generation 2019

|  |  |  |
| --- | --- | --- |
| ***Technology*** | ***Capacity***  ***June 2019 (%)*** | ***Generation***  ***July 18 - June 19 (%)*** |
| **Biomass** | 1.05 | 0.00 |
| **Geothermal** | 24.93 | 44.91 |
| **Hydro** | 31.05 | 33.38 |
| **Solar** | 0.01 | 0.00 |
| **Wind** | 12.62 | 10.63 |
| **Thermal** | 30.34 | 11.07 |

Figure 1: Kenyan Grid Power Plants Capacity per technology % share July 18 - June 19

Figure 2: Kenyan Grid Generation per technology % share July 18- June 19

Kenya Electricity Generation Company (KenGen) - the national generator, and various Independent Power Producers (IPPs) - private investors generate power in Kenya. As of June 2019, the total Kenyan grid capacity consisted of approximately 61% government owned power plants with the rest run by IPPs.

In accordance with the Energy Act 2019, other key sector players in the Kenya power sub-sector include the Ministry of Energy and (MoE), the Energy and Petroleum Regulatory Authority (EPRA), the Rural Electrification and Renewable Energy Corporation (REREC) and the Kenya Electricity Transmission Company (KETRACO). MoE leads the articulation of energy policies while EPRA leads in the development and implementation of relevant energy regulations including tariff setting. Rural electrification and renewable energy development is led by REREC while KETRACO is responsible for the design, construction and operation of high voltage electricity infrastructure, typically transmission lines exceeding 132 kV. Currently, Kenya Power and Lighting Company PLC is the national system dispatcher and retailer and operates all distribution systems.

**Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)**

Option 1 was selected therefore only grid power plants will be included in the calculation.

**Step 3: Select a method to determine the operating margin (OM)**

According to the tool, the calculation of the operating margin emission factor (EFgrid,OM,y) must be based on one of the following methods:

1. Simple OM, or
2. Simple adjusted OM, or
3. Dispatch data analysis OM, or
4. Average OM.

The simple OM method can only be used if:

1. Low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years or 2) based on long-term averages for hydroelectricity production (minimum time frame of 15 years).
2. The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three year (𝑖.𝑒,𝑎𝑣𝑒𝑟𝑎𝑔𝑒 𝑜𝑓 𝐸𝐺𝐿𝐶𝑀𝑅𝑦8760, 𝐸𝐺𝐿𝐶𝑀𝑅𝑦−18760, 𝐸𝐺𝐿𝐶𝑀𝑅𝑦−28760) is less than the average of the lowest annual system loads (LASL) in the grid of the same three years (i.e. average of LASLy, LASLy-1, LASLy-2).

Simple OM could not be used since low cost /must run resources were found to constitute more than 50% of the total grid generation. In addition, the average amount of load supplied by low cost /must run resources in the period June 2016 – July 2019 was found to be more than the average of the lowest system loads in the same period.

Table 3: Assessment of Low Cost/Must Run Generation (GWh) and Load (MW)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***Generation July 15-June 16*** | ***Generation July 15-June 16*** | ***Generation July16-June17*** | ***Generation July17-June18*** | ***Generation July18-June19*** |
| *Total Grid Generation (GWh)* | *9,131.99* | *9,677.95* | *9,977.06* | *10,483.57* | *11,205.23* |
| *LowCost/ Must Run Generation (GWh)* | 7,422.16 | 8,452.79 | 7,853.02 | 8,328.29 | 9,965.29 |
| *Lowcost/must run share* | 81% | 87% | 79% | 79% | 89% |

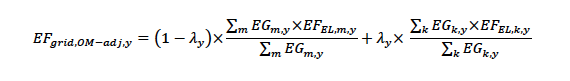
Although hourly data was available, dispatch data analysis OM (Option C) could not be applied as the tool requires an update of the OM value for the year in which the project activity displaces grid electricity thus requiring hourly monitoring of the actual electricity dispatched in the grid (see paragraph 42 in the tool). Additionally, paragraph 63 of the same document states that this approach is not applicable to historical data and hence was considered to not be applicable to determine the standardised baseline.

From the remaining available options, Simple adjusted OM, method was selected for the calculation of the operating margin. The method requires that in addition to data on annual power generation, fuel consumption and fuel type from each power plant connected to the grid, that data on the hourly load of the grid in MW is also made available. Since the utility company made the hourly load data available, the simple adjusted method was applied.

