**Project design document form for CDM project activities**

**(Version 07.0)**

*Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.*

| PROJECT DESIGN DOCUMENT (PDD) | |
|---|---|
| **Title of the project activity** | Small Hydroelectric Power Plants Projects: São Pedro, Carangola, Calheiros, São Simão, Funil, São Joaquim, Fumaça IV, Jataí, Irara, Bonfante, Monte Serrat, Santa Fé, hereafter referred to as group ("bundling"). |
| **Version number of the PDD** | 4.4 |
| **Completion date of the PDD** | 17/06/2016 |
| **Project participant(s)** | Centrais Elétricas Brasileiras S/A – ELETROBRÁS<br>São Pedro Energia S/A<br>Carangola Energia S/A<br>Calheiros Energia S/A<br>São Simão Energia S/A<br>Funil Energia S/A<br>São Joaquim Energia S/A<br>Caparaó Energia S/A<br>Jataí Energética S/A<br>Irara Energética S/A<br>Bonfante Energética S/A<br>Monte Serrat Energética S/A<br>Santa Fé Energética S/A |
| **Host Party** | Brazil |
| **Applied methodology(ies) and, where applicable, applied standardized baseline(s)** | ACM0002: "Grid-connected electricity generation from renewable sources" (version 16.0.0) |
| **Sectoral scope(s) linked to the applied methodology(ies)** | Sectoral Scope: 1 - Energy industries (renewable - / non-renewable sources). |
| **Estimated amount of annual average GHG emission reductions** | 650,438 $tCO_2e$ |

# SECTION A. Description of project activity

## A.1. Purpose and general description of project activity

>>

The primary objective of the proposed project activity is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to environmental, social and economic sustainability by increasing the share of renewable energy in total electricity consumption for Brazil (and for the region of Latin America and the Caribbean).

The privatization process of the electric sector, initiated in 1995 commenced with the expectation of adequate tariffs (fewer subsidies) and better prices for generators. It drew the attention of investors to possible alternatives not available in the centrally planned electricity market. Unfortunately, the Brazilian energy market lacked a consistent expansion plan; the current expansion plan contains major problems such as political and regulatory uncertainties. In the late 1990's a strong increase in demand contrasted with a less-than-average increase in installed capacity caused the outbreak of the supply crisis/rationing in 2001/2002. One of the solutions the government provided was flexible legislation, which favored smaller independent energy producers. Furthermore the possible eligibility under the Clean Development Mechanism of the Kyoto Protocol drew the attention of investors to small hydropower projects.

The project activity consists of the implementation of 12 (twelve) small hydropower plants ("PCH", from the Portuguese "Pequena Central Hidrelétrica") located in the States of Espírito Santo, Minas Gerais, Rio de Janeiro and Goiás, totaling 275.6 MW installed capacity .

**Table 1 – Small hydropower plants included in this PDD**

| SHP | Installed Capacity (MW)[1] | Reservoir area ($km^2$) | Location / State | Project Developer |
|---|---|---|---|---|
| São Pedro | 30.06 | 0.11 | Espírito Santo | São Pedro Energia S/A |
| Carangola | 15.30 | 0,0059 | Minas Gerais | Carangola Energia S/A |
| Calheiros | 19.26 | 0.26 | Espírito Santo and Rio de Janeiro | Calheiros Energia S/A |
| São Simão | 27.00 | 0.72 | Espírito Santo | São Simão Energia S/A |
| Funil | 22.68 | 1.5 | Minas Gerais | Funil Energia S/A |
| São Joaquim | 21.60 | 0.063 | Espírito Santo | São Joaquim Energia S/A |
| Fumaça IV | 4.50 | 0.04 | Espírito Santo and Minas Gerais | Caparaó Energia S/A |
| Jataí | 30.00 | 0.425 | Goiás | Jataí Energética S/A |
| Irara | 30.00 | 2.58 | Goiás | Irara Energética S/A |
| Bonfante | 18.24 | 0.55 | Minas Gerais and Rio de Janeiro | Bonfante Energética S/A |
| Monte Serrat | 26.89 | 0.55 | Minas Gerais and Rio de Janeiro | Monte Serrat Energética S/A |
| Santa Fé | 30.06 | 1.278 | Minas Gerais and Rio de Janeiro | Santa Fé Energética S/A |

**Source: ANEEL/SIGEL (2014)[2] and ANEEL/BIG (2014)[3]**

[1] The installed capacity of the small hydropower plants was considered as the sum of the installed power generation capacities of its power units (generators) as required by the ACM0002 definition. Although the installed capacity of São Pedro small hydropower plant surpasses 30 MW (the eligibility criteria to be classified as small hydropower plant according to ANEEL Resolution # 394/1998), all power plants included in the proposed project activity are considered as small hydropower plant ("PCH" from the Portuguese Pequena Central Hidrelétrica) by the Brazilian government and, for this reason, they were selected under the Brazilian Program of Incentives to Alternative Energy Sources (PROINFA). More information regarding this issue is presented in the Project Participants response of the Validation Protocol (CL 1).

The small hydropower plants were developed in the context of the Brazilian Program of Incentives to Alternative Energy Sources ("PROINFA" in a free translation from the Portuguese "Programa de Incentivo às Fontes Alternativas de Energia Elétrica"). The main goal of the program is to increase the renewable energy sources share in the Brazilian electricity market, thus contributing to a greater environmental sustainability. In order to achieve such goals, the Brazilian government has designated Eletrobrás (Centrais Elétricas Brasileiras) to act as the primary off-taker of electricity by entering into long-term Power Purchase Agreements (PPAs).

Prior to the implementation of the project activity no small hydropower plants were operational in the location where the projects were developed. The project activity reduces GHG emissions by avoiding electricity generation from fossil fuel sources, which would be generated (and emitted) in the absence of the project. In conclusion, the baseline scenario and the scenario without the project activity are the same. The project activity is expected to reduce 650,438 $tCO_2e$/year, resulting in 6,504,377 tCO2e during the crediting period. Furthermore, the proposed CDM project activity is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

According to ACM0002, in the project activity scenario, there are emissions of methane ($CH_4$) from the water reservoir of hydropower plants. However, since the power densities of the small hydropower plants included in this PDD are greater than 10 $W/m^2$, there are no GHG emissions involved in the project activity.

The project activity can be seen as a solution by the private sector to the Brazilian electricity sector since it may help to avoid another electricity supply crisis, contributing to sustainable development and having a positive effect for the country beyond the evident reductions in GHG.

Although the project activity does not have a relevant positive impact in the host country given its electric system size, it is without reasonable doubt part of a greater idea. The project contributes to sustainable development since it meets the present needs without compromising the ability of future generations to meet their own needs, as defined by the Brundtland Commission (1987). In other words, the implementation of small hydroelectric power plants ensures renewable energy generation, reduces the national electric system demand, avoids negative social and environmental impact caused by the construction of large hydropower plants with large reservoirs and fossil fuel thermo power plants, and drives regional economies, increasing quality of life in local communities.

Therefore, indisputably the project has reduced negative environmental impacts and has developed the regional economies, resulting, consequently, in better quality of life. In other words, environmental sustainability combined with social and economic justice, undeniably contribute to the host country's sustainable development.

## A.2. Location of project activity

### A.2.1. Host Party

>>
Brazil.

[2] ANEEL/SIGEL (2014). Georreferenced Information System from the Electric Sector ("SIGEL from the Portuguese Sistema de Informações Georreferenciadas do Setor Elétrico). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://sigel.aneel.gov.br/kmz.html>.

[3] ANEEL/BIG (2014). "Agentes Produtores Independentes". Electricity Generation Database ("BIG" from the Portuguese Banco de Informação de Geração). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ListaAgentes.asp?destino=3>.

### A.2.2. Region/State/Province etc.

>>

| SHP | State |
|---|---|
| São Pedro | Espírito Santo (ES) |
| Carangola | Minas Gerais (MG) |
| Calheiros | Espírito Santo (ES) and Rio de Janeiro (RJ) |
| São Simão | Espírito Santo (ES) |
| Funil | Minas Gerais (MG) |
| São Joaquim | Espírito Santo (ES) |
| Fumaça IV | Espírito Santo (ES) and Minas Gerais (MG) |
| Jataí | Goiás (GO) |
| Irara | Goiás (GO) |
| Bonfante | Minas Gerais (MG) and Rio de Janeiro (RJ) |
| Monte Serrat | Minas Gerais (MG) and Rio de Janeiro (RJ) |
| Santa Fé | Minas Gerais (MG) and Rio de Janeiro (RJ) |

**Source: ANEEL/BIG (2014)[4]**

### A.2.3. City/Town/Community etc.

>>

| SHP | Municipality |
|---|---|
| São Pedro | Domingos Martins |
| Carangola | Carangola |
| Calheiros | Bom Jesus de Itabapoana (RJ) and São José do Calçado (ES) |
| São Simão | Alegre |
| Funil | Dores de Guanhães |
| São Joaquim | Alfredo Chaves |
| Fumaça IV | Caiana (MG) and Dores do Rio Preto (ES) |
| Jataí | Jataí |
| Irara | Rio Verde |
| Bonfante | Simão Pereira (MG) and Comendador Levy Gasparian (RJ) |
| Monte Serrat | Simão Pereira (MG) and Comendador Levy Gasparian (RJ) |
| Santa Fé | Comendador Levy Gasparian and Três Rios (RJ) and Santana do Deserto (MG) |

**Source: ANEEL/BIG (2014)[5]**

### A.2.4. Physical/Geographical location

>>

The small hydropower plants of the project activity are distributed in the Southeast and Midwestern region of Brazil (Figure 1).

[4] ANEEL/BIG (2014). "Agentes Produtores Independentes". Electricity Generation Database ("BIG" from the Portuguese Banco de Informação de Geração). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ListaAgentes.asp?destino=3>.

[5] ANEEL/BIG (2014). "Agentes Produtores Independentes". Electricity Generation Database ("BIG" from the Portuguese Banco de Informação de Geração). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ListaAgentes.asp?destino=3>.

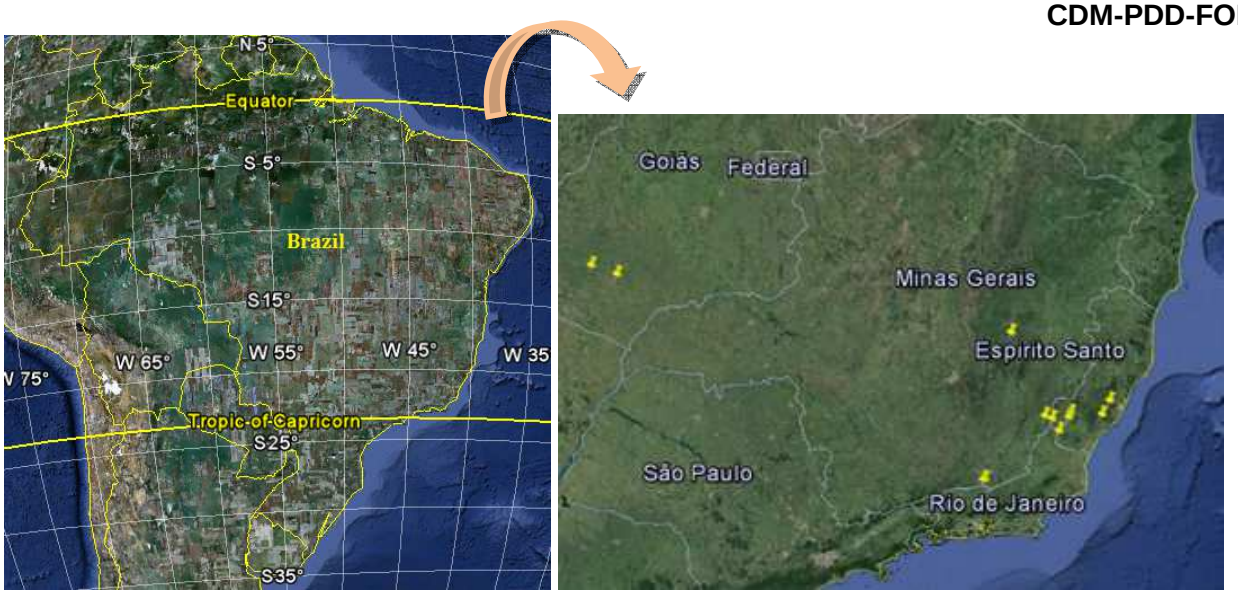


**Figure 1 – Map of boundaries of Brazil Federal Republic and location of the small hydropower plants included in the project activity**

**Source: SIGEL/ANEEL (2014)[6]**

Geographical coordinates of each small hydropower plant are presented in the table below as source of information (Table 2).

**Table 2 – Location of the small hydropower plants included in the proposed project activity**

| SHP | River | Geographical coordinates | | Source |
|---|---|---|---|---|
| | | Latitude (S) | Longitude (W) | |
| São Pedro | Jucu Braço do Norte | 20º19' 30" | 40º38' 05" | Resolution ANEEL 604/03 |
| Carangola | Carangola | 20º42' | 42º04' | Resolution ANEEL 356/99 |
| Calheiros | Itabapoana | 21º01' | 41º43' | Resolution ANEEL 12/00 |
| São Simão | Itapemirim Braço Norte | 20º37' | 41º29' | Resolution ANEEL 84/01 |
| Funil | Guanhães | 19° 05' | 42° 51' | Resolution ANEEL 361/99 |
| São Joaquim | Benevente | 20° 36' | 40° 48 ' | Resolution ANEEL 404/00 |
| Fumaça IV | Preto | 20° 45' | 41° 52 ' | Resolution ANEEL 369/99 |
| Jataí | Claro | 17°53' 36" | 51°43' 24" | Resolution ANEEL 2686/06 |
| Irara | Doce | 18° 04' 03" | 51° 10 ' 03" | Resolution ANEEL 525/02 |
| Bonfante | Paraibuna | 22° 00' 32" | 43°15'55" | Resolution ANEEL 357/01 |
| Monte Serrat | Paraibuna | 22° 01' 11" | 43° 18 ' 08" | Resolution ANEEL 356/01 |
| Santa Fé | Paraibuna | 22° 01' 23" | 43°09'46" | Resolution ANEEL 608/02 |

**Source: ANEEL/CEDOC (2014)[7]**

## A.3. Technologies and/or measures

>>

According to the Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica) Resolution # 394/1998, small hydropower plant is defined as hydropower plants with

[6] ANEEL/SIGEL (2014). Georreferenced Information System from the Electric Sector ("SIGEL from the Portuguese Sistema de Informações Georreferenciadas do Setor Elétrico). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://sigel.aneel.gov.br/kmz.html>.

[7] ANEEL/CEDOC (2014). The Brazilian Power Regulatory Agency database ("CEDOC" from the Portuguese Centro de documentação da ANEEL). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Available at: <http://biblioteca.aneel.gov.br/index.html>.

installed capacity plant between 1 and 30 MW and reservoir area smaller than 3 km[28] . All hydropower plants included in the proposed project activity is defined as small hydropower plants. Detailed description of each power plant presented in the following tables.

**Table 3 – Equipment description of São Pedro, Carangola and Calheiros**

| Equipment | Specification | São Pedro | Carangola | Calheiros |
|---|---|---|---|---|
| Generator | Quantity | 2 | 2 | 2 |
| | Nominal power (kVA) | 16,700 | 8,500 | 10,700 |
| | Nominal tension (V) | 6,900 | 13,800 | 13,800 |
| | Power factor | 0.9 | 0.9 | 0.9 |
| | Frequency (Hz) | 60 | 60 | 60 |
| | Rotation (rpm) | 600 | 900 | 327.3 |
| | Manufacturer | Alstom | WEG | Voith Siemens |
| | Year of Manufacture | 2008 | 2007 | 2007 |
| Turbine | Quantity | 2 | 2 | 2 |
| | Nominal power (kW) | 15,464 | 7,730 | 9,794 |
| | Type | Francis - Horizontal Axle | Francis - Horizontal Axle | Francis - Horizontal Axle |
| | Rotation (rpm) | 600 | 900 | 327.3 |
| | Manufacturer | Alstom | Voith Siemens | Voith Siemens |
| | Year of Manufacture | 2008 | 2008 | 2008 |
| | | | | |
| Electric Meter (Master) | Location | Connection | Connection | Connection |
| | Manufacturer | Power Measurement | ELO | ACTARIS |
| | Serial Number | PT-0901A254-01 | 90004410 | 37103629 |
| | Model /type | ION 8600 | 2180SP | SL7000 |
| Electric Meter (Rearward) | Location | Connection | Connection | Connection |
| | Manufacturer | Power Measurement | ELO | ACTARIS |
| | Serial Number | PT-0901A265-01 | 90002795 | 37103628 |
| | Model /type | ION 8600 | 2180SP | SL7000 |

**Table 4 – Equipment description of São Simão, Funil and São Joaquim**

| Equipment | Specification | São Simão | Funil | São Joaquim |
|---|---|---|---|---|
| Generator | Quantity | 2 | 2 | 2 |
| | Nominal power (kVA) | 15,000 | 12,600 | 12,000 |
| | Nominal tension (V) | 6,900 | 13,800 | 13,800 |
| | Power factor | 0.9 | 0.9 | 0.9 |
| | Frequency (Hz) | 60 | 60 | 60 |
| | Rotation (rpm) | 450 | 450 | 900 |
| | Manufacturer | Alstom | WEG | WEG |
| | Year of Manufacture | 2007 | 2007 | 2007 |
| Turbine | Quantity | 2 | 2 | 2 |
| | Nominal power (kW) | 13,920 | 11,600 | 11,050 |
| | Type | Francis - Horizontal Axle | Francis - Horizontal Axle | Francis - Horizontal Axle |
| | Rotation (rpm) | 450 | 450 | 900 |
| | Manufacturer | Alstom | Voith Siemens | Voith Siemens |

[8] In some cases, ANEEL considers “small hydropower plants” those hydropower plants with 1 MW – 30 MW installed capacity, whose reservoir areas are greater than 3 km$^2$. However, the criteria established in ANEEL Resolution # 652/2003 shall be satisfied, *i.e.* the reservoir area shall be lower or equal to the installed capacity in MW multiplied by 14.3, divided by gross waterfall in meters.

| | | | | |
|---|---|---|---|---|
| | Year of Manufacture | 2006 | 2007 | 2007 |
| **Electric Meter (Master)** | Location | Connection | Connection | Connection |
| | Manufacturer | ELO SISTEMAS | ELO | ELO SISTEMAS |
| | Serial Number | 90006130 | 90007643 | 90004318 |
| | Model /type | 2180SP | 2180SP | ELO 2180 SP |
| **Electric Meter (Rearward)** | Location | Connection | Connection | Connection |
| | Manufacturer | ELO SISTEMAS | ELO | ELO SISTEMAS |
| | Serial Number | 90007547 | 90007642 | 90007640 |
| | Model /type | 2180SP | 2180SP | ELO 2180 SP |

