**Quality Assurance (QA) and Quality Control (QC) report**

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| **Sectoral scope** | Energy industries (renewable - / non-renewable sources) |
| **Name of DNA** | DNA of Cape Verde |
| **Primaries persons for the QC report** | Mr. Hernani ALmeida and Mr. Ariel Cruz Assunção |
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| **Implementation date of QC procedures** | July 2019 - 3 years from approval of this SB |

**Please describe how the QC procedures were implemented**

The DNA of Cape Verde has designated the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) to be responsible for this standardized baseline development and maintenance. ECREEE acts on DNA's behalf in this case, whilst keeping the DNA office duly informed along the process of developing and maintaining this standardized baseline. ECREEE is directly involved in the communication with UNFCCC under the official designation of the CDM DNA office of Cape Verde.

The DNA or ECREEE sends a request to Electra, Agua e Energia da Boavista (AEB), Agua de Ponta Preta (APP), ARME to ask them for providing the data required for the standardized baseline including the grid emission factor calculations. This data request constitutes on its own a data delivery protocol, as described by the most recent EB procedures and regulations.

The data are collected according to a specified data format (the sectoral specific template has been submitted to the secretariat). In other words, for each generation facility, Electra, Agua e Energia da Boavista, Agua de Ponta Preta and ARME should provide:
1. the amount of electricity sent to the power grid/distribution network,
2. fuel consumption per type of fuel as well as the NCV of each fuel where needed.
3. The data request also contains information on the units such us active power and location in which the data should be reported, as well as the data vintage (period of time when data are reported).

Further instructions concerning the collection of the raw data and its processing are generally not necessary, because Electra and Government bodies (DNICE) already have in place their solid internal QC/QA procedures as described below. The Ministry of Industry, Trade and Energy (MICE) may be requested to some data directly. Bcause they are the entity that checks the numbers and validate them under their system planning.
All raw data is provided and submitted by the individual power plants in the form of reports to Electra head office, then later Electra sends to the government bodies and at the same time, Electra publishes the annual reports with all of the data and information. Cabeolica publishes its own annual reports independently.

The data collection process for each parameter is described below:
**1 . Electricity generation and delivered to the grid** data is measured using calibrated and certified smartmeters located at each plant. Like in other countries, those meters are used for metering the electricity supplied to the grid.
For the case of Cabeolica and Electric Wind, these smartmeter readings are the basis for settling the payment that each generation facility receives from Electra. The installed meters should have a minimum accuracy class 2.0 and are calibrated regularly in accordance with the relevant national regulations and requirements set out by national utility and Property and Quality Institute (IGQI). The data on electricity generation and supply to the grid is produced by Electra APP and AEB continuously and regularly reported to ARME and MICE through official reporting lines/processes.
**2. Fuel consumption data** is measured using scales (fuel oil and diesel). All meters are certified as per the relevant Cape Verde national standards and those requirements set by IGQI and Electra. The annual consumption is established by taking inventory at the beginning and end of each day of the year and the fuel purchase data throughout the year (for all types of fuels). The values are produced by Electra, APP and AEB on a monthly basis and annual values are aggregated.

**3. The NCVs for the fuel used in each power plant** are taken directly from the fuel supplier. Even been a small island country, now there are specialized labs involved in doing regular testing of the NCVs. As well it is considered that supplier data is of highest quality.

The raw data for these parameters are screened internally and aggregated annual basis for the purpose of this standardized baseline. They are available also on monthly basis. While the monthly reports are of preliminary nature because they do not reflect any of the reviews and corrections performed by Electra, the annual reports by Electra, APP and AEB involves a thorough review and audit of the entire data set for consistency and accuracy.
The data received from Electra, APP and AEB or MICE of Cape Verde is further reviewed by DNA through ECREEE as the designated body and its highly competent energy experts. The data is compared against data from previous years, which are also shown in Electra annual reports published online.
In case, in the process of review, any inconsistencies are identified, e.g. typos, too high or too low efficiency of electricity generation, etc., further clarifications are requested from Utilities/MICE. If necessary, power plants may be contacted directly to provide clarifications.
In case no errors, inconsistencies and problems are identified, these data sets will be used for the standardized baseline. In case of errors, inconsistencies and problems, the data set will be used only after careful review and clearance by Electra, APP, AEB and ARME/MICE with a confirmation that such identified issues are resolved.
As ECREEE is working on behalf/closely with the DNA office, the entire process is involving the DNA office by keeping the DNA in copy and the DNA office may provide input and guidance at any time during this process.

