



United Nations Development Programme

Country: COLOMBIA

PROJECT DOCUMENT

**Project Title:** NAMA Pilot Implementation of Technology Transfer Projects in the Industrial Sector of the Cundinamarca-Bogotá Region

**UNDAF Outcomes:** Strengthening of the national, regional, and local capacities for the comprehensive management of the territory, which guarantees sustainable development.

**Primary outcomes of the UNDP Strategic Environmental and Sustainable Development Plan:** Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (Output 1.5)

**Expected Product from Country Programme:** Strengthening of capacities by civil society and public institutions in order to address and reduce the negative impact of climate change, the reduction of the ozone layer, solid waste management, comprehensive management of water sources and persistent organic pollutants, in accordance with international agreements.

**Expected Product from CPAP:** Civil society and public institutions strengthen their capacity to address and reduce the negative impact of climate change, the reduction of the ozone layer, solid waste management, comprehensive management of water sources and persistent organic pollutants, in accordance with international agreements/At least 4 new initiatives in 2012.

**Executing Agency/Implementing Partner:** Corporación Ambiental Empresarial (CAEM)

**Implementing Agency/Responsible Partner:** United Nations Development Programme - UNDP Colombia

**Brief Description**

Based on an analysis of the energy and technology status of the most energy intensive industries in the region of Bogota-Cundinamarca, the project aims to promote technology transfer through the development of pilot projects with industry sector companies in the region. This will provide inputs for developing a NAMA for the industry sector in order to reduce the sector's GHG emission, improving their productivity and competitiveness in line with the Colombian Low-Carbon Development Strategy.

Thus, the project will support technology transfer in industry sub-sectors in the region through the implementation of the following components: 1) Strengthening the capacity of industry to establish their business-as-usual energy and GHG emissions baseline; 2) Implementation of technology transfer pilot projects in accordance with identified and prioritized mitigation actions in the industry sector; and 3) Knowledge management for the replicability of the impact of the technology transfer pilot projects in the industry sector.

|                         |           |                            |                |
|-------------------------|-----------|----------------------------|----------------|
| Programme Period:       | 2008-2014 | Total resources required   | USD 13,853,944 |
| Atlas Award ID:         | 00089717  | Total allocated resources  | 13,853,944     |
| Project ID:             | 00095815  |                            |                |
| PIMS #                  | 5190      | o GEF                      | USD 1,726,484  |
| Start date:             | Dec 2015  | o Government (cash)        | 9,000,000      |
| End Date                | Dec 2019  | o Government (in-kind)     | 1,743,260      |
| Management Arrangements | NIM       | o Private Sector (in kind) | 610,000        |
| PAC Meeting Date        | _____     | o Swisscontact (in kind)   | 220,000        |
|                         |           | o USAID (in kind)          | 354,200        |
|                         |           | o UNDP Colombia (in kind)  | 200,000        |

Agreed by (Executing Agency/Implementing Partner): Corporación Ambiental Empresarial (CAEM):

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Date/Month/Year

Agreed by UNDP:

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Date/Month/Year

## LIST OF ACRONYMS

|        |   |
|--------|---|
| BAU    | Business As Usual.  |
| BOPS   | Energy Best Operating Practices.  |
| CAEM   | Environment and Business Corporation. In Spanish: <i>Corporación Ambiental Empresarial</i>  |
| CCB    | Chamber of Commerce of Bogota, for its acronym in Spanish.  |
| CPAP   | Country Programme Action Plan.  |
| ISIC   | International Standard Industrial Classification.   |
| CRC    | Regional Competitiveness Commission, for its acronym in Spanish.  |
| DANE   | National Administrative Department of Statistics. In Spanish: <i>Departamento Administrativo de Estadística</i> , for its acronym in Spanish. |
| DNP    | National Planning Department. In Spanish: <i>Departamento Nacional de Planeación</i>  |
| EAM    | Annual Manufacturing Survey, for its acronym in Spanish.  |
| ECDBC  | Colombia's Low-Carbon Development Strategy. In Spanish: <i>Estrategia Colombiana de Desarrollo Bajo en Carbono</i>                            |
| ESCO   | Energy Service Company.   |
| GHG    | Greenhouse Gas.   |
| GEF    | Global Environment Facility.  |
| GMS    | Global Management Support.  |
| APR    | Annual Project Report.  |
| ICR    | Regional Competitiveness Report, for its acronym in Spanish.  |
| IDEAM  | Hydrology, Meteorology and Environmental Studies Institute. In Spanish: <i>Instituto de Hidrología, Meteorología y Estudios Ambientales</i>   |
| MADS   | Ministry of Environment and Sustainable Development, for its acronym in Spanish.  |
| MinCIT | Ministry of Industry, Commerce, and Tourism, for its acronym in Spanish.  |
| MME    | Ministry of Mines and Energy, for its acronym in Spanish.   |
| MMM    | Monthly Manufacturing Sample, for its acronym in Spanish.   |
| MTMR   | Regional Quarterly Manufacturing Sample, for its acronym in Spanish.  |
| MRV    | Monitoring, Reporting, and Verification.  |
| NAMA   | Nationally Appropriate Mitigation Actions.  |
| NIM    | National Implementation Measure.  |
| NINO   | NAMA Information Note.  |
| GDP    | Gross Domestic Product.   |
| PIMS   | Project Institutional Memory System.  |
| PIR    | Project Implementation Report.  |
| NDP    | National Development Plan.  |
| UNDP   | United Nations Development Programme.   |
| PRICC  | Climate Change Regional Comprehensive Plan Capital Region, for its acronym in Spanish.  |
| PROURE | National Programme for the Rational and Efficient Use of Energy, for its acronym in Spanish.  |
| SMEs   | Small and Medium Enterprises.   |
| SBAA   | Standard Basic Assistance Agreement.  |
| SIREM  | Business Information and Reporting System, for its acronym in Spanish.  |
| SLCP   | Short-Lived Climate Pollutants.   |
| UNFCCC | United Nations Framework Convention on Climate Change.  |
| UPME   | Mining and Energy Planning Unit, for its acronym in Spanish.  |
| REU    | Rational Energy Use.  |

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## 1. SITUATION ANALYSIS

1. According to the 2008 inventory of greenhouse gas (GHG) emissions developed under the Climate Change Comprehensive Regional Plan for Capital Region (PRICC) for the region of Bogotá-Cundinamarca, total GHG emissions were 22,962,000 tCO<sub>2</sub> equivalent, of which 12,508,000 tCO<sub>2</sub>e correspond to the city of Bogotá and 10,454,000 tCO<sub>2</sub>e correspond to the department of Cundinamarca. Of the total emissions, 73.3% in Bogotá correspond to energy (use of fossil fuels in power generation, transportation, industry and commerce), 24.8% to waste, 1.6% to industrial processes (production of cement, coke, glass and substitutes), and 0.3% to agriculture<sup>1</sup>. On the other hand, in Cundinamarca, 56% of emissions correspond to the energy sector (use of fossil fuels in power generation, transportation, industry and commerce), 35% to agriculture, 6% to waste, and 3% to industrial processes (production of cement, coke, glass and substitutes).

2. The industry sector is one of the prioritized sectors within the Colombian Low-Carbon Development Strategy (ECDBC). The ECDBC is a development planning program in the short, medium and long term that seeks to decouple the increase of GHG emissions from national economic growth. It is led by the Ministry of Environment and Sustainable Development (MADS) and supported by the National Planning Department (DNP), and the sectoral Ministries of Colombia. Under the framework of the ECDBC, a study conducted in 2014 by the University Los Andes in Colombia (by request of the Ministry of Environment, Housing and Territorial Development) has developed abatement cost curves for the industry sector. This study preliminarily identified the potential and costs of mitigation measures that could be implemented in the industry sector, mainly focused on technological transformation and energy efficiency. The measures identified by the work team in charge of the formulation of this proposal largely correspond to those included in the University Los Andes study, demonstrating the project is aligned with what has been previously analyzed by the National Government.

### 1.1. CONTEXT OF THE INDUSTRY SECTOR IN THE BOGOTÁ – CUNDINAMARCA REGION

#### General Aspects of the Region

3. The Bogotá-Cundinamarca region includes the city of Bogotá, located in the department of Cundinamarca, northwest of the Andes mountain range, in a 1,776 km<sup>2</sup> savannah, at an average altitude of 2,625 meters above sea level and with an average temperature of 14°C. On the other hand, the department of Cundinamarca covers an area of 22,434 km<sup>2</sup> and it is bordered by the departments of Boyacá and Meta to the north, by Huila and Tolima to the south, and by extensions of Tolima to the west.

4. Nationwide, there were on average 653,093<sup>2</sup> people working for the industry sector (taking into account the 19 industry groups<sup>3</sup>) in 2013, of which 40% (261,731 people) were concentrated in the Bogotá-Cundinamarca region (194,490 people in Bogotá and 67,241 people in Cundinamarca)<sup>4</sup>.

5. As a region, Bogotá-Cundinamarca accounts for 27.9% of the National GDP<sup>5</sup>, roughly a quarter of the national gross domestic product. Bogotá and Cundinamarca are economically and socially heterogeneous, inter alia, due to their disaggregated contributions to the GDP accounting for 22.9% for Bogotá and 5% for Cundinamarca, according to the latest economic profile and report by the Ministry of Commerce, Industry and Tourism (MinCIT).

6. The Gross Domestic Product (GDP) of the region accumulated on average US\$91,929 million during the 2009-2013 term. The region is characterized by the development of 5 main economic sectors which drive the annual national economic growth of 3.9%. These are: industry, trade, services, agriculture, and mining (the first three sectors concentrated in Bogotá and its surrounding municipalities).

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1 Document: Climatic Change Regional Comprehensive Plan - Capital Region - PRICC. (2008). Inventory of GHG emissions for the Cundinamarca-Bogotá region.

2 Results of the Annual Manufacturing Survey (EAM) 2013.

3 Industry groups established by the National administrative Department of Statistics (DANE) on the EAM.

4 EAM figures; 2013.

5 Ministry of Commerce, Industry and Tourism, 2015

7. According to the Regional Competitiveness Report (ICER) 2010, the region's industry sector is mainly concentrated in the municipalities around Bogota, with metallurgical, pharmaceutical and textile activities, among others. In Bogota, the industry sector contributes with an 8.8% of the local GDP (US\$13,746 million), where the manufacturing industry accounts for 74.6% of the local gross production. Meanwhile, in Cundinamarca, the set of industry subsectors that contribute to the development of the department are related to the processing of mineral materials, chemical and agricultural type (with a gross output of about US\$2,415 million). The production of the industry and services sector represent 66% of the regional GDP, contributing with about US\$16,161 million to the latter in the last 5 years.

#### **GHG Emissions associated to the industry sector<sup>6</sup>**

8. In the region, the emissions related to the industry sector for 2012 were:

| <b>Emissions related to energy consumption</b> |                         |                      |                               |                      |
|--|-------------------------|----------------------|-------------------------------|----------------------|
| Industry Subsectors                            | GHG Emissions in Bogotá |                      | GHG Emissions in Cundinamarca |                      |
|  | (tCO <sub>2</sub> )     | Total Percentage (%) | (tCO <sub>2</sub> )           | Total Percentage (%) |
| Food, drinks, and tobacco                      | 527,000                 | 18                   | 370,000                       | 21                   |
| Textile and garments, shoes and leathers       | 371,000                 | 13                   | 33,200                        | 2                    |
| Paper and press                                | 520,500                 | 17                   | 55,200                        | 3                    |
| Chemicals                                      | 400,200                 | 14                   | 187,000                       | 10                   |
| Cement, rocks, glass, and ceramic              | 829,300                 | 28                   | 1,019,000                     | 57                   |
| Iron, steel, and non- metal                    | 113,400                 | 4                    | 76,300                        | 4                    |
| Other Manufacturing Industries                 | 190,500                 | 6                    | 53,200                        | 3                    |
| <b>Total</b>                                   | <b>2,951,900</b>        | <b>100</b>           | <b>1,624,900</b>              | <b>100</b>           |

| <b>Emissions due to industrial processes</b> |                         |                      |                               |                      |
|--|-------------------------|----------------------|-------------------------------|----------------------|
| Activities                                   | GHG Emissions in Bogotá |                      | GHG Emissions in Cundinamarca |                      |
|  | (tCO <sub>2</sub> )     | Total Percentage (%) | (tCO <sub>2</sub> )           | Total Percentage (%) |
| Industrial Processes                         | 198,000                 | 100                  | 296,000                       | 100                  |
| <b>Total</b>                                 | <b>198,000</b>          | <b>100</b>           | <b>296,000</b>                | <b>100</b>           |

<sup>6</sup> The figures referred to in here correspond to the GHG Technical Report for Bogotá-Cundinamarca, 2012, which complies with GHG calculation procedures by the IPCC (Intergovernmental Panel on Climate Change).

## Environmental Investments and gender considerations

9. According to the Environmental Industrial Survey (EAI)<sup>7</sup>, the industry sector invests money in order to prevent, mitigate and control environmental impacts. By 2012, industrial establishments made investments in environmental protection for US\$141.919 million, mostly in response to the environmental regulation enforced by country environmental authorities. These investments were mainly allocated to air and climate protection of the influence area (58.5%) and wastewater management activities, waste management, noise reduction, and other environmental protection categories (41.5 %).

10. Although the industrial sector has invested a remarkable sum in environmental compliance related issues, the sector is a source of air, water, soil and noise pollution. Nearby communities are often directly affected by these negative side-effects of industry, and women and children are the most vulnerable to these impacts. Studies by the Distrital Secretary of Health in Bogota show that each 10 microgram-increase in particulate matter per cubic meter of air due to industrial activity may increase by up to 20% of medical consultations on acute respiratory infections among vulnerable populations (children, pregnant women and elderly persons).

11. This project has the potential to improve air quality aspects as a co-benefit of the project through the employment of new technology and more efficient operation of existing technologies, which reduces the amount of particulate matter released to the air. This may help reduce the development of respiratory diseases in nearby communities, and therefore indirectly in lower social costs, reduced sickness absence of workforce, and increased workforce productivity.

12. On the other hand, the industrial sector employs around 38,000 women in the Cundinamarca-Bogota region and 95,000 on a national level (an estimated 14.6% of the persons employed in the industrial sector are women), and therefore are constantly exposed to the negative impacts of the sector. The positive aforementioned air quality-related co-benefits may therefore have the potential to enhance working conditions and reduce health-related risks especially for women workers in the sector, as women are often more vulnerable to negative environmental impacts. Evidently, the positive impacts of better air quality conditions will benefit to all people employed by the sector.

## 1.2. SITUATION OF PRIORITIZED INDUSTRY SUBSECTORS IN THE BOGOTÁ – CUNDINAMARCA REGION

The project has identified four industrial subsectors to support energy efficiency measures in the Bogotá – Cundinamarca region. Below is a brief description of the baseline conditions of each subsector.

### Subsector A – Basic iron, steel industry, and of metal and non-metallic mineral products

13. The latest regional economic profiles report published by the MinCIT<sup>8</sup> and EAM records show an economic share of 23% for the industry subsector of basic iron, steel, and metal and non-metallic mineral products in the region with US\$2,385 million in gross production. In social terms, employment generation associated with industry subsector employment accounts for 5.3% of the working population in the region, which is about 13,879 persons.

#### *Subsector emissions*

14. During the production process the subsector consumes large amounts of energy. Although most gases in the subsector are associated to CO<sub>2</sub> compounds, methane traces and nitrogen oxides are also released into the environment. According to the GHG inventory for the region<sup>9</sup>, in 2012 the industry sector emitted a total of 5,070,800 tCO<sub>2</sub>e due to energy consumption and industrial processes, of which 36.45% (1,848,300 tCO<sub>2</sub>e) correspond to emissions due to the production of cement, stones, glass and ceramics, and 3.74% (189,700 tCO<sub>2</sub>e) to the production of iron, steel and non-metal.

<sup>7</sup> Published on August 30, 2014, considering data of the 2011-2012 term.

<sup>8</sup> Economic Profile Report Ministry of Industry, Commerce, and Tourism (MinCIT), available at: <http://www.mincit.gov.co/publicaciones.php?id=16724>

<sup>9</sup> Report published by the PRICC in 2012.



### Subsector economic profiles

15. The industrial subsector associated to the processing of metallic and non-metallic minerals is represented by 310 companies<sup>10</sup> in the region (247 companies in Bogota and 63 in Cundinamarca). According to the Business Information and Reporting System-SIREM of the Superintendence of Corporations, the associated subsector accumulates assets of approximately US\$6 billion for the region.

16. Associated with the industry subsector, the region has small, medium and large enterprises as categorized by total assets. In Bogota, 93% are large companies (US\$4.7 billion), and the remaining 7% are medium (US\$286,504 million) and small (US \$95,349 million); on the other hand, in Cundinamarca, 85% of subsector enterprises are large (US\$0.8 billion), and the remaining 15% are medium (US\$117,395 million) and small (US\$19,038.5 million). Most assets of this industry subsector are focused in Bogotá, with around 8 times more assets than Cundinamarca.

### Energy Uses

17. The use of mechanical and thermal equipment for the physical molding or shaping of minerals and their transformation into useful materials for other industries is common in the subsector. In the processing industry of metallic and non-metallic minerals, the use of machinery is mainly associated with the common steps of: rolling, bending, cutting and molding; where some equipment such as winches, conveyors, numerical control systems, bulbs for the plant and machinery, turbines and others are used.