**Table 5 – Equipment description of Fumaça IV, Jataí and Irara**

| Equipment | Specification | Fumaça IV | Jataí | Irara |
|---|---|---|---|---|
| **Generator** | Quantity | 2 | 3 | 3 |
| | Nominal power (kVA) | 2,500 | 11,110 | 11,110 |
| | Nominal tension (V) | 6,900 | 13,800 | 13.8 |
| | Power factor | 0.9 | 0.9 | 0.9 |
| | Frequency (Hz) | 60 | 60 | 60 |
| | Rotation (rpm) | 900 | 327 | 360 |
| | Manufacturer | WEG | WEG | WEG |
| | Year of Manufacture | 2007 | 2007 | 2007 |
| **Turbine** | Quantity | 2 | 3 | 3 |
| | Nominal power (kW) | 2,340 | 10,299 | 10,467 |
| | Type | Francis - Horizontal Axle | Francis - Horizontal Axle | Francis - Horizontal Axle |
| | Rotation (rpm) | 900 | 327.27 | 360 |
| | Manufacturer | Energy Power | Brumazi - Vatech Hydro | Vatech Hydro |
| | Year of Manufacture | 2007 | 2008 | 2008 |
| **Electric Meter (Master)** | Location | Connection | Connection | Connection |
| | Manufacturer | Power Measurement | SCHULUMBERGER | ITRON |
| | Serial Number | | 31681514 | 50712519 |
| | Model /type | ION 8600 | Q1000 | Q1000 |
| **Electric Meter (Rearward)** | Location | Connection | Connection | Connection |
| | Manufacturer | Power Measurement | SCHULUMBERGER | ITRON |
| | Serial Number | | 31681514 | 50712522 |
| | Model /type | ION 8600 | Q1000 | Q1000 |

**Table 6 – Equipment description of Bonfante, Monte Serrat and Santa Fé**

| Equipment | Specification | Bonfante | Monte Serrat | Santa Fé |
|---|---|---|---|---|
| **Generator** | Quantity | 1 | 2 | 2 |
| | Nominal power (kVA) | 19,200 | 14,150 | 16,700 |
| | Nominal tension (V) | 6,900 | 6.9 | 13,800 |
| | Power factor | 0.95 | 0.95 | 0.9 |
| | Frequency (Hz) | 60 | 60 | 60 |
| | Rotation (rpm) | 514 | 500 | 327 |
| | Manufacturer | Alstom | Alstom | Alstom |
| | Year of Manufacture | 2007 | 2007 | 2007 |
| **Turbine** | Quantity | 1 | 2 | 2 |
| | Nominal power (kW) | 19,390 | 12,990 | 15,540 |
| | Type | Kaplan - Horizontal Axle | Kaplan - Horizontal Axle | Kaplan - Horizontal Axle |
| | Rotation (rpm) | 135 | 175 | 327.27 |
| | Manufacturer | Alstom | Alstom | Alstom |
| | Year of Manufacture | 2007 | 2007 | 2007 |

| | | | | |
|---|---|---|---|---|
| **Electric Meter (Master)** | Location | Connection – SE Itegração | Connection | Connection |
| | Manufacturer | Power Measurement | SCHNEIDER | Power Logic |
| | Serial Number | PT0707A403-01 | PT-0707A403-01 | PT-0612A235-01 |
| | Model /type | ION 8600 | ION8600-4Q | ION8600C |
| **Electric Meter (Rearward)** | Location | Connection – SE Itegração | Connection | Connection |
| | Manufacturer | Power Measurement | SCHNEIDER | Power Logic |
| | Serial Number | PT0707A403-01 | PT-0707A404-01 | PT-0612A235-01 |
| | Model /type | ION 8600 | ION8600-4Q | ION8600C |

Since Brazil has a large hydropower potential, the know-how used in the project activity has been transferred to the Host Country already. Therefore, the main equipment used in the project activity was manufactured in Brazil. This contributes for the energy sector development (resulting in more research) and for the capacity increase of the industrial sector within the Host Country.

All electric meter follows specification of the document called Sub module[9] 12.2 of The National System Operator (ONS)

### A.4. Parties and project participants

| Party involved (host) indicates host Party | Private and/or public entity(ies) project participants (as applicable) | Indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Brazil (host) | São Pedro Energia S/A private entity | No |
| | Carangola Energia S/A private entity | |
| | Calheiros Energia S/A private entity | |
| | São Simão Energia S/A private entity | |
| | Funil Energia S/A private entity | |
| | São Joaquim Energia S/A private entity | |
| | Caparaó Energia S/A private entity | |
| | Jataí Energética S/A private entity | |
| | Irara Energética S/A private entity | |
| | Bonfante Energética S/A private entity | |
| | Monte Serrat Energética S/A private entity | |

[9] http://www2.aneel.gov.br/arquivos/PDF/Submodulo12%5B1%5D.2_v8.0.pdf

| | | |
|---|---|---|
| | Santa Fé Energética S/A<br>private entity | |
| | Centrais Elétricas Brasileiras S/A – ELETROBRÁS<br>public entity | |

### A.5. Public funding of project activity

>>

There is no public funding from Parties included in Annex I countries of the United Nations Framework Convention on Climate Change and the proposed project activity does not result in a diversion of Official Development Assistance (ODA).

## SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

### B.1. Reference of methodology and standardized baseline

>>

ACM0002: "Grid-connected electricity generation from renewable sources" (version 16.0.0).

ACM0002 refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (Version 5.0.0)[10];
- Tool for the demonstration and assessment of additionality (Version 7.0.0)[11];
- Tool to calculate project or leakage $CO_2$ emissions from fossil fuel combustion (version 2.0.0)[12];
- Tool to determine the remaining lifetime of equipment (version 1.0.0)[13];
- Combined tool to identify the baseline scenario and demonstrate additionality (version 5.0.0)[14];
- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 3.0.1)[15].

The "Combined tool to identify the baseline scenario and demonstrate additionality" is not applicable to the proposed project activity since additionality is demonstrated in the light of the "Tool for the demonstration and assessment of additionality".

The "Tool to calculate project or leakage $CO_2$ emissions from fossil fuel combustion" is not applicable to the project activity since there are no leakage or project emissions involved in the project.

The "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" is not applicable since this is the first crediting period of the proposed project activity and the project considers a fixed crediting period (10 years without renewal).

### B.2. Applicability of methodology and standardized baseline

>>

ACM0002 is applicable to project activities that:

[10] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

[11] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[12] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

[14] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v5.0.0.pdf

[15] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

(a) Install a greenfield power plant;
(b) Involve a capacity addition to an existing plant(s);
(c) Involve a retrofitting of (an) existing operating plant(s)/unit(s);
(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or
(e) Involve a replacement of (an) existing plant(s)/unit(s).

In the case of the proposed project activity, option (a) is applicable.

Furthermore, the methodology is applicable under the following conditions:

*(a) The project activity may include renewable energy power plant/unit of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.*

The proposed project activity consists of the installation of 12 (twelve) small hydropower plants.

*(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.*

Not applicable, since only new project/unit(s) is considered in the proposed project activity.

In case of hydro power plants, one of the following conditions shall apply:

*(a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or*
*(b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of the reservoirs is increased and the power density calculated using equation (3) is greater than 4 W/m$^2$; or*
*(c) The project activity results in new single or multiple reservoirs and the power density calculated using equation (3) is greater than 4 W/m$^2$; or*
*(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2 , all of the following conditions shall apply:*
*(i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2 ;*
*(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;*
*(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be:*
*a. Lower than or equal to 15 MW; and*
*b. Less than 10 per cent of the total installed capacity of integrated hydro power project.*

In the case of the proposed project activity, option (c) is applied since the small hydropower plants result in new single reservoir with power density greater than 4 W/m$^2$. Power densities of each project are presented in the table below. Detailed description of power density calculation is presented in section B.6. of this PDD.

**Table 7 – Plants of the project activity**

| SHP | Installed Capacity (MW) | Reservoir Area (km$^2$) | Power Density (W/m$^2$) |
|---|---|---|---|
| São Pedro | 30.06 | 0.11 | 273.27 |
| Carangola | 15.30 | 0,0059 | 2,593.22 |
| Calheiros | 19.26 | 0.26 | 74.08 |
| São Simão | 27.00 | 0.72 | 37.50 |
| Funil | 22.68 | 1.5 | 15.12 |
| São Joaquim | 21.60 | 0.063 | 342.86 |
| Fumaça IV | 4.50 | 0.04 | 112.50 |
| Jataí | 30.00 | 0.425 | 70.58 |
| Irara | 30.00 | 2.58 | 11.63 |
| Bonfante | 18.24 | 0.55 | 33.16 |
| Monte Serrat | 26.89 | 0.55 | 48.88 |

| | | | |
|---|---|---|---|
| Santa Fé | 30.06 | 1.278 | 23.52 |

**Source: ANEEL/SIGEL (2014)[16]**

In the case of integrated hydro power projects, project proponent shall:

*(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or*

*(b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.*

Not applicable, since the proposed project activity is not an integrated project type.

Additionally, the methodology is not applicable to the following:

*(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site*

Not applicable, since all small hydropower plants included in the proposed project activity are grid-connected power projects.

*(b) Biomass fired power plants;*

Not applicable, since only small hydropower plants were included in the proposed project activity.

Considering explanations above, the proposed project activity follows the applicability conditions established in ACM0002.

## B.3. Project boundary

According to ACM0002, the spatial extent of the project boundary includes the project power plant connected physically to the electricity system that the CDM project power plant is connected to.

The sources of greenhouse gases included or excluded of the project boundary are shown in the table below.

| Source | | GHGs | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline scenario | $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity | $CO_2$ | Yes | Main emission source |
| | | $CH_4$ | No | Minor emissions source |
| | | $N_2O$ | No | Minor emissions source |
| Project scenario | For geothermal power plants, fugitive emissions of $CH_4$ and $CO_2$ from non-condensable gases contained in geothermal steam | $CO_2$ | Yes | Main emission source. However, this emission source is not applicable to the proposed project activity, since the proposed project is based on hydropower source. |
| | | $CH_4$ | Yes | Main emission source. However, this emission source is not applicable to the proposed project activity, since the proposed project is based on hydropower source. |
| | | $N_2O$ | No | Minor emissions source |
| | $CO_2$ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants | $CO_2$ | Yes | Main emission source. However, this emission source is not applicable to the proposed project activity, since the proposed project is based on hydropower source. |
| | | $CH_4$ | No | Minor emissions source |

[16] ANEEL/SIGEL (2014). Georreferenced Information System from the Electric Sector ("SIGEL from the Portuguese Sistema de Informações Georreferenciadas do Setor Elétrico). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://sigel.aneel.gov.br/kmz.html>.

| | | | | |
|---|---|---|---|---|
| | and geothermal power plants | $N_2O$ | No | Minor emissions source |
| | For hydro power plants, emissions of $CH_4$ from the reservoir | $CO_2$ | No | Minor emissions source |
| | | $CH_4$ | Yes | Main emission source. However, all power plants included in the proposed project activity has power density is higher than 10 W/m$^2$. Detailed calculation is presented in section B.6.3. |
| | | $N_2O$ | No | Minor emissions source |

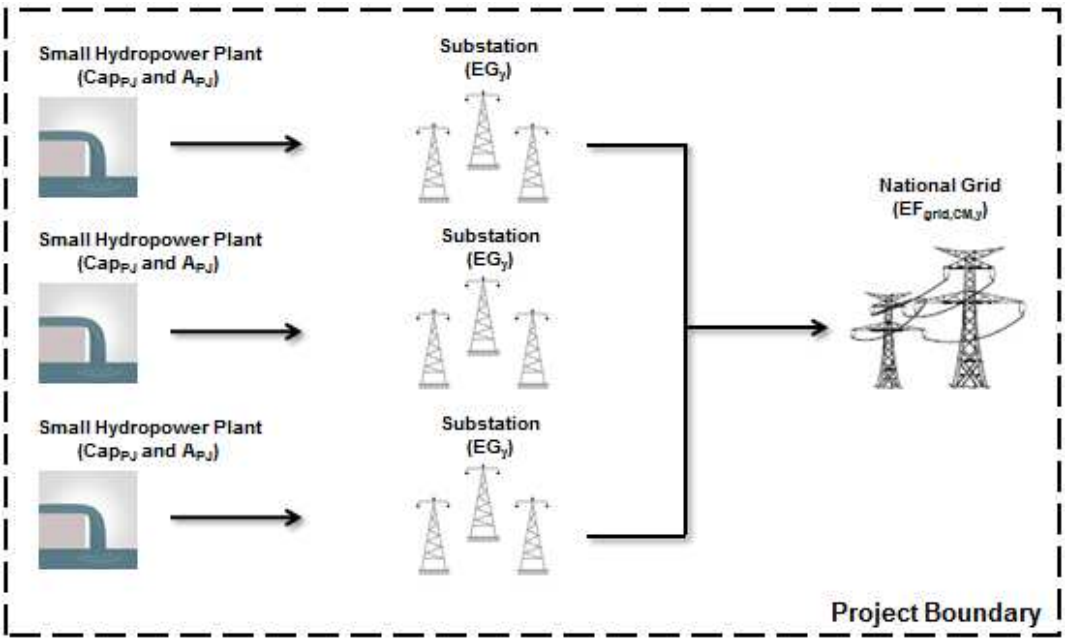


**Figure 2 – Example of schematic view of the project boundary**

## B.4. Establishment and description of baseline scenario

>>

In accordance with the ACM0002, if the project activity consists of the installation of a greenfield power plant, the baseline scenario is:

> *"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".*

Since the proposed project activity consists of the implementation of greenfield power projects, the baseline scenario mentioned above is applicable

## B.5. Demonstration of additionality

>>

According to the "Guidelines for completing the project design document form", if the start date of the project activity is prior to the date of publication of the PDD for the global stakeholder consultation (GSP), provide evidence of the prior consideration of the CDM in accordance with applicable provisions related to the demonstration of prior consideration of the CDM in the Project Standard. In the case of the proposed project activity, the project starting date (30/06/2004) is prior to the GSP (05/10/2012).

Therefore, according to the CDM Project Standard:

For a proposed CDM project activity with a start date before 2 August 2008 and prior to the date of publication of the PDD for global stakeholder consultation, project participants shall demonstrate that the CDM was seriously considered in the decision to implement the proposed project activity. Such demonstration requires the following elements to be satisfied:

(a) *Project participants shall provide evidence of their awareness of the CDM prior to the start date of* the proposed project activity, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project

In order to demonstrate CDM consideration, the PP analyzed the events regarding PROINFA legislation / regulation and selected projects.

Since 2001, the government has stated its strong support for renewable energy sources. On April 26th, 2002, it approved Law # 10,438, creating the Alternative Electricity Sources Incentive Program (PROINFA). Hence, the Brazilian government designated Eletrobrás as the entity responsible for the renewable electricity commercialization of selected projects by signing Power Purchase Agreements (PPAs) for a 20-year period. The creation of PROINFA clearly indicates that, without specific support, the renewable sources and the small projects would hardly otherwise be implemented.

Evidence for the serious consideration of CDM can be demonstrated through the issuance of the Brazilian Decree # 5,025 dated March 30th, 2004, which regulates the Law # 10,438/2002. This Decree states that PROINFA aims for the reduction of greenhouse gases as established by the United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto Protocol, contributing to sustainable development. Therefore, the program is clearly a "Type E-" policy. Furthermore, Article 16 of the Decree # 5,025/2004 determines the creation of PROINFA account, which is administrated by Eletrobrás (energy buyer), and is composed of revenues and costs related, among others, from the CDM project activities.

In order to participate in the program, project sponsor must satisfy all the requirements presented in the "PROINFA Claiming Guide" ("Guia de Habilitação") under Law # 10,438/2002 and its regulatory Decrees.

Carbon credits are clearly mentioned in PROINFA Decrees, one could argue that the government had indeed expectation of receiving such values and thus they were considered in the contracted price. On the other hand, project sponsors were aware of the requirements under the program, and that carbon credit revenues would help overcome the technological and financial barriers existent at that time.

Further evidence of CDM consideration is the signature of the PPAs. Regulations that rules PROINFA PPAs are Law nr 10,438/2002 and regulatory Decrees. The PROINFA PPAs were signed in 2004. In the case of the proposed project activity, PPAs were signed on 30/06/2004, *i.e.* after the publication of Decree # 5,025/2004.

Therefore, at the time of the PPA signature, project sponsors knew and were aware about the conditionings and requirements established under their participation in PROINFA. Under its responsibility, the Brazilian government has demonstrated its commitment and efforts to get the PROINFA projects registered under CDM.

*(b) Project participants shall provide evidence that continuing and real actions were taken to secure CDM status for the proposed project activity in parallel with its implementation;*

*(c) Project participants shall provide an implementation timeline of the proposed CDM project activity. The timeline should include, where applicable, the date when the investment decision was made, the date when construction works started, the date when commissioning started and the date of start-up (e.g. the date when commercial production started). Project participants shall provide a timeline of events and actions, which have been taken to achieve CDM registration, with description of the evidence used to support these actions.*

In order to demonstrate that continuing and real actions were taken to secure the CDM status for the proposed project activity, the PPs presented the timeline of events below:

**Table 8 – Timeline of events**

| Date | Action |
|---|---|
| 26/04/2002 | Publication of Law # 10,438 which creates the Alternative Electricity Sources Incentive Program (PROINFA). |
| 30/03/2004 | Publication of Decree # 5,025 which regulates Law # 10,438 stating that PROINFA aims for the reduction of greenhouse gases as established by the United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto Protocol, contributing to sustainable development. |
| 30/06/2004 | Signature of the Power Purchase Agreements of the project activity with Eletrobrás. |
| 30/08/2004 | Technical Note # 006/2004 from Eletrobrás Environment Department. It presents discussion regarding CDM and carbon credit markets framework and Eletrobrás insertion under CDM. |
| 13-17/06/2005 | Participation of Eletrobrás team on CDM training course promoted by the Center of Wind and Solar Energy - Sério de Salvo Brito ("CRESESB" from the Portuguese Centro de Referência para Energia Solar e Eólica Sérgio de Salvo Brito). |
| 02/08/2005 | Technical Note # 007/2005 from Eletrobras Environmental Department. It presents discussion regarding carbon credits ownership and detailed analysis regarding PROINFA projects registration under CDM. |
| 09-11/11/2005 | VIII ENGEMA ("ENGEMA" from the Portuguese Encontro Nacional sobre Gestão Empresarial e Meio Ambiente). National Meeting conducted by Eletrobrás and Fundação Getúlio Vargas (FGV) regarding advantages of CDM projects in Brazil. It presented the benefits from CDM and risks associated with uncertainties after 2012. |
| 11/11/2005 | Eletrobrás internal meeting for the creation of a Technical Group regarding Kyoto Protocol and carbon credit markets. |
| 16/11/2005 | Discussion from the Technical Group created to discuss carbon credits under CDM of PROINFA projects. |
| 17/01/2006 | Official Letter # MDL/02/2006/CIMGC. Clarifications provided by the Brazilian DNA regarding starting date and retroactive carbon credits to the Mines and Energy Ministry. The Brazilian DNA informed that PROINFA projects were not allowed to receive retroactive credits, since projects eligible for retroactive credits should start operation from 01/01/2000 to 18/11/2004, which was not case of PROINFA projects. |
| 01/06/2007 | Report "PROINFA – Grupo Executivo dos Créditos de Carbono do Proinfa" prepared for presentation to Eletrobras Executive Board. The report presented estimation of emission reductions and revenues associated. It concludes with a proposal of creating internal departments for the management of CDM matters regarding PROINFA projects. |
| 12/06/2007 | 2183th Eletrobrás Executive Board Meeting for discussion of Report "PROINFA – Grupo Executivo dos Créditos de Carbono do Proinfa". It creates Coordination Departments for the management, development and commercialization of carbon credits under CDM of PROINFA projects. |
| 30/10/2008 | Eletrobrás provision of CDM costs (personnel training, validation, registration fee, verification and advisory company contracting) to be included in the 2009 Annual PROINFA Plan ("PAP" from the Portuguese Plano Anual do Proinfa). |
| 25/03/2009 | Technical note DE/UEP # 108/2009 issued by PROINFA Management Unit (from the Portuguese Unidade Gestora do PROINFA) request to include in the provision of expenses related to the CDM development for PROINFA projects in the PROINFA Annual Plan ("PAP" from the Portuguese Plano Anual do Proinfa)[17]. |
| 01/02-18/02/2010 | Eletrobrás internal discussions regarding the possibility of signature of a cooperation agreement with Rio de Janeiro University (COPPE/UFRJ) and fulfillment of legal/normative requirements associated. |
| 26/05/2010 | Report prepared for presentation to the Eletrobrás Executive Board regarding the signature of a Cooperation Agreement between Eletrobrás and Rio de Janeiro University (UFRJ), scope, modules and provision of costs. |
| 31/08/2010 | Draft of Cooperation Agreement between Eletrobrás and Rio de Janeiro |

[17] This information is public available in 2010 PROINFA Annual Plan ("PAP"). The preparation of PAP was established by Decree # 5,025/2004.

| | |
|---|---|
| | University (COPPE/UFRJ) for technical training of Eletrobrás and COPPE/UFRJ teams regarding CDM methodologies and procedures to be used in PROINFA projects. |
| 07-11/2011 | Publication of PDDs in Portuguese for public consultation. |
| 05/10/2012 | CDM validation starting with the PDD publication for Global Stakeholder Consultation at the UNFCCC's website. |

As presented in the timeline above, continuing efforts were taken in order to secure the CDM status of the proposed project activity. The delay in start the CDM validation process for the proposed project activity is due to governmental process required while dealing with several entities (private and public), prolonged governmental process – especially when approval is required –, and barriers faced for the implementation of renewable projects at that time.