Kenya Power and Lighting Company PLC provided the required data for the most recent data vintage, July 2016 – June 2019 in line with the utility company’s reporting cycle.

**Step 4: Calculate the operating margin emission factor according to the selected method**

The simple adjusted OM emission factor (EF grid,OM-adj,y) requires that power plants/ units be separated in low cost/must run power sources (k) and other power sources (m). It is calculated based on the net electricity generation of each power unit and an emission factor for each power unit following equation 10 provided in the tool.



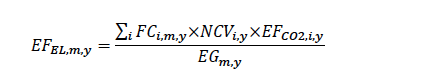
Where:

|  |  |  |
| --- | --- | --- |
| EFgrid,OM-adj,y | = | Simple adjusted operating margin CO2 emission factor in year y (tCO2/MWh) |
| λy | = | Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y* |
| EGm,y | = | Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) |
| EGk,y | = | Net quantity of electricity generated and delivered to the grid by power unit k in year y (MWh) |
| EFEL,m,y | = | CO2 emission factor of power unit m in year y (tCO2/MWh) |
| EFEL,k,y | = | CO2 emission factor of power unit k in year y (tCO2/MWh) |
| m | = | All grid power units serving the grid in year y except low-cost/must-run power units |
| k | = | All low-cost/must run grid power units serving the grid in year y |
| y | = | The relevant year as per the data vintage chosen in Step 3 |

*EFEL,m,y, EFEL,k,y, EGm,y* and *EGk,y* were determined using the same procedures as those for the parameters *EFEL,m,y* and *EGm,y* in Option A of the simple OM.

**Determination of *EFEL,m,y***

The emission factor for each power unit m and k was calculated following option A1 provided in the tool (paragraph 49 (a)). Therefore equation 4 provided in the tool (below) was applied for the calculation.



*Where:*

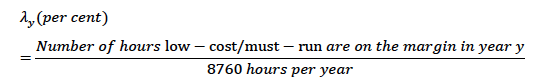
|  |  |
| --- | --- |
| *EFEL,m,y* | CO2 emission factor of power unit *m* in year *y* (t CO2/MWh) |
| *FCi,m,y* | Amount of fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit) |
| *NCV*i,y | Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit) |
| *EFCO2,i,y* | CO2 emission factor of fuel type *i* in year *y* (t CO2/GJ) |
| *EGm,y* | Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh) |

**Determination of EFEL,k,y**

For the low-cost/must run plants the conservative approach provided in option A3 (paragraph 50 (a)) of the tool) was applied where an emission factor of 0 t CO2/MWh was applied.

**Determination of λy**

The parameter λyis defined using equation 11 provided in the tool shown below:



Approach 2 provided in paragraph 62 of the tool was used to determine λy. As such, the stepwise procedure provided in appendix 3 was applied. According to this method, load data for the 3 most recent years was collected and used to plot a duration curve by sorting the load data from the highest to the lowest. The annual generation for the low-cost/must run power plants was computed and its intersection to the load curve established.

λy values applied for the calculation

|  |  |
| --- | --- |
| λ 2016-2017 | 0.13756 |
| λ 2017-2018 | 0.18345 |
| λ 2018-2019 | 0.34726 |

With the approach described above, the simple adjusted OM was calculated as:

|  |  |  |
| --- | --- | --- |
| **EFgrid,OM-adj,y =** | **0.5545** | [tCO2/MWh] |

**Step 5: Calculate the build margin (BM) emission factor**

The tool provides 2 options to calculate the build margin emission factor. Option 1 (paragraph 72 (a) in the tool) was selected. With this approach, the build margin is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. Option 1 was considered applicable for the calculation of the standardized baseline, as it does not require one to monitor the emission factor during the crediting period.

The sample group of power units *m* used to calculate the build margin was determined following the stepwise approach provided in figure 4 and paragraph 75 of the tool.

The following 9 units were excluded from the list of power units as they are commissioned units registered as CDM project activities[[2]](#footnote-2).