**Please specify how the credibility of the data sources was checked.**

The data source is Electra/Cabeolica/MICE/APP/AEB. These are national utility/government bodies and independent bodies or private company and these are the only bodies in Cape Verde that have the mandate to possesses full, complete, accurate and traceable information on the operation of the power sector in the country.
Where Electra/Cabeolica/MICE is mentioned together, it mainly refers that they are the body directly dealing with the national data. When MICE and ARME can validate any numbers values upon request by ECREEE. It is expected that under normal and usual situations, the data sets provided by Electra can be of highest quality and do not contain any errors of significant nature.

**Please specify how the accuracy of the data was checked.**

The accuracy of the data is checked at two levels:
First, Electra, Cabeolica, AEB and MICE checks the data received from the individual plants for consistency and accuracy. It must be noted that the level of accuracy for fuel consumption and electricity generation data is very high because these data are used as a basis for commercial transactions between companies and are confirmed by invoices, before they are submitted to government bodies. These data are also used for economic regulation by the regulatory agency.
The data on NCV has also high level of accuracy because they are provided by fuel suppliers and such values are of critical importance to the daily operation of the power plants and therefore it is of highest level of interest for power plants to ensure the highest level of quality of these data.
Second, the data are checked again by the experts of the ECREEE as appointed by the Cape Verde DNA, especially against data from previous years and any potential issues, errors, inconsistencies would be clarified and explained before the datasets are used for calculations.
To conclude, it is ensured that the datasets provided by the utility and government bodies following the above described processes are of high level of quality and accuracy.

**Please specify how the consistency was achieved and how the data vintage provision was met.**

The data for each year is collected and reported in the same format and is subject to the same reporting requirements/process as specified in the original data request by ECREEE on behalf of the DNA to Electra/MICE. This allows the data to be updated at regular intervals (annually), so that they are traceable and are comparable over time.
The data is reported on an annual basis (January 1 – December 31) for each calendar year and with access to all loads and consumptions diagrams, which allows the required data vintage provisions to be met. The data was

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| usually in the past released with a delay between several months to maximum one year due to the need of processing and checking for consistency of all the data from individual power plants. Normally, we expect the datasets to be ready for publication within 6-7 months' time following the end of the previous calendar year. Now, the data are released faster and the accounts report (audit by foreign firms) comes early as well.<br>This data delivery protocol requires Electra/Cabeolica/MICE to provide information on all existing grid connected power plants, or independent power plants on each island. Electra as a national utility possesses most information on the operation of the grid-connected power plants in Cape Verde and the data on Boavista are provided by AEB. As mentioned above, MICE validate all figures.<br>For consistency issues, the data received would always be checked by the ECREEE experts on behalf of the DNA. It should be mentioned that each year's annual report of Electra already compares with the previous years' data, which can already serve as a basis for cross checking yearly data.<br>The above procedures therefore can ensure that the reported and used values are of high level of consistency. |
| **Please specify how the completeness was achieved.** |
| The potential risk of not reporting, omitting any of the generation facilities is not possible as the country has mandatory reporting requirements for the above information and need such high-quality data for better planning of the sector. |
| **Please specify how the transparency was achieved.** |
| In Cape Verde, most of the above data are publicly available on the website of Electra through its annual reports and on the Master Plan of the Eletricity Sector. This already ensures the highest level of transparency of data and information. The data from Cabeolica and Electric Wind (reported through Electra since 2011, for example) are made easily accessible, too. As well as from AEB and APP. Any additional information required is provided by MICE that also validates or Electra following the request by ECREEE on DNA behalf. |
| **Please specify major issues and uncertainties identified during the QC procedures.** |
| Because all of the data are provided by national utility Electra, IPP Cabeolica and government independent body following stringent reporting lines, the level of uncertainty is extremely low.<br>Internal and external reporting requirements are clearly set up in the country and by Electra and MICE and most of the data are made public available since many years, except the very small newly established company Electric Wind.<br>Therefore, there are no main uncertainties involved in this process. |
| **Please specify major corrective actions taken during the QC procedures.** |
| There are no specific corrective actions required in this case. |
| **Please justify the conservativeness of the approaches taken during the QC procedures** |
| The approach follows an approved UNFCCC tool "Tool to calculate grid emission factor of an electricity system" thus all conservative measures are already taken into account within the applied tool/methodology. |
| **Please summarize key findings and present a plan to improve the data quality in future** |
| Cape Verde as a small island country has a solid QA/QC process to ensure high level of quality and accuracy of the data collected for this standardized baseline. However, the procedure will be improved in line with any changes in the procedures and requirements for establishment of standardized baselines. |

**Date to of QC report finalization**

15/07/2019

**Signature of the DNA**