18. In studies developed by the Mining and Energy Planning Unit (UPME) in 2013 and 2014<sup>11</sup>, the main uses of energy in the subsector are related to:

| Energy Use                        | Share in Total Energy Consumption | Activity  |
|-----------------------------------|-----------------------------------|---|
| Direct heat                       | 68.58%                            | Use of ovens for metalworking, brick, ceramics, or glass production (these ovens mainly run on mineral coal and natural gas). |
| Equipment requiring motive force  | 17.98%                            | Uses in engines for conveyor belts, pumps, ventilators, compressed air and extractors.  |
| Electricity consumption equipment | 8.9%                              | Uses in lightning of installations, A/C, and cooling systems.   |

### Subsector B – Manufacturing of petroleum products, outside refinery, basic chemicals, pharmaceutical products, soaps, detergents, and other chemical products

19. The latest regional economic profiles report published by the MinCIT and EAM records show an economic share of the industry subsector of 48% in the region with US\$5,410 million in gross production. In social terms, employment generation associated with industrial subsector employment accounts for 22.46% of the employed population in the region, about 58,785 people.

### Subsector emissions

20. During the production process, the subsector consumes large amounts of energy. According to the GHG inventory for the region<sup>12</sup>, in 2012 the industrial sector emitted a total of 5,070,800 tCO<sub>2</sub>e due to energy consumption and industrial processes, of which 11.58% (587,200 tCO<sub>2</sub>e) correspond to emissions due to ventilation systems, distillation units, and laboratory fume hood, materials loading and unloading operations,

<sup>10</sup> The number of enterprises referred to correspond to the group of enterprises that voluntarily register their assets on SIREM of the Superintendence of Industry and Commerce; which means it does not necessarily include the total number of enterprises linked to the subsector.

<sup>11</sup> 2014. UPME – CORPOEMA. Determination and prioritization of energy efficiency alternatives for manufacturing subsectors code ISIC 19 to 31 in Colombia based of the characterization of energy consumption for their different processes, uses and final use equipment.

<sup>12</sup> Report published by the PRICC in 2012



leaks in pumps, valves, ledges, sampling, mechanical seals, delivery devices and tanks, and secondary operations including treatment of wastes, dumping, cooling towers, sewage procedures, areas of spills and leaks.

#### *Subsector economic profiles*

21. The industry associated to the manufacture of petroleum products, basic chemicals, pharmaceutical products, soaps and detergents, and other chemical products, is represented by 279 companies<sup>13</sup> in the region (225 companies in Bogota and 54 in Cundinamarca).

22. Associated with the industry subsector, the region has small, medium and large enterprises as categorized by total assets. In Bogota, 89% are large companies (US\$3.45 billion), and the remaining 11% are medium (US\$318,667 million) and small (US\$115,965 million); on the other hand, in Cundinamarca, 93% of subsector enterprises are large (US\$1,25 billion), and the remaining 7% are medium (US\$ 93.190 million) and small (US\$9.314 million). Most assets by industry subsector type are focused in Bogotá, which has on average 4 times more assets than Cundinamarca.

#### *Energy Uses*

23. Studies carried out by the UPME in 2013 and 2014<sup>14</sup>, show that the main uses of energy in the subsector are related to:

| Energy Use                        | Share in Total Energy Consumption | Activity  |
|-----------------------------------|-----------------------------------|---|
| Direct heat                       | 22.42%                            | Use of ovens and boilers that mainly run on natural gas during manufacturing processes.   |
| Indirect heat                     | 18.32%                            |   |
| Equipment requiring motive force  | 50.71%                            | Uses and operation of equipment for ventilation, extraction, compressed air, pumps and process equipment that consumes electricity. |
| Electricity consumption equipment | 8.55%                             | Uses in lightning of installations, A/C, and cooling systems.   |

#### **Subsector C – Processing of meat, oils and greases, fruits and vegetables**

24. This sector's economic activities are concentrated in Bogotá<sup>15</sup>. According to Decree 315 of 2006, by which the Master Plan for Food Supply and Food Security for Bogota Capital District is adopted and other provisions are dictated, 33% of the basic foods consumed in Bogotá are at a distance of 40 kilometers from the capital and the remaining 67% at a radius of 300 kilometers, (Cundinamarca, Boyacá, Tolima, and Meta). The latest regional economic profiles report published by the MinCIT and the EAM records show an economic share in the industry subsector of US\$1,014 million in gross production in the region. In social terms, employment generation associated with industrial subsector employment accounts for 3.34% of the employed population in the region, which are about 8,754 people (employed in meat and fish processing, and the processing of fruit, vegetables, oils, and greases).

<sup>13</sup> The number of enterprises referred to correspond to the group of enterprises that voluntarily register their assets on SIREM of the Superintendence of Industry and Commerce; which means it does not necessarily include the total number of enterprises linked to the subsector.

<sup>14</sup> <sup>14</sup> 2014. UPME – CORPOEMA. Determination and prioritization of energy efficiency alternatives for manufacturing subsectors code ISIC 19 to 31 in Colombia based of the characterization of energy consumption for their different processes, uses and final use equipment.

<sup>15</sup> According to the Chamber of Commerce of Bogotá (CCB); on its report "Characterization of productive chains of manufacture and services in Bogotá and Cundinamarca"-2004

### Subsector emissions

25. According to the GHG inventory for the region<sup>16</sup>, in 2012 the industrial sector emitted a total of 5,070,800 tCO<sub>2</sub>e due to energy consumption and industrial processes, of which 17.69% (897,000 tCO<sub>2</sub>e) correspond to emissions associated to food processing (including meat and fish processing, and the processing of fruit, vegetables, oils and greases, beverages and tobacco production<sup>17</sup>.

### Subsector economic profiles

26. The industry associated with the processing of meat, oils and greases, fruits and vegetables is represented by 76 companies<sup>18</sup> in the region (68 companies in Bogota and 8 in Cundinamarca). According to the Business Information and Reporting System-SIREM of the Superintendence of Corporations, the associated industry accumulates assets of approximately US\$1.44 billion for the region.

27. Associated with the industry subsector the region has small, medium and large enterprises as categorized by total assets. In Bogota, 88% are large companies (US\$1.21 billion), and the remaining 11% are medium (US \$ 143,468 million) and small (US \$ 16,730 million); meanwhile, in Cundinamarca, 72% of subsector enterprises are large (US\$46,096 million), and the remaining 28% are medium (US\$15,215 million) and small (US\$2,538 million). Most assets by industry subsector are focused in Bogotá, which has on average 22 times more assets than Cundinamarca.

### Energy Uses

28. In studies developed by the UPME in 2013 and 2014<sup>19</sup>, the main uses of energy in the subsector are related to:

| Energy Use                        | Share in Total Energy Consumption | Activity  |
|-----------------------------------|-----------------------------------|---|
| Direct heat                       | 75.88%                            | Use and operation of boilers that run both on coal and natural gas.   |
| Indirect heat                     |                                   |   |
| Equipment requiring motive force  | 12.01%                            | Uses and operation of equipment for ventilation, extraction, compressed air, pumps and process equipment that consumes electricity. |
| Electricity consumption equipment | 12.11%                            | Uses in lightning of installations, office equipment, cooling systems, A/C, compressed air, among other uses.                       |

### Subsector D – Manufacture of dairy products, candies, coffee, chocolate, and other food products

29. The latest regional economic profiles report published by the MinCIT and EAM records show an economic share of this industry subsector of 14% with US\$1,638 million in gross production in the region. In social terms, employment generation associated with industrial subsector employment accounts for 8.28% of the employed population in the region, equaling about 21,691 people (employed in the manufacture of dairy products, candies, coffee, chocolate, and other food products).

<sup>16</sup> Report published by the PRICC in 2012.

<sup>17</sup> The figures shown are from the GHG Report for Bogotá-Cundinamarca -2012, which uses the IPCC for its calculation, in line with the National GHG Report -2010.

<sup>18</sup> The number of enterprises referred to correspond to the group of enterprises that voluntarily register their assets on SIREM of the Superintendence of Industry and Commerce; which means it does not necessarily include the total number of enterprises linked to the subsector.

<sup>19</sup> 2014. UPME – CORPOEMA. Determination and prioritization of energy efficiency alternatives for manufacturing subsectors code ISIC 19 to 31 in Colombia based of the characterization of energy consumption for their different processes, uses and final use equipment

### Subsector emissions

30. According to the GHG inventory for the region<sup>20</sup>, in 2010 the industrial sector emitted a total of 5,070,800 tCO<sub>2</sub>e due to energy consumption and industrial processes, of which 17.69% (897,000 tCO<sub>2</sub>e) correspond to emissions associated to processing of food, beverages and tobacco<sup>21</sup> (including the manufacture of dairy products, candies, coffee, chocolate, and other food products).

### Subsector economic profiles

31. The industry associated with the manufacture of dairy products, candies, coffee, chocolate, and other food products is represented by 120 companies in the region<sup>22</sup> (97 companies in Bogota and 23 in Cundinamarca). According to the Business Information and Reporting System-SIREM of the Superintendence of Corporations, the associated industry accumulates assets of approximately US \$ 2.15 billion for the region.

32. Associated with the industry subsector the region has small, medium and large enterprises as categorized by total assets. In Bogota, 90% are large enterprises (US\$1.69 billion), and the remaining 10% are medium (US \$ 160,368 million) and small (US \$ 24,008 million); meanwhile, in Cundinamarca, 80% of subsector enterprises are large (US\$217,480 million), and the remaining 20% are medium (US\$51,384 million) and small (US\$3,738 million). Most assets by industry subsector are focused in the city of Bogotá, which has on average 7 times more assets than Cundinamarca.

### Energy Uses

33. In studies developed by the UPME in 2013 and 2014<sup>23</sup>, the main uses of energy in the subsector are related to:

| Energy Use                        | Share in Total Energy Consumption | Activity  |
|-----------------------------------|-----------------------------------|---|
| Direct heat                       | 79.37%                            | Use and operation of ovens and boilers that run both on coal and natural gas.   |
| Indirect heat                     |                                   |   |
| Equipment requiring motive force  | 13.65%                            | Uses and operation of equipment for ventilation, extraction, compressed air, pumps and process equipment that consumes electricity. |
| Electricity consumption equipment | 6.98%                             | Uses in lightning of installations, office equipment, cooling systems, A/C, compressed air, among other uses.                       |

## 1.3. BASELINE SITUATION OF PRIORITIZED INDUSTRY SUBSECTORS IN THE BOGOTÁ – CUNDINAMARCA REGION

### Economic Context

34. Overall, the industrial sector is currently facing financial issues associated with a decline in productivity and loss of competitiveness, both at the national level due to the loss of local market because of imports, and internationally due to the decrease in exports. According to DANE's Monthly Manufacturing Sample (MMM), industrial production has been declining in an expedited manner (in 2013 it dropped 1.9% and in 2014 it grew just 1.3%), demonstrating that the industry is decreasing its activity. Proof of this is that whereas between 2008

<sup>20</sup> Report published by the PRICC in 2012

<sup>21</sup> The figures shown are from the GHG Report for Bogotá-Cundinamarca -2012, which uses the IPCC for its calculation, in line with the National GHG Report -2010.

<sup>22</sup> The number of enterprises referred to correspond to the group of enterprises that voluntarily register their assets on SIREM of the Superintendence of Industry and Commerce; which means it does not necessarily include the total number of enterprises linked to the subsector.

<sup>23</sup> 2014. UPME – CORPOEMA. Determination and prioritization of energy efficiency alternatives for manufacturing subsectors code ISIC 19 to 31 in Colombia based of the characterization of energy consumption for their different processes, uses and final use equipment.

and 2013 the Colombian economy grew at an annual average rate of 4%, the industry sector barely grew at an average rate of 0.1%, making the GDP weight of the manufacturing sector to go from 14% in 2007 to 11% percent in 2013. This condition applies to the entire domestic industry, including the prioritized subsectors in the Bogotá-Cundinamarca region, whose share of the total national participation is significant.

35. This situation is due to factors within industries as well as external conditions to the industry sector. Internally, the main problem lies in the technological obsolescence of the industries, which leads to high production costs (low efficiency and production), high energy consumption and higher emissions of pollutants. This condition is evident in industries in the Bogotá-Cundinamarca region, where there are a number of small and medium enterprises primarily serving domestic markets, which have kept their production structure mostly unchanged over time.

36. With regard to external conditions, it is seen that the industry sector has not adapted to the new production needs and is thus losing competitiveness. Factors that affected the sector include the fall in commodity prices; competition with industry from other countries which have much cheaper production structures which have taken advantage of the opportunities of entry to Colombia given by the new structures of imports of goods and free trade agreements (which reduce the tariffs and provide economic benefits); the loss of strategic international markets for the country due to political and/or economic issues; and events associated with the national economic context which have taken place in recent years, such as the high costs of transportation and logistics, infrastructure deficiencies and the revaluation of the Peso,. These conditions mainly affect industries in the Bogotá-Cundinamarca region, which are export-oriented (mainly large companies) or companies whose products compete with substitutes and imports, such as the food, beverages and tobacco subsector.

37. Acknowledging the need to revitalize the sector, the industries, with support from regional and national Government entities, are undertaking initiatives aimed at improving the competitiveness of the domestic industry, mainly aiming at increased productivity. Amongst the most feasible and cost effective measures identified are energy efficiency investments, as there is a range of affordable interventions that have a low and medium term financial payback period. These processes will reduce production costs and increase production indicators in the use of raw materials and inputs. Special credit lines offered by national development banks such as BANCOLDEX can be accessed to finance these investments. Hence, investing in energy efficiency is a good entry point to begin the process of revitalization of the industrial sector. These interventions are embedded in a context of supportive national policies to strengthen the sector, such as reform to the labor markets, an improved regulatory framework, and national investment in logistics and transportation infrastructure.

### **Identified barriers**

38. The implementation of technology transfer activities aimed at improving the productivity and competitiveness of the industrial sector in the Bogotá-Cundinamarca region faces barriers that prevent or limit their adoption by the industry. These barriers are related to:

39. *Knowledge/Technical Barriers - Limited technical knowledge in the industrial sector to identify and develop energy efficiency activities aimed at improving the industries.*

40. Although industry subsectors have general knowledge associated with operating practices, production processes and technologies used by industries in their daily operations (business knowledge), there is a lack of technical capacity within industries to identify improvement alternatives in energy efficiency which lead to energy saving and reduction of GHG emissions. A key reason is the lack of trained personnel with knowledge and specific experience in the subject matter, as well as a lack of information required for energy characterizations and/or diagnoses. Usually this knowledge is not easy to develop, especially within small and medium industries, since it mostly prevails outside of the sector and is managed by individuals or specialized companies that provide limited services through consulting or consulting contracts. As such, energy management, although an important expense in industrial process, is not adequately internalized, assessed or addressed.

41. In addition, within the priority subsectors there is limited knowledge and inadequate mechanisms to perform the monitoring and measurement of energy indicators (and corresponding GHG emissions) that establish the energy and environmental performance of companies (establish the baseline as the reference point for improvement). This condition is evident in a large number of small and medium enterprises that do not have an energy management system (as defined per ISO 50001) or an environmental management system (as defined per ISO 14000) as monitoring tools. It is not a common practice for the industry to adopt these kinds of indicators or to have monitoring process for outcomes in terms of energy and environmental outcomes due to their high costs and low benefits perceived. Hence, the knowledge and technical barriers can be summarized as such:

- Inadequate diagnosis of energy consumption patterns within industries
- Low level of specialized energy management capacity within industries
- Scarce technical capacity to identify potential technological conversion processes
- Limited capacity to develop internal energy audits (and perceived high cost of external consultancy services)
- Limited information available to determine baseline reference points and develop cost benefit analyses of energy efficiency investment scenarios

42. *Investment/Financial barriers - Limitations of the industrial sector to gain access to financial resources that enable it to face the investments involved in the development of reconversion, innovation and adaptation processes for its processes and technologies.*

43. Given the limited technical capacities described before, there is an unwillingness to invest upfront in the identification of energy efficiency measures. There is limited capacity within the industry sector to develop both financing strategies of reconversion innovation and adaptation processes of its processes and technologies which result in profitable business models (demonstrating that funding does not compromise the economic performance of the company). There is low experience in conducting economic and financial feasibility analyses of energy efficiency projects in the framework of long-term investment financial planning. This condition is especially evident in small businesses, which do not have sufficient organizational structure to enable them to consider these financial planning activities as part of their daily work or qualified staff for this purpose.

44. On the other hand, there is a lack of funding tools and models for energy efficiency projects which are aimed at saving energy and reducing GHG emissions (funding that recognizes energy efficiency activities). The use of conventional credit lines by enterprises of the industry sector entails constraints for entrepreneurs because of the difficulty of access, a condition is particularly evident in small businesses that can hardly meet all the requirements and conditions to access credits, combined with high interest rates which make the financial costs unattractive. Furthermore, there is a lack of knowledge by the industrial sector about the supply of non-commercial loans (development loans promoted by national development banks or multilateral funds) that may be more attractive and favorable for industries, since they offer lower rates or because they are specially developed products for business improvement. Investment and financial barriers can be summarized as such:

- High risk perception of energy efficiency investments by industrial sector
- Unwillingness to provide upfront investment for pre-feasibility and feasibility analyses
- Limited capacity to develop business plans and economic/financial analyses for energy efficiency investments.
- Limited access to affordable financial instruments for investment in energy efficiency.