Table 4: CDM registered projects excluded from the Build Margin Calculation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ***Name*** | ***Commissioning Date*** | ***Generation***  ***July18-June19 (MWh)*** | ***Reference Number*** |
| 1 | Gura | 01/06/2019 | 11,670.36 | 6606 |
| 2 | Lake Turkana Wind Power | 01/03/2019 | 1,124,221.55 | 4513 |
| 3 | Olkaria IV | 01/01/2014 | 1,094,995.94 | 8646 |
| 4 | Olkaria I units 4 and 5 | 01/01/2014 | 1,068,858.14 | 8643 |
| 5 | Olkaria II | 01/01/2010 | 796,387.32 | 3773 |
| 6 | Tana | 01/01/2010 | 95,605.98 | 5023 |
| 7 | Kiambere | 01/01/2009 | 1,025,539 | 7783 |
| 8 | Mumias Cogeneration | 01/01/2008 | 0.0 | 1404 |
| 9 | New Ngong | 01/01/2008 | 14,671.43 | 9960 |

16 power plants were therefore included in the sample group of power units *m* that were used to calculate the build margin as shown in table:

Table 5: Sample group of power units m

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Name** | **Commissioning Date** | **Generation July18-June19 (MWh)** | **Emission Factor** | **%** |
| 1 | Strathmore | 01/09/2019 | 151.67 | - | 0.00 |
| 2 | Regen-Terem Hydro | 01/06/2017 | 20,117.51 | - | 0.34 |
| 3 | Biojoule Kenya Limited | 01/01/2016 | 268.11 | - | 0.34 |
| 4 | OrPower 4 -Geothermal (the 4th plant) | 01/01/2016 | 247,406.27 | - | 4.49 |
| 5 | Ngong II (Gamesa 13.6 MW) | 01/01/2015 | 37,038.24 | - | 5.11 |
| 6 | Ngong Phase II (Gamesa 6.8 MW) | 01/01/2015 | 15,733.47 | - | 5.37 |
| 7 | Triumph Diesel | 01/01/2015 | 16,412.10 | 0.60 | 5.64 |
| 8 | OrPower 4 -Geothermal III | 01/01/2014 | 164,631.29 | - | 8.40 |
| 9 | Gikira Small Hydro | 01/01/2014 | 1,145.84 | - | 8.42 |
| 10 | Thika Power | 01/01/2014 | 107,440.60 | 0.60 | 10.22 |
| 11 | Gulf Power | 01/01/2014 | 37,117.18 | 0.65 | 10.84 |
| 12 | OrPower 4 -Geothermal II | 01/01/2013 | 337,126.27 | - | 16.48 |
| 13 | Eburru Hill | 01/01/2012 | 10,222.92 | - | 16.65 |
| 14 | OW 37 Olkaria Well Head | 01/01/2012 | 129,041.08 | - | 18.81 |
| 15 | OW43 Olkaria Mobile Wellheads | 01/01/2012 | 65,682.02 | - | 19.91 |
| 16 | OW905,OW914 ,OW915 and OW 919 Olkaria Mobile Wellheads3 | 01/01/2012 | 297,173.68 | - | 24.89 |
| **Total Grid Generation in 2019 excluding CDM projects 1,486,708.25 MWh** | | | | | |

The build margin emissions factor was calculated following equation 15 in the tool provided below:



Where:

|  |  |
| --- | --- |
| EFgrid,BM,y | Build margin CO2 emission factor in year y (tCO2/MWh) |
| EGm,y | Net quantity of electricity generated and delivered to the grid by power plant *m* in year *y* (MWh) |
| EFEL,m,y | CO2 emission factor of power plant *m* in year *y* (tCO2/MWh) |
| m | Power plants included in the build margin |
| y | Most recent historical year for which power generation is available |

Therefore the build margin is calculated as

|  |  |  |
| --- | --- | --- |
| EFgrid,BM,y = | **0.1350** | [tCO2/MWh] |

**Step 6: Calculate the combined margin emissions factor**

Weighted average combined margin was applied for the calculation, as this method is preferable in line with paragraph 83 of the tool.

The weighted average combined margin is calculated following equation 16 of the tool shown below:



Where:

|  |  |
| --- | --- |
| EFgrid,BM, | Build Margin CO2 emission factor in year y (tCO2/MWh) |
| EFgrid,OM,y | Operating margin CO2 emission factor in year y (tCO2/MWh) |
| wOM | Weighting of operating margin emissions factor (%) |
| wBM | Weighting of build margin emissions factor (%) |

According to paragraph 86 of the tool the following default values should be used for wOM and wBM

|  |  |
| --- | --- |
| Wind and Solar generation projects | *wOM* = 0.75 and *wBM* = 0.25 for the first crediting period and for subsequent crediting periods |
| All other projects | *wOM* = 0.5 and wBM = 0.5 for the first crediting period, and  *wOM* = 0.25 and *wBM* = 0.75 for the second and third crediting period |

The result of the calculation of equation 16 is provided in Table 6 below for wind and solar projects in the second column, all other projects in the third column and in the last column the factor to be used for projects that have already completed their 1st crediting period.