The signed PPAs estimated the electricity supply in December 2006. However, due to barriers faced by project developers for projects implementation, the date of the operation start-up was delayed several times through PPAs addendum. In fact, the small hydropower plants included in the proposed project activity started operation in 2008-2009.

**Table 9 – Operation start-up of power plants included in the proposed project activity**

| SHP | Date of operation startup[18] | ANEEL approval |
|---|---|---|
| São Pedro | 16/06/2009 | 2,195 dated 15/06/2009 |
| Carangola | 25/06/2008 | 2,342 dated 24/06/2008 |
| Calheiros | 12/09/2008-25/09/2008 | 2,431 dated 11/092008 and 3,534 dated 24/09/2008 |
| São Simão | 17/02/2009 | 631 dated 16/02/2009 |
| Funil | 05/03/2008-06/03/2008 | 840 dated 04/03/2008 and 864 dated 05/03/2008 |
| São Joaquim | 17/04/2008-01/05/2008 | 1,564 dated 16/04/2008 and 1,741 dated 30/04/2008 |
| Fumaça IV | 30/12/2008 | 4,828 dated 30/12/2008 |
| Jataí | 30/07/2008-05/08/2008-21/08/2008 | 2,798 dated 29/07/2008, 2,884 dated 04/08/2008 and 3,086 dated 20/08/2008 |
| Irara | 06/09/2008-11/09/2008 | 3308/08 dated 05/09/2008 and 3,356 dated 10/09/2008 |
| Bonfante | 02/08/2009 | 2,865 dated 01/08/2008 |
| Monte Serrat | 16/06/2009 | 2,195 dated 15/06/2009 |
| Santa Fé | 09/05/2008 | 1,806 dated 08/05/2008 |

The additionality of the proposed project activity is demonstrated following the steps presented in the "Tool for the demonstration and assessment of additionality" as follows:

**Step 0 – Demonstration whether the proposed project activity is the first-of-its-kind**

Not applicable since the proposed project activity is not a first-of-its-kind project.

**SATISFIED/PASS – Proceed to Step 1**

**Step 1: Identification of alternatives to the project activity consistent with current laws and regulations**

**Sub-step 1a. Define alternatives to the project activity**

Scenario 1: The alternative to the project activity is the continuation of the current (previous) situation of electricity supplied by the existing power plants from the interconnected system;

Scenario 2: The proposed project activity undertaken without being registered as a CDM project activity.

[18] Dates of operation startup are based on the dates of operation authorization issued by ANEEL for each generating unit. For this reason, there is more than one date of operation startup for the power plants.

**Sub-step 1b. Consistency with mandatory laws and regulations**

Both alternatives, the project activity and the alternative scenario, are in compliance with all regulations according the following entities:

- The National Electric System Operator ("ONS" from the Portuguese Operador Nacional do Sistema Elétrico);
- The Electricity Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica);
- The Mines and Energy Ministry ("MME" from the Portuguese Ministério de Minas e Energia);
- The Chamber of Electrical Energy Commercialization ("CCEE" from the Portuguese Câmara de Comercialização de Energia Elétrica);
- The Brazilian Institute of Environment and Renewable Natural Sources ("IBAMA" form the Portuguese Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis);
- The environmental agency of Rio de Janeiro state ("INEA" from the Portuguese Instituto Estadual do Ambiente);
- The environmental agency of Goiás state ("SEMARH" from the Portuguese Secretaria de Meio Ambiente e dos Recursos Hídricos de Goiás);
- The environmental agency of Espírito Santo state ("IEMA" from the Portuguese Instituto Estadual de Meio Ambiente e Recursos Hídricos do Espírito Santo);
- The environmental agency of Minas Gerais state ("SEMAD" from the Portuguese Secretaria de Estado de Meio Ambiente e Desenvolvimento Sustentável de Minas Gerais);
- The CDM Executive Board.

**SATISFIED/PASS – Proceed to Step 2**

**Step 2. Investment analysis**

**Sub-step 2a. Determine appropriate analysis method**

The additionality of the proposed project activity is demonstrated through an investment benchmark analysis (option III). Options I and II are not applicable since:

Option I – Both the project activity and the alternatives identified in Step 1 generate financial and economic benefits other than CDM related income;

Option II – Financial information regarding other project types of electricity generation was not available.

**Sub-step 2b. Option III – Apply benchmark analysis**

The financial indicator identified for each small hydropower plant included in the proposed project activity is the Net Present Value (NPV). The NPV of the projects was calculated considering the benchmark of the electric sector: the Weighted Average Cost of Capital (WACC).

*Benchmark – Weighted Average Cost of Capital (WACC)*

The weighted-average cost of capital (WACC) is a rate used to discount business cash flows and takes into consideration the cost of debt and the cost of equity of a typical investor in the sector of the project activity. The benchmark can be applied to the cash flow of the project as a discount rate when calculating the net present value (NPV) of the same, or simply by comparing its value to the internal rate of return (IRR) of the project. The WACC considers that shareholders expect compensation towards the projected risk of investing resources in a specific sector or industry in a particular country.

The WACC calculation is based on parameters that are standard in the market, considers the specific characteristics of the project type, and is not linked to the subjective profitability expectation or risk profile of this particular project developer. The WACC presented here was valid and applicable at the time of the investment decision (June 2004) calculated through the formula below:

$$\mathbf{WACC = Wd \times Kd + We \times Ke}$$

**We** and **Wd** are, respectively, the weights of equity and debt typically observed in the sector. The weights were derived from the "Guidelines on the assessment of investment analysis"[19] , which considers a default value for CDM projects: 50% debt (**Wd**) and 50% (**We**) equity are assumed as a default value. **Kd** and **Ke** are, respectively, the cost of debt and cost of equity.

→ Cost of Debt (**Kd**)

**Kd** is the cost of debt, which is observed in the market related to the project activity, and which already accounts for the tax benefits of contracting debts. **Kd** also derives from long term loans applied to the sector in Brazil, and therefore is based on three variables, including the BNDES financing endeavour credit line's interest rates. **Kd** is calculated considering the sum of:

- Financial cost (a);
- BNDES remuneration (b);
- Credit risk rate (c).

The financial cost (a) is represented by the Long Term Interest Rate ("TJLP" from the Portuguese Taxa de Juros a Longo Prazo). TJLP is a variable market figure which assesses the rate of debt to be applied to the average party borrowing from BNDES. This figure is the underlying majority found in the debt portion of borrowers from the BNDES. The TJLP is based on factors pertaining to market rates and spread of corporate rates over government risk.

BNDES remuneration (b) and the credit risk rate (c) are two other factors that constitute the rate of debt companies in Brazil encounter via BNDES. The BNDES remuneration is the fee attached by BNDES for its administrative and operational costs, and for its remuneration. This rate varies according to BNDES policies and is non-negotiable and the least arguable rate in the equation. Regarding the credit risk rate, each year BNDES provides the lower and upper limits of the variation margin of that rate. It respects its perception of risks, and the banking policies. For the purposes of our calculation and due to the fact that the industry as a whole is being considered, we estimate that rate by averaging the upper limit of the margin with the rate established for loans to direct public administration of States and Cities, which is the lowest rate that could be provided to a private investor.

Two other components for the **Kd** calculation are the marginal tax rate (**t**) and inflation forecast (**π**). In the **Kd** calculation, the marginal tax rate (**t**) is multiplied by the Cost of debt and then by the debt to total cost of capital ratio to ascertain the debt portion of the WACC formula. In the case of Brazil, and specifically to energy projects, this tax factor could either be 34% or 0%. In the case of the small hydropower plants included in this project activity, the tax regime used is the Presumed Profit, and therefore, **t** = 0%.

The nominal rate achieved for debt is used to calculate nominal WACC, which is used to discount nominal cash flow projections. In order to achieve the real cash flow rate, the inflation targeting figure (**π**) for Brazil is reduced from the nominal figure achieved. The **π** is obtained from the Brazilian Central Bank (www.bcb.gov.br) and has experienced very little variance in the past 5 years.

Considering explanations above, **Kd** is calculated through the following equation:

$$Kd = [1 + (a + b + c) \times (1 - t)] / [(1 + \pi) - 1]$$

**Table 10 - – Cost of Debt (Kd) calculation**

| *Cost of Debt (Kd)* | |
|---|---|
| *(a) Financial cost*[20] | *10.97%* |
| *(b) BNDES spread*[21] | *2.50%* |

[19] Paragraph 18, EB 62, Annex 5. Available at: <http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf>.

[20] 5-year average of the Long term Interest Rate (from the Portuguese *Taxa de Juros de Longo Prazo – TJLP*). Available at [source].

[21] BNDES' remuneration. Information available at: http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/Set2901.pdf>.

| | |
|---|---|
| *(c) Credit risk rate*[22] | *1.50%* |
| *(a+b+c) Pre-Cost of Debt* | *14.97%* |
| *(t) Marginal tax rate*[23] | *0.00* |
| *(π) Inflation forecast*[24] | *5.50%* |
| ***After tax Cost of Debt*** | *8.97% p.y.* |

→ Cost of Equity (**Ke**)

**Ke** represents the rate of return for equity investments, and is a summation of the following parameters:

- Risk-free rate (Rf);
- Equity risk premium (Rm);
- Estimated country risk premium (Rc);
- Sectorial risk (β).

**Rf** stands for the risk free rate. **Rf** is the risk-free default rate available in the market which represents the standard investment rate available to all investors. This risk-free rate acts as an opportunity cost figure, allowing investors to compare and gauge the value to them from pursuing alternative risk and reward opportunities versus simply purchasing and holding the risk-free instrument freely available for purchase in the market. The internationally accepted standard for the risk-free rate is the United States Treasury bond and, therefore, this figure was considered for the **Ke** calculation.

Sectorial risk stands for the average sensitivity of comparable companies in that industry to movements in the underlying market. The parameter considered for Sectorial Risk is the beta "**β**" derived from the correlation between returns of US companies from the sector and the performance of the returns of the US market. **β** has been adjusted to the leverage of Brazilian companies in the sector, reflecting both structural and financial risks. **β** adjusts the market premium to the sector.

**Rm** represents the market premium, or higher return, expected by market participants in light of historical spreads attained from investing in equities versus risk free assets such as government bond rates, investors require a higher return when investing in private companies. The market premium is estimated based on the historical difference between the S&P 500 returns and the long term US bonds returns. The spread over the risk-free rate is the average of the difference between those returns.

Note that in the formula above the factor EMBI+ (Emerging Markets Bond Index Plus), considers as the country risk premium, **Rc**. This factor accounts for the country or sovereign risk embedded in the debt of a country. Assuming that relative to the US risk-free debt market EMBI+ is 0, then Brazil's EMBI+ would calculate for the added or reduced risk relative of Brazils debt markets to the US.

Justification for the EMBI+ addition to the risk-free rate lies in the vast differences between the United States in such factors as credit risk, inflation history, politics, debt markets, and more. Ignoring these differences would result in the incorrect application of relevant environmental factors in the decision-making process of an investor in Brazil.

In order to adjust the **Ke** calculation, the expected inflation rate (for the United States) (**π'**) is reduced. For its calculation is considered the 10 Year Treasury Note (^TNX), and the TIPS (Treasury Inflation Protected Securities) are considered for its calculation, which are readily quoted in the US market. The ^TNX index carries inflation on their value while the TIPS is an index without inflation. Subtraction from the chosen period average values from the ^TNX and the TIPS results in the estimated inflation. There is no need to adjust for Brazil's expected inflation when dealing with a hurdle rate in real terms.

Considering explanation above, **Ke** is calculated through the following equation:

$$Ke = \{1 + [Rf + (\beta \times Rm) + Rc]\} \times (1+ \pi) / (1+ \pi') - 1$$

[22] Credit risk rate. Information available at: <http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/Set2901.pdf>.

[23] Federal Service Revenue. Available at: <http://www.receita.fazenda.gov.br/Aliquotas/ContribCsll/Aliquotas.htm> and <http://www.receita.fazenda.gov.br/Aliquotas/ContribPj.htm>.

[24] The Central Bank of Brazil. Brazilian inflation targeting. Available at: < <http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf>.

**Table 11 - Cost of Equity (Ke) calculation**

| ***Cost of Equity*** | |
|---|---|
| *(Rf) Risk-free rate*[25] | *5.42%* |
| *(π') US expected inflation*[26] | *2.02%* |
| *(π) Inflation forecast*[27] | *5.50%* |
| *(Rm) Equity Risk Premium*[28] | *6.54%* |
| *(β) Sectorial risk*[29] | *0.89* |
| *(Rc) Estimated Country Risk Premium*[30] | *9.71%* |
| ***Cost of Equity with Brazilian Country Risk*** | *18.84% p.y.* |

Each data used to calculate the benchmark was presented to the DOE during validation. The spreadsheet used for WACC calculation is available with the Project Participants and is available under request.

Considering the values presented above, we have the following:

WACC = 50% x 8.97% + 50% x 18.84%
WACC = 13.91%

Another benchmark that can be used as reference in order to analyze the attractiveness of the project activity is the one considered by the Brazilian government at the time of PROINFA release. In order to determine the subsidized energy price for the different types of renewable projects, the Mines and Energy Ministry established 14.89% per year as the minimum economic return required for power projects. This value was made publicly available for public call and, after the public call, the final result was 13.91% per year. Although there is no information available regarding parameters considered and its calculation, this value is the same as the benchmark of the electric sector calculated above. This result confirms the applicability of the value of the benchmark at the time of the investment decision of the proposed project activity.

*Financial Indicator – Net Present Value (NPV)*

The investment decision and starting date of the project activity is considered as the date in which Power Purchase Agreements were signed with ELETROBRÁS under PROINFA, *i.e.* 30/06/2004. Detailed description of the project starting date is presented in section C.1.1 of this PDD.

According to the "PROINFA Claiming Guide" ("Guia de Habilitação"), project developers should present to ELETROBRÁS, among other documents, the budget for the project implementation in order to claim under PROINFA. Therefore, the financial indicator identified for the proposed project activity is the Net Present Value (NPV) available and applicable at the time of the investment decision. Source of information considered for the NPV calculation is presented in the table below and detailed for each project in the IRR spreadsheet.

[25] 20-year US Treasury Yield. Available at: <http://www.federalreserve.gov/>.

[26] 20-year T.Notes minus 20-year TIPS. Available at: <http://www.federalreserve.gov/>.

[27] The Central Bank of Brazil. Brazilian inflation targeting. Available at: < <http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf>.

[28] Historical S&P500 premium over 10-year US-Treasury Bond. Available at: <http://pages.stern.nyu.edu/~adamodar/>.

[29] Average Beta US Power Companies re-levered to Brazilian leverage. Available at: <http://pages.stern.nyu.edu/~adamodar/>.

[30] Emerging Markets Bond Index Plus Brazil. Index calculated by JPMorgan. Available at: <www.ipeadata.gov.br>.

**Table 12 – Source of information for the NPV calculation**

| Parameter | Value | Reference / Source of Information |
|---|---|---|
| Installed Capacity | Variable for each project | Eletrobras Default Budget ("OPE" from the Portuguese Orçamento Padrão Eletrobrás) submitted by the project developers in order to participate in PROINFA program and sign PPAs.<br>Thus, PLF determination applies option (a) of the "Guidelines for the reporting and validation of plant load factors", *i.e.* the plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval. |
| Plant Load Factor (PLF) | Variable for each project | |
| Power Output | Variable for each project | Calculated based on 8,760 hours per year. |
| Energy Price | BRL 76.92/MWh | Average of the results of the 1st Energy Auction conducted by the Brazilian government in 2003 adjusted to the Brazilian inflation targeting up to the expected operation startup of the projects. |
| Plant Investment | Variable for each project | Eletrobras Default Budget ("OPE" from the Portuguese Orçamento Padrão Eletrobrás) submitted by the project developers in order to participate in PROINFA program and sign PPAs. |
| Operational Cost | 5% of total investment | Eletrobras/Mines and Energy Ministry: "Guidelines for studies and projects for small hydropower plants". |
| Connection System Cost | Variable for each project | The Tariff for the Use of the Transmission System ("TUST" from the Portuguese Tarifa de Uso do Sistema de Transmissão) / Tariff for the Use of the Distribution System ("TUSD" from the Portuguese Tarifa de Uso do Sistema de Distribuição) varies for each project depending on the local power utility. The connection fee is established by the Brazilian Power Regulatory Agency (ANEEL) through its Resolutions. |
| Inspection Fee | BRL 284.81 per kW / month | Inspection Fee for Electric Energy Services ("TFSEE" from the Portuguese Taxa de Fiscalização de Serviços de Energia Elétrica) varies for each calendar year. The inspection fee is established by ANEEL through its Ordinances. |
| Energy Sales Tax | PIS = 0.65%<br>Social Integration Program Tax (Programa de Integração Social) | Established by Law # 10,637 dated 30/12/2002: <http://www.receita.fazenda.gov.br/Legislacao/leis/2002/lei10637.htm>. |
| | 3.00%<br>Financing Contribution for Social Security (Contribuição para o Financiamento da | Established by the Law # 10,833 dated 29/12/2003: <http://www.receita.fazenda.gov.br/Legislacao/leis/2003/lei10833.htm>. |

| | | |
|---|---|---|
| | Seguridade Social) | |
| Income taxes | 9%<br>Social Tax (CSLL) (% of the gross revenue) | Law nr. 105 dated 10/01/2001: <http://www.receita.fazenda.gov.br/aliquotas/ContribCsll/Aliquotas.htm>. |
| | 12% Assumed Income for Social Tax | Law nr. 8,981 dated 20/01/1995: <http://www.receita.fazenda.gov.br/aliquotas/ContribCsll/ApuracaAnualRecMensBascalcEst.htm>. |
| | 25% Income Tax (IR) (% of the gross revenue) | Law nr. 8,541 dated 23/12/1992: <http://www.planalto.gov.br/ccivil_03/LEIS/L8541.htm#art20> |
| | 8% Assumed Income for Income Tax | Decree nr. 3,000 dated 26/03/1999: <http://www.receita.fazenda.gov.br/PessoaJuridica/DIPJ/2005/PergResp2005/pr517a555.htm>. |

Detailed description of the IRR calculation is presented in the cash flow spreadsheet attached to this response.