45. *Legal and Regulatory Barriers - Lack of implementation of the regulatory and legislative framework that establishes the basis on which the adoption of technology transfer processes are promoted in the industry.*

46. This barrier considers the existing constraint to the implementation of the regulatory framework applicable to technology transfer activities that lead to improved energy use of the industry sector. Although there is a framework, it lacks clear mechanisms for its application because the regulations are not in place (i.e. incentives in Law 1715 of 2015) or because there is no clear articulation between the public sector (agencies, institutions and government entities) and companies in the industrial sector (PROURE case). Furthermore, there is no regulatory framework that establishes precise actions to finance and access clean

technologies that assist companies fulfilling of their objectives of improving productivity and competitiveness. This is associated to the lack of experience of the public sector in the development of operational systems for monitoring compliance with existing standards related to environmental and energy performance of companies in the industrial sector.

47. This project acknowledges the existence of such legal and regulatory barriers but is not designed to directly address them. Rather, it will operate in the context of the existing regulatory framework, and in an institutional context in which measures are being taken to improve the regulatory environment. Furthermore, the UNIDO/GEF project “Promotion of Industrial Energy Efficiency in Colombian Industries”, which will be executed in parallel to this initiative, intervenes at a more systemic level and addresses the key regulatory issues associated to energy efficiency in industries. The current project’s contribution will be to systematize the pilot experiences for the development of an industrial NAMA, which will serve as a national policy instrument to foster low emissions development in the industrial sector.

## **2. STRATEGY**

### **2.1. PROJECT JUSTIFICATION, RATIONALE AND POLITICAL COMPLIANCE**

48. The industrial sector of the Bogotá-Cundinamarca region, consisting mainly of large companies, but also of numerous small and medium enterprises (SMEs), has substantial opportunities to implement energy efficiency measures in a cost-effective way. There is great potential to improve industrial processes due to the use of outdated technologies and poor energy management practices. Thus, the adoption of measures that can be easily implemented with low investment, such as Best Operating Practices (BOPs), will lead to significant energy savings, lower production costs and short-term improved productivity of industries. In turn, the favorable outcomes of implementing BOPs will raise industry awareness about the effectiveness of implementing these measures. This will catalyze interest in undertaking measures of greater complexity and increased investment, such as low-carbon technology reconversion, innovation and adaptation projects. In addition to reducing energy consumption and GHG emissions, such investments will lead to the modernization of the industry sector in the region, making it more competitive in the long term.

49. The potential for improvement in the industries of the Bogota-Cundinamarca region has not been fully exploited due to the existing barriers for industry stakeholders to move towards the adoption of energy efficiency schemes on a large scale. To overcome the identified barriers, the project strategy addresses each of the situations identified in the industry subsectors in the region in a structured way. The project will work closely with the industrial sector of Bogotá/Cundinamarca in strengthening its capacity to analyze and identify energy efficiency interventions, supporting the development of technical and financial feasibility assessments, liaising between industries and financial partners (primarily national development banks) to ease access to finance, and providing technical assistance in the implementation of energy efficiency measures. The experience will be captured in a case study that will be structured according to the Colombian criteria for the development of NAMAs and will serve as a basis for the development of a national industrial NAMA. This strategy, in addition to providing alternative solutions to overcome the identified barriers, will provide the basis for the development of instruments that promote energy efficiency activities at a national scale (national industry sector) thereby promoting mitigation actions in line with the national interests defined by the Colombian Low Emission Development Strategy.

#### **Consistency with National Priorities**

50. The Colombian Government has identified energy savings and efficient use as a national priority due to the impact it has on both national GHG emissions and in the productivity and competitiveness of the industry sector. Thus, the proposed project seeks to address these priorities by promoting appropriate energy management in the industrial sector, creating technical capabilities and promoting the development of technology transfer activities in the industries of the Bogotá-Cundinamarca region, thereby achieving improved productivity and competitiveness of this sector.

51. In Colombia, Rational and Efficient Use of Energy (REE) management is defined with the enactment of Law 697 of 2001, which declares REE as a matter of public, social, and national interest. As a result, the



country has made progress in energy efficiency with the creation of the Programme for the Rational and Efficient Use of Energy and Other Non-Conventional Forms of Energy (PROURE), as a tool to seek to improve energy efficiency of the productive sectors and to promote non-conventional energy sources in accordance with the national energy saving goals.

52. PROURE<sup>24</sup> establishes the institutional participation structure of public and private stakeholders for the promotion of rational and efficient use of energy, institutional mechanisms for its promotion, incentives for research and education in the field, and the mandate for the definition of financing mechanisms, among others. These terms are aligned with the proposed project in terms of its interest in promoting technological improvement in the industry sector by developing capacity building-oriented activities, the structuring of technology reconversion, innovation and adaptation projects that result in energy savings and reduction of GHG emissions, and the design of monitoring mechanisms for the management, institutional coordination, project financing and for generating inputs for the design and implementation of a NAMA for the Industry sector.

53. By resolution, the Ministry of Mines and Energy (MME) adopted the indicative action plan 2010-2015 (with a vision to 2020) to develop the PROURE, stressing as part of its objectives, goals and subprograms, the sustainable and efficient management of the energy chain, the building of the terms to promote a market of energy goods and services, the strengthening of institutions and business initiatives, and the facilitation of the application of the rules relating to incentives, in order to promote the development of projects and sub-programmes of the industrial sector in the PROURE. For its part, Resolution 180919 of 2010 issued by the MME, sets the goals of energy efficiency and of non-conventional sources identified in the Indicative Action Plan 2010-2015 to develop the program, which are established for the industry sector, such as electricity saving (3.43% for 2015 with a vision to 2020) and other energy savings (0.25% for 2015 with a vision to 2020). Thus, the project is developed in the framework of this national plan to meet the priorities set with regards to sustainable and efficient energy management, the strengthening of institutions and business initiatives, and the promotion of the development of projects in the industrial sector, contributing to the achievement of national goals established under the PROURE.

54. In 2012, the national government enacted Resolution 0186 of 2012 through the MADS, which contained the schemes that encourage the management of energy demand in the industrial sector. These target energy saving goals, such as the optimization of the use of electricity for power and the optimization of combustion processes, which are aligned with the activities and outcomes proposed by the project. Law 1715 of 2014 was enacted to promote the development and use of non-conventional renewable energy both in the Interconnected System (SI) and the non-interconnected areas (ZNI), seeking for efficient energy management in terms of energy efficiency and demand response.

55. In the past National Development Plan (NDP) 2010-2014 "Prosperity for All"<sup>25</sup>, four measures were prioritized to address climate change, which are: i) the Colombian Low-Carbon Development Strategy (ECDBC), ii) National Climate Change Adaptation Plan, iii) the National REDD+ Strategy, and iv) the Financial Protection Strategy for Disasters. The ECDBC is a program that includes sectoral mitigation plans that foster low emissions development while harnessing financing options that strengthen the sector. This strategy identifies the industrial sector as one of eight priority sectors due to its role in the national economic development, its high share in consumption of energy resources, and its potential for reducing GHG emissions associated with production processes. This represents an opportunity for the implementation of the ECDBC because of its great potential to contribute to the reduction of GHG emissions through the improvement of the industry sector.

56. Therefore, the Ministry of Commerce, Industry, and Tourism (MinCIT) in coordination with the MADS, and within the framework of the ECDBC, designed the Sector Action Plan (PAS) for GHG mitigation in the industrial sector, approved in June 2014 by consensus of the different industry stakeholders and government representatives. The PAS establishes mitigation measures in the form of policies, programmes, and actions that seek to reduce or avoid GHG emissions in the sector through four strategic lines, which are: the

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<sup>24</sup> Regulated by Decrees 3683 of 2003 and 2501 of 2007.

<sup>25</sup> Reference to Law 1450 of 2011



comprehensive management of the demand for energy resources in the industry sector, the logistics optimization and partnership, the comprehensive management and utilization of waste, and the optimization and upgrading of production processes with high potential for greenhouse gas emissions. The project proposes activities that are contained within the strategic guidelines established by the PAS, promoting the achievement of goals aimed by the country in terms of reduction of GHG emissions.

57. For its part, the Ministry of Foreign Trade has structured the National Productivity and Competitiveness Policy (PNPC) based on the guidelines set by the government to develop the national productive and competitive strategy. This strategy complements the Domestic Productivity and Competitiveness Agenda<sup>2626</sup>, which establishes the way to address priority development and industrial growth needs in alignment with the action plans proposed by the CONPES 3527 "National Competitiveness and Productivity Policy", and which are part of the National Competitiveness System (SNC).

58. Finally, the current NDP (2014-2018) called "All for a new country", establishes six transversal strategies on which public policy will be developed in the country in the coming years, which are: i) Strategic competitiveness and infrastructure, ii) Strategic mobility, iii) Field transformation, iv) Security, justice and democracy for peace building, v) Good governance, and vi) Green growth. As part of these strategies, the proposed project will contribute to the development of the NDP through the following actions:

- a) Productive development through the implementation of technologies that reduce energy consumption in the industry and hence improve production management.
- b) Moving towards sustainable and low-carbon growth by implementing technologies that reduce GHG emissions in the industry.
- c) Contribution to science, technology and innovation by building capacities in stakeholders and replication of lessons learned during the project.
- d) Establish inputs for formulating an industrial sector NAMA, in accordance with the guidelines and interests of the national government.

### **National Ownership and Country Eligibility**

59. By Law 164 of 1994, Colombia adopted the "United Nations Framework Convention on Climate Change", and by Law 629 of 2000, it adopted the "Kyoto Protocol".

60. The main objective of GEF-5 Climate Change strategy is to reduce the risks of global climate change through actions that reduce GHG emissions. The aim of this project has been established under the GEF operational principles, reflecting national and regional priorities, proposing alternatives to improve the environment and progress in favor of the reduction of global environmental risks.

61. The activities proposed by the project will contribute to reducing the risks of global climate change through actions that reduce national GHG emissions, by implementing technology transfer and reconversion projects for adaptation and/or substitution to cleaner fuels, improved production processes for increasing energy efficiency and the optimization of its operations related to adaptation and adjustment of core and peripheral low-carbon technologies, resulting in efficient energy management and optimization of fuels consumption.

62. The Colombian industrial sector is aware of the legal and environmental liabilities associated with the rational and efficient use of energy, in accordance with the objectives set by the PROURE, and its impact on productivity and competitiveness in the industrial sector in the framework of the National Productivity and Competitiveness Policy and the objectives of the National Development Plan 2014 - 2018 "All for a new country." For this sector there are work plans on energy and production matters, which are being implemented according to the requirements of the current regulation.

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<sup>26</sup> Established by Conpes 3297

## 2.2. DESIGN PRINCIPLES AND STRATEGIC CONSIDERATIONS

63. The project design is based on the definition of the industrial subsectors that are priorities for the Bogotá-Cundinamarca region in terms of their potential for GHG mitigation, their contribution to the economic development of the city- region, their social, economic and environmental impact, and their potential for technological implementation. The prioritization is based on the degree of replicability and implementation of the pilot National Appropriate Mitigation Actions (NAMA) for technology transfer in the industrial sector of Cundinamarca and Bogota; therefore, the subsectors that have been categorized as priorities, besides being selected as product of the qualification and evaluation criteria mentioned above, comply significantly with the competitiveness development plans of the region.

64. To select the subsectors, efforts were oriented to comparing and identifying industrial subsectors defined in the different information sources and databases of public and private institutions in Colombia and other regional and local sources. Therefore, it was decided to approve the common source subsectors defined by the EAM and DANE's Regional Quarterly Manufacturing Sample (MTMR).

65. The Analytic Hierarchy Process methodology was adopted, which sets parameters to rate and to evaluate a set of criteria and sub-criteria formulated and defined by the project team. In these criteria the economic, social, environmental and technological dimension of each subsector is contemplated. The set of criteria evaluates: potential mitigation of greenhouse gases, contribution to economic development in the region and the city, social, economic and environmental impact, and potential of technological implementation. Each criterion occupies an importance level, guided and defined by the formulation team with the assessment of different percentage weights, that when distributed in the sub-criteria with parameters, allows the prioritization of industrial subsectors in the department and the city of Bogota. The assessment indicated that the priority subsectors for project implementation are:

- a) Basic iron and steel industries and of metal and non-metallic mineral products,
- b) Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products,
- c) Processing of meat, oils and greases, fruits and vegetables, and
- d) Manufacture of dairy products, candies, coffee, chocolate, and other food products.

66. Priority industry subsectors have also been included in the Internal Agenda of Bogotá-Cundinamarca as a result of the prioritization exercise made by the Regional Competitiveness Commission (CRC) of Bogotá-Cundinamarca and the Chamber of Commerce of Bogotá in 2008<sup>27</sup>, which included the sectors of: chemicals, construction materials, ceramics and glass, and the food and beverages group.

67. The establishment of the above subsectors as priorities does not constitute a limitation to consider potential projects in other subsectors within the industry sector in the Bogotá-Cundinamarca region for this project, however they will be prioritized by the project.

68. For these industry subsectors, there are two ways to consider the development of low-carbon technology transfer pilot projects during the implementation of the present project:

- a) The implementation of BOPs, which include a training component of the technical staff and investment in low-cost peripheral technologies (investments below US\$15,000) with high impact in terms of energy saving and reduction of GHG emissions; and
- b) The implementation of high-cost core technologies<sup>28</sup> reconversion, innovation and adaptation projects (investment over US\$15,000) with high impact in terms of energy saving and reduction of GHG emissions.

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<sup>27</sup> Within the framework of the Regional Competitiveness Plan for Bogotá and Cundinamarca 2010-2019.

<sup>28</sup> These types of projects include activities related to processes, technologies and equipment

69. A detailed analysis of the existing conditions in the priority industry subsectors for the region allowed to define the most appropriate mitigation measures to reduce the consumption of electric and heat energy in these industries, including the following:

| Energy                      | Technology, process or equipment | Energy Efficiency Programme  | Type of Energy Efficiency Measure | Potential Savings | Potential Savings (GJ) | Emissions Avoided (ton CO <sub>2</sub> /year) |             |             | Investment of the Measure (US\$) |
|-----------------------------|----------------------------------|--|-----------------------------------|-------------------|------------------------|---|-------------|-------------|----------------------------------|
|                             |                                  |  |                                   |                   |                        | Coal  | Natural Gas | Electricity |                                  |
| Mineral Coal or Natural Gas | Boilers and Steam Systems        | Best practices, update of condensate recovery & insulation.            | BOP - Process                     | 3%                | 360                    | 32.84   | 21.68       | -           | 165                              |
|                             |                                  | Boiler load control.   | Process                           | 5%                | 600                    | 54.74   | 36.14       | -           | 8,000                            |
|                             |                                  | Installation of oxygen analyzing system in flue gas.                   | Technological                     | 8%                | 960                    | 87.58   | 57.82       | -           | 18,000                           |
|                             |                                  | Installation of boiler flue economizer.                                | Technological                     | 9%                | 1,080                  | 98.53   | 65.05       | -           | From US\$215 to US\$100          |
|                             |                                  | Boiler cleaning to reduce loss due to build-up and soot.               | BOP - Technological               | 2%                | 240                    | 21.89   | 14.45       | -           | 700                              |
|                             |                                  | Reduction of boiler steam pressure.                                    | Process                           | 5%                | 600                    | 54.74   | 36.14       | -           | 7,000                            |
|                             |                                  | Incorporation of modern burners with air/fuel ratio control.           | Technological                     | 5%                | 600                    | 54.74   | 36.14       | -           | From US\$212 to US\$120          |
|                             |                                  | Installation of sensible heat recovery systems.                        | Technological                     | 5%                | 600                    | 54.74   | 36.14       | -           | From US\$69 to US\$35            |
|                             |                                  | Substitution of boiler for a more efficient one.                       | Technological                     | 18%               | 2,160                  | 197.05  | 130.09      | -           | From US\$1,350 to US\$820        |
|                             |                                  | Substitution of coal boiler for a more efficient fluidized bed boiler. | Technological                     | 17%               | 2,040                  | 186.11  | -           | -           | From US\$4,750 to US\$2,200      |
|                             | Glass Industry Ovens             | Use of recycled glass material   | Process                           | 3%                | 360                    | 32.84   | 21.68       | -           | 20,000                           |
|                             |                                  | Reduction of the investment cycle.                                     | Technological                     | 2%                | 240                    | -   | 14.45       | -           | 10,000                           |
|                             |                                  | Use of waste heat from flue.   | Technological                     | 10%               | 1,200                  | -   | 72.27       | -           | 85,000                           |
|                             |                                  | Modifications to combustion.   | Technological                     | 10%               | 1,200                  | 109.47  | 72.27       | -           | 85,000                           |
|                             | Brick Industry Ovens             | Implement pulverized fuel burners in ovens.                            | Technological                     | 5%                | 600                    | 54.74   | -           | -           | 44,000                           |
|                             |                                  | Increase flow area of combustion gases in ovens.                       | Technological                     | 5%                | 600                    | 54.74   | -           | -           | 21,000                           |
|                             |                                  | Implement quality control to the coal.                                 | Process                           | 8%                | 960                    | 87.58   | -           | -           | 21,000                           |
|                             |                                  | Implement a good coal milling and grinding system.                     | Process                           | 5%                | 600                    | 54.74   | -           | -           | 21,000                           |
|                             |                                  | Implement a good coal combustion system.                               | Process                           | 4%                | 480                    | 43.79   | -           | -           | 28,000                           |
|                             |                                  | Implement artificial dryers with waste heat recovered from the oven.   | Technological                     | 5%                | 600                    | 54.74   | 36.14       | -           | 20,000                           |
|                             | Steel Industry Ovens             | Metal load: preparation and supply of energy.                          | Process                           | 5%                | 600                    | 54.74   | -           | 62.33       | 80,000                           |
|                             |                                  | Use of solid pig iron.   | Process                           | 4%                | 480                    | -   | -           | 49.87       | 30,000                           |
|                             |                                  | Use of liquid pig iron.  | Process                           | 3%                | 360                    | -   | -           | 37.40       | 35,000                           |
|                             |                                  | Preheating of scrap metal.   | Process                           | 4%                | 480                    | -   | -           | 49.87       | 70,000                           |
|                             |                                  | Uses of preheating ovens.  | Technological                     | 3%                | 360                    | 32.84   | -           | 37.40       | 40,000                           |

|             |         |   |               |     |       |   |   |        |                           |
|-------------|---------|---|---------------|-----|-------|---|---|--------|---------------------------|
|             |         | Automation, process and robots control.   | Technological | 5%  | 600   | - | - | 62.33  | 60,000                    |
| Electricity | Engines | Best practices in the purchase, installation, operation and maintenance of engines.                                 | BOP           | 2%  | 240   | - | - | 24.93  | > \$10                    |
|             |         | Installation of VSD drives in ventilators and pumps.  | Technological | 25% | 3,000 | - | - | 311.67 | From US\$1,370 to US\$135 |
|             |         | Installation of VSD drives in conveyor belts, mills   | Technological | 15% | 1,800 | - | - | 187.00 | From US\$1,370 to US\$135 |
|             |         | Substitution of engines for efficient engines.  | Technological | 5%  | 600   | - | - | 62.33  | From US\$721 to US\$86    |
|             | Cooling | Best practices, maintenance of heat exchanger surface, adjustment of optimum evaporator and condenser temperatures. | BOP           | 4%  | 480   | - | - | 49.87  | 1,200                     |
|             |         | Control of the suction pressure and process automation.   | Technological | 7%  | 840   | - | - | 87.27  | From US\$1,370 to US\$135 |

70. The inclusion of these mitigation measures allows establishing technological impact chains to be promoted in each of the industry sectors considered, identifying the most suitable type of core and peripheral low-carbon technologies.