Table 6: Calculation of the Standardized Baseline Combined Margin Emission Factor, EFgrid,CM,y

|  |  |  |  |
| --- | --- | --- | --- |
|  | ***Solar and Wind Projects (1st crediting period and subsequent crediting periods)*** | ***All Other Projects (1st crediting period)*** | ***All Other Projects (2nd and 3rd crediting period)*** |
| **EFgrid,OM,y (tCO2e/MWh)** | 0.5545 | 0.5545 | 0.5545 |
| WOM (%) | 0.75 | 0.5 | 0.25 |
| **EFgrid,BM,y (tCO2e/MWh)** | 0.1350 | 0.1350 | 0.1350 |
| WBM (%) | 0.25 | 0.5 | 0.75 |
| **EFgrid,CM,y (tCO2e/MWh)** | **0.4496** | **0.3447** | **0.2399** |

Project activities applying this standardised baseline will have for their first crediting period:

* A combined margin grid emission factor of **0.4496** tCO2e/MWh, calculated for solar and wind projects; or
* A combined margin grid emission factor of **0.3447** tCO2e/MWh, calculated for all other projects.

**Conclusion**

This standardised baseline will provide project owners with a standardised grid emission factor for the determination of their emission reductions. This will simplify the calculation of emission reductions and removals for CDM project activities and reduce verification costs. It further assures environmental integrity in the emission reductions calculated. The use of the standardised baseline will significantly reduce the complexity in the determination of emissions reductions.

The national grid emission factor was calculated over the three-year period 2016-2019, as:

* **0.4496** tCO2eq/MWh for solar and wind projects;
* **0.3447** tCO2eq/MWh for all other projects in the first crediting period;
* **0.2399** tCO2eq/MWh for all project activities in the second and third crediting period.

The approved calculation spread sheet and detailed report are included in the submission package. An overview of the results is presented Table 6 above.

The official institutions Kenya Power and Lighting Company PLC and the Energy and Petroleum Regulatory Authority (EPRA) have provided the data on net electricity generation and fossil fuel consumption.

**Validity of the proposed standardized baseline**

*State the period of time for which the proposed standardized baseline is valid in accordance with the “Standard for determining coverage of data and validity of standardized baselines”.*

The standardised baseline shall be valid for a period of 3 years from the date of approval by the CDM Executive Board.

**Deviations from the approved methodological tool (if applicable)**

*Provide descriptions of and justifications for the necessity and the appropriateness of any deviations from the valid version of the approved methodological tool to develop the proposed standardized baseline. Also, justify why a revision of the valid version of the approved methodological tool is not necessary.*

Not applicable

**References and any other relevant information**

Not applicable

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**Document information**

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| --- | --- | --- |
| *Version* | *Date* | *Description* |
|  | | |
| 1. 04.0 | 21 September 2018 | Revision to:  • Reflect updated list of attachments contained in the version 05.2 of “Procedure: Development, revision, clarification and update of standardized baselines” (CDM-EB63-A28-PROC);  • Include editorial and structural improvement. |
| 1. 03.0 | 1 September 2015 | Revision to:  • Reflect updated requirements in the version 04.0 of “Procedure: Development, revision, clarification and update of standardized baselines” (CDM-EB63-A28-PROC);  • Include editorial improvement. |
| 1. 02.0 | 1 December 2013 | The document title has changed from “Proposed standardized baseline form” (F-CDM-PSB) to “Proposed standardized baseline submission form” (CDM-PSB-FORM).  Revision to:  • Reflect updated requirements in the “Procedure: Development, revision, clarification and update of standardized baselines”  • Include editorial improvement |
| 1. 01.0 | 23 March 2012 | Initial publication. |
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1. Additionally, Kenya has cross-border energy supply agreements with the Ethiopian Electric Utility Company (EEU) and Tanzania Electricity Supply Company Limited (TANESCO), where the nearest grid is used to supply the electrified border town. Thus EEU exports to Moyale off-grid system in Kenya, while Kenya Power and Lighting Company PLC supplies the Namanga town border side of Tanzania. [↑](#footnote-ref-1)
2. The following registered CDM projects were not included because they are yet to be commissioned 1) EAREP - Njega 5MW Small Hydro Project 2) Akiira I 35 MW Geothermal Project (CPA 001) 3) 60 MW Kinangop Wind Park Project 4) Corner Baridi Wind Farm 5) Kipeto Wind Energy Project [↑](#footnote-ref-2)