The NPV of small hydropower plants are presented in the table below.

**Table 13 – NPV of small hydropower plants**

| Project | NPV |
|---|---|
| São Pedro | -77,248,723 |
| Carangola | -40,393,244 |
| Calheiros | -48,668,477 |
| São Simão | -70,870,553 |
| Funil | -60,369,666 |
| São Joaquim | -54,100,479 |
| Fumaça IV | -11,324,496 |
| Jataí | -22,273,500 |
| Irara | -68,589,649 |
| Bonfante | -94,493,936 |
| Monte Serrat | -60,650,266 |
| Santa Fé | -29,712,262 |

Detailed calculation of the NPV is presented in the spreadsheet attached to this response. All documented reference regarding the parameters considered in the NPV calculation was presented to DOE during validation.

**Sub-step 2c. Calculation and comparison of financial indicators**

As can be seen, the NPV of the projects are negative at the time of the investment decision, which demonstrates that the project activity is not financially attractive to investor.

**Sub-step 2d. Sensitivity analysis**

As required by the Additionality Tool, a sensitivity analysis was conducted to demonstrate whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions. In addition, it states that “variations in the sensitivity analysis should at least cover a range of +10% and -10%”.

Therefore, financial analysis was performed by altering the following parameters:

- Increase in project revenue (energy price and plant load factor/energy assured);

- Reduction in running costs (operational costs and investments).

Results of the sensitivity analysis are presented below:

**Table 14 - Sensitivity analysis of São Pedro, Carangola, Calheiros, São Simão, Funil and São Joaquim projects**

| Scenario | São Pedro | Carangola | Calheiros | São Simão | Funil | São Joaquim |
|---|---|---|---|---|---|---|
| Original | -77,248,723 | -40,393,244 | -48,668,477 | -70,870,553 | -60,369,666 | -54,100,479 |
| Increase in the energy price | -71,312,063 | -37,287,864 | -45,147,111 | -65,969,019 | -55,680,962 | -49,818,086 |
| Increase in the project plant load factor (PLF)/energy assured | -71,312,063 | -37,287,864 | -45,147,111 | -65,969,019 | -55,680,962 | -49,818,086 |
| Reduction in operational costs | -75,042,756 | -39,238,966 | -47,358,502 | -68,960,079 | -58,637,648 | -52,523,687 |
| Reduction in project investment | -68,248,913 | -35,684,072 | -43,324,101 | -63,076,283 | -53,303,452 | -47,667,550 |

**Table 15 - Sensitivity analysis of Fumaça IV, Jataí, Irara, Bonfante, Monte Serrat and Santa Fé projects**

| Scenario | Fumaça IV | Jataí | Irara | Bonfante | Monte Serrat | Santa Fé |
|---|---|---|---|---|---|---|
| Original | -11,324,496 | -22,273,500 | -68,589,649 | -94,493,936 | -60,650,266 | -29,712,262 |
| Increase in the energy price | -10,457,054 | -16,065,965 | -62,717,483 | -90,147,049 | -54,765,201 | -21,295,812 |
| Increase in the project plant load factor (PLF)/energy assured | -10,457,054 | -16,065,965 | -62,717,483 | -90,147,049 | -54,765,201 | -21,295,812 |
| Reduction in operational costs | -11,003,129 | -20,279,440 | -66,611,282 | -91,869,272 | -58,703,789 | -28,100,771 |
| Reduction in project investment | -10,013,396 | -14,138,222 | -60,518,393 | -83,785,948 | -52,709,112 | -23,137,774 |

Considering the results of investment analysis, the NPV of the small hydropower plants of the proposed project activity without being registered under CDM is negative, evidencing that project activity is not financially attractive for the investor even when parameters change in favour of the project. Therefore, undoubtedly these small hydropower plants would not be implemented without specific support from PROINFA motivated by the CDM revenues.

**SATISFIED/PASS – Proceed to Step 3**

**Step 3. Barrier analysis**

Not applicable. Additionality was demonstrated by Step 2 – Investment Analysis.

**Step 4. Common practice analysis**

According to the "Tool for the demonstration and assessment of additionality", the "Guidelines on common practice" shall be applied while conducting the common practice analysis.

For the purpose of common practice analysis, the PP applied the definitions presented in the "Guidelines on common practice" in the context of the proposed project activity as follows.

Applicable geographical area

> *"The applicable geographical area should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification on the essential distinction between the identified specific geographical area and rest of the host country".*

Brazil has an extension of 8,514,876.599 square kilometers[31] (with over 4,000 km distance in the North-South as well as in the East-West axis) and 6 distinct climate regions: sub-tropical, semi-arid, equatorial, tropical, highland-tropical and Atlantic-tropical (humid tropical). Considering the distinct climate conditions, precipitation varies from 500 to more than 3,000 mm/year[32]. These varieties of climate obviously have strong influence in the technical aspects related to hydropower plant implementation since meteorological events have strong influence in hydrologic process[33] . As cited by VESELKA (2008), "climate affects all major aspects of the electric power sector from electricity generation, transmission and distribution system to consume demand for power"[34] .

An evidence of the climate regional distinctiveness can be noted by the spot price value division into sub-markets (South, Southeast/Midwest, Northeast, and North), known as Settlement Price for the Differences ("PLD" from the Portuguese Preço de Liquidação das Diferenças). PLD is used to price the purchase and the sale of electricity in the short term market.

Nevertheless, the climate conditions are not the only distinguishing feature among the several Brazilian regions. For the use of the transmission system, the Tariff for the Use of the Distribution System ("TUSD" from the Portuguese Tarifa de Uso do Sistema de Distribuição) or Tariff for the Use of the Transmission System ("TUST" from the Portuguese the Tarifa de Uso do Sistema de Transmissão) has to be applied. The TUSD/TUST tariff varies depending on the state where the power plant is connected to. TUSD/TUST is established under ANEEL regulation and has strong impact in the financial analysis of a project. Just for reference, from the first semester of 2010, TUSD in São Paulo state (located in the same region of Minas Gerais) was BRL 1.82/kW[35] and BRL 4.64/kW[36] in Minas Gerais state (more than two times higher than São Paulo).

Furthermore, each state has a specific environmental agency responsible for determining the technical standards required to obtain all environmental licenses, with regional regulations and distinct administrative process established by each state region.

Therefore, when evaluating the different climate conditions of each region, the specific environmental regulatory framework of each state, the energy price subdivision per markets and different values of TUSD/TUST applied at each Brazilian state, it's clear that the national territory does not consist of the same "comparable environments" as required by the methodological tool "Tool for the demonstration and assessment of additionality". Undoubtedly, these differences among the Brazilian states (climate, energy price, transmission/distribution costs and environmental legislation) have technical, financial and regulatory impacts for the implementation of hydropower plants. Therefore, it is reasonable to consider only projects located in same state of the proposed project activity, *i.e.* **Espírito Santo, Minas Gerais, Rio de Janeiro and Goiás**.

Measure

*"Measure" (for emission reduction activities) is a broad class of greenhouse gas emission reduction activities possessing common features". Four types of measures are currently covered in the framework:*

*(a) Fuel and feedstock switch;*

*(b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies;*

[31] Available at: http://www.ibge.gov.br/english/geociencias/cartografia/default_territ_area.shtm.

[32] Public information available at *Instituto Nacional de Metereologia – INMET*'s website. Gráfico de normais climatológicas (1961-1990): <http://www.inmet.gov.br/>.

[33] PINTO, J. A. Climatic indicators study for long term prediction in the river flow of Alto São Francisco basin (in a free translation from the Portuguese Estudo de indicadores climáticos para a previsão de longo termo de vazões na bacia do Alto São Francisco). Universidade Federal de Minas Ferais: Belo Horizonte, 2005. Available at: <http://www.smarh.eng.ufmg.br/defesas/20D.PDF>.

[34] VESELKA, T. D. Balance power: A warming climate could affect electricity. Geotimes. Earth, energy and environment news. American Geological Institute: August, 2008. Available at: < http://www.agiweb.org/geotimes/aug08/article.html?id=feature_electricity.html>.

[35] ANEEL Resolution # 961 issued on April 6th, 2010. Available at: < http://www.aneel.gov.br/cedoc/atreh2010961.pdf >.

[36] ANEEL Resolution # 960 issued on April 6th, 2010. Available at: < http://www.aneel.gov.br/cedoc/atreh2010960.pdf >.

(c) *Methane destruction;*
(d) *Methane formation avoidance.*

Considering options presented above, the proposed project activity applies **option (b)** since power generation is based on renewable energy.

Output

*"Output is goods/services produced by the project activity including, among other things, heat, steam, electricity, methane, and biogas unless otherwise specified in the applied methodology".*

The output produced by the proposed project activity is the **renewable electricity generated by grid-connected hydropower power plants**.

Different technologies

According to the "Guidelines on common practice", different technologies are technologies that deliver the same output and differ by at least one of the following:

*(a) Energy source/fuel*

Only electricity generation from water source (hydropower plants) has to be considered in this analysis.

*(b) Feed stock*

Not applicable.

*(c) Size of installation (power capacity):*
*(i) Micro (as defined in paragraph 24 of Decision 2/CMP.5 and paragraph 39 of Decision 3/CMP.6);*
*(ii) Small (as defined in paragraph 28 of Decision 1/CMP.2);*
*(iii) Large.*

According to the Brazilian regulation, small scale hydropower plants are defined as plants with installed capacities between 1MW and 30MW and reservoir areas no greater than 3km$^2$ (ANEEL Resolution # 652/2003). Small hydropower plants have specific regulations regarding environment and electricity legislation/regulation, including taxes. Since the project activity is inserted in the context of the Brazilian legislation, it is reasonable to compare the proposed project activity with other small hydropower plants according to the Host Country definition of small scale power plants (and not to the CDM-EB definition of small scale).

Considering explanations above, no large scale hydropower plants as defined by ANEEL was considered in this common practice analysis. Therefore, the technology that delivers the same output of the proposed project activity in the context of the measure and applicable geographical area is the **electricity generation by grid-connected small hydropower plants**. Large scale hydropower plants have to be considered as having different technology to the proposed project activity.

*(d) Investment climate in the date of the investment decision, inter alia:*
*(i) Access to technology*

Small hydropower plants can differ significantly from each other considering the region to be implemented, climate, topography, availability of transmissions lines, river flow regularity, etc. For those reasons alone it is extremely difficult and not reasonable to compare different hydropower potential and plants. Moreover, hydropower plants cannot be optimally placed (close to load centers and transmission lines) and easily transferred (moved to a new region where a better tariff is offered) as, for example, modular fossil-fuel-fired (diesel, natural gas) power plants. Differences may be even larger if no big water storage is possible, as in the case of small hydropower plants.

Therefore, depending on the project location, differences related to the technical aspects of small hydropower plant projects have influence in their implementation, even if small hydropower projects are located in the same region. Considering that these technical differences obviously have influence in the investment/financing of a project and project sponsors have different investment capacity, financial information has to be considered when small hydropower projects are analyzed. However, no financial information or incentives of similar projects is accessible or publicly available, and, therefore, it could not be included in this analysis.

*(ii) Subsidies or other financial flows*

Not applicable since this information is not publicly available.

*(iii) Promotional policies*

Not applicable.

*(iv) Legal regulations*

Electricity sector framework: Until the beginning of the 1990's, the energy sector was composed almost exclusively of state-owned companies. From 1995 onwards, due to the increase in international interest rates and the lack of state investment capacity, the government initiated the privatization process. However, by the end of 2000 results were still modest. Although further initiatives, aiming to improve electric generation in the country, were taken between the 1990's and 2003, they did not attract new investment to the sector.

In 2003, the recently elected government decided to fully review the electricity market institutional framework in order to boost investments in the electric energy sector. Market rules were changed and new institutions were created such as Energetic Research Company ("EPE" from the Portuguese Empresa de Pesquisa Energética) – an institution responsible for the long term planning of the electricity sector with the role of evaluating, on a perennial basis, the safety of the supply of electric power – and Chamber for the Commercialization of Electric Power ("CCEE" from the Portuguese Câmara de Comercialização de Energia Elétrica) – an institution responsible for the management of electric power commercialization within the interconnected system. This new structure was approved by the House of Representatives and published in March of 2004.

Since the investment decision of the proposed project activity occurred in the context new regulatory framework, the PP considered only projects with **operation start-up March 2004 onwards**. Projects that started operations before the new electricity framework have to be considered as having different technology to the proposed project activity.

*(e) Other features, inter alia:*

*(i) Nature of investment (example: unit cost of capacity or output is considered different if the costs differ by at least 20%)*

Not applicable since this information is not publicly available.

Based on the definitions presented above, the following stepwise approach was conducted for common practice purposes as follows.

**Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity**

The proposed project activity encompasses 12 (twelve) small hydropower plants resulting in 275.6 MW installed capacity. This results in a range of 137.8 MW and 413.4 MW.

In spite of the "Guidelines on common practice" clearly states that step 1 shall be applied for the "project activity", the PP analyzed the installed capacity of each plant included in the proposed project activity for a conservative approach. Results are presented in the table below.

**Table 16 – Output range of -/+50% of the installed capacity of the small hydropower plants included in the proposed project activity**

| Projects | Installed Capacity (MW) | -50% inst. capacity (MW) | +50% inst. capacity (MW) |
|---|---|---|---|
| São Pedro | 30.06 | 15.03 | 45.09 |
| Carangola | 15.30 | 7.65 | 22.95 |
| Calheiros | 19.26 | 9.63 | 28.89 |
| São Simão | 27.00 | 13.50 | 40.50 |
| Funil | 22.68 | 11.34 | 34.02 |
| São Joaquim | 21.60 | 10.08 | 32.40 |
| Fumaça IV | 4.50 | 2.25 | 6.75 |
| Jataí | 30.00 | 15.00 | 45.00 |
| Irara | 30.00 | 15.00 | 45.00 |
| Bonfante | 18.24 | 9.12 | 27.36 |
| Monte Serrat | 26.89 | 13.44 | 40.33 |

| | | | |
|---|---|---|---|
| Santa Fé | 30.06 | 15.03 | 45.09 |

For conservativeness reasons, the lowest and the highest ranges were considered for the purpose of common practice analysis. Therefore, a **range of 2.25 MW and 45.09 MW** was considered.

**Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:**

*(a) The projects are located in the applicable geographical area*

Projects located in the states of Espírito Santo, Minas Gerais, Rio de Janeiro and Goiás were analyzed.

*(b) The projects apply the same measure as the proposed project activity*

Renewable energy projects were analyzed.

*(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity*

Water source projects were analyzed.

*(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant*

Grid-connected renewable energy projects were analyzed.

*(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1*

As discussed in Step 1, only renewable electricity generated by grid-connected hydropower power plants with a range of 2.25 MW and 45.09 MW were considered in this analysis.

(f) *The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity*

As presented in the PDD, the project "start date" is the date when PROINFA PPAs were signed, *i.e* 30/06/2004. On the other hand, the GSP occurred on 05/10/2012. Therefore, only projects with commercial operation start-up before 30/06/2004 (the earliest date) are considered for the purpose of common practice analysis.

Considering the criteria presented above, the following projects were identified:

**Table 17 – Operational projects in Brazil that satisfies items (a), (b), (c), (d), (e) and (f) presented above**

| Nr. | Project | Installed Capacity (MW) | Type | River | Municipality | State | Operation Startup |
|---|---|---|---|---|---|---|---|
| 1 | Rio de Pedras | 9.3 | small | Pedras | Itabirito | MG | 1907 |
| 2 | Piabanha | 9.0 | small | Piabanha | Areal | RJ | 1908 |
| 3 | Jucu | 4.8 | small | Jucu | Domingos Martins | ES | 1909 |
| 4 | Fruteiras | 8.7 | small | Fruteiras | Cachoeiro de Itapemirim | ES | 1912 |
| 5 | Tombos | 2.9 | small | Carangola | Tombos | MG | 1912 |
| 6 | Marmelos | 4.0 | small | Paraibuna | Juiz de Fora | MG | 1915 |
| 7 | Martins | 7.7 | small | Uberabinha | Uberlândia | MG | 1915 |
| 8 | Salto Morais | 2.4 | small | Tijuco | Ituiutaba | MG | 1922 |
| 9 | Fagundes | 4.8 | small | Fagundes | Areal | RJ | 1923 |
| 10 | Paraúna | 4.3 | small | Paraúna | Gouveia | MG | 1927 |
| 11 | Ituerê | 4.0 | large | Pomba | Rio Pomba | MG | 1928 |
| 12 | Paciência | 4.1 | small | Paraibuna | Matias Barbosa | MG | 1930 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | Rede Elétrica Piquete - Itajubá - REPI | 3.3 | small | Bicas | Wenceslau Braz | MG | 1932 |
| 14 | Coronel Domiciano | 5.0 | small | Fumaça | Muriaé | MG | 1935 |
| 15 | Xavier | 6.0 | small | Grande | Nova Friburgo | RJ | 1936 |
| 16 | Gafanhoto | 14.0 | small | Pará | Divinópolis | MG | 1946 |
| 17 | Peti | 9.4 | large | Santa Bárbara | São Gonçalo do Rio Abaixo | MG | 1946 |
| 18 | São Bernardo | 6.8 | small | São Bernardo | Piranguçu | MG | 1948 |
| 19 | Brecha | 12.4 | large | Piranga | Guaraciaba | MG | 1948 |
| 20 | Poço Fundo | 9.2 | small | Machado | Poço Fundo | MG | 1949 |
| 21 | Macabu | 21.0 | small | Macabu | Trajano de Morais | RJ | 1950 |
| 22 | Joasal | 8.4 | small | Paraibuna | Juiz de Fora | MG | 1950 |
| 23 | Cachoeira dos Prazeres | 3.8 | small | Maynard | Ouro Preto | MG | 1951 |
| 24 | Brito | 2.9 | large | Piranga | Ponte Nova | MG | 1952 |
| 25 | Cachoeira dos Macacos | 3.4 | small | Araguari | Perdizes and Sacramento | MG | 1952 |
| 26 | Areal | 18.0 | small | Preto | Areal | RJ | 1953 |
| 27 | Piau | 18.0 | small | Piau | Piau | MG | 1955 |
| 28 | Tronqueiras | 8.5 | small | Tronqueiras | Coroaci | MG | 1955 |
| 29 | Rochedo | 4.0 | small | Meia Ponte | Piracanjuba | GO | 1955 |
| 30 | Salto do Paraopeba | 2.5 | small | Paraopeba | Jeceaba | MG | 1956 |
| 31 | Pandeiros | 4.2 | small | Pandeiros | Januária | MG | 1958 |
| 32 | Rio Bonito | 22.5 | large | Santa Maria | Santa Maria de Jetibá | ES | 1959 |
| 33 | Dona Rita | 2.4 | small | Tanque | Santa Maria de Itabira | MG | 1959 |
| 34 | Cajuru | 7.2 | large | Pará | Carmo do Cajuru and Divinópolis | MG | 1959 |
| 35 | Franca Amaral | 4.5 | small | Itabapoana | Bom Jesus do Itabapoana and São José do Calçado | RJ | 1961 |
| 36 | Glória | 11.4 | large | Glória | Muriaé | MG | 1983 |
| 37 | Areal | 4.4 | small | Bananal | Santa Rita de Jacutinga | MG | 1988 |
| 38 | Mello | 9.5 | small | Santana | Rio Preto | MG | 1995 |
| 39 | Muniz Freire | 25.0 | large | Pardo | Muniz Freire | ES | 1997 |
| 40 | Walter Rossi (former known a Antas II) | 15.8 | large | Antas | Poços de Caldas | MG | 1998 |
| 41 | João Camilo Penna (former known a Cachoeira do Emboque) | 22.0 | large | Matipó | Raul Soares | MG | 1998 |
| 42 | Ervália | 7.0 | small | dos Bagres | Ervália and Guiricema | MG | 1999 |
| 43 | Fumaça | 10.1 | small | Gualaxo do Sul | Mariana | MG | 2000 |
| 44 | Viçosa (Bicame) | 4.5 | small | Castelo | Conceição do Castelo | ES | 2001 |
| 45 | Pai Joaquim | 23.0 | small | Araguari | Sacramento and Santa Juliana | MG | 2002 |
| 46 | Túlio Cordeiro de Mello (former known a Granada) | 15.9 | small | Matipó | Abre Campo | MG | 2003 |
| 47 | Ivan Botelho II (former known a Palestina) | 12.5 | small | Pomba | Icaju | MG | 2003 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 48 | Padre Carlos (former known a Rolador) | 7.8 | small | das Antas | Poços de Caldas | MG | 2003 |
| 49 | Ormeo Junqueira Botelho (former known a Cachoeira Encoberta) | 22.7 | small | Glória | Muriaé | MG | 2003 |
| 50 | Santa Cecília (Elevatória) | 35.0 | large | Paraíba do Sul | Barra do Piraí | RJ | March 52 |
| 51 | Nova Maurício | 29.2 | small | Novo | Leopoldina | MG | October 56 |
| 52 | São Domingos | 14.3 | large | São Domingos | São Domingos | GO | June 90 |
| 53 | Guary | 5.4 | small | Pinho | Santos Dumont | MG | January 98 |
| 54 | Caboclo | 4.2 | small | Maynart | Ouro Preto | MG | May 99 |
| 55 | F | 3.8 | small | Córrego Capitão do Mato | Nova Lima | MG | September 03 |
| 56 | Ilhéus | 2.6 | small | Mortes | Barbacena | MG | September 03 |
| 57 | Neblina | 6.5 | small | Manhuaçu | Ipanema | MG | September 03 |
| 58 | Pacífico Mascarenhas | 2.9 | small | Parauninha | Santana do Riacho | MG | September 03 |
| 59 | Rio Piracicaba | 9.0 | small | Piracicaba | João Monlevade | MG | September 03 |
| 60 | Funil | 3.6 | small | Maynart | Ouro Preto | MG | September 03 |
| 61 | Benjamim Mário Baptista (former known a Nova Sinceridade) | 9.0 | small | Manhuaçu | Manhuaçu | MG | September 03 |
| 62 | Ivan Botelho I (former known a Ponte) | 24.4 | small | Pomba | Descoberto and Guarani | MG | September 03 |
| 63 | Salto | 4.2 | small | Maynart | Ouro Preto | MG | September 03 |
| 64 | E Nova | 2.7 | small | Córrego Capitão do Mato | Nova Lima | MG | September 03 |
| 65 | Madame Denise (Cachoeira do Furado) | 2.9 | small | Taquaruçu | Taquaraçu de Minas | MG | September 03 |
| 66 | Pedro Affonso Junqueira (former known a Antas I) | 8.9 | large | das Antas | Poços de Caldas | MG | September 03 |
| 67 | Monte Alto | 7.4 | large | São João | Passos | MG | September 03 |
| 68 | São João | 3.2 | large | São João | Itaú de Minas | MG | September 03 |
| 69 | Lago Azul | 4.0 | small | Ribeirão Castelhano | Cristalina and Ipameri | GO | September 03 |
| 70 | Furquim | 6.0 | small | Ribeirão do Carmo | Mariana | MG | November 03 |
| 71 | Cachoeira do Lavrinha (former known as São Patrício) | 3.0 | small | das Almas | Rianápolis | GO | April 04 |

**Source: ANEEL/BIG (2014)**[37]

**Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number $N_{all}$.**

[37] ANEEL/BIG (2014). "Agentes Produtores Independentes". Electricity Generation Database ("BIG" from the Portuguese Banco de Informação de Geração). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ListaAgentes.asp?destino=3>.

As required above, the following CDM project activities were excluded from the list of projects presented in Table 12:

**Table 18 – Identified CDM registered projects listed in Table 12**

| Nr. | Projects | CDM ref. | Date of registration | Site |
|---|---|---|---|---|
| 1 | Túlio Cordeiro de Mello (former known as Granada) | 0519 | 02/10/2006 | https://cdm.unfccc.int/Projects/DB/DNV-CUK1152830265.44/view |
| 2 | Ivan Botelho II (former known as Palestina | 0477 | 28/08/2006 | https://cdm.unfccc.int/Projects/DB/DNV-CUK1150965247.9/view |
| 3 | Ormeo Junqueira Botelho (former known as Cachoeira Encoberta) | 0520 | 02/10/2006 | https://cdm.unfccc.int/Projects/DB/DNV-CUK1152828482.6/view |
| 4 | Benjamim Mário Baptista (former known as Nova Sinceridade) | 0543 | 24/09/2006 | https://cdm.unfccc.int/Projects/DB/DNV-CUK1154525241.46/view |
| 5 | Ivan Botelho I (former known as Ponte): | 0519 | 02/10/2006 | https://cdm.unfccc.int/Projects/DB/DNV-CUK1152830265.44/view |

**Source: UNFCCC (2014)**[38]

While excluding the above mentioned CDM projects from Table 12, $N_{all}$ = 66.

**Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number $N_{diff}$.**

As established above, different technologies refers to: (i) projects which use other source of electricity generation than water; (ii) projects classified as large scale under Brazilian regulation (projects with installed capacity up to 30 MW installed capacity and/or reservoir area greater than 3km$^2$) and (iii) projects with operation start-up in the old regulatory framework of the electric sector (before March 2004).

Operational projects in Brazil classified as having different technologies according criteria (i), (ii) and (iii) are presented in the table below.

**Table 19 - Operational projects in Brazil classified as having different technologies – items (i), (ii) and (iii) above**

| Nr. | Project | Installed Capacity (MW) | Type | River | Municipality | State | Operation Startup |
|---|---|---|---|---|---|---|---|
| 1 | Rio de Pedras | 9.3 | small | Pedras | Itabirito | MG | 1907 |
| 2 | Piabanha | 9.0 | small | Piabanha | Areal | RJ | 1908 |
| 3 | Jucu | 4.8 | small | Jucu | Domingos Martins | ES | 1909 |
| 4 | Fruteiras | 8.7 | small | Fruteiras | Cachoeiro de Itapemirim | ES | 1912 |
| 5 | Tombos | 2.9 | small | Carangola | Tombos | MG | 1912 |
| 6 | Marmelos | 4.0 | small | Paraibuna | Juiz de Fora | MG | 1915 |
| 7 | Martins | 7.7 | small | Uberabinha | Uberlândia | MG | 1915 |
| 8 | Salto Morais | 2.4 | small | Tijuco | Ituiutaba | MG | 1922 |
| 9 | Fagundes | 4.8 | small | Fagundes | Areal | RJ | 1923 |
| 10 | Paraúna | 4.3 | small | Paraúna | Gouveia | MG | 1927 |
| 11 | Ituerê | 4.0 | large | Pomba | Rio Pomba | MG | 1928 |

[38] UNFCCC (2014). Project cycle search. United Nations Framework Convention on Climate Change. Available at: <http://cdm.unfccc.int/Projects/projsearch.html>.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | Paciência | 4.1 | small | Paraibuna | Matias Barbosa | MG | 1930 |
| 13 | Rede Elétrica Piquete - Itajubá - REPI | 3.3 | small | Bicas | Wenceslau Braz | MG | 1932 |
| 14 | Coronel Domiciano | 5.0 | small | Fumaça | Muriaé | MG | 1935 |
| 15 | Xavier | 6.0 | small | Grande | Nova Friburgo | RJ | 1936 |
| 16 | Gafanhoto | 14.0 | small | Pará | Divinópolis | MG | 1946 |
| 17 | Peti | 9.4 | large | Santa Bárbara | São Gonçalo do Rio Abaixo | MG | 1946 |
| 18 | São Bernardo | 6.8 | small | São Bernardo | Piranguçu | MG | 1948 |
| 19 | Brecha | 12.4 | large | Piranga | Guaraciaba | MG | 1948 |
| 20 | Poço Fundo | 9.2 | small | Machado | Poço Fundo | MG | 1949 |
| 21 | Macabu | 21.0 | small | Macabu | Trajano de Morais | RJ | 1950 |
| 22 | Joasal | 8.4 | small | Paraibuna | Juiz de Fora | MG | 1950 |
| 23 | Cachoeira dos Prazeres | 3.8 | small | Maynard | Ouro Preto | MG | 1951 |
| 24 | Brito | 2.9 | large | Piranga | Ponte Nova | MG | 1952 |
| 25 | Cachoeira dos Macacos | 3.4 | small | Araguari | Perdizes and Sacramento | MG | 1952 |
| 26 | Areal | 18.0 | small | Preto | Areal | RJ | 1953 |
| 27 | Piau | 18.0 | small | Piau | Piau | MG | 1955 |
| 28 | Tronqueiras | 8.5 | small | Tronqueiras | Coroaci | MG | 1955 |
| 29 | Rochedo | 4.0 | small | Meia Ponte | Piracanjuba | GO | 1955 |
| 30 | Salto do Paraopeba | 2.5 | small | Paraopeba | Jeceaba | MG | 1956 |
| 31 | Pandeiros | 4.2 | small | Pandeiros | Januária | MG | 1958 |
| 32 | Rio Bonito | 22.5 | large | Santa Maria | Santa Maria de Jetibá | ES | 1959 |
| 33 | Dona Rita | 2.4 | small | Tanque | Santa Maria de Itabira | MG | 1959 |
| 34 | Cajuru | 7.2 | large | Pará | Carmo do Cajuru and Divinópolis | MG | 1959 |
| 35 | Franca Amaral | 4.5 | small | Itabapoana | Bom Jesus do Itabapoana and São José do Calçado | RJ | 1961 |
| 36 | Glória | 11.4 | large | Glória | Muriaé | MG | 1983 |
| 37 | Areal | 4.4 | small | Bananal | Santa Rita de Jacutinga | MG | 1988 |
| 38 | Mello | 9.5 | small | Santana | Rio Preto | MG | 1995 |
| 39 | Muniz Freire | 25.0 | large | Pardo | Muniz Freire | ES | 1997 |
| 40 | Walter Rossi (former known a Antas II) | 15.8 | large | Antas | Poços de Caldas | MG | 1998 |
| 41 | João Camilo Penna (former known a Cachoeira do Emboque) | 22.0 | large | Matipó | Raul Soares | MG | 1998 |
| 42 | Ervália | 7.0 | small | dos Bagres | Ervália and Guiricema | MG | 1999 |
| 43 | Fumaça | 10.1 | small | Gualaxo do Sul | Mariana | MG | 2000 |
| 44 | Viçosa (Bicame) | 4.5 | small | Castelo | Conceição do Castelo | ES | 2001 |
| 45 | Pai Joaquim | 23.0 | small | Araguari | Sacramento and Santa Juliana | MG | 2002 |
| 46 | Padre Carlos (former known a Rolador) | 7.8 | small | das Antas | Poços de Caldas | MG | 2003 |
| 47 | Santa Cecília | 35.0 | large | Paraíba do Sul | Barra do Piraí | RJ | March 52 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (Elevatória) | | | | | | |
| 48 | Nova Maurício | 29.2 | small | Novo | Leopoldina | MG | October 56 |
| 49 | São Domingos | 14.3 | large | São Domingos | São Domingos | GO | June 90 |
| 50 | Guary | 5.4 | small | Pinho | Santos Dumont | MG | January 98 |
| 51 | Caboclo | 4.2 | small | Maynart | Ouro Preto | MG | May 99 |
| 52 | F | 3.8 | small | Córrego Capitão do Mato | Nova Lima | MG | September 03 |
| 53 | Ilhéus | 2.6 | small | Mortes | Barbacena | MG | September 03 |
| 54 | Neblina | 6.5 | small | Manhuaçu | Ipanema | MG | September 03 |
| 55 | Pacífico Mascarenhas | 2.9 | small | Parauninha | Santana do Riacho | MG | September 03 |
| 56 | Rio Piracicaba | 9.0 | small | Piracicaba | João Monlevade | MG | September 03 |
| 57 | Funil | 3.6 | small | Maynart | Ouro Preto | MG | September 03 |
| 58 | Salto | 4.2 | small | Maynart | Ouro Preto | MG | September 03 |
| 59 | E Nova | 2.7 | small | Córrego Capitão do Mato | Nova Lima | MG | September 03 |
| 60 | Madame Denise (Cachoeira do Furado) | 2.9 | small | Taquaruçu | Taquaraçu de Minas | MG | September 03 |
| 61 | Pedro Affonso Junqueira (former known a Antas I) | 8.9 | large | das Antas | Poços de Caldas | MG | September 03 |
| 62 | Monte Alto | 7.4 | large | São João | Passos | MG | September 03 |
| 63 | São João | 3.2 | large | São João | Itaú de Minas | MG | September 03 |
| 64 | Lago Azul | 4.0 | small | Ribeirão Castelhano | Cristalina and Ipameri | GO | September 03 |
| 65 | Furquim | 6.0 | small | Ribeirão do Carmo | Mariana | MG | November 03 |

**Source: ANEEL/BIG (2014)**[39]

The only small hydropower plant that can be considered similar to the proposed project activity is Cachoeira do Lavrinha (former known as São Patrício), since is a small hydropower plant with 3 MW installed capacity, located in Goiás State, and started operations in April 2004 (after the new regulatory framework of the electric sector and before the starting date of the project activity). Therefore, as presented in Table 19 above, $N_{diff} = 65$.

Source of information regarding operation startup of the projects mentioned above is detailed in the common practice spreadsheet presented to DOE during validation.

**Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity**

Considering results above, $N_{all} = 66$ and $N_{diff} = 65$. Therefore:

$$N_{all} - N_{diff} = 1 < 3 \text{ and}$$
$$F = 1 - N_{diff}/N_{all} = 0.01 < 0.2$$

As can be seen in the analysis mentioned above, the factor F is lower than 0.2 and $N_{all}$-$N_{diff}$ is lower than 3. Therefore, it can be concluded that the proposed project activity is not common practice.

**SATISFIED/PASS – Project is ADDITIONAL**

[39] ANEEL/BIG (2014). "Agentes Produtores Independentes". Electricity Generation Database ("BIG" from the Portuguese Banco de Informação de Geração). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://www.aneel.gov.br/aplicacoes/AgenteGeracao/ListaAgentes.asp?destino=3>.

## B.6. Emission reductions

### B.6.1. Explanation of methodological choices

>>

**Project Emissions**

According to ACM0002, for most renewable energy power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \textbf{Equation 1}$$

Where:

$PE_y$ = Project emissions in year $y$ ($tCO_2e$);
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year $y$ ($tCO_2$);
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year $y$ ($tCO_2e$);
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year $y$ ($tCO_2e$).

The project emissions associated with the proposed project activity are $CO_2$ and $CH_4$ emissions from water reservoirs. According to ACM0002, project emissions from reservoir depend on the power density of hydropower projects calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad \textbf{Equation 2}$$

Where:

PD = Power density of the project activity, as $W/m^2$;
$Cap_{PJ}$ = Installed capacity of the hydroelectric plant after implementation of the project activity (W);
$Cap_{BL}$ = Installed capacity of the hydroelectric plant before implementation of the project activity (W). For new hydroelectric power plants, this value is zero;
$A_{PJ}$ = Reservoir area measured at the surface of the water, after implementation of the project activity when the reservoir is full ($m^2$);
$A_{BL}$ = Reservoir area measured at the surface of the water, before implementation of the project activity when the reservoir is full ($m^2$). For new reservoirs, this value is zero;

If the power density (PD) of the hydroelectric plant is higher than 4 $W/m^2$ and lower or equal to 10 $W/m^2$:

$$PE_y = \frac{EF_{Res} \cdot TEG_y}{1000} \quad \textbf{Equation 3}$$

Where:

$PE_v$ = Reservoir emission as $tCO_2e$/year;
$EF_{Res}$ = Default emission factor for emissions from reservoirs of hydropower plants and the standard value according to EB23 is 90 $kgCO_2e$/MWh;
$TEG_y$ = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in the year y (MWh).

If the power density (PD) of the hydroelectric plant is higher than 10 $W/m^2$, PEy = 0

**Baseline emissions**

Baseline emissions (BEy, as tCO2e) are obtained by the product of the emissions factor of baseline (EFy as tCO2e/MWh) by the electricity supplied to the grid by the project activity (EGy, as MWh) as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$$ **Equation 4**

Where:

$BE_y$ = Baseline emissions in the year y ($tCO_2$/year);

$EG_{PJ,y}$ = Liquid amount of electricity injected in the grid as resulted from the implementation of the CDM project in the year y (MWh/year);

$EF_{grid,CM,y}$ = Emission factor of $CO_2$ of the combined margin for the generation of energy connected to the grid in the year calculated using the latest version of the "Tool for the calculation of the emission factor for an electrical system" ($tCO_2e$/MWh).

**I. Calculation of the combined margin $CO_2$ emission factor for grid connected power generation ($EF_{grid,CM,y}$)**

According to the "Tool to calculate the emission factor for an electricity system"the following 6 (six) steps shall be applied in order to calculate the baseline emission factor as further detailed below.

**STEP 1** - Identify the relevant electricity systems
According to the tool, "if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. If such delineations are not available, project participants should define the project electricity system and any connected electricity system and justify and document their assumptions in the CDM-PDD".

The Brazilian DNA published Resolution # 8, issued on May 26th, 2008, defining the Brazilian Interconnected Grid as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest). Hence, this figure was used to calculate the baseline emission factor of the grid.

**STEP 2** – Choose whether to include off-grid power plants in the project electricity system (optional)
The tool provides the following 2 (two) options to calculate the operating margin and build margin emission factor:

Option (i): only grid power plants are included in the calculation;
Option (ii): both grid power plants and off-grid power plants are included in the calculation.

The Brazilian DNA made available the emission factor calculation based on information of the grid power plants only – option (i) – following the "Tool to calculate the emission factor for an electricity system". More information of the methods applied can be obtained at the DNA's website (http://www.mct.gov.br/index.php/content/view/4016.html). Since data published by the Brazilian DNA is used, option (i) was considered in this CPA.

**STEP 3** - Select a method to determine the operating margin (OM)
The calculation of the operating margin emission factor (EFgrid,OM,y) is based on one of the following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

Since there is no preferable method for the calculation of the OM emission factor, option (c) Dispatch data analysis OM was chosen since it is the method chosen by the Brazilian DNA. More information of the OM emission factor can be obtained at the DNA's website (http://www.mct.gov.br/index.php/content/view/74689.html).

According to the "Tool to calculate the emission factor for an electricity system", in the "dispatch data analysis OM" method, it shall be considered the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring. Therefore, this PoA applies the ex-post data vintage.