71. After identifying the most appropriate mitigation measures to reduce the consumption of electricity and heat in industries, the potential number of low-carbon technology transfer projects to be developed is established in consideration of the universe of existing industries in the priority subsectors in the Bogotá-Cundinamarca region.

- a) For the development of BOP pilot projects (investments under \$ 15,000), the project aims to foster investment in 160 industries, distributed as follows:

| Subsector  | Enterprises to be intervened |
|--|------------------------------|
| Basic iron and steel industries and of metal and non-metallic mineral products   | 34                           |
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products | 42                           |
| Processing of meat, oils and greases, fruits and vegetables  | 42                           |
| Manufacture of dairy products, candies, coffee, chocolate, and other food products.  | 42                           |
| TOTAL  | 160                          |

Potential BOPs pilot projects to be developed take the following analysis into consideration:

| Subsector  | Measures  | Total Potential Savings (GJ/year) |                  |                  | Total Potential Emissions Avoided (tCO <sub>2</sub> /year) |                 |                 | Investments (US\$) | Total Investments (US\$) | VA (US\$) | Cost of Energy Avoided (US\$/GJ) |
|--|---|-----------------------------------|------------------|------------------|--|-----------------|-----------------|--------------------|--------------------------|-----------|----------------------------------|
|  |   | Large                             | Medium           | Small            | Large  | Medium          | Small           |                    |                          |           |                                  |
| Basic iron and steel industries and of metal and non-metallic mineral products   | Best practices in the operation and maintenance of ovens.   | 4,493.59                          | 4,642.77         | 39,324.03        | 340.3  | 351.6           | 2,978.0         | 1,000              | 34,000                   | 14.156    | 0,29                             |
|  | Best practices in the purchase, installation, operation and maintenance of engines.                                 | 1,149.56                          | 1,187.73         | 10,060.00        | 119.4  | 123,4           | 1,045.1         | 1,739              | 59,134                   | 24.620    | 1,99                             |
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products | Best practices in the operation and maintenance of ovens.   | 624.31                            | 973.09           | 358.98           | 47.3   | 73.7            | 27.2            | 1,000              | 42,000                   | 17.487    | 8,94                             |
|  | Best practices, update of condensate recovery & insulation.   | 494.97                            | 771.49           | 284.61           | 37.5   | 58.4            | 21.6            | 825                | 34,649                   | 14.426    | 9,30                             |
|  | Boiler cleaning to reduce loss due to build-up and soot.  | 461.97                            | 720.06           | 265.63           | 35.0   | 54.5            | 20.1            | 700                | 29,400                   | 12.241    | 8,46                             |
|  | Best practices in the purchase, installation, operation and maintenance of engines.                                 | 1,444.95                          | 2,252.21         | 830.85           | 150.1  | 234.0           | 86.3            | 635                | 26,680                   | 11.108    | 2,45                             |
| Processing of meat, oils and greases, fruits and vegetables  | Best practices, update of condensate recovery & insulation.   | 4,299.34                          | 3,961.63         | 3,325.59         | 325.6  | 300.0           | 251.8           | 3,300              | 138,596                  | 57.705    | 4,98                             |
|  | Boiler cleaning to reduce loss due to build-up and soot.  | 1,791.39                          | 1,650.68         | 1,385.66         | 135.7  | 125.0           | 104.9           | 700                | 29,400                   | 12.241    | 2,54                             |
|  | Best practices in the purchase, installation, operation and maintenance of engines.                                 | 618.40                            | 569.82           | 478.34           | 64.2   | 59.2            | 49.7            | 234                | 9,820                    | 4.088     | 2,45                             |
|  | Best practices, maintenance of heat exchanger surface, adjustment of optimum evaporator and condenser temperatures. | 783.30                            | 721.78           | 605.89           | 81.4   | 75.0            | 62.9            | 1,200              | 50,400                   | 20.984    | 9,94                             |
| Manufacture of dairy products, candies, coffee, chocolate, and other food products.  | Best practices, update of condensate recovery & insulation.   | 3,642.34                          | 1,177.38         | 2,026.72         | 275.8  | 89.2            | 153.5           | 4,125              | 173,246                  | 72.131    | 10,54                            |
|  | Boiler cleaning to reduce loss due to build-up and soot.  | 2,081.34                          | 672.79           | 1,158.13         | 157.6  | 50.9            | 87.7            | 700                | 29,400                   | 12.241    | 3,13                             |
|  | Best practices in the purchase, installation, operation and maintenance of engines.                                 | 2,313.52                          | 747.84           | 1,287.32         | 240.3  | 77.7            | 133.7           | 610                | 25,624                   | 10.668    | 2,45                             |
| <b>TOTAL</b>   |   | <b>24,198.97</b>                  | <b>20,049.25</b> | <b>61,391.75</b> | <b>2,010.24</b>  | <b>1,672.60</b> | <b>5,022.58</b> | <b>16,768</b>      | <b>682,349</b>           |           |                                  |

- a) For the development of **process** reconversion, innovation and adaptation pilot projects (investments over US\$15,000), the project design phase has identified interventions in 37 industries, distributed as follows:

| Subsector  | Enterprises to be intervened |
|--|------------------------------|
| Basic iron and steel industries and of metal and non-metallic mineral products   | 18                           |
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products | 7                            |
| Processing of meat, oils and greases, fruits and vegetables  | 6                            |
| Manufacture of dairy products, candies, coffee, chocolate, and other food products.  | 6                            |
| TOTAL  | 37                           |

Potential process reconversion, innovation and adaptation pilot projects to be developed take the following analysis into consideration

| Subsector   | Measures   | Total Potential Savings (GJ/year) |          |           | Total Potential Emissions Avoided (tCO <sub>2</sub> /year) |        |         | Investments (US\$) | Total Investments (US\$) | VA (US\$) | Cost of Energy Avoided (US\$/GJ) |
|---|--|-----------------------------------|----------|-----------|--|--------|---------|--------------------|--------------------------|-----------|----------------------------------|
|   |  | Large                             | Medium   | Small     | Large  | Medium | Small   |                    |                          |           |                                  |
| Basic iron and steel industries and of metal and non-metallic mineral products (Brick Industry).                                      | Implement quality control to the coal.             | 19,971.50                         | 6,878.18 | 17,477.35 | 1,512.4  | 520.9  | 1,323.5 | 21,000             | 105,000                  | 18,583    | 0.42                             |
|   | Implement a good coal milling and grinding system. | -                                 | 4,298.86 | 10,923.34 | -  | 325.5  | 827.2   | 21,000             | 84,000                   | 14,867    | 0.98                             |
|   | Implement a good coal combustion system.           | -                                 | 6,878.18 | 5,825.78  | -  | 520.9  | 441.2   | 28,000             | 112,000                  | 19,822    | 1.56                             |
| Basic iron and steel industries and of metal and non-metallic mineral products (Metalworking).  | Metal load: preparation and supply of energy.      | -                                 | -        | 3,641.11  | -  | -      | 275.7   | 80,000             | 80,000                   | 14,159    | 3.89                             |
|   | Use of solid pig iron.                             | -                                 | -        | 2,912.89  | -  | -      | 220.6   | 30,000             | 30,000                   | 5,310     | 1.82                             |
|   | Use of liquid pig iron.                            | -                                 | -        | 2,184.67  | -  | -      | 165.4   | 35,000             | 35,000                   | 6,194     | 2.84                             |
|   | Preheating of scrap metal.                         | -                                 | -        | 2,912.89  | -  | -      | 220.6   | 70,000             | 70,000                   | 12,389    | 4.25                             |
| Basic iron and steel industries and of metal and non-metallic mineral products (Glass).   | Use of recycled glass material.                    | -                                 | 2,579.32 | -         | -  | 195.3  | -       | 20,000             | 20,000                   | 3,540     | 1.37                             |
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products. | Boiler load control.                               | -                                 | 395.64   | 70.27     | -  | 30.0   | 5.3     | 8,000              | 32,000                   | 5,663     | 12.16                            |
|   | Reduction of boiler steam pressure.                | -                                 | 197.82   | 70.27     | -  | 15.0   | 5.3     | 7,000              | 21,000                   | 3,717     | 13.86                            |
| Processing of meat, oils and greases, fruits and vegetables.  | Boiler load control.                               | -                                 | 687.78   | 513.21    | -  | 52.1   | 38.9    | 8,000              | 24,000                   | 4,248     | 3.54                             |
|   | Reduction of boiler steam pressure.                | -                                 | 687.78   | 513.21    | -  | 52.1   | 38.9    | 7,000              | 21,000                   | 3,717     | 3.09                             |
|   | Boiler load control.                               | -                                 | 233.61   | 344.68    | -  | 17.7   | 26.1    | 8,000              | 24,000                   | 4,248     | 7.35                             |

|   |                                     |           |          |           |          |          |          |         |         |       |      |
|---|-------------------------------------|-----------|----------|-----------|----------|----------|----------|---------|---------|-------|------|
| Manufacture of dairy products, candies, coffee, chocolate, and other food products. | Reduction of boiler steam pressure. | -         | 233.61   | 344.68    | -        | 17.7     | 26.1     | 7,000   | 21,000  | 3,717 | 6.43 |
| TOTAL   |                                     | 19,971.50 | 23,070.7 | 47,734.36 | 1,512.41 | 1,747.11 | 3,614.85 | 350,000 | 679,000 |       |      |

b) For the development of **technology** reconversion, innovation and adaptation pilot projects (investments over US\$15,000), the project design phase has identified 49 industries, distributed as follows:

| Subsector  | Enterprises to be intervened |
|--|------------------------------|
| Basic iron and steel industries and of metal and non-metallic mineral products   | 18                           |
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products | 4                            |
| Processing of meat, oils and greases, fruits and vegetables  | 21                           |
| Manufacture of dairy products, candies, coffee, chocolate, and other food products.  | 6                            |
| TOTAL  | 49                           |

Potential technology reconversion, innovation and adaptation pilot projects to be developed take the following analysis into consideration:

| Subsector  | Measures   | Total Potential Savings (GJ/year) |          |          | Total Potential Emissions Avoided (tCO <sub>2</sub> /year) |        |       | Investments (US\$) | Total Investments (US\$) | VA (US\$) | Cost of Energy Avoided (US\$/GJ) |
|--|--|-----------------------------------|----------|----------|--|--------|-------|--------------------|--------------------------|-----------|----------------------------------|
|  |  | Large                             | Medium   | Small    | Large  | Medium | Small |                    |                          |           |                                  |
| Basic iron and steel industries and of metal and non-metallic mineral products (Brick Industry). | Implement pulverized fuel burners in ovens.                          | -                                 | -        | 3,641.11 | -  | -      | 275.7 | 44,000             | 44,000                   | 7,787     | 2.14                             |
|  | Increase flow area of combustion gases in ovens.                     | -                                 | -        | 3,641.11 | -  | -      | 275.7 | 21,000             | 21,000                   | 3,717     | 1.02                             |
|  | Implement artificial dryers with waste heat recovered from the oven. | -                                 | 4,298.86 | -        | -  | 325.5  | -     | 20,000             | 20,000                   | 3,540     | 0.82                             |
|  | Adaptation and/or partial substitution of fossil fuels.              | -                                 | 8,597.72 | 7,282.23 | -  | 651.1  | 551.5 | 80,000             | 320,000                  | 56,635    | 3.57                             |
|  | Installation of VSD drives in conveyor belts, mills                  | -                                 | 3,299.24 | 2,794.44 | -  | 342.8  | 290.3 | 47,045             | 94,089                   | 16,652    | 2.73                             |
| Basic iron and steel industries and of metal and non-metallic mineral products (Metalworking).   | Uses of preheating ovens.  | -                                 | 2,579.32 | -        | -  | 195.3  | -     | 40,000             | 40,000                   | 7,079     | 2.74                             |
|  | Automation, process and robots control.                              | -                                 | 4,298.86 | -        | -  | 325.5  | -     | 60,000             | 60,000                   | 10,619    | 2.47                             |
|  | Adaptation and/or partial substitution of fossil fuels.              | -                                 | 8,597.72 | 7,282.23 | -  | 651.1  | 551.5 | 80,000             | 320,000                  | 56,635    | 3.57                             |
|  | Installation of VSD drives in conveyor belts, mills.                 | -                                 | 3,299.24 | 2,794.44 | -  | 342.8  | 290.3 | 41,164             | 82,328                   | 14,571    | 2.39                             |
|  | Substitution of engines for efficient engines.                       | -                                 | 1,099.75 | -        | -  | 114.3  | -     | 47,722             | 47,722                   | 8,446     | 7.68                             |



|   |  |           |           |           |          |         |         |           |           |         |       |
|---|--|-----------|-----------|-----------|----------|---------|---------|-----------|-----------|---------|-------|
| Manufacture of petroleum products, outside refinery, basic chemicals, pharmaceuticals, soaps, detergents and other chemical products. | Installation of oxygen analyzing system in flue gas.         | -         | 316.51    | 56.22     | -        | 24.0    | 4.3     | 17,000    | 34,000    | 6,017   | 16.14 |
|   | Installation of VSD drives in ventilators and pumps          | -         | 2,406.20  | 427.39    | -        | 250.0   | 44.4    | 7,195     | 14,390    | 2,547   | 0.90  |
| Processing of meat, oils and greases, fruits and vegetables.  | Installation of oxygen analyzing system in flue gas.         | -         | 1,100.45  | 410.57    | -        | 83.3    | 31.1    | 18,000    | 36,000    | 6,371   | 4.22  |
|   | Installation of boiler flue economizer.                      | -         | 1,238.01  | 461.89    | -        | 93.8    | 35.0    | 43,000    | 86,000    | 15,221  | 8.95  |
|   | Incorporation of modern burners with air/fuel ratio control. | -         | 687.78    | 256.60    | -        | 52.1    | 19.4    | 42,400    | 84,800    | 15,008  | 15.89 |
|   | Installation of sensible heat recovery systems               | -         | 687.78    | 256.60    | -        | 52.1    | 19.4    | 22,000    | 44,000    | 7,787   | 8.25  |
|   | Substitution of boiler for a more efficient one.             | 21,496.68 | 7,428.05  | 3,695.10  | 1,627.9  | 562.5   | 279.8   | 300,000   | 2,700,000 | 477,857 | 14.65 |
|   | Installation of VSD drives in ventilators and pumps.         | -         | 659.52    | 246.06    | -        | 49.9    | 18.6    | 23,630    | 47,261    | 8,364   | 9.24  |
|   | Control of the suction pressure and process automation.      | -         | 150.37    | 56.10     | -        | 15.6    | 5.8     | 11,000    | 22,000    | 3,894   | 18.86 |
| Manufacture of dairy products, candies, coffee, chocolate, and other food products.   | Installation of oxygen analyzing system in flue gas.         | -         | 373.77    | -         | -        | 28.3    | -       | 18,000    | 18,000    | 3,186   | 8.52  |
|   | Installation of boiler flue economizer.                      | -         | 420.49    | -         | -        | 31.8    | -       | 30,000    | 30,000    | 5,310   | 12.63 |
|   | Incorporation of modern burners with air/fuel ratio control. | -         | 233.61    | -         | -        | 17.7    | -       | 15,000    | 15,000    | 2,655   | 11.36 |
|   | Installation of sensible heat recovery systems.              | -         | -         | 172.34    | -        | -       | 13.1    | 13,800    | 13,800    | 2,442   | 14.17 |
|   | Installation of VSD drives in ventilators and pumps.         | -         | 865.55    | 638.55    | -        | 89.9    | 66.3    | 10,750    | 21,500    | 3,805   | 2.53  |
| TOTAL   |  | 21,496.68 | 52,638.82 | 34,112.99 | 1,627.91 | 4,299.4 | 2,772.3 | 1,052,706 | 4,215,890 |         |       |

72. The program will foster investment of approximately US\$ 680,000 in 160 companies to implement BOPs, with the potential to obtain energy savings of 105,640 GJ, resulting in a potential reduction of 8,705 tCO<sub>2</sub>/year. The GEF grant will catalyze a further investment of at least US\$5,000,000 from the private sector to develop 86 process and technology reconversion, innovation and adaptation projects that have the potential to allow obtaining energy savings of 156,434 GJ, resulting in a potential reduction of 15,574 tCO<sub>2</sub>/year.

73. The project design and strategic considerations are based on existing conditions, the development priorities of the Bogotá-Cundinamarca region, and the risks associated with the execution of activities. The project includes extensive involvement as a catalyst that helps integrate environmental principles into sector policies (particularly those associated with the promotion of industrial productivity and competitiveness), and replicates lessons learnt in different regions and subsectors. It is therefore expected that the project will promote the increased involvement of enterprises in GHG mitigation and energy efficiency activities, which is of national importance.

### **2.3. PROJECT OBJECTIVES**

#### **Overall Objective**

74. To promote the adoption of best industry practices and the implementation of low-carbon technologies in companies that form part of the industry sector in Bogotá-Cundinamarca in order to reduce GHG emissions, improve productivity and competitiveness in alignment with the Colombian Low-Carbon Development Strategy, and provide inputs for the development of a NAMA for the industry sector.

#### **Specific Objectives**

75. The project's overall objective is achieved by meeting the following specific objectives:
- a. Strengthening the technical, financial and administrative capacity of stakeholders who make up the value chain in priority industry subsectors.
  - b. Developing instruments that encourage and catalyze private sector investment for implementing low- carbon technology transfer projects.
  - c. Implementing low- carbon technology transfer pilot projects in industrial subsectors prioritized in the region.
  - d. Executing a strategy to disseminate and replicate project experiences in other industry subsectors and regions of the country.
  - e. Analyzing the outcomes achieved with the implemented technology transfer pilot projects, with the objective to provide inputs for the development of a NAMA for the industry sector.

### **2.4. PROJECT ACTIVITIES/PRODUCTS AND OUTCOMES**

76. The execution of the project is divided into three main components which include key activities to obtain the expected outcomes and outputs. The project components are described below.

#### ***Component 1. Strengthening the capacity of the industry sector in order to establish its energy and GHG emissions BAU baseline***

***Expected Result:*** *Strengthened capacity in the industry sector to identify and develop GHG emission reduction technology transfer projects.*

77. This component seeks to establish the needs and priorities of the various public and private entities that make up the industry subsectors for the region, in terms of capacity building in technical, financial and administrative aspects, considering the circumstances of regional and national development. The component mainly involves prioritized subsectors in the Bogotá-Cundinamarca region. This component consists of the following products and activities:

| Product  | Activities  |
|--|---|
| 1.1 Educational materials produced to enable energy and GHG emissions self-diagnosis of industry sector companies in the Bogotá-Cundinamarca region.           | 1.1.1. Development of a methodological guide for determining the baseline energy and GHG emissions, applicable to technology transfer projects to be implemented in the industry sector in the region of Bogotá-Cundinamarca. This guide will include issues related to energy efficiency in activities and processes within the prioritized industry subsectors, emission factors, identification of opportunities for mitigation, and calculation of GHG emission reductions, among others. |
| 1.2. Capacity building program implemented with industry sector stakeholders in the Bogotá-Cundinamarca region.  | 1.2.1. The development of a training program for relevant stakeholders in priority subsectors (companies, suppliers, authorities, academia, etc.), on technical, operational, financial, technological, innovation, energy efficiency, and climate change mitigation issues, with specific application to activities and processes currently being developed by the industries of the industry sector of Bogotá-Cundinamarca.   |
|  | 1.2.2. Perform training activities (i.e. workshops, meetings, etc.) to teach decision-makers within companies in prioritized industry subsectors in Bogotá-Cundinamarca to identify existing opportunities for technological improvements, costs and benefits of these, co-benefits associated and the overall impact of implementing the potential projects.   |
| 1.3 Energy and GHG emissions baseline diagnosis conducted for the technology transfer pilot projects identified in the industry sector in Bogotá-Cundinamarca. | 1.3.1 Information gathering for the construction of specific baselines for the pilot projects to be implemented by companies in the industrial sector in Bogotá-Cundinamarca.   |
|  | 1.3.2 Support to companies in building their energy and GHG emissions baseline diagnosis from information and data collected.   |
| 1.4 Dissemination strategy and presentation of the project to industry sector stakeholders in Bogotá-Cundinamarca.   | 1.4.1 Design a strong dissemination strategy and presentation of the project and its benefits to encourage industry sector stakeholders to participate.   |
|  | 1.4.2 Delivery of the educational materials (both in physical and digital formats) developed in order to encourage the development of pilot projects to the relevant sector stakeholders (companies, suppliers, authorities, academy, etc.)   |

**Component 2. Implementation of technology transfer pilot projects according to the mitigation actions identified and prioritized in the industry sector.**

**Expected Result:** Pilot projects implemented and operating in the industry sector in the Bogotá-Cundinamarca region, including best operative energy practices (BOPs), process and technology re-conversion, innovation and adaptation project.

78. This component seeks to create a reference framework that allows identifying, promoting, and developing low-carbon process and technology re-conversion, innovation and adaptation projects in the different companies in the industrial sector for Bogota-Cundinamarca, considering their potential and capacity to reduce GHG emissions by improving their energy performance. This component will particularly focus on the selected subsectors. The component consists of the following products and activities:

| Product   | Activities  |
|---|---|
| <p>2.1. Financial instruments established to promote investment in technology transfer pilot projects in Bogotá-Cundinamarca.</p>   | <p>2.1.1. Design of financial models that contain various strategies and mechanisms for financing structured technology transfer pilot projects (i.e. promotion programs, preferential credit lines, etc.), considering linking various sources of financing, such as commercial, development, and multilateral banks, among others, and different payment schemes related to the market of energy services, such as payment by savings achieved, payment for environmental services, carbon markets, among others (depending on each pilot project-specific context and characteristics).</p>  |
| <p>2.2 Portfolio of technology transfer pilot projects identified in the industry sector in Bogotá-Cundinamarca. This portfolio will include projects of three different types:</p> <ul style="list-style-type: none"> <li>a) Projects that incorporate best operative energy practices (cost less than USD 15,000)</li> <li>b) Projects that involve process conversion, innovation and adaptation (cost over USD 15,000)</li> <li>c) Projects that involve technology conversion, innovation and adaptation (cost over USD 15,000)</li> </ul> | <p>2.2.1 Based on the information on existing production processes, energy consumption parameters and equipment of final energy use<sup>29</sup>, perform the detailed characterization and/or energy assessment of the beneficiary companies in the industrial subsectors in the Bogota-Cundinamarca region in order to identify key aspects associated with energy consumption and potential saving measures. <b>Climate impacts will be incorporated into this assessment, particularly to identify water/energy efficiency links, in order to enhance resilience against potential water shortages.</b></p> <p>2.2.2 Identify the BOPs applicable to each characterized and/or diagnosed company in the industry subsectors (taking into account aspects such as the input management required, energy optimization, waste reduction and automation, etc.) in order to establish the technological impact chains.</p> <p>2.2.3 Based on the BOP pilot projects, identify and prioritize the types of technology reconversion, innovation, and adaptation projects that can be implemented by companies characterized and/or diagnosed in industry subsectors in the Bogotá-Cundinamarca region (in alignment with the mitigation PAS of the industry sector), considering among these:</p> <ul style="list-style-type: none"> <li>- Energy optimization in fuel consumption,</li> <li>- Adaptation and/or substitution for cleaner fuels,</li> <li>- Improvement of production processes for increasing energy efficiency and optimizing their operations.</li> </ul> <p>2.2.4 Implement activities to promote technologies that include technology and financial rounds, business missions, exchange of national and international experiences, participation in fairs and national and international events, among others, in order to give first-hand information to entrepreneurs and decision-makers about technologies they can access and their outcomes once implemented.</p> |

<sup>29</sup> The information gathering at the source (in each company) is made by applying different procedures, such as technical visits, electronic surveys invoice revisions, etc.

|   |   |
|---|---|
| <p>2.3 Portfolio of low emissions technology transfer pilot projects (which includes the above mentioned three types of projects) implemented in industry subsectors in the Bogotá-Cundinamarca region.</p> | <p>2.3.1 Perform the technical, financial and administrative structuring of the technology transfer pilot projects with companies in the industrial subsectors in the region of Bogotá-Cundinamarca (with the possibility of having projects in other subsectors incorporated provided they meet the requirements defined by the programme).</p>  |
|   | <p>2.3.2 Assist structured technology transfer pilot projects to access financial resources through financing models defined under this project.</p>  |
|   | <p>2.3.3 Assist companies with the implementation of the BOP and technology reconversion, innovation and adaptation pilot projects, providing the technical support required during the training and the supply of equipment, installation and commissioning, and the start of operation.</p>   |
|   | <p>2.3.4 Development of a system that allows monitoring, reporting and verification (MRV system), that consolidates, disseminates and updates orderly and periodically all information and data concerning the outcomes and monitoring of economic indicators (i.e. to measure productivity), social indicators (i.e. to measure impact on employment generation), environmental indicators (i.e. to measure GHG emission reductions achieved), and energy indicators (i.e. to measure consumption and energy savings) of each implemented project.</p> |
|   | <p>2.3.5 Support the carrying out of equipment calibration processes (once the technology is implemented), energy measurements and monitoring of other atmospheric emissions (isokinetic measurements to determine the reductions of black carbon and other pollutants).</p>  |

**Component 3. Knowledge management for the replication of the technology transfer pilot projects’ impact in the industry sector.**

**Expected Result:** *Inputs provided for the formulation of a NAMA for the industry sector to replicate the development of technology transfer projects in other industry subsectors and regions of the country.*

79. This component seeks to establish the framework for collecting and analyzing the results of the pilot projects in terms of energy savings and GHG mitigation achieved, as well as monitoring of defined project performance indicators, including marginal abatement costs, energy productivity, and co-benefits, among others. This component sets the basis for the dissemination of the achieved outcomes of the project. It will also establish a framework of action to ensure sustainability and replicability of the experiences and to provide elements for the design of a NAMA for the industry sector, based on the needs of the requirements of the National Government. This component is transversal and needs to adapt to the different pilot projects and the subsector finally included in the project administering all relevant information. This component consists of the following products and activities:

| Product  | Activities   |
|--|--|
| <p>3.3 Diagnosis of energy and GHG mitigation indicators, and outcomes achieved by the technology transfer pilot projects to identify cases of success for their replication/extension.</p>  | <p>3.3.1 Consolidation of information related to the indicators on energy consumed/saved and GHG mitigation through the implementation of the pilot projects of industrial subsectors in Bogotá-Cundinamarca.</p>  |
|  | <p>3.3.2 Analysis of pilot project outcomes in the industrial sector in Bogotá-Cundinamarca according to information compiled by the MRV system for each of these, including the development and evaluation of the curve of marginal abatement costs, reduction of GHG emissions/cost for tCO<sub>2</sub>e potential, SLCP mitigation, energy productivity, combination of technical, financial and commercial feasibility potential and socio-economic co-benefits, among others, analyze them, establish their success factors, and define the possibility for replication or expansion.</p> |
| <p>3.4 Dissemination of lessons learned and best practices of the pilot projects in other regions, in order to spur further innovation processes and technological transformation in the industry sector in Colombia.</p>                            | <p>3.4.1 Establish lessons learned, implemented reconversion models, and best practices applied in each industry for the pilot projects implemented in the selected industrial subsectors in Bogotá-Cundinamarca.</p>  |
|  | <p>3.4.2 Planning and conduction of workshops and dissemination sessions to show decision-makers from companies in other industrial subsectors and regions of the country the lessons learned and outcomes achieved in order to encourage the development of new projects.</p>   |
| <p>3.5 Assessment of institutional and financial mechanisms of pilot projects and coordination for the sustainability and replication of future technology transfer pilot interventions in the industry sector and other subsectors in Colombia.</p> | <p>3.5.1 Define the financial model (strategies) that were used to finance the transfer of technology pilot projects in priority subsectors in Bogotá-Cundinamarca in order to establish their sustainability and replicability in future technology transfer projects to be developed in other industrial subsectors and other regions.</p>   |
|  | <p>3.5.2 Assess the implementation of financial models and partnership mechanisms for the future development of technology transfer pilot projects for in other subsectors and regions in the context of NAMA for the industrial sector.</p>   |
| <p>3.6 Pilot case study completed to support the development of a NAMA for the industry sector.</p>  | <p>3.6.1 Gather information and data on the outcomes achieved by implemented technology transfer pilot projects in order to establish the necessary inputs for formulating a NAMA for the industry sector and feed the national MRV system for Colombia that is managed by MADS.</p>   |
|  | <p>3.6.2 Analyze the outcomes achieved for their replication in other subsectors and regions, and the required documentation of these outcomes in order to support the application of a national methodology for the formulation of the NAMA for the industrial sector, which will be registered.</p>  |

## 2.5. INDICATORS, RISKS, AND ASSUMPTIONS

### Indicators

80. An indicator system was defined to measure compliance of the objective proposed by the project region in terms of capacity building in the value chain, the implementation of technology transfer pilot projects, the development of a monitoring, reporting and verification system of the outcomes achieved, the mechanisms for disseminating and replicating the acquired experiences in other subsectors and regions of the country, and the generation of inputs for formulating a NAMA for the industrial sector.

81. The main indicators that have been defined for the purpose of establishing compliance with the objective of the project are:

- Amount of GHG emissions reduced in industry subsectors in the Bogota - Cundinamarca region
- Amount of energy saved through implementation of Energy Efficiency measures
- % of increase in energy productivity in SMEs which make up the industry subsectors in the Bogotá-Cundinamarca region
- Level of investment triggered for energy efficiency in industrial sector in Bogotá/Cundinamarca

The indicators established to measure progress for achieving outcomes are presented in detail in project results framework.

### Risks

82. The risks affecting the effective implementation of the proposed project, with their corresponding mitigation actions to be applied, are the following:

| Risk  | Type        |        | Mitigation Action  |
|---|-------------|--------|--|
| Change in the socio-economic conditions of the industries in the industrial subsectors in the Bogotá-Cundinamarca region which limits their participation in the project. | Financial   | Medium | The productive sectors in Colombia have developed in a context of political and economic stability, and a policy context that recognizes the socio-economic benefits of industrial activity. Changes in these socio-economic conditions may occur, affecting the economic performance of companies, and thereby their interest in investing in technology reconversion, innovation and adaptation processes. However, there are national policy mechanisms that help mitigate this situation. First, economic benefits and other co-benefits associated with the implementation of technology transfer projects make the investment profitable even in unstable conditions. Second, the existence of Resolution 0186 of 2012 issued by MADS, which sets the framework to access tax benefits triggered for the development of savings and energy efficiency, provides additional incentives to add value to projects, thereby attracting the interest of stakeholders. Furthermore, the project has a technical, administrative and financial support strategy for the structuring and implementation of pilot projects, such as programmes for capacity building, financing mechanisms, and technical assistance, among others. |
| Technical problems that incidentally affect technology transfer projects, limiting achievement of expected outcomes.  | Operational | Low    | While energy efficiency technologies applicable to the industry (in priority subsectors) have been widely tested, they are not exempt to technical and/or operational failures. To mitigate this situation, the development of technology transfer projects involves a strict structuring and evaluation process of technical, administrative and financial aspects in order to establish their suitability and operability under the specific conditions of each industry in the industrial subsectors in the region of Bogota-Cundinamarca. Further, validated and tested technologies will be preferred. Also, protocols will be established to address possible cases of   |



|   |           |            |  |
|---|-----------|------------|--|
|   |           |            | technical problems as soon as possible, limiting their impacts to a minimum (including negative environmental impacts).  |
| The general public and/or communities in the zones of influence of industry subsectors have a wrong perception of implemented projects and their outcomes.  | Strategic | Low        | Although the projects bring direct benefits in terms of energy saving and reduction of GHG emissions, as well as the associated co-benefits, different levels of knowledge between communities and the industries in priority subsectors that the project will work with in the region could cause the communities to have a wrong perception of the pilot projects that are implemented. To mitigate this, a transparent and proactive communication strategy must be implemented with local communities since the early stages of the project, taking into account the lessons learned from similar projects, which include effective dissemination of project processes and its outcomes through a communication strategy.      |
| Lack of collaboration from banks in providing and developing financial instruments that can be used for implementing the pilot technology transfer projects | Financial | Low        | Industries could have difficulty accessing the financial instruments to be developed or identified during the implementation of the project due to lack of information or reluctance of private banks to promote such alternatives (e.g. it is more favorable for them to promote other types of credits that represent higher incomes to them). To mitigate this, private banks (led by the national development bank) have been closely engaged during project formulation and will be involved in project implementation, ensuring that the bank and industrial sectors have a mutual understanding of the financing needs for this type of project as well as the financial and environmental benefits that they will deliver. |
| Climate change impacts, in particular water shortages, affect industrial operations in Bogota/Cundinamarca region   | Climate   | Low/Medium | Water shortages have been identified as the main climate change impact that could affect small and medium industries in Bogotá/Cundinamarca. This could affect water intensive industrial processes, as well as energy supply if hydroelectricity generation is affected. The project will incorporate the climate risk into the energy audits conducted in the industrial sector, seeking to optimize water/energy measures that can increase the efficiency in the use of both resources.  |
| <b>Overall Risk</b>   |           | <b>Low</b> |  |

**Assumptions**

83. Assumptions are classified as external factors (events, conditions or decisions) which are beyond the project control and are likely to occur in the short and medium term, influencing its implementation and long-term sustainability. The assumptions for the achievement of objectives proposed by the project are:
1. Macroeconomic conditions Colombia remain stable, fostering an investment friendly environment.
  2. The interest expressed by the identified priority industry subsectors in Bogotá/Cundinamarca region remains to develop technology transfer activities.
  3. Industries with robust financial health and access to financial resources will invest in identified EE measures that have a positive financial return in the short and medium term.
  4. Public policies supporting competitiveness and increased productivity in the industrial sector continue to evolve positively and incentivize investment in energy efficiency.