**STEP 4** - Calculate the operating margin emission factor according to the selected method
The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the grid power units that are actually dispatched at the margin during each hour h where the project is displacing grid electricity. It shall be calculated according to the formulae below:

$$EF_{grid,OM-DD,y} = \frac{\sum_{h} EG_{PJ,h} \times EF_{EL,DD,h}}{EG_{PJ,y}} \qquad \textbf{Equation 5}$$

Where:

$EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$);
$EG_{PJ,h}$ = Electricity displaced by the project activity in hour h of the year y (MWh);
$EF_{EL,DD,h}$ = $CO_2$ emission factor for power units in the top of the dispatch order in hour h in year y ($tCO_2/MWh$);
$EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh);
h = Hours in year y in which the project activity is displacing grid electricity;
y = Year in which the project activity is displacing grid electricity.

*Calculation of hourly $CO_2$ emission factor for grid power units ($EF_{EL,DD,h}$)*
The Brazilian DNA annually publishes the operating margin emission factor based on option (c) dispatch data analysis. Therefore, this figure was considered in the proposed project activity.

*Calculation to determine the set of grid power units n in top of the dispatch*
The Brazilian DNA annually publishes the operating margin emission factor based on option (c) dispatch data analysis. Therefore, this figure was considered in the proposed project activity.

**STEP 5** - Calculate the build margin (BM) emission factor
The build margin emissions factor is the generation-weighted average emission factor ($tCO_2/MWh$) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad \textbf{Equation 6}$$

Where:

$EF_{grid,BM,y}$ = Build margin $CO_2$ emission factor in year y ($tCO_2/MWh$);
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);
$EF_{EL,m,v}$ = $CO_2$ emission factor of power unit m in year y ($tCO_2/MWh$);
m = Power units included in the build margin;
y = Most recent historical year for which electricity generation data is available.

In terms of vintage of data, the following 2 (two) options can be used:

**Option 1:** For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of PoA-DD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

**Option 2:** For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 2 is considered in the proposed CPA, *i.e.* the ex-post data vintage.

*Calculation to determine the set of power units m included in the build margin*

The Brazilian DNA annually publishes the build margin emission. Therefore, this figure was considered in the proposed project activity.

*Calculation of the $CO_2$ emission factor for each power unit m ($EF_{EL,m,y}$)*
The Brazilian DNA annually publishes the calculation of the build margin emission. Therefore, this figure was considered in the proposed project activity.

**STEP 6** – Calculate the combined margin (CM) emission factor
The calculation of the combined margin (CM) emission factor is based on one of the following methods:
(a) Weighted average CM; or
(b) Simplified CM.
Since the weighted average CM method (option A) is the preferred option according to the tool, this method was considered. The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM} \quad \textbf{Equation 7}$$

Where,
$EF_{grid,BM,y}$ = Build margin $CO_2$ emission factor in year y ($tCO_2$/MWh);
$EF_{grid,OM,y}$ = Operating margin $CO_2$ emission factor in year y ($tCO_2$/MWh);
$w_{OM}$ = Weighting of operating margin emissions factor (%);
$w_{BM}$ = Weighting of build margin emissions factor (%).

The following default values should be used for $w_{OM}$ and $w_{BM}$:

- Wind and solar power generation project activities: wOM = 0.75 and wBM = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;
- All other projects: $w_{OM}$ = 0.5 and $w_{BM}$ = 0.5 for the first crediting period, and wOM = 0.25 and wBM = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

**II. Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity ($EG_{PJ,y}$)**

According to ACM0002, the calculation of $EG_{PJ,y}$ is different depending on the case of the project. Since the proposed project activity consists of a greenfield plant, the following equation shall be used:

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{Equation 8}$$

Where,
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh);
$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh).

**Emission Reductions**

The reductions of emissions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{Equation 9}$$

Where:
$ER_y$ = Reductions of emissions in the year y ($tCO_2e$/year);
$BE_y$ = Emissions of baseline in the year y ($tCO_2$/year);
$PE_y$ Emissions of the project in the year y ($tCO_2e$/year).

**Leakage**

In accordance with ACM0002, "no leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (*e.g.*, extraction, processing and transport) are neglected". Therefore, Ly = 0 $tCO_2e$.

### B.6.2. Data and parameters fixed ex ante

*(Copy this table for each piece of data and parameter.)*

| | |
|---|---|
| **Data / Parameter** | $EF_{Res}$ |
| **Unit** | $kgCO_2e/MWh$ |
| **Description** | Default emission factor for emissions from reservoirs. |
| **Source of data** | Decision at EB 23. |
| **Value(s) applied** | 90 |
| **Choice of data or Measurement methods and procedures** | Established by ACM0002. |
| **Purpose of data** | Project emissions. |
| **Additional comment** | - |

| | |
|---|---|
| **Data / Parameter** | $Cap_{pj}$ |
| **Unit** | W |
| **Description** | Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero. |
| **Source of data** | Project site. |
| **Value(s) applied** | 0 |
| **Choice of data or Measurement methods and procedures** | Determine the installed capacity based on recognized standards. |
| **Purpose of data** | Baseline emissions. |
| **Additional comment** | - |

| | |
|---|---|
| **Data / Parameter** | $A_{BL}$ |
| **Unit** | $m^2$ |
| **Description** | Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full ($m_2$). For new reservoirs, this value is zero. |
| **Source of data** | Project site. |
| **Value(s) applied** | 0 |
| **Choice of data or Measurement methods and procedures** | Measured from topographical surveys, maps, satellite pictures, etc. |
| **Purpose of data** | Project emissions. |
| **Additional comment** | - |

## B.6.3. Ex ante calculation of emission reductions

>>

**Project emissions**

For determining if there are project emissions involved in the proposed project activity, the power densities of the small hydropower plants were calculated as follows:

**Table 20 – Power density calculation**

| Project | $Cap_{PJ}$ (MW) | $A_{PJ}$ ($km^2$) | PD ($W/m^2$) |
|---|---|---|---|
| São Pedro | 30.06 | 0.11 | 273.27 |
| Carangola | 15.30 | 0,0059 | 2,593.22 |
| Calheiros | 19.26 | 0.26 | 74.08 |
| São Simão | 27.00 | 0.72 | 37.50 |
| Funil | 22.68 | 1.5 | 15.12 |
| São Joaquim | 21.60 | 0.063 | 342.86 |
| Fumaça IV | 4.50 | 0.04 | 112.50 |
| Jataí | 30.00 | 0.425 | 70.58 |
| Irara | 30.00 | 2.58 | 11.63 |
| Bonfante | 18.24 | 0.55 | 33.16 |
| Monte Serrat | 26.89 | 0.55 | 48.88 |
| Santa Fé | 30.06 | 1.278 | 23.52 |

**Source: ANEEL/SIGEL (2014)[40]**

Since the power densities of small hydropower plants included in the project activity are higher than 10 $W/m^2$, there are no project emissions involved in the proposed project activity.

**Baseline emissions**

Baseline emissions are calculated based on the $CO_2$ emission factor of the grid and the electricity dispatched to the grid by the project activity as follows.

**I. Calculation of the combined margin $CO_2$ emission factor for grid connected power generation ($EF_{grid,CM,y}$)**

The *ex-ante* calculation of the combined margin $CO_2$ emission factor for grid connected power generation ($EF_{grid,CM,y}$) follows the steps established in the "Tool to calculate the emission factor for an electricity system" and are presented below:

**STEP 1** - Identify the relevant electricity systems

According to Resolution # 8 issued by the Brazilian DNA on May 26th, 2008, the Brazilian Interconnected Grid ("SIN" from the Portuguese Sistema Interligado Nacional) corresponds to the system to be considered. It covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest) as presented in the figure below.

[40] ANEEL/SIGEL (2014). Georreferenced Information System from the Electric Sector ("SIGEL from the Portuguese Sistema de Informações Georreferenciadas do Setor Elétrico). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Information available at: <http://sigel.aneel.gov.br/kmz.html>.

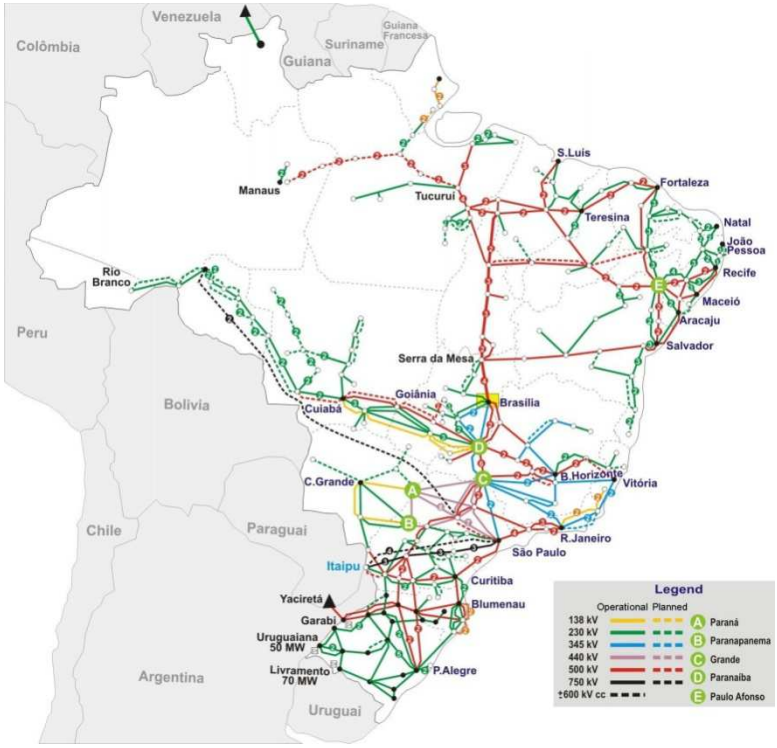


**Figure 3 – Brazilian Interconnected System**

**Source: ONS (2011)[41]**

**STEP 2** – Choose whether to include off-grid power plants in the project electricity system (optional)
Option I was chosen and only grid connected power plants is considered.

**STEP 3** - Select a method to determine the operating margin (OM)
The Brazilian DNA made publicly available the OM through the dispatch data analysis OM (option c). Therefore, this method was used for the proposed project activity. Please refer to section B.6.1. for explanation of methodological choices.

**STEP 4** - Calculate the operating margin emission factor according to the selected method
The Brazilian DNA made publicly available the OM emission factor through the dispatch data analysis OM (option c). Therefore, data of 2014 was used (the most recent data available) as presented below.

$$\mathbf{EF_{grid,OM\text{-}DD,y} = 0.5837\ tCO_2e/MWh}$$

**STEP 5** – Calculate the build margin (BM) emission factor
The Brazilian DNA made publicly available the build margin emission factor. Therefore, data of 2014 was used (the most recent data available) as presented below.

$$\mathbf{EF_{grid,BM,y} = 0.2963\ tCO_2e/MWh}$$

**STEP 6** – Calculate the combined margin (CM) emissions factor
Applying the results presented above in STEPS 4 and 5 above to the Equation 7 presented in section B.6.1. and considering the weights $w_{OM}$ = 0.50 and $w_{BM}$ = 0.50, we obtain:

$$\mathbf{EF_{grid,CM,y} = 0.5 \times 0.5837 + 0.5 \times 0.2963\ tCO_2e/MWh}$$
$$\mathbf{EF_{grid,CM,y} = 0.4400\ tCO_2e/MWh}$$

[41] Electric System National Operator ("ONS" from the Portuguese *Operador Nacional do Sistema Elétrico*). Mapas do SIN. Information available at: <http://www.ons.org.br/>. Accessed on May 13th, 2011.

**II. Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity ($EG_{PJ,y}$)**

As mentioned in section B.6.1, $EG_{PJ,y} = EG_{facility,y}$. Estimated quantity of net electricity generation supplied by the project plant/unit to the grid is calculated based on the assured energy of power plants provided by project developers for implementation approval to the Brazilian Power Regulatory Agency (ANEEL). Table 21 presents the assured energy/capacity factor of power plants according to ANEEL website.

**Table 21 – PLF of small hydropower plants included in the proposed project activity**

| Project | Installed Capacity (MW) | Assured Energy (MW-ave) | Plant Load Factor [Assured Energy ÷ Installed Capacity] |
|---|---|---|---|
| São Pedro | 30.06 | 18.41 | 61.2% |
| Carangola | 15.30 | 9.63 | 62.9% |
| Calheiros | 19.26 | 10.92 | 56.7% |
| São Simão | 27.00 | 15.2 | 56.3% |
| Funil | 22.68 | 13.09 | 57.7% |
| São Joaquim | 21.60 | 13.28 | 61.5% |
| Fumaça IV | 4.50 | 2.61 | 58.0% |
| Jataí | 30.00 | 19.25 | 64.2% |
| Irara | 30.00 | 18.21 | 60.7% |
| Bonfante | 18.24 | 13.48 | 73.9% |
| Monte Serrat | 26.89 | 18.28 | 68.0% |
| Santa Fé | 30.06 | 16.40 | 54.6% |

**Source: ANEEL/BIG (2013) and ANEEL/CEDOC (2014)[42]**

Therefore, the proposed project activity applies option (a) of the "Guidelines for the reporting and validation of plant load factors", *i.e.* "the plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval".

**Emission Reductions**

The reductions of emissions are calculated through Equation 9 as presented in the table below.

**Table 22 – Estimated emission reductions of the project activity**

| Project | $BE_y$ ($tCO_2e$/year) | $PE_y$ $tCO_2e$/year | $ER_y$ ($tCO_2e$/year) |
|---|---|---|---|
| São Pedro | 70,956 | 0.00 | 70,956 |
| Carangola | 37,116 | 0.00 | 37,116 |
| Calheiros | 42,088 | 0.00 | 42,088 |
| São Simão | 58,584 | 0.00 | 58,584 |
| Funil | 50,451 | 0.00 | 50,451 |
| São Joaquim | 51,184 | 0.00 | 51,184 |
| Fumaça IV | 10,059 | 0.00 | 10,059 |
| Jataí | 74,193 | 0.00 | 74,193 |
| Irara | 70,185 | 0.00 | 70,185 |
| Bonfante | 51,954 | 0.00 | 51,954 |
| Monte Serrat | 70,455 | 0.00 | 70,455 |
| Santa Fé | 63,209 | 0.00 | 63,209 |

**Leakage**

[42] ANEEL/CEDOC (2014). The Brazilian Power Regulatory Agency database ("CEDOC" from the Portuguese Centro de documentação da ANEEL). The Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica. Available at: <http://biblioteca.aneel.gov.br/index.html>.

As mentioned in section B.6.1, leakage in the context of the project activity is 0 (zero).

### B.6.4. Summary of ex ante estimates of emission reductions

| Year | Baseline emissions (t $CO_2e$) | Project emissions (t $CO_2e$) | Leakage (t $CO_2e$) | Emission reductions (t $CO_2e$) |
|---|---|---|---|---|
| Year 1 - (2016) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 2 - (2017) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 3 - (2018) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 4 - (2019) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 5 - (2020) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 6 - (2021) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 7 - (2022) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 8 - (2023) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 9 - (2024) | 650,438 | 0.0 | 0.0 | 650,438 |
| Year 10 - (2025) | 650,438 | 0.0 | 0.0 | 650,438 |
| **Total** | **6,504,377** | **0** | **0** | **6,504,377** |
| **Total number of crediting years** | 10 | | | |
| **Annual average over the crediting period** | **650,438** | **0** | **0** | **650,438** |

### B.7. Monitoring plan

### B.7.1. Data and parameters to be monitored

*(Copy this table for each piece of data and parameter.)*

| **Data / Parameter** | $EG_{facility,y}$ | |
|---|---|---|
| **Unit** | MWh/yr | |
| **Description** | Quantity of net electricity generation supplied by the project plant/unit to the grid in year y. | |
| **Source of data** | Electricity meter(s). | |
| **Value(s) applied** | **Project** | **$EG_{facility,y}$ (MWh/yr)** |
| | São Pedro | 161,272 |
| | Carangola | 84,359 |
| | Calheiros | 95,659 |
| | São Simão | 133,152 |
| | Funil | 114,668 |
| | São Joaquim | 116,333 |
| | Fumaça IV | 22,864 |
| | Jataí | 168,630 |
| | Irara | 159,520 |
| | Bonfante | 118,085 |
| | Monte Serrat | 160,133 |
| | Santa Fé | 143,664 |

| | |
|---|---|
| **Measurement methods and procedures** | This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured:<br>(a) The quantity of electricity supplied by the project plant/unit to the grid; and<br>(b) The quantity of electricity delivered to the project plant/unit from the grid.<br>Accuracy of electricity meters shall follow ONS Grid Procedures[43] and INMETRO Ordinances[44]. ONS Grid Procedures establish the use of accuracy class 0.2 electricity meters. |
| **Monitoring frequency** | Continuous measurement and at least monthly recording. |
| **QA/QC procedures** | Cross check measurement results with records for sold electricity. |
| **Purpose of data** | Baseline emissions. |
| **Additional comment** | $EG_{facility,y}$ calculation for estimated emission reductions is based on assured energy of projects as provided by ANEEL. |

| | |
|---|---|
| **Data / Parameter** | **$EF_{grid,CM,y}$** |
| **Unit** | $tCO_2/MWh$ |
| **Description** | Combined margin $CO_2$ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" |
| **Source of data** | The Brazilian DNA. |
| **Value(s) applied** | 0.4400 |
| **Measurement methods and procedures** | As per the "Tool to calculate the emission factor for an electricity system". |
| **Monitoring frequency** | Hourly and yearly. |
| **QA/QC procedures** | Official source of data. |
| **Purpose of data** | Baseline emissions. |
| **Additional comment** | For estimative purposes, data of 2014 year was used. |

| | |
|---|---|
| **Data / Parameter** | **$Cap_{PJ}$** |
| **Unit** | W |
| **Description** | Installed capacity of the hydro power plant after the implementation of the project activity. |
| **Source of data** | Equipment tag installed at the project site. |

[43] http://extranet.ons.org.br/operacao/prdocme.nsf/videntificadorlogico/91D2F3D5E0A476AC83257945005B18FC/$file/Submodulo%2012.2_Rev_2.0.pdf?openelement

[44] http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC001929.pdf

| | |
|---|---|
| **Value(s) applied** | |

| Project | $Cap_{PJ}$ (W) |
|---|---|
| São Pedro | 30,060,000 |
| Carangola | 15,300,000 |
| Calheiros | 19,260,000 |
| São Simão | 27,000,000 |
| Funil | 22,680,000 |
| São Joaquim | 21,600,000 |
| Fumaça IV | 4,500,000 |
| Jataí | 29,997,000 |
| Irara | 29,997,000 |
| Bonfante | 18,240,000 |
| Monte Serrat | 26,885,000 |
| Santa Fé | 30,060,000 |

| | |
|---|---|
| **Measurement methods and procedures** | Determine the installed capacity based on manufacturer's specifications or commissioning data or recognized standards. |
| **Monitoring frequency** | Once at the beginning of each crediting period. |
| **QA/QC procedures** | - |
| **Purpose of data** | Project emissions. |
| **Additional comment** | - |

| | |
|---|---|
| **Data / Parameter** | $A_{PJ}$ |
| **Unit** | $m^2$ |
| **Description** | Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full. |
| **Source of data** | Project site. |
| **Value(s) applied** | |

| Project | $A_{PJ}$ ($m^2$) |
|---|---|
| São Pedro | 110,000 |
| Carangola | 5,900 |
| Calheiros | 260,000 |
| São Simão | 720,000 |
| Funil | 1,500,000 |
| São Joaquim | 63,000 |
| Fumaça IV | 40,000 |
| Jataí | 425,000 |
| Irara | 2,580,000 |
| Bonfante | 550,000 |
| Monte Serrat | 550,000 |
| Santa Fé | 1,278,000 |

| | |
|---|---|
| **Measurement methods and procedures** | The reservoir area will be monitored through topographical data in the location of the project activity (made once at the time of the project design) and the reservoir level monitored yearly by the project sponsor.<br><br>The water level to be compared with the topographical study will be based on the average water level that will be verified annually. Electronically archived. |
| **Monitoring frequency** | Once at the beginning of each crediting period. |
| **QA/QC procedures** | Measured from topographical surveys, maps, satellite pictures, etc. |
| **Purpose of data** | Project emissions. |
| **Additional comment** | $A_{PJ}$ presented above is based on information provided by ANEEL/SIGEL. |

## B.7.2. Sampling plan

>>

Not applicable.