**2.6. FINANCIAL MODALITY**

84. The Project will exercise the National Implementation Modality (NIM) and follow the UNDP guidelines and standard regulation.

## 2.7. COST EFFECTIVENESS SUSTAINABILITY, AND REPLICABILITY

85. The considerations of profitability, sustainability and replicability have been integrated into the project design ensuring that it is aligned with key national policies and priorities to mitigate climate change, rational use of energy and promote business development.

### Profitability

86. The proposed project is cost effective in reaching its goal, as important energy savings and GHG reductions can be demonstrated through the promotion of pilot technology transfer projects. It is estimated that GEF resources will contribute to the achievement of the following outcomes:

| Direct Emissions                  |                        |  |                    |                           |  |
|-----------------------------------|------------------------|--|--------------------|---------------------------|--|
| Type of Measure                   | Enterprises & Projects | Emissions Avoided (tCO <sub>2</sub> /year) | Investments (\$US) | \$US/tCO <sub>2</sub> /yr | Lifetime (10 yr) \$US/tCO <sub>2</sub> |
| BOP Implementation                | 160                    | 8,705                                      | 682,349            | 7.84                      | 0.78                                   |
| Process adjustments and/or update | 37                     | 5,797                                      | 679,000            | 11.71                     | 1.17                                   |
| Technological adjustments         | 43                     | 8,700                                      | 4,215,890          | 48.50                     | 4.85                                   |
| <b>TOTAL</b>                      | <b>246</b>             | <b>23,202</b>                              | <b>5,577,239</b>   |                           |  |

| Indirect Emissions                |                        |  |
|-----------------------------------|------------------------|--|
| Type of Measure                   | Enterprises & Projects | Emissions Avoided (tCO <sub>2</sub> /year) |
| BOPs Implementation               | 1,731                  | 94,182                                     |
| Process adjustments and/or update | 400                    | 62,667                                     |
| Technological adjustments         | 465                    | 94,098                                     |
| <b>TOTAL</b>                      | <b>2,596</b>           | <b>250,947</b>                             |

Profitability is calculated by dividing the GEF contribution (USD 1,726 million) by the reduction of direct and indirect emissions.

87. Based on the above calculations, it is estimated that the cost-efficiency in the use of GEF resources is given based on the fact that for every of GEF US dollar, a reduction of 2.03 in tCO<sub>2</sub>e is promoted for a period of 10 years.

88. In the priority subsectors in the region, there are industries that have shown interest in implementing projects aimed at improving energy performance and benefit from energy savings. The project addresses this situation by promoting projects for implementing BOPs in industries, which will establish the bases to catalyze the implementation of low-carbon technology reconversion, innovation, and adaptation projects, with benefits that are obtained in the long term. The implementation of these projects allows companies that adopt them to obtain economic returns from the savings achieved, by paying lower energy bills and generating higher incomes by increasing productivity. This way it is established that the pilot projects are profitable since they achieve savings that in the medium and long term turn to be greater than the required investments.

89. The project provides stakeholders the opportunity to implement economically viable alternative technologies in a cost efficient way, by using GEF funds to catalyze private sector resources, as the support provided by the project encourages investment in pilot projects. Further, the experience is expected to be replicated through a NAMA model for the industry sector, fostering domestic alternatives to improve productivity of industries in priority industry subsectors in the Bogota region as one of the outcomes of this project.

## **Sustainability**

90. To ensure project sustainability and support tools designed (for capacity building, promotion of technology transfer projects, and monitoring, reporting and verification of outcomes), the project components are integrated under existing institutional and political structures, or under the responsibility of public and private entities with direct participation in energy efficiency matters.

91. The main problem associated with the development of technology transfer activities in the industry has been the lack of technical expertise, the high cost of acquisition of machinery and equipment required, and the lack of measured and proven outcomes; therefore, the identification and development of economically viable alternative technologies for the technological reconversion, innovation and adaptation in the industries within the priority subsectors in the region, and the development of tools that facilitate and support these processes will lead to building the technical capacity required in decision-makers, the access to financial resources under favorable conditions, and a broad dissemination of the outcomes of these initiatives. Thus, it is expected that more technology transfer processes are implemented in the industry, motivated by the installed capacities, financed and disseminated through the implemented instruments.

92. Once the capacity for technology transfer is built, support tools are defined, and pilot projects are implemented, entrepreneurs in industries of the subsectors in the Bogotá-Cundinamarca region that implemented them will continue independently with the actions needed to meet their responsibilities in terms of operation and monitoring. Taking into account that measures are aimed at rational and efficient use of energy by implementing BOPs, energy optimization in fuel consumption, adaptation and/or substitution for cleaner fuels, and improvement of the production processes to increase energy efficiency and the optimization of its operations, which will result in significant progress towards achieving the country goals of reducing energy consumption in their sectors and reducing GHG emissions, the project creates the basis so that the promoting entities themselves become responsible for the monitoring and dissemination to relevant parties through the development of a national mitigation instrument applicable to the industry sector (NAMA for the Industry sector).

## **Replicability**

93. The project provides a model by which the implementation of technology transfer projects in the prioritized industry subsectors in the region is promoted by covering a percentage of investment costs corresponding to BOP implementation projects in industries as the basis for catalyzing the investment from these industries in low-carbon technology reconversion, innovation and adaptation projects, in terms of processes and equipment which will tend to improve their productivity and competitiveness.

94. The development of this project will establish a model that is replicable in industries with technologies and processes that demand energy within the industry sector in all regions of Colombia, by providing information on technical alternatives that allow achieving energy savings and reducing GHG emissions, with the support of processes for capacity building in the subsectors, the design of financial mechanisms, the development of energy efficiency projects in the industry, the adoption of a knowledge management system for monitoring outcomes, and an institutional and regulatory framework for all these actions.

95. The primary mechanism for replicating the model proposed by the project will be through the generation of inputs for formulating a NAMA for the industry sector, considering that a model with low investment, which leads to energy savings and reductions of GHG emissions, could catalyze private investment to adopt energy efficiency schemes that require greater investments and generate substantial changes in their production systems. Thus, the dynamics applied in the sample of 160 companies that will implement BOPs pilot projects and that will catalyze the implementation of 80 technology reconversion, innovation and adaptation projects, can be replicated in the universe of 2,886 companies with similar conditions at a national level. This will be achieved based on the outcomes monitored by the MRV system and sharing of the lessons learned with stakeholders (public sector, private sector and community in general).



### 3. PROJECT RESULTS FRAMEWORK

This Project will contribute to achieving the following Country Programme Outcome, as defined in the CPAP or CPD: Strengthening of capacities by civil society and public institutions, in order to address and reduce the negative impact of climate change, the reduction of the ozone layer, solid waste management, comprehensive management of water sources and persistent organic pollutants, in accordance with international agreements.

Country Programme Outcome Indicators: Civil society and public institutions strengthen their capacity to address and reduce the negative impact of climate change, the reduction of the ozone layer, solid waste management, comprehensive management of water sources and persistent organic pollutants, in accordance with international agreements/At least 4 new initiatives in 2012.

Key Applicable Area Environment and Sustainable Development Key Outcomes Area: Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access

Applicable GEF Strategic Objectives and Programme: Climate Change

Applicable Expected GEF Outcomes:

Applicable GEF Outcomes Indicators:

|  | Indicator  | Baseline   | Objectives   |   | Means of Verification  | Risks & Assumptions   |
|--|--|--|--|---|--|---|
|  |  |  | Project Mid-term   | Project End   |  |   |
| <b>Project Objective<sup>30</sup></b><br>Promoting the adoption of best industry practices and the implementation of low-carbon technologies in companies that form part of the industry sector in Bogotá-Cundinamarca | Amount of GHG emissions reduced in industry subsectors in the Bogota - Cundinamarca region | Current emissions of the benefitting companies in the industry subsectors in the region (to be determined in year 1 of project)          | 50% of BOP projects executed and project portfolio of technological reconversion, innovation and adaptation to be implemented, already identified. | Direct reduction of at least 55,000 tCO <sub>2</sub> e in priority industry subsectors for the region, by implementing pilot projects, as compared to baseline. Expected annual reductions at end of project are 23,000 tCO <sub>2</sub> e/year.  | The value of the reduction of GHG emissions is established as the difference between baseline emissions of each project and the emissions calculated with operational information and of energy consumption of the beneficiaries of the GEF project in priority industrial subsectors for the city –region, once the projects have been implemented. | Assumption: The macroeconomic conditions of the country remain stable and allow for financing of cost effective energy efficient measures with short and medium term payback. |
|  | Amount of energy saved through implementation of Energy Efficiency measures                | Current energy consumption of the benefitting companies in the industry subsectors in the region (to be determined in year 1 of project) | At least 15 MWh reduction in annual energy consumption as a result of the implementation of 50% of projected BOP projects (80 projects).           | At least 80 MWh reduction in annual energy consumption as a result of the implementation of the full portfolio of projects. To be achieved through : <ul style="list-style-type: none"> <li>• Implementation of 160 BOP projects,</li> <li>• Implementation of 86 projects of technological reconversion, innovation and adaptation (processes and technologies) that include the following activities:               <ul style="list-style-type: none"> <li>- Energy optimization in fuel consumption,</li> <li>- Adaptation and/or substitution for cleaner fuels,</li> </ul> </li> </ul> |  |   |

<sup>30</sup> Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR

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|  |  |   |  | - Improvement in the production processes for increasing energy efficiency and optimizing their operations.   |   |  |
|  | % of increase in energy productivity in SMEs which make up the industry subsectors in the Bogotá-Cundinamarca region   | Current level of production and energy consumption in the benefitting companies in the industrial sub-sectors in the region (to be established in year 1).  | Energy productivity indicators established and the goal of improved productivity defined for each project.   | Increase between 1% and 3% in energy productivity of enterprises in priority industrial subsectors for the region that have implemented the proposed technology transfer projects.            | Evaluation of production parameters (produced units consumed inputs, sales, etc.) in the period of time, and energy consumption (kWh consumed, TJ consumed, etc.) of companies in the industrial subsectors for the region, once the projects have been implemented in order to compare them with the baseline information of each developed project. | Risk: Despite having implemented the technology transfer processes, energy productivity of the companies is being impaired by externalities that affect production and therefore energy consumption. |
|  | Level of investment triggered for energy efficiency in industrial sector in Bogotá/Cundinamarca  | Scattered investment taking place, unquantified and unconsolidated  | Business plans in place for investment of at least USD 6,000,000 in EE in industry   | At least USD 6,000,000 invested by industry in energy efficiency measures.  | Project records tracking investments made in EE measures  | Assumption: Overall investment conditions in Colombia remain stable or improve over the project lifetime   |
| <b>Outcome 1</b><br>Strengthening of the capacity of the industry sector | Number of guidelines for Energy and GHG emissions self-assessments produced for companies benefitted by the GEF project  | General technical information, primarily from international sources and partially from domestic sources about establishing GHG baselines and defining relevant emission factors. Specific information and methodologies required for industrial sub sectors is unavailable. | General methodological guide for determining baseline energy and GHG emissions applicable to such projects in the industrial subsectors in the region properly developed and disseminated.             | Methodological guidelines applied by all companies that have implemented BOPs projects (in building their energy and GHG emissions baseline).   | Methodological guidelines developed according to the requirements of the GEF project, with their corresponding dissemination materials, such as presentations, booklets, among others.  |  |
|  | Number of persons trained in technical, financial and commercial projects associated with the development of specific technology transfer projects for industrial subsectors in the region | Industry specific capacity development programs not developed.  | Capacity-building programs developed for technical, financial and commercial aspects associated with the development of specific technology transfer projects for industrial subsectors in the region. | At least 300 people trained in technical, financial and commercial projects associated with the development of specific technology transfer projects for industrial subsectors in the region. | Training programs designed in accordance with appropriate technical institutions and actors.<br><br>Records of attendance and participation in training activities.   |  |
|  | Number of companies that implement BOP with energy and GHG   | There is no baseline GHG in the companies.  | Energy and GHG emissions assessment in the 80 companies that   | Energy and GHG emissions assessment of the 160 companies that have implemented BOP projects.  | Baselines (energy and GHG emissions) of all projects implemented by   | Risk: The energy and GHG emissions assessment of companies   |

|   |  |   |  |  |   |   |
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|   | emissions assessment completed   |   | have implemented BOP projects so far.  |  | industrial subsectors in the region, according to project guidelines.   | do not have data to collect the required baseline information prior to the implementation of technology transfer projects.  |
| <b>Outcome 2</b><br>Implementation of technology transfer pilot projects according to the mitigation actions identified and prioritized in the industry sector. | Number of projects accessing funding from financing mechanisms defined by the GEF project.   | Overall, there are financial models for the promotion and financing of energy efficiency activities in general (ESCO type models with performance payments) but not specific to the types of projects proposed by the project, added to the lack of resources to promote major industry changes (the resources used by these modeling are limited to the financial capabilities of companies or ESCOs). | Defined and structured financing mechanisms.   | 80% of the identified projects seeking funding have access to financing mechanisms defined by the GEF project.   | Portfolio of financing options (funding program) of technology transfer projects for industries in priority subsectors for the region, effectively agreed with the stakeholders of the national financial and operational sector. | Risk: Projects opt for self financing, thus choosing not to access financing mechanisms proposed by project. This would not affect the achievement of project results.  |
|   | Number of Best Operating Practices projects identified and implemented within SMEs   | There is a prior definition of the most appropriate mitigation measures to reduce the consumption of electricity and heat in industries that make up the industrial subsectors in Bogotá-Cundinamarca   | 160 identified BOP projects, and a first project portfolio of technological reconversion, innovation, and adaptation identified in at least 40 SMEs. (investment below \$15,000) | 100% (160 projects) of BOP projects and of the portfolio of technological reconversion, innovation, and adaptation is implemented. (investment below \$15,000) | Characterization reports and/or energy assessment of the projects implemented, in accordance with the standards defined by the GEF project.   | Assumption: Industries with robust financial health and access to financial resources will invest in identified BOPs that have a positive financial return in the short and medium term.                        |
|   | Number of projects implemented in technological and/or process conversion, innovation and/or adaptation                                | There is a characterization of project types per sub sector. Individual projects not defined.   | At least 86 of technological reconversion, innovation and adaptation (processes and technologies) projects identified and financially structured. (Investment minimum \$15,000). | At least 86 of technological reconversion, innovation and adaptation (processes and technologies) projects implemented (Investment minimum \$15,000).          | Outcomes Reports of BOPs projects and technological reconversion, innovation and adaptation implemented.  | Risk: That the outcome is achieved in terms of reductions in GHG emissions, in a lower number of projects.<br><b>Risk: Climate change impacts, in particular water shortages, affect industrial operations.</b> |
|   | Number of Monitoring, reporting and verification systems (MRV) for monitoring indicators and outcomes of technology transfer projects. | The MADS is developing a MRV system for Colombia, with the purpose of having a standardized approach that allows to estimate and report the change in GHG emissions and absorptions caused by policies and/or mitigation actions in the   | Basic design parameters defined for the operation of the project MRV system in accordance with the needs of the stakeholders and the national government.                        | A MRV system (tool) in place covering the scope of this project and collecting and reporting GHG and associated data for investments triggered by project.     | Reports generated by the project MRV system.  | Assumption: Investments triggered by project follow project guidance to collect required data.  |



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|  |  | sector. Within this process, the definition of indicators is planned through the application of the Policy and Action Standard Guide published by WRI. |   |  |  |  |
|  | Number of training processes aimed at strengthening technical capacities of stakeholders and decision-makers in priority industry subsectors for Bogota-Cundinamarca.                                      | Energy efficiency technical capacity is spread throughout the sector, without having been set specifically to date.                                    | Training and strengthening processes carried out with stakeholders and decision-makers within companies that have implemented BOP projects (50% of companies planned).    | 100% of the companies benefitted by the GEF project have participated in the training activities carried out and are fully trained to identify EE opportunities and conduct MRV on implemented measures. | Records of attendance and participation in training activities.  |  |
| <b>Outcome 3</b><br>Knowledge management for the replication of the technology transfer pilot projects' impact in the industry sector. | Level of systematization of consolidation and analysis of best practices of technology transfer pilots.  | Currently, no knowledge management system aimed at monitoring energy indicators and mitigation for such projects has been implemented.                 | Having defined a project outcome management system of technology transfer projects implemented  | 100% of the outcomes and energy and GHG mitigation indicators of implemented projects properly consolidated and analyzed.  | Results of energy and GHG mitigation indicators for industrial subsectors in the region based on implemented projects.   |  |
|  | Level of systematization of local socioeconomic benefits resulting from project implementation   | Level of socioeconomic benefits attained through energy efficiency investments is unclear and assessed qualitatively                                   | Baseline parameters for socioeconomic assessment are defined, in terms of industry competitiveness, employment, and gender.   | Full assessment of socioeconomic benefits of energy efficiency investments in industry is finalized and disseminated.  | Data generated by participating industries and report produced by project staff.   |  |
|  | Level of dissemination of project results and processes carried out in different regions of Colombia (lessons learned and project achievements)  | N/A  | 2 dissemination processes (in different regions to that of the project) of experiences from lessons learned and successful outcomes achieved by the projects implemented. | 4 dissemination processes (in different regions to that of the project) of experiences from lessons learned and successful outcomes achieved by the projects implemented.                                | Effectively developed processes for sharing experiences and lessons learned with entrepreneurs and stakeholders from other regions.  |  |
|  | Level of availability of financial mechanisms and products in place to guarantee sustainability and replicability of future pilot interventions in the industrial sector and other subsectors in Colombia. | Financing available, but not specifically tailored to the needs of energy efficiency investments in industrial SME sectors                             | Financial mechanisms and products defined and ongoing.  | At least 2 financial mechanisms available, capable of delivering at least USD 10m annually to EE projects in SMEs in Colombia.   | Mechanisms for financing technology transfer projects (energy efficiency) in industries within priority subsectors for the region effectively agreed with relevant stakeholders. | Risk: Projects opt for self-financing, thus reducing interest from financial institutions in targeting EE in SMEs. |

|  |   |  |   |  |  |   |
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|  | <p>Quality of information provided to MADS for development and implementation of a NAMA in the industry sector.</p> | <p>Through the ECDBC and the MinCIT, the country has been working on the definition of the structure for constructing the NAMA for the industry sector, clearly defining the basis of the scheme, support activities required and the types of projects to be implemented that seek the desired results.</p> | <p>Inputs established to align the project with the methodology defined for structuring the NAMA for the industry sector.</p> | <p>NAMA implementation case study report formulated and aligned with the Government's defining parameters and complying with all MRV procedures.</p> | <p>Input supplies, guidance of the project and outcomes achieved for their replication in other subsectors and regions, through the application of a national methodology for the formulation of NAMA for the industry sector, which will be registered.</p> | <p>Risk: Project results do not provide convincing data and evidence to develop a national industry NAMA.</p> |
|--|---|--|---|--|--|---|

#### 4. TOTAL BUDGET AND WORK PLAN

| <b>Award ID:</b>   |   | 00089717   |                   | <b>Project ID:</b>                     |                                     | 00095815                   |                            |                            |                            |                  |                        |               |
|--|---|--|-------------------|--|-------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|------------------------|---------------|
| <b>Award Title:</b>  |   | NAMA Pilot Implementation of Technology Transfer Projects in the Industrial Sector of the Cundinamarca-Bogotá Region |                   |  |                                     |                            |                            |                            |                            |                  |                        |               |
| <b>Business Unit:</b>  |   | COL10  |                   |  |                                     |                            |                            |                            |                            |                  |                        |               |
| <b>Project Title:</b>  |   | NAMA Pilot Implementation of Technology Transfer Projects in the Industrial Sector of the Cundinamarca-Bogotá Region |                   |  |                                     |                            |                            |                            |                            |                  |                        |               |
| <b>PIMS No.</b>  |   | 5190   |                   |  |                                     |                            |                            |                            |                            |                  |                        |               |
| <b>Implementing Partner</b>  |   | CAEM   |                   |  |                                     |                            |                            |                            |                            |                  |                        |               |
| <b>GEF Outcome/Atlas Activity</b>  | <b>Responsible Party/Implementing Agent</b> | <b>Fund ID</b>   | <b>Donor Name</b> | <b>Atlas Budget Description</b>        | <b>Atlas Budgetary Account Code</b> | <b>Amount Year 1 (USD)</b> | <b>Amount Year 2 (USD)</b> | <b>Amount Year 3 (USD)</b> | <b>Amount Year 4 (USD)</b> | <b>Total</b>     | <b>See Budget Note</b> |               |
| <b>Component 1</b><br>Industrial sector capacities strengthened for the establishment of energy and GHG emissions baseline under the BAU reference setting | CAEM  | 62000  | GEF               | International Consultants              | 71200                               | 0                          | 4,000                      | 0                          | 4,000                      | 8,000            | 1                      |               |
|  |   |  |                   | Local Consultants                      | 71300                               | 35,000                     | 15,000                     | 8,000                      | 5,000                      | 63,000           | 2                      |               |
|  |   |  |                   | Contractual Services - Individuals     | 71400                               | 18,000                     | 18,000                     | 18,000                     | 18,000                     | 72,000           | 3                      |               |
|  |   |  |                   | Travel Expenses                        | 71600                               | 8,000                      | 8,000                      | 6,000                      | 6,000                      | 28,000           | 4                      |               |
|  |   |  |                   | Contractual Services - Companies       | 72100                               | 10,000                     | 10,000                     | 5,000                      | 5,000                      | 30,000           | 5                      |               |
|  |   |  |                   | Supplies                               | 72500                               | 3,000                      | 3,000                      | 3,000                      | 3,000                      | 12,000           | 6                      |               |
|  |   |  |                   | Audiovisual production and press costs | 74200                               | 10,000                     | 15,000                     | 15,000                     | 10,000                     | 50,000           | 7                      |               |
|  |   |  |                   | Miscellaneous                          | 74500                               | 15,000                     | 15,000                     | 10,000                     | 10,000                     | 50,000           | 8                      |               |
| <b>SUBTOTAL</b>  |   |  |                   |  |                                     | <b>99,000</b>              | <b>88,000</b>              | <b>65,000</b>              | <b>61,000</b>              | <b>313,000</b>   |                        |               |
| <b>Component 2</b><br>Technology transfer pilot projects implemented according to mitigation actions identified and prioritized in the industrial sector.  | CAEM  | 62000  | GEF               | Local Consultants                      | 71300                               | 55,000                     | 65,000                     | 55,000                     | 50,000                     | 225,000          | 9                      |               |
|  |   |  |                   | Contractual Services - Individuals     | 71400                               | 79,425                     | 103,625                    | 103,625                    | 103,625                    | 390,300          | 10                     |               |
|  |   |  |                   | Travel Expenses                        | 71600                               | 26,709                     | 26,709                     | 20,709                     | 19,711                     | 93,838           | 11                     |               |
|  |   |  |                   | Contractual Services - Companies       | 72100                               | 20,000                     | 65,000                     | 60,000                     | 30,000                     | 175,000          | 12                     |               |
|  |   |  |                   | Supplies                               | 72500                               | 0                          | 3,000                      | 2,000                      | 1,793                      | 6,793            | 13                     |               |
|  |   |  |                   | Technology equipment                   | 72800                               | 0                          | 30,000                     | 30,000                     | 32,000                     | 92,000           | 14                     |               |
|  |   |  |                   | Audiovisual production and press costs | 74200                               | 2,000                      | 7,000                      | 6,000                      | 6,000                      | 21,000           | 15                     |               |
|  |   |  |                   | Miscellaneous                          | 74500                               | 3,000                      | 3,000                      | 3,000                      | 3,000                      | 12,000           | 16                     |               |
| <b>SUBTOTAL</b>  |   |  |                   |  |                                     | <b>186,134</b>             | <b>303,334</b>             | <b>280,334</b>             | <b>246,129</b>             | <b>1,015,931</b> |                        |               |
| <b>Component 3</b><br>Sustainable Technology Transfer Knowledge in the Industrial Sector   | CAEM  | 62000  | GEF               | Local Consultants                      | 71300                               | 0                          | 0                          | 24,000                     | 50,000                     | 74,000           | 17                     |               |
|  |   |  |                   | Contractual Services - Individuals     | 71400                               | 14,400                     | 14,400                     | 14,400                     | 14,400                     | 57,600           | 18                     |               |
|  |   |  |                   | Travel Expenses                        | 71600                               | 0                          | 4,000                      | 8,000                      | 13,000                     | 25,000           | 19                     |               |
|  |   |  |                   | Contractual Services - Companies       | 72100                               | 0                          | 0                          | 0                          | 11,000                     | 11,000           | 20                     |               |
|  |   |  |                   | Audiovisual production and press costs | 74200                               | 0                          | 2,000                      | 5,000                      | 5,000                      | 12,000           | 21                     |               |
|  |   |  |                   | Miscellaneous                          | 74500                               | 0                          | 0                          | 10,000                     | 10,000                     | 20,000           | 22                     |               |
|  |   |  |                   | <b>SUBTOTAL</b>                        |                                     |                            |                            |                            |                            | <b>14,400</b>    | <b>20,400</b>          | <b>61,400</b> |
| Monitoring and Evaluation  | CAEM  | 62000  | GEF               | International Consultants              | 71200                               | 0                          | 0                          | 0                          | 15,000                     | 15,000           | 23                     |               |
|  |   |  |                   | Local Consultants                      | 71300                               | 0                          | 5,000                      | 0                          | 10,000                     | 15,000           | 24                     |               |
|  |   |  |                   | Communications and audiovisual media   | 72400                               | 250                        | 250                        | 250                        | 250                        | 1,000            | 25                     |               |
|  |   |  |                   | Professional Services                  | 74100                               | 2,500                      | 2,500                      | 2,500                      | 2,500                      | 10,000           | 26                     |               |
|  |   |  |                   | <b>SUBTOTAL</b>                        |                                     |                            |                            |                            |                            | <b>2,750</b>     | <b>7,750</b>           | <b>2,750</b>  |
| Project Management Costs   | CAEM  | 62000  | GEF               | Contractual Services - Individuals     | 71400                               | 35,000                     | 40,000                     | 41,000                     | 40,953                     | 156,953          | 27                     |               |
|  |   |  |                   | <b>SUBTOTAL</b>                        |                                     |                            |                            |                            |                            | <b>37,750</b>    | <b>47,750</b>          | <b>43,750</b> |
| <b>TOTAL PROJECT</b>   |   |  |                   |  |                                     |                            | <b>337,284</b>             | <b>459,484</b>             | <b>450,484</b>             | <b>479,232</b>   | <b>1,726,484</b>       |               |

**BUDGET NOTES:**

|    |  |
|----|--|
| 1  | Contracts with expert international consultants to establish project guidelines and recommendations.   |
| 2  | Contracts with local consultants for making the methodological guide for determining the baseline energy and GHG emissions, assisting the training program and supporting companies in building their energy and emissions diagnosis.  |
| 3  | Project personnel to support the base line development and measurement of indicators   |
| 4  | Travel to the regions to present the project and the monitoring of training and capacity building processes.   |
| 5  | Contractual Services – Contracting of companies for local travel, and communication companies specialized in performing workshops, training sessions and capacity building with the different stakeholders, as well as the dissemination and presentation of the project.  |
| 6  | Miscellaneous supplies for the training and capacity building processes the project implements.  |
| 7  | Project outreach materials (audiovisual works, publications, etc.) and educational materials for energy and GHG emissions self-diagnosis.  |
| 8  | Logistics for organizing workshops and events  |
| 9  | Contracts with local consultants for the design of the required financial instruments, perform the characterization and diagnosis of energy companies, and provide technical assistance for the implementation of the BOPs and technology reconversion, innovation and adaptation projects, and development of the MRV system. |
| 10 | Project personnel to accompany the identification of technology conversion projects, the implementation of technologies, financial structuration of projects and investments, and hiring processes   |
| 11 | Field visits to execute technical work associated with the implementation of BOPs and technology reconversion, innovation and adaptation projects.   |
| 12 | Contractual Services – Companies for calibration service of monitoring equipment, measuring of technical parameters and measuring atmospheric emissions.   |
| 13 | Miscellaneous supplies for the processes of measurement and monitoring of technical parameters to run the project.   |
| 14 | Data Management Equipment (MRV system) to support the consolidation, dissemination, and regular updating of information and data on outcomes and monitoring of the project indicators.   |
| 15 | Technical materials for promoting technologies within the project framework (audiovisual works, publications, etc.).   |
| 16 | Logistics for organizing workshops and events  |
| 17 | Contracts with local consultants for evaluation and technical analysis of outcomes, including the gathering of information and making of reports.  |
| 18 | Project personnel to support data collection, consolidation and analysis   |
| 19 | Field visits for gathering outcomes (monitoring indicators) and for project dissemination.   |
| 20 | Contracting of companies for local travel for information gathering and presentation of project results  |
| 21 | Dissemination materials (audiovisual works, publications, etc.) and presentation of project outcomes in the different scenarios selected.  |
| 22 | Logistical arrangements for workshops and meetings.  |
| 23 | Terminal evaluation of project   |
| 24 | Terminal evaluation of project, and possible informal mid-term review  |
| 25 | Communications and data connection costs for data transfer   |
| 26 | Financial audits   |
| 27 | Contracts with of project management unit for project management (coordinator and administrative and financial assistant)  |

**Summary of Funds:**

|  | <b>Amount Year 1</b> | <b>Amount Year 2</b> | <b>Amount Year 3</b> | <b>Amount Year 4</b> | <b>Total</b>      |
|--|----------------------|----------------------|----------------------|----------------------|-------------------|
| <b>GEF</b>   | <b>337,284</b>       | <b>459,484</b>       | <b>450,484</b>       | <b>479,232</b>       | <b>1,726,484</b>  |
| <b>Bogota Chamber of Commerce</b>                      | 62,500               | 62,500               | 62,500               | 62,500               | <b>250,000</b>    |
| <b>Corporación Ambiental Empresarial</b>               | 180,000              | 60,000               | 60,000               | 60,000               | <b>360,000</b>    |
| <b>Ministerio de Ambiente y Desarrollo Sostenible</b>  | 200,000              | 200,000              | 300,000              | 100,000              | <b>800,000</b>    |
| <b>Regional Autonomous Corporation of Cundinamarca</b> | 250,000              | 152,315              | 152,315              | 304,630              | <b>859,260</b>    |
| <b>Gobernación de Cundinamarca</b>                     | 84,000               |                      |                      |                      | <b>84,000</b>     |
| <b>Bancóldex</b>                                       |                      | 3,000,000            | 3,000,000            | 3,000,000            | <b>9,000,000</b>  |
| <b>Swisscontact</b>                                    | 110,000              | 55,000               | 55,000               |                      | <b>220,000</b>    |
| <b>USAID</b>   | 354,200              |                      |                      |                      | <b>354,200</b>    |
| <b>UNDP</b>  | 100,000              | 100,000              |                      |                      | <b>200,000</b>    |
| <b>TOTAL</b>   | <b>1,677,984</b>     | <b>4,089,299</b>     | <b>4,080,299</b>     | <b>4,006,362</b>     | <b>13,853,944</b> |

## 5. MANAGEMENT ARRANGEMENTS

96. This project will last four years and will be implemented under the form of national implementation modality (NIM); it is a comprehensive part of the Country Programme Action Plan (CPAP) of the UNDP 2008-2014 signed by the Government of Colombia and UNDP in 2008. The signing of the CPAP of the UNDP constitutes a legal endorsement by the Government of Colombia.

97. To ensure the accountability of UNDP in the programming of activities and use of resources, and to promote national property, management and oversight arrangements of UNDP programming activities will be established. The management structure will respond to the needs of the project in terms of leadership, management, control, and communication. The project has a transversal nature and involves various stakeholders, thus, its flexible structure to adapt to potential changes during project implementation. The management structure of the UNDP project is composed of functions and responsibilities that meet the diverse interests and skills required by the project.

### 5.1 DECISION-MAKING STRUCTURE AND ORGANIZATION CHART

98. **Implementing Agency.** In its capacity as GEF Implementing Agency for this project, UNDP will provide management services during the project cycle as defined by the GEF Council. The project will follow the overall implementation arrangements described in the UNDP Guidelines: *Programme and Project Management Roles*.

99. UNDP has wide experience working with the Government of Colombia in the field of energy efficiency, low carbon development and climate change mitigation, and is well positioned to assist in institutional strengthening and capacity building. The UNDP-CO in Colombia and the Regional Coordinating Unit (RCU) of UNDP/GEF in Panama will be responsible for acting with transparent practices, proper conduct, and professional auditing. The staff and consultants will be hired in accordance with established principles of equal opportunities, progress outcomes, cost-effectiveness, fairness, integrity, transparency, and effective UN international transparency competition, and all financial transactions and agreements shall follow the same principles.

100. **Executing Entity.** The project will be executed by the Environmental and Business Corporation (CAEM for its acronym in Spanish). The CAEM shall coordinate the work with other strategic partners that collaborate on this project, and will be its sole manager. The CAEM shall host the Project Coordination Unit. It will be assigned the overall monitoring of the project and represent the interests of the Colombian government during project implementation.

101. The Executing Agency will carry out the general monitoring of the project and provide political, technical, logistical and administrative support for the successful implementation of the project, following UNDP and GEF guidelines. The results of the evaluation of organizational capacities are included in section 4.4 and Annex 2 of this document.

102. **Project Director.** The Project Director is the Director of the CAEM, who will be responsible for guiding and advising the project implementation on behalf of the Executing Agency, with the limitations set by the Steering Committee. The main responsibility of the Project Director is to ensure that the project produces the outcomes identified in the project document, with the standard level of quality required and within the specified limitations of time and costs.

103. **Steering Committee.** Project implementation will be carried out under the overall guidance of a Steering Committee which will be specifically formed for this purpose. The Steering Committee is the highest responsible authority for making management and consulting decisions to the CAEM and the Project Coordinator when guidance is required, including approval of budget revisions. The membership, responsibilities, and operating standards of the Committee will be confirmed during its first session.

104. The Committee will be a key authority to ensure that lessons learned from the project provide feedback, as well as the harmonious development of the project activities, regardless of the entity responsible for them.

105. The Committee shall consist of the following members:
- a) CAEM as Executing Agency, assuming the role of the Executive (Chairman) of the Steering Committee;
  - b) UNDP, assuming the role of Senior Vendor and Implementing Agency, and will provide guidance in regards to the technical feasibility of the project;
  - c) Ministry of Environment and Sustainable Development (MADS for its acronym in Spanish), assuming the role of Strategic Partner.
106. The main responsibilities of the Steering Committee shall be at least to:
- a) Approve any delegating responsibility for the CAEM Project Coordinator;
  - b) Approve the Project Work Plan;
  - c) Approve the project plans (i.e. Annual Work Plans) and technical reports and financial progress;
  - d) Make decisions with respect to the goals defined in the Project Annual Work Plan;
  - e) Monitor the progress of the project; ensure that activities meet project objectives and strategies; make recommendations on project implementation and outcomes;
  - f) Approve the budget and substantial project amendments and address issues related to the Project Coordinator's report;
  - g) Address issues that may have significant impact on project implementation.

107. Based on the approved Annual Work Plan, the Steering Committee may review and approve project quarterly plans when necessary and authorize higher expenses than those established in the agreed quarterly spending plans. The Steering Committee is the authority that terminates each quarterly plan and authorizes the start of the next, although this role can be delegated to the Project Technical Committee (see below); it ensures that the necessary resources are compromised and arbitrates any conflict in the project or negotiates a solution to any problem between the project and external entities.

108. The date of the first meeting of the Steering Committee must be agreed by the UNDP and the CAEM, and must occur upon start of project implementation in order to approve the first Project Annual Work Plan. The Steering Committee will meet once every twelve months; however, they may schedule additional meetings as required by the project, the Executing Agency, or UNDP. The Project Coordinator will coordinate the Steering Committee meetings of with the Official of the Programme for the Environment and Sustainable Development of UNDP.

109. In order to ensure maximum accountability of UNDP on project outcomes, the decisions of the Steering Committee will be made according to standards that ensure management for progress outcomes, cost-effectiveness, fairness, integrity, transparency and effective international competition. If a consensus cannot be reached in the Council, the final decision will rest upon the UNDP.

110. **Project Coordination Unit.** The CAEM will establish a Project Coordination Unit responsible for directing, overseeing and coordinating the implementation. The Unit established will be hosted within the CAEM, supported by its technical and administrative staff and its network of experts in the areas of energy efficiency in industry and climate change mitigation. The Project Coordination Unit is comprised of the Project Coordinator and Administrative Assistant. The unit will be led by the Project Coordinator, who also monitors the performance of contractors and entities running activities within the project framework.

111. The Project Coordination Unit will be under the authority, leadership and guidance of the CAEM as executing agency, therefore, as part of that institution, it shall be subject to its rules and enforcement procedures, which must comply with UNDP procedures that are based on the principles of equal opportunity, progress outcomes, improvement of economic conditions, justice, integrity, and transparency and effective international competition of the United Nations, and all agreements and financial transactions will also follow the same principles of ethics and transparency.



a) **Project Coordinator.** The Project Coordinator shall be responsible for managing the project in its operational, administrative and financial areas. He shall be subject to the monitoring of the Executing Agency, UNDP, and the Steering Committee, and will be responsible for the functions defined in Annex 1.

The Project Coordinator will be hired by the CAEM following the principles of transparency and equal opportunities, and will be financed through project funds.

The Project Coordinator has the authority to run the day to day activities of the project on behalf of the Executing Entity and the Strategic Partners, within the limits/flexibility established by the Steering Committee. The primary responsibility of the Project Coordinator is to ensure that the project achieves the products specified in this document with the quality stands required and within the specified limits of time and costs.

b) **Administrative Assistant.** The main role of the Administrative Assistant is to ensure the integrity and efficiency of administrative and financial processes and disbursement requests to UNDP. His main functions are defined in Annex 1.

112. **Strategic Partners.** The Ministry of Environment and Sustainable Development (MADS) is a Project Strategic Partner. Strategic Partners must ensure timely implementation, provide support to the CAEM and its Project Coordination Unit, and abide by the recommendations of the Steering Committee.

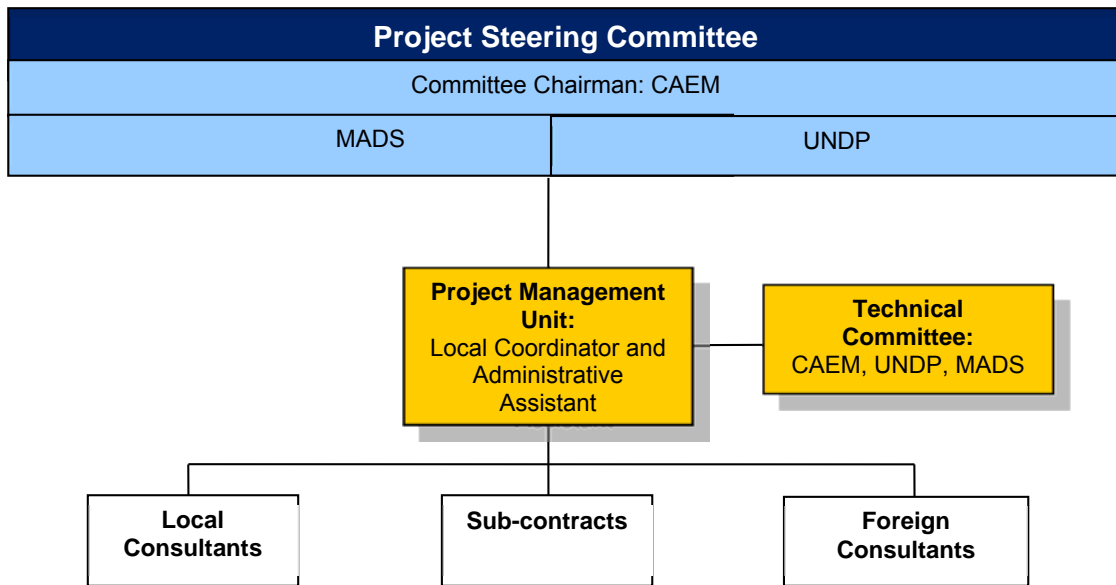
113. **Technical Committee.** A Technical Committee will be established for the overall project monitoring. This committee shall meet once every quarter or as needed. It will be comprised of the Project Coordinator, a representative of the CAEM, a representative of MADS and the Official of the Programme for the Environment and Sustainable Development of UNDP or his delegate. According to the thematic agenda, other institutions may be invited to participate in meetings. The Technical Committee will provide strategic guidance to the project and evaluate the added value of the project. This group will also review the achievement of outcomes according to the reports of the CAEM and the Project Coordinator, so that it can make recommendations to the Steering Committee in order to make adjustments in project implementation. In addition, as delegated by the Steering Committee, the Technical Monitoring Committee will review and approve project quarterly plans, terminate each quarterly plan, and authorize the start of the next.

114. **Project Guarantor.** Each member of the Steering Committee is responsible for project assurance; however, this role can be delegated. The Project Guarantor supports the functions of the Steering Committee by monitoring in an objective and independent manner and meeting project monitoring functions. This role ensures the proper management of the project and the achievement of key outcomes. Being Project Guarantor is an independent role of the Project Coordinator; therefore, the Steering Committee may not delegate its responsibilities on him. The Official of the Programme for the Environment and Sustainable Development of UNDP will have the role of Project Guarantor.

115. The success of the project depends on the strong coordination and effective management of the Steering Committee. The responsibility will rely upon the CAEM and the Project Coordination Unit, which will be responsible for organizing the Steering Committee meetings, providing materials to members prior to the meeting and outlining a clear set of objectives and sub-objectives to be met within the scope of the project.

116. In addition to specific positions mentioned above, a number of subcontracts are needed to ensure and complement the technical capacities of the different project partners. These contracts shall be established in accordance with the UNDP and the CAEM guidelines and the terms of reference defined by the Project Coordinator during the first month of implementation or during project implementation, according to the Annual Work Plan. UNDP will provide GEF funds to the Executing Agency for the procurement of goods and services.

**21. Organization Chart**



**5.2 UNDP SUPPORT SERVICES**

117. The project will be managed by the CAEM according to UNDP procedures which are based on the principles of equal opportunities, progress outcomes, improvement of economic conditions, justice, integrity, transparency and effective international competence of the United Nations, and all agreements and financial transactions will also follow the same principles of ethics and transparency.

118. During the first month of the project implementation, the CAEM shall prepare a procedures manual, in cooperation with the UNDP-CO in Colombia, which will apply to the implementation of this project. Every six months, the Project Coordinator must inform UNDP of any updates or changes to the manual. UNDP should review and approve the changes proposed.

119. UNDP Colombia will support the CAEM in project administration and management, as well as in the technical assistance, if required, according to the project needs. The project will support a position of Project Coordinator to provide direct day-to-day implementation of the project. The Official of the Environmental Programme, the Financial Official and Procurement Official, and M&E Official of UNDP in Colombia will provide administrative, technical, financial, and management support to the project, as required. Additional support roles will be undertaken by the Regional Bureau for Latin America and the Caribbean of UNDP and the regional offices of UNDP/GEF.

120. Direct cash transfers will be used as payment method to facilitate timely project implementation. If the CAEM requires support services for the implementation from the UNDP- CO that are outside the scope of implementation services as prescribed by the relevant program and financial manuals, costs will be charged to the project with the universal price list of the Support Service for the Implementation of UNDP, using universally assigned rates.

121. The CAEM retains the rights to set tariffs for project-related activities, such as mileage, travel grants in the country (travel allowance), consulting fees, etc., in relation to project staff and contracted by the project. However, they shall not exceed the internal rates of UNDP.

**5.3. IMPLEMENTATION MODEL**

122. This project will be implemented nationally (NIM) by the Corporate Environmental Corporation (CAEM). Local execution is to be carried out since it is considered important to to build the capacity required

from this project in local institutions. Additionally, as shown in the following paragraph, the CAEM is an entity with the ability to implement a project funded by the GEF, in addition to having specialized technical knowledge on the subject of energy efficiency in the industry.

#### **5.4. CAPACITY ASSESSMENT OF THE EXECUTING AGENCY AND RESPONSIBLE PARTNERS**

123. The CAEM was selected as the preferred Executing Agency by the Colombian government (see Letter of Endorsement sent together with the PIF to the GEF, Annex 3). The CAEM meets high standards of financial management and analysis of capabilities, according to UNDP guidelines, it demonstrates its quality to implement the project due to its specific expertise in energy efficiency in the industrial sector. CAEM is a qualified entity to act as Project Implementing Partner since it has implemented several projects related to the improvement of energy efficiency in the industrial sector for mitigating climate change and to the strengthening of the energy services market, as well as the making of GHG inventory and the measuring of the carbon footprint in the industries, funded by the World Bank, the Swiss Cooperation, the German Cooperation, the United States Agency for International Development, and local authorities, among others. The capacity assessment of the entity is in Annex 2.

#### **5.5. COOPERATION AGREEMENTS WITH RELATED PROJECTS**

124. The Project Steering Committee will take the initiative to promote exchange between implementation teams and Project Coordinators who are managing related projects to ensure coordination and synchronization of efforts and to promote sharing, whenever possible.

#### **5.6. INPUT PROVIDED BY PARTNERS**

125. The direct implementation of project activities is expected to be performed by the CAEM and the Project Coordination Unit, which will be physically located in Bogota, Colombia. The monitoring of the unit will be a function of the CAEM.

#### **5.7. OBLIGATIONS AND PREREQUISITES**

126. **Financial:** The project will start when the contributions stipulated for its funding are available. This project is funded by international cooperation agencies, institutions of national and local government, and the private sector. The funding of this project will be administered in accordance with the financial regulations of UNDP, which are attached to this Project Document, and in every case must be compliant to what is agreed here in order to achieve the project goals.

127. **Management and Support Services:** In accordance with the decisions and directives of UNDP's Executive Board reflected in its cost recovery policy with charge to other resources, the contributions shall be subject to the recovery of indirect expenses incurred by UNDP offices at the headquarters and in the country, when providing general management support (GMS). To cover these GMS costs, donor contributions shall be allocated an 8% charge and 5% when they are national government entities. All accrued interest attributable to the contribution shall be credited to the UNDP account and will be used in accordance with established UNDP procedures.

128. **Exchange Variations:** Eventual exchange differences resulting from changes in exchange rates will be added to or deduced from the corresponding value in US dollars (USD \$) to each deposit, as provided in Chapter 5, Regulation 5.04 of the UNDP Financial Manual. Such adjustment shall be made through the budget review.

129. **Forecasts or Exchange Variations:** UNDP, together with the Project Director, will quarterly analyze coverage of budgetary resources and project cash (generated by possible exchange variations) in order to adjust the work plans. To enable UNDP to record income from cost-sharing contributions in the month in which they were deposited in the UNDP account, the donor institution shall immediately send the UNDP a formal communication stating that the deposit has been made, together with the bank deposit slip.

130. **Equipment Transfer:** UNDP will hold ownership of the equipment, supplies and other property financed from this project. Issues related to the transfer of property by UNDP shall be determined in accordance with relevant UNDP policies and procedures.

131. **Project Termination:** This project will end due to: 1) expiration of the term envisaged for its duration with no extension; 2) implement of its purpose; 3) unforeseeable circumstance or force majeure.

132. The contribution shall be subject exclusively to the internal and external audit procedures provided for in the UNDP financial regulations, rules, policies and procedures. If the Annual Audit Report presented by the Board of Auditors of the United Nations to the governing body of UNDP were to include relevant observations regarding the contribution, the country office shall make this information known to the donor.

## **5.8. AGREEMENT ON INTELLECTUAL PROPERTY RIGHTS AND USE OF LOGOS**

133. In order to give proper recognition to the GEF and UNDP for providing funding, GEF and UNDP logos must appear in all project presentations, publications, vehicles and hardware, among others. Any quote in publications regarding projects funded by UNDP and GEF must also give recognition to UNDP and GEF.

134. In accordance with standard UNDP procedures, all resources and equipment obtained through the support of projects remain property of UNDP until project closure, or sooner if requested by the UNDP. At that time, the Steering Committee will make a decision on how to dispose of these resources. The Project Coordinator will oversee the proper use and maintenance of these resources and equipment.

135. Patent rights, copyrights and other similar rights related to any invention or process originating from UNDP assistance under this Agreement shall belong to the UNDP. However, unless the Parties in each case, expressly agree otherwise, the Government is entitled to use any such discoveries or processes within the country free of royalty or any similar charge.

136. Promoting the inclusion of political, partisan or religious or commercial nature, or any symbols, logos, logo marks on documents, publications and activities carried out in the implementation of this project will not be allowed.

## **6. MONITORING AND EVALUATION FRAMEWORK**

137. Project Monitoring and evaluation (M&E) will be carried out in accordance with procedures established by UNDP and the GEF and supplied by the project team and the UNDP-CO with the support of the Regional Coordination Unit (RCU) of UNDP/GEF in Panama City, Panama. The Project Outcomes Framework, which is presented in section 3 of this Project Document, includes progress and impact indicators for the project implementation, with their corresponding verification mechanisms. The M&E Plan includes a report of the Inception phase, evaluations of project implementation, quarterly and annual evaluations, and mid-term and final evaluations. The following sections present the main elements of the M&E Plan, as well as the estimated costs for related activities. The M&E Plan will be presented and finalized at the Project Inception Report, once project indicators, verification mechanisms and definition of all responsibilities of the project team related to M&E are perfected collectively.

### **6.1. PROJECT INCEPTION PHASE**

138. A Project Inception Workshop (IW) will be held within the first 3 months of project initiation, with all the equipment thereof, the relevant counterparts of the Colombian government, co-financing partners, UNDP-CO and the representation of the RCU of UNDP/GEF, as well as the headquarters of UNDP/GEF, as appropriate.

139. The main objective of the Inception Workshop (IW) will be to help the project team to understand and own the project goal and objective, as well as finalizing the first Project Annual Work Plan, using as a basis the Project Outcomes Framework and the GEF tracking tool for measuring capacity building. This will include the review of the Outcomes Framework (indicators, means of verification and assumptions); additional information will also be provided as necessary, based on this exercise and completion of the

Annual Work Plan with precise and measurable performance indicators and in a consistent manner with the expected project outcomes.

140. Additionally, the purpose and objective of the IW will be to: a) introduce the project team to the UNDP/GEF working group that will support the project during its implementation, namely UNDP Colombia and the staff responsible for the RCU; b) detail the functions, support services and complementary responsibilities of UNDP Colombia and RCU staff before the project team; c) provide a detailed overview of the requirements of the UNDP/GEF concerning reports submission and M&E, with special emphasis on the Annual Project Implementation Reports (PIR) and related communications, on the Annual Project Report (APR). as well as as in mid-term and final evaluations. Also, the IW will provide an opportunity to inform the project team about the budget planning, budget evaluations, and UNDP mandatory budget reprogramming.

141. The IW will also provide an opportunity for all partners to understand their roles, functions, and responsibilities within the decision-making structure of the project, including report submission and communication lines, and mechanisms for conflict resolution. The terms of reference for the project team and decision-making structures will be discussed once again to clarify the responsibilities of each party during the project implementation phase.

## **6.2. RESPONSIBILITIES AND MONITORING EVENTS**

142. A detailed schedule of project evaluation meetings will be developed by the Project Coordinator, in consultation with project partners and stakeholders representatives, and incorporated in the Project Inception Report. Such a schedule will include: a) tentative time frames for Project Steering Committee meetings; b) project-related M&E activities.

143. **Permanent monitoring.** The day-to-day monitoring of implementation progress will be the responsibility of the CAEM and the Project Coordinator, based on the Annual Work Plan and its indicators. The CAEM and/or Project Coordinator will inform UNDP Colombia of any delays or difficulties faced during implementation, so that the appropriate support