## B.7.3. Other elements of monitoring plan

>>

The monitoring of the proposed grouping will be conducted following the ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources". All data collected as part of monitoring will be archived electronically and be kept at least for two years after the end of the last crediting period.

As presented section B.7.1, and according to ACM0002, the parameters to be monitored for the proposed project activity are as follows:

(i) Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* ($EG_{facility,y}$);
(ii) Installed capacity of the hydro power plant after the implementation of the project activity ($Cap_{PJ}$);
(iii) Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full ($A_{PJ}$);
(iv) Combined margin $CO_2$ emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" ($EF_{grid,CM,y}$).

**(i) Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* ($EG_{facility,y}$)**

The monitoring of electricity generation by small hydropower plants follows the procedures established by the National Electric System Operator ("ONS" from the Portuguese Operador Nacional do Sistema Elétrico) , the Brazilian Power Regulatory Agency ("ANEEL" from the Portuguese Agência Nacional de Energia Elétrica) and the Chamber of Electric Energy Commercialization ("CCEE" from the Portuguese Câmara de Comercialização de Energia Elétrica).

According to ONS Grid Procedures, there shall be energy meters at the substation/"connection point" (principal and backup). Meters installed shall have the necessary technical specifications as required by the National Operator System ("ONS" from the Portuguese Operador do Sistema Nacional).

Electricity meters located at the substation measures the net electricity generated by the project activity, *i.e.* the electricity dispatched to the grid. This data will be used for emission reductions calculation. Electricity dispatched to the grid can be cross-checked with sales receipt (records for sold electricity) or/and internal control.

Calibration of meters located in the "connection point" of the grid shall be made every 2 years as required by ONS Grid Procedures.

It is important to mention that CCEE makes feasible and regulates the electricity energy commercialization. Hence, information related to electricity generation and supply of all grid-connected power plants is controlled by CCEE.

**(ii) Installed capacity of the hydro power plant after the implementation of the project activity ($Cap_{PJ}$)**

The installed capacity of the power plants was checked by DOE once at the beginning of the crediting period based on equipment tag installed at the project sites. Data was also cross-checked with official documents, *e.g.* ANEEL resolution and/or licenses issued by the environmental agency.

According to ACM0002, $Cap_{PJ}$ shall be monitored at the beginning of the crediting period. Since the proposed project activity applies a fixed crediting period, monitoring is not required.

**(iii) Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full ($A_{PJ}$)**

The reservoir area was checked by DOE once at the beginning of the crediting period based on data from "Georreferenced Information System from the Electric Sector" ("SIGEL from the Portuguese Sistema de Informações Georreferenciadas do Setor Elétrico) of the Brazilian Regulatory Agency (ANEEL). Therefore, data is based on official source of data.

According to ACM0002, $A_{PJ}$ shall be monitored at the beginning of the crediting period. Since the proposed project activity applies a fixed crediting period, monitoring is not required.

**(iv) Combined margin $CO_2$ emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" ($EF_{grid,CM,y}$)**

The grid emission factor presented in this PDD was calculated by the Brazilian DNA, using the Dispatch Data Analysis for the Operating Margin. The Build Margin emission factor was determined using the generation-weighted average emission factor of all power units during the most recent year for which power generation data was available. Therefore, the emission factor of 0.3593 $tCO_2e/MWh$ of 2012 year was used just for estimating the expected emission reductions of the project activity during the crediting period. Hence, the emission factor calculation used in this PDD, for estimating purposes only, must be verified and updated accordantly using the most recent data available at the time of the verification process.

### B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion of application of methodology: 03/12/2015
Contact information:
Company: Centrais Elétricas Brasileiras S/A – ELETROBRÁS
Name: Jorge de Oliveira Camargo
E-mail: camargo@eletrobras.com
Telephone: +55 (21) 2514-5893

Centrais Elétricas Brasileiras S/A – ELETROBRÁS is a Project Participant of the proposed project activity.

## SECTION C. Duration and crediting period

### C.1. Duration of project activity

### C.1.1. Start date of project activity

>>
According to the Glossary of CDM Terms, "start date", in the context of CDM project activities is "…the earliest date at which either the implementation or construction or real action of a CDM project activity".

In the context of the small hydropower plants of the proposed project activity, the signature of the Power Purchase Agreement (PPA) under PROINFA is considered as the project "start date", *i.e.* 30/06/2004.

### C.1.2. Expected operational lifetime of project activity

>>
27 years – 0 months

## C.2. Crediting period of project activity

### C.2.1. Type of crediting period

>>
10 years, 0 months (fixed).

### C.2.2. Start date of crediting period

>>
January, 1st, 2016 or registration date on CDM, upon which takes place later.

### C.2.3. Length of crediting period

10 years, 0 months.

## SECTION D. Environmental impacts

## D.1. Analysis of environmental impacts

>>

In Brazil, the sponsor of any activity that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other capable to cause environmental degradation is obliged to secure a series of permits from the relevant environmental agency (federal and/or local, depending on the type of project and location).

Although hydropower plants are considered as a renewable energy generation project, project sponsors have to obtain all licenses as required by the National Environmental Council ("CONAMA" from the Portuguese Conselho Nacional do Meio Ambiente) Resolution # 237 dated December 19th, 1997:

- The Preliminary License (from the Portuguese Licença Prévia or LP);
- The Construction License (from the Portuguese Licença de Instalação or LI);
- The Operating License (from the Portuguese Licença de Operação or LO).

In order to issue licenses mentioned above, CONAMA Resolution # 237/1997 establishes the following types of environmental studies for the issuance of licenses mentioned above:

- The Environmental Impact Study ("EIA" from the Portuguese Estudo de Impacto Ambiental) and the Environmental Impact Report ("RIMA" from the Portuguese Relatório de Impacto Ambiental) or;
- The Simplified Environmental Report ("RAS" from the Portuguese Relatório Ambiental Simplificado).

According to CONAMA Resolution # 1 dated January 23rd, 1986, environmental studies shall present at least the following information:

- Goals and justifications for the project implementation;
- Description of each stages of the project including alternatives for technical infrastructure and location;
- Summary of the diagnosis made in the region where the project will be implemented;
- Potential impacts caused by the project implementation during its lifetime, including methodological choices, quantification, qualification and duration;
- The effects of the potential impacts caused by the project implementation in the impacted region;
- Mitigating measures for the negative impacts that cannot be avoided;
- Monitoring program for the impacts;
- Conclusion.

In the case of the project activity, environmental studies were conducted for the licenses issuance as required by the environmental agencies. In general, the main impacts associated with the construction and operation of small hydropower plants are as follows:

<u>Physical Environment:</u>

- Interference with the local microclimate;

- Alteration of water variability;
- Alteration in dynamics and composition of sediments upstream and downstream of the dam;
- Interference with multiple uses of water resources: navigation, irrigation, supplying, flood control, leisure, tourism etc.;
- Groundwater rise.

Biotic Environment:

- Alteration of the physical, chemical and biological structure of the environment;
- Fragmentation of vegetal formations;
- Impacts on fauna and flora.

Socio-environmental and cultural environment:

- Interference in the urban and rural physical-territorial organization;
- Proliferation of zoonosis and vectors of diseases;
- Loss of economic activities (farming, vegetal exploration, mineral exploration and fishing activities);
- Flooding of archaeological sites;
- Disappearance of landscape sites, constructions of cultural value and cave sites.

Detailed description of the potential impacts caused by the implementation of the small hydropower plants of the proposed project activity are presented in the environmental studies, which were provided to DOE during validation.

Mitigating and compensatory measures implemented by the project developers in order to reduce the potential impacts caused by the project activity implementation are described in section D.2.

## D.2. Environmental impact assessment

>>

The potential impacts caused by the project activity implementation were analyzed in the environmental licensing phases of the related projects, being considered in the elaboration of environmental studies for the attainment of the licenses. In order to mitigate and/or compensate these impacts, the following programs and measures were implemented:

**Bonfante:**

Restoration of degraded areas; Monitoring of water and ichthyofauna quality; Compensation for Mining Activities; Groundwater Level Monitoring; Banks Restoration and Erosion Process Control; Properties compensation and population improvements and management; Environmental sanitation; Recreation and leisure; Social Communication; Environmental plan for the construction; Historical heritage; Environmental Plan for Preservation and Reservoir Area Use; Reservoir Cleaning.

**Calheiros:**

Basic Infrastructure Project; Reservoir Silting Monitoring Program; Erosion Process Monitoring Program for the Reservoir Banks; Removal Plan for Directly Affected Areas; Restoration of Degraded Areas; Mitigation Measures for Areas with Reduced Flow; Program for Ichthyofauna Rescue; Monitoring Plan; Fauna Rescue Program; Water Quality and Limnological Monitoring Plan; Community Relationship - Social Communication Program; Municipalities Support Program; Labor Health Care Program; Archaeological Prospection Project; Land Negotiation Project; Environmental Plan for Preservation and Use of Surrounding Areas of the Reservoir; Environmental Management; Preservation Unit Strengthening Program; Amphibians and Reptiles Monitoring Program.

**Carangola:**

Construction Site Control Program; Restoration of Degraded Areas Program; Riparian Forest Restoration Program; Flora Rescue Program; Deforestation Program; Water Quality Monitoring Program; Ichthyofauna Preservation Program; Ichthyofauna Rescue and Monitoring Program; Transposition Mechanism Implantation Subprogram; Social Communication Program; Environmental Education Program; Negotiation Program; Recovery of the Affected Infrastructure Program; Strengthening Action Program for Community and Public Services; Socio-Environmental Monitoring Plan; Security Program; Heritage Education/Archaeological Rescue Program; Environmental Plan for the Preservation and Use of Surrounding Areas of the Reservoir; Environmental Coordination Program; Tourism and Leisure Activities Support Program; Social Assistance Plan.

**Fumaça IV:**

Wastewater and Waste Control Program at the Construction Site; Erosion Process Control Program; Restoration of Degraded Areas Program; Water Quality and Limnological Monitoring Plan; Riparian Forest Restoration Program; Deforestation Program; Environmental Compensation Program; Ichthyofauna Conservation Program; Fauna Rescue Program; Monitoring Program; Social Communication Program; Environmental Education Program; Archaeological Prospection Program; Land Negotiation Program; Heritage Education Program; Strengthening Action Program for Community and Public Services; Program for Registration of Fumaça Waterfall Memory; Emília Waterfall Restoration Program; Environmental Plan for the Preservation and Use of Surrounding Areas of the Reservoir; Environmental Coordination Program.

**Funil:**
Environmental Control Program at the Construction Site; Monitoring Program for Reservoir Erosion Process; Restoration of Degraded Areas Program; Flora Rescue Program; Deforestation Program; Riparian Forest Restoration Program; Ichthyofauna Preservation Program; Water Quality Monitoring Plan; Birds Monitoring Program; Fauna Rescue Program; Environmental Education Program; Social Communication Program; Land Negotiation Program; Heritage Education Program; Archaeological Prospection; Strengthening of Community and Public Services Support Program; Health Care Program; Social Assistance Plan; Environmental Plan for the Use of the Surrounding Areas; Socio-Economic Monitoring Plan; Reservoir Silting Monitoring Plan; Environmental Coordination Program.

**Irara:**
Environmental Management; Environmental Information Project; Environmental Education Project; Security; Health Care; Archaeological Heritage Rescue; Land Negotiation; Master Plan for the Reservoir and Surrounding Areas; Upstream and Downstream Flows Monitoring; Reservoir Cleaning Program; Flora Rescue Program; Riparian Forest Restoration Incentive; Fire Prevention and Fighting Program; Fauna Rescue; Ichthyofauna Rescue; Avifauna, Amphibians, Reptiles and Mammals Monitoring Program; Ichthyofauna Monitoring Program; Water Quality Monitoring Program; Aquatic Macrophytes Monitoring and Control; Creation of Preservation Units.

**Jataí:**
Environmental Education and Labor Health Care Program; Flora Rescue and Landscape Restoration; Fauna Monitoring and Management Program; Linear Park Creation Program; Insects Control and Monitoring Program; Restoration of Degraded Areas Program; Birds Monitoring and Management Program; Ichthyofauna Conservation and Rescue Program; Environmental Management Program; Silting Control Program; Camping and Installation Control Program; Environmental Control in the Area of Reduced Outflow; Program of Land and Improvements Negotiation; Institutional Support Program; Environmental Plan for the Preservation and Use of the Surrounding Areas of the Reservoir; Water Quality Monitoring Program; Environmental Information for the Population of the Surrounding Areas; Archaeological Heritage Survey and Rescue Program; Prevention of Accidents with Poison Animals Program.

**Monte Serrat:**
Restoration of Degraded Areas Program; Ichthyofauna and Water Quality Monitoring Program; Compensation for Mining Activities; Monitoring of Groundwater Level; Restoration of Banks and Erosion Processes Control; Indemnity of Properties and Management of Resettled Population; Environmental Sanitation Program; Recreation and Leisure Program; Social Communication Program; Environmental Plan for the Construction; Historical Heritage Program; Environmental Plan for the Preservation and Use of the Reservoir; Reservoir Cleaning.

**SHP Santa Fé:**
Restoration of Degraded Areas Program; Reservoir Cleaning and Vegetation Suppression; Environmental Compensation Program; Infrastructure Reorganization Program; Indemnity of Properties and Management of Resettled Population; Protection of River Banks and Reservoirs Program; Archaeological Heritage Preservation and Studies Program; Archaeological Heritage Survey and Rescue; Heritage Valuation Program; Recreation and Leisure Activities Support Program; Fauna and Flora Preservation Program; Ichthyofauna Conservation and Monitoring Program; Silting and Flow Monitoring Program; Limnological and Water Quality Monitoring Program; Social Communication Program; Environmental Education Program; Groundwater Monitoring Program; Mining Rights Monitoring Program; Program for Preservation and Use of the Reservoir Area.

**São Joaquim:**
Climate Monitoring Program; Hydrological Monitoring Program; Characterization of the Salt Water Intrusion in the Anchieta Region; Watershed Restoration Program; Restoration of Degraded Areas Program; Ichthyofauna Monitoring Plan; Fauna Rescue Program; Social Communication Program; Leisure and Tourism Development Program; Program of Reforestation of the Surrounding Areas of the Reservoir; Local

Labor Priority Program; Flora Preservation Program; Environmental Plan for the Construction; Preservation Unit Implementation Program; Archaeological Prospection Program; Land Negotiation Program.

**São Pedro:**
Erosion Processes Prevention, Control and Monitoring Program; Water Resources Qualitative and Quantitative Monitoring Plan; Polluting Loads Survey Program for Córrego do Gordo and Jucu Braço Norte Rivers; Atmospheric Emission Control; Seeds Collection and Seeding Production Program; Flora Rescue Program; Restoration of Degraded Areas Program; Reforestation of the Surrounding Areas of the Reservoir Program; Fauna Rescue Program; Monitoring Program Ichthyofauna, Amphibians, Reptiles and Birds; Planktonic Communities Qualitative and Quantitative Monitoring Plan; Environmental Plan for the Preservation and Use of the Surrounding Areas of the Reservoir; Preservation Unit Creation Program; Environmental Education; Program; Tourism and Recreation Incentive Program; Archaeological Prospection Program.

**São Simão:**
Environmental Education Program; Erosion Process Prevention; Control and Monitoring Program; Water Resources Qualitative and Quantitative Monitoring Plan; Restoration of Degraded Areas Program; Seeds Collection and Seeding Production Program; Flora Rescue Program; Program for the Reforestation of the Surrounding Areas of the Reservoir; Monitoring Program of Ichthyofauna, Amphibians, Reptiles, Birds and Mammals; Preservation Units Creation Program; Fauna Rescue Program; Tourism and Recreation Incentive Program; Accidents Prevention program; Archaeological Prospection Program.

All projects included in the proposed project activity are operational and have the environmental licenses presented in the table below. In cases which operational license has expired, renewal protocol is presented demonstrating that project developers requested the renewal of license and is under renewal process in environmental agency.

**Table 23 – Operating licenses issued for the small hydropower plants included in the proposed project activity**

| SHP | Environmental Agency | Operation License (LO) Number | Date of LO issuance | LO Validity | Renewal Protocol |
|---|---|---|---|---|---|
| São Pedro | Instituto Estadual de Meio Ambiente e Recursos Hídricos do Espírito Santo (IEMA) | 197/2014 | 06/08/2014 | 06/08/2018 | Yes |
| Carangola | Secretaria de Estado de Meio Ambiente e Desenvolvimento Sustentável de Minas Gerais (SEMAD) | 089/ZM | 22/10/2007 | 22/10/2013 | Yes |
| Calheiros | Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) | 686/2007 | 31/10/2011 | 31/10/2021 | No |
| São Simão | Instituto Estadual de Meio Ambiente e Recursos Hídricos do Espírito Santo (IEMA) | 273/2014 | 13/11/2014 | 13/11/2018 | Yes |
| Funil | Secretaria de Estado de Meio Ambiente e Desenvolvimento Sustentável de Minas Gerais (SEMAD) | 378/2007 | 27/12/2007 | 27/12/2011 | Yes |
| São Joaquim | Instituto Estadual de Meio Ambiente e Recursos Hídricos do Espírito Santo (IEMA) | 299/2012 | 08/11/2012 | 08/11/2016 | No |
| Fumaça IV | Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) | 739/2008 | 04/01/2016 | 04/01/2022 | No |

| | | | | | |
|---|---|---|---|---|---|
| Jataí | Secretaria de Meio Ambiente e dos Recursos Hídricos de Goiás (SEMARH) | 3359/2011 | 21/12/2011 | 21/12/2015 | sim |
| Irara | Secretaria de Meio Ambiente e dos Recursos Hídricos de Goiás (SEMARH) | 1185/2010 | 22/12/2010 | 10/01/2020 | No |
| Bonfante | Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) | 756/2008 | 26/06/2013 | 26/06/2018 | Yes |
| Monte Serrat | Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) | 811/2008 | 05/08/2014 | 05/08/2024 | Yes |
| Santa Fé | Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) | 702/2007 | 13/06/2013 | 13/06/2018 | No |

Since licenses were issued for the implementation of projects as mentioned above, environmental studies were conducted during the licensing process and impacts for the project implementation were considered minor, otherwise, licenses would not be issued. Copy of licenses and receipt of renewal request are available with the Project Participants and were presented to DOE during validation.

## SECTION E. Local stakeholder consultation

### E.1. Solicitation of comments from local stakeholders

>>

The Brazilian Designated National Authority ("CIMGC", from the Portuguese Comissão Interministerial de Mudanças Globais do Clima), requests comments from local stakeholders, and the validation report issued by an authorized DOE according to the CIMGC Resolution # 7, issued on March 5th, 2008, in order to provide the Letter of Approval.

According to CIMGC Resolution #7/2008[45]:

*"If the project activities are in just one or several townships, within the geographical boundaries of a single state (State/Federal District), the letters of invitation must be sent to at least the following stakeholders:*

- ✓ *City hall of each involved township;*
- ✓ *City council of each involved township;*
- ✓ *State environmental body;*
- ✓ *Municipal environmental bodies;*
- ✓ *Brazilian NGO Forum and Social Movements for the Environment and Development – FBOMS*
- ✓ *Community associations whose purposes are direct or indirectly related to the project activity;*
- ✓ *The State Attorney General of the state involved, or, depending on the case, the Attorney General for the Federal District and Territories;*
- ✓ *Federal Attorney General.*

*If project activities involve more than one state and are submitted to the Interministerial Commission in a single Project Design Document, through bundling, the letters of invitation must be sent to at least the same stakeholders described above, for each project activity included in the bundling, considering the geographic boundary of each township and state involved.*

*If the boundary of a project activity extends beyond the boundaries of more than one state or the Federal District, but it does not involve bundling, and it is submitted to the CIMGC in a single PDD, through bundling, the letters of invitation must be sent to at least the following stakeholders:*

[45] Available at: <http://www.mct.gov.br/upd_blob/0219/219489.pdf>.

- ✓ *Government of each state or Federal District involved;*
- ✓ *Legislative assembly of each state involved, or in the case of the Federal District, the Legislative Chamber;*
- ✓ *Federal environmental body;*
- ✓ *State environmental bodies involved;*
- ✓ *Brazilian NGO Forum and Social Movements for the Environment and Development – FBOMS*
- ✓ *National entities whose purposes are direct or indirectly related to the project activity;*
- ✓ *The State Attorney Generals of the states involved, or, depending on the case, the Attorney General for the Federal District and Territories;*
- ✓ *Federal Attorney General*

Considering the requirement mentioned above, invitation letters were sent to the following agents in August 2011 (copies of the letters and post office confirmation of receipt communication are available upon request and were supplied to the DOE during validation):

**Table 24 – Letters of invitation to stakeholder consultation in August 2011 – First consultation**

| SHP | Location | City hall | City council | Municipal environmental bodies | State environmental body | Government of states | Legislative assembly |
|---|---|---|---|---|---|---|---|
| São Pedro | Domingos Martins (ES) | X | | | X | | |
| Carangola | Carangola (MG) | X | X | | X | | |
| Calheiros | Bom Jesus de Itabapoana (RJ) | X | X | | | | |
| | São José do Calçado (ES) | | X | | X | | |
| São Simão | Alegre (ES) | | | | X | | |
| Funil | Dores de Guanhães (MG) | X | X | | X | | |
| São Joaquim | Alfredo Chaves (ES) | X | X | | X | | |
| Fumaça IV | Caiana (MG) | X | | | X | | |
| | Dores do Rio Preto (ES) | X | X | X | X | | |
| Jataí | Jataí (GO) | X | X | X | X | | |
| Irara | Rio Verde (GO) | | | | X | | |
| Bonfante | Simão Pereira (MG) | X | X | | X | | |
| | Comendador Levy Gasparian (RJ) | X | X | | | | |
| Monte Serrat | Simão Pereira (MG) | | | | X | | |
| | Comendador Levy Gasparian (RJ) | | X | | | | |
| Santa Fé | Comendador Levy Gasparian (RJ) | | X | | | | |
| | Santana do Deserto (MG) | | X | | X | | |
| | Três Rios (RJ) | | | | | | |

| SHP | Location | FBOMS | Federal environmental body | Community associations | The State of Attorney | Federal Attorney |
|---|---|---|---|---|---|---|
| São Pedro | Domingos Martins (ES) | | X | X | X | X |
| Carangola | Carangola (MG) | | X | X | X | X |
| Calheiros | Bom Jesus de Itabapoana (RJ) | | X | X | X | X |
| | São José do Calçado (ES) | | X | X | X | X |
| São Simão | Alegre (ES) | | X | X | X | X |
| Funil | Dores de Guanhães (MG) | | X | X | X | X |
| São Joaquim | Alfredo Chaves (ES) | | X | X | X | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fumaça IV | Caiana (MG) | | x | x | x | x |
| | Dores do Rio Preto (ES) | | x | x | x | x |
| Jataí | Jataí (GO) | | x | x | | x |
| Irara | Rio Verde (GO) | | x | | | x |
| Bonfante | Simão Pereira (MG) | | x | | x | x |
| | Comendador Levy Gasparian (RJ) | | x | x | x | x |
| Monte Serrat | Simão Pereira (MG) | | x | | x | x |
| | Comendador Levy Gasparian (RJ) | | x | x | x | x |
| Santa Fé | Comendador Levy Gasparian (RJ) | | x | x | x | x |
| | Santana do Deserto (MG) | | x | x | x | x |
| | Três Rios (RJ) | | x | | x | x |

In the case of the impossibility to prove the invitation letters sent to stakeholder consultation in accordance with CIMGC Resolution # 7/2008, CIMGC Resolution # 10 dated 22/05/2013[46] determines that public hearings shall be conducted with all stakeholders, interested and/or affected by the project activities about the Clean Development Mechanism . Since invitation letters were missing to some entities identified during the CDM validation, invitation letters for the public consultation were sent to the following stakeholders in May 2014:

- Government of the states of Espírito Santo, Minas Gerais, Rio de Janeiro and Goiás;
- Legislative assembly of the states of Espírito Santo, Minas Gerais, Rio de Janeiro and Goiás;
- The environmental agency of Rio de Janeiro state ("INEA" from the Portuguese Instituto Estadual do Ambiente);
- Brazilian NGO Forum and Social Movements for the Environment and Development – FBOMS
- The State Attorney Generals of Goiás State (Ministério Público do estado de Goiás).

However, during the CDM validation there were doubts and misunderstandings regarding the 2nd public hearing conducted by the PPs, since not all listed stakeholders mentioned in CIMGC Resolution # 7/2008 were invited, but the missing entities involved in the project only. Furthermore, there were doubts regarding the entities to be considered in the stakeholder consultation process since there are projects included in the PDD which are located in more than one state and there are projects located in a single state of the Host Country. Also, the DOE demonstrated some concerns regarding the public meeting held in May 2014, since it was centralized in Rio de Janeiro and it was not conducted in other municipalities/states were the project activity has been developed. For this reason, several consultations were made to the Brazilian DNA, the DOE and the CDM Team as follows:

**Table 25 – Timeline of Project Participants consultations regarding the procedure for local stakeholder consultation**

| Date | Sender | Content |
|---|---|---|
| 03/12/2012 | Eletrobrás | Clarification request to CIMGC regarding the possibility of local stakeholder consultation ("LSC") by electronic proof of receipt. |
| 17/12/2012 | CIMGC | Non-acceptance of the consultation by electronic means and confirmation for the stakeholder consultation 15 days before the start of the CDM validation process ("GSP", Global Stakeholder Start). The Project Participant request was analyzed during the 14th Extraordinary Meeting held on 11/12/2012. |
| 17/12/2012 | Eletrobrás | The Project Participant informed to CIMGC that the CDM validation process of the proposed project activity started on 05/10/2012 and, therefore, a procedure to conducting the LSC was required. |
| 22/07/2014 | Eletrobrás | The Project Participant informed the status of the LSC process at that time, i.e. invitation letters sent in August 2011 and public meeting held in May 2014 with the missing entities not invited in August 2011. |
| 23/07/2014 | CIMGC | Confirmation that public meeting should be conducted with all stakeholders listed in CIMGC Resolution #10/2013. |
| 07/08/2014 | Eletrobrás | The Project Participant requested clarification if the public meeting could be |

[46] Available at: <http://www.mct.gov.br/upd_blob/0226/226477.pdf>.

| | | |
|---|---|---|
| | | held in one single location with all stakeholders, since resolution was not clear about this possibility. |
| 12/08/2014 | CIMGC | CIMGC confirmed that the request made by the Project Participant would be analyzed in during the 82nd Extraordinary Meeting on 26/09/2014. |
| 10/09/2014 | - | Meeting with the Project Participant (Eletrobras), the Mines and Energy Ministry ("MME", Ministério de Minas e Energia), the Environment Ministry ("MMA", Ministério do Meio Ambiente) and the Ministry of Science, Technology and Innovation ("MCTI", Ministério de Ciência, Tecnologia e Informação) to discuss the LSC held for the proposed project activity. |
| 18/09/2014 | Eletrobrás | The Project Participant sent a formal letter informing the status of the proposed project activity and the contribution of these projects to the Host Country sustainability. Also, it informed that all stakeholders listed in CIMGC Resolution #7/2008 participated somehow in the consultation process during August 2011 to May 2014. |
| 30/09/2014 | CIMGC | CIMGC suggested the temporary standstill of the CDM validation process for the preparation of invitation for local stakeholder comments following CIMGC Resolution #7/2008. The validation process shall start after 15 days of the invitation for local stakeholder comments at least, by the publication of the most recent version of the PDD at the UNFCCC website for consultation. In this case, the DOE shall arrange the republication of the PDD at the UNFCCC's website by explaining the reasons presented by the Brazilian DNA. |
| 17/10/2014 | DOE | Clarification request to the CDM Team for the re-publication of the PDD at the UNFCCC's website considering the Brazilian DNA suggestion on 30/09/2014. |
| 04/11/2014 | UNFCCC | The CDM Team confirms that amendments/corrections under the Brazilian DNA requirements could be done during the CDM validation after re-conducting the LSC without re-publishing the PDD for GSP. |
| 18/11/2014 | Eletrobrás | The Project Participant forwarded the CDM Team response to CIMGC. |
| 24/11/2014 | CIMGC | CIMGC confirms that the description of the new LSC process shall be included in the PDD and in the Validation Report. It informed that, although no re-publication would be done at the UNFCCC's website, all documented evidence of the new LSC shall be made public available at the UNFCCC's website during the project registration. |
| 08/12/2014 | Eletrobrás | The Project Participant conducted a new stakeholder consultation through letters sent for comments invitation to all stakeholders listed in CIMGC Resolution CIMGC Resolution #7/2008. |

As presented in the table above, the Project Participants conducted a new LSC in December 2014 by the invitation for comments of the applied stakeholders listed in CIMGC Resolution #7/2008 as indicated by CIMGC.

Detailed description of comments received during the stages of the local stakeholder consultation is presented in the following sections. All documented evidence was supplied to DOE.

## E.2. Summary of comments received

>>

As mentioned in section E.1, the stakeholder consultation of the proposed project activity was conducted in 3 (three) stages:

- First stage: invitation letters for comments before the Global Stakeholder Process (GSP) as required by the Brazilian DNA – CIMGC Resolution # 7/2008. Letters were sent in August 2011. No comments were received regarding this invitation;

- Second stage: because of the inability of the first stage performance of proof, were sent invitation letters for all stakeholders involved, interested and/or affected by the project activities , or programs of activities under the Clean Development Mechanism participation of a public consultation, as required by the Brazilian DNA – CIMGC Resolution # 10/2013, article 1st. The face public meeting was held by the Project Participants on May 26th, 2014.

  In this meeting, representatives from Eletrobrás clarified the goals of the meeting and the project activity compliance with the Brazilian DNA requirements. An overview of climate change, National

Policy of Climate Change ("PNMC" from the Portuguese Política Nacional de Mudança Clima) and Kyoto Protocol were presented. It was also presented an introduction of PROINFA objectives and carbon credits from the small hydropower plants of the proposed activity – São Pedro, Carangola, Calheiros, São Simão, Funil, São Joaquim, Fumaça IV, Jataí, Irara, Bonfante, Monte Serrat, Santa Fé.

The following comments were received during this meeting:

Comment 1: Mrs. Márcia Valle Real – representative from the Environmental Secretariat of Rio de Janeiro state (SEEMA/RJ): Mrs. Márcia clarified that it can be determined one "official" state for the location of projects under the boundaries of more than one state. Furthermore, it stated that all environmental licensing process is from the Environmental Agency of Rio de Janeiro State (INEA/RJ) responsibility.

Comment 2: Mr. Sérgio Soares da Silva – representative from the State of Attorney for Public Interest of Goiás state: Mr. Sérgio raised the following questions: (i) How the the Project Participant Eletrobrás has been dealing with the Operation License renewal of PROINFA projects? (ii) Why the biomass projects have been withdrawal from the CDM process?

Comment 3: Mr. Daniel Rennó Tenenwurcel – representative from the government of Minas Gerais State: Mr. Daniel asked about the period of the CDM registration conclusion for the proposed project activity.

- Third stage: invitation letters for comments were sent in December 2014 for a new LSC as suggested by the Brazilian DNA in agreement with the UNFCCC. No comments were received during this consultation, except for the Federal Attorney General informing that consultations regarding CDM projects should be done to the Ministry of Science, Technology and Innovation ("MCTI" from the Portuguese Ministério de Ciência, Tecnologia e Inovação) – the Brazilian DNA. It also informed that the Federal Attorney General cannot provide advisory services for public and private entities.

## E.3. Report on consideration of comments received

>>

In the first stage of the public consultation of the proposed project activity, no comments were received. However, during the second stage of public consultation, comments were received and documented in the Minutes of Meeting dated May 26th, 2014.

Comments from the public meeting held on May 26th, 2014 were presented in section E.2 above and report on consideration of comments /responses for the comments received are presented below:

Comment 1: the Project Participant Eletrobrás confirmed that the Brazilian Power Regulatory Agency (ANEEL) resolutions were satisfied/fulfilled.

Comment 2: the Project Participant Eletrobrás stated that payment for the electricity purchase is suspended in cases which the project owners do not regulate licenses of their projects. In some cases, the contract may be terminated. Regarding PROINFA biomass projects, Eletrobrás clarified that these projects were not excluded from PROINFA; but they do not follow the CDM requirements and methodologies.

Comment 3: the Project Participant Eletrobrás stated that the estimated period for the CDM process conclusion is 6 (six) months.

Since no comments were received during the third stage LSC process, but only the statement of the Federal Attorney General exempting its opinion, no actions were taken by the Project Participants regarding this letter.

## SECTION F. Approval and authorization

>>

The only Party involved in the proposed project activity is the Host Country, Brazil. In Brazil, in order to obtain the Letter of Approval (LoA), the Project Participants must submit the Final Validation Report to the Brazilian DNA ("CIMGC" from the Portuguese Comissão Interministerial de Mudança Global do Clima).

The procedures established by the Brazilian DNA in order to obtain the LoA, are determined in Resolution # 1 dated September, 11th 2003. Further information related to the methods and procedures for the issuance of the Brazilian LoA can be obtained in the "Manual for submission of project activities under CDM" (from the Portuguese "Manual para submissão de atividades de projeto no âmbito do MDL"), available at: <http://www.mct.gov.br/upd_blob/0025/25268.pdf>.

# Appendix 1. Contact information of project participants and responsible persons/ entities

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Centrais Elétricas Brasileiras S/A – ELETROBRÁS |
| **Street/P.O. Box** | Rua do Ouvidor, 107 – 5º andar |
| **Building** | Leonel Miranda |
| **City** | Rio de Janeiro |
| **State/Region** | Rio de Janeiro |
| **Postcode** | 20040-030 |
| **Country** | Brazil |
| **Telephone** | (021) 2514-5894 |
| **Fax** | (021) 2514-5811 |
| **E-mail** | camargo@eletrobras.com |
| **Website** | |
| **Contact person** | Jorge de Oliveira Camargo |
| **Title** | Head of the Division of Studies of Market |
| **Salutation** | Mr |
| **Last name** | Camargo |
| **Middle name** | de Oliveira |
| **First name** | Jorge |
| **Department** | Energetic Expansion Studies Department - GCE |
| **Mobile** | - |
| **Direct fax** | +55 (21) 2514-5948 |
| **Direct tel.** | +55 (21) 2514-5893 |
| **Personal e-mail** | camargo@eletrobras.com |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Centrais Elétricas Brasileiras S/A – ELETROBRÁS |
| **Street/P.O. Box** | Rua do Ouvidor, 107 – 5º andar |
| **Building** | Leonel Miranda |
| **City** | Rio de Janeiro |
| **State/Region** | Rio de Janeiro |
| **Postcode** | 20040-030 |

| | |
|---|---|
| **Country** | Brazil |
| **Telephone** | (021) 2514-5894 |
| **Fax** | (021) 2514-5811 |
| **E-mail** | camargo@eletrobras.com |
| **Website** | |
| **Contact person** | Jorge de Oliveira Camargo |
| **Title** | Head of the Division of Studies of Market |
| **Salutation** | Mr |
| **Last name** | Camargo |
| **Middle name** | de Oliveira |
| **First name** | Jorge |
| **Department** | Energetic Expansion Studies Department - GCE |
| **Mobile** | - |
| **Direct fax** | +55 (21) 2514-5948 |
| **Direct tel.** | +55 (21) 2514-5893 |
| **Personal e-mail** | camargo@eletrobras.com |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | São Pedro Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Carangola Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Calheiros Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |

| | |
|---|---|
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | São Simão Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Funil Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |

| | |
|---|---|
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | São Joaquim Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |

| | |
|---|---|
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Caparaó Energia S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Jataí Energética S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |

| | |
|---|---|
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Irara Energética S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Bonfante Energética S/A |

| | |
|---|---|
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Monte Serrat Energética S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |

| | |
|---|---|
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

| | |
|---|---|
| **Project participant and/or responsible person/ entity** | ☒ Project participant<br>☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity |
| **Organization name** | Santa Fé Energética S/A |
| **Street/P.O. Box** | Avenida Prudente de Morais, 1250 10º and 11º andares |
| **Building** | - |
| **City** | Belo Horizonte |
| **State/Region** | Minas Gerais |
| **Postcode** | 30380-252 |
| **Country** | Brazil |
| **Telephone** | - |
| **Fax** | - |
| **E-mail** | - |
| **Website** | - |
| **Contact person** | Mr. Edvaldo Santana |
| **Title** | - |
| **Salutation** | Mr. |
| **Last name** | Santana |
| **Middle name** | |
| **First name** | Edvaldo |
| **Department** | - |
| **Mobile** | - |
| **Direct fax** | - |
| **Direct tel.** | +55 (31) 3527-9100 |
| **Personal e-mail** | edvaldosantana@brasilpch.com.br |

# Appendix 2. Affirmation regarding public funding

No public funding is involved in the present project.

This project is not a diverted ODA from an Annex 1 country.

# Appendix 3. Applicability of methodology and standardized baseline

This section is intentionally left blank. For details please refer to section B.2. above.

# Appendix 4. Further background information on ex ante calculation of emission reductions

This section is intentionally left blank. For details please refer to sections B.6.1 and B.6.3 above

# Appendix 5. Further background information on monitoring plan

Not applicable.

# Appendix 6. Summary of post registration changes

Not applicable.

## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 07.0 | 15 April 2016 | Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0). |
| 06.0 | 9 March 2015 | Revisions to:<br>• Include provisions related to statement on erroneous inclusion of a CPA;<br>• Include provisions related to delayed submission of a monitoring plan;<br>• Provisions related to local stakeholder consultation;<br>• Provisions related to the Host Party;<br>• Editorial improvement. |
| 05.0 | 25 June 2014 | Revisions to:<br>• Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0));<br>• Include provisions related to standardized baselines;<br>• Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1;<br>• Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;*<br>• Editorial improvement. |
| 04.1 | 11 April 2012 | Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b |
| 04.0 | 13 March 2012 | Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8). |
| 03.0 | 26 July 2006 | EB 25, Annex 15 |
| 02.0 | 14 June 2004 | EB 14, Annex 06b |
| 01.0 | 03 August 2002 | EB 05, Paragraph 12<br>Initial adoption. |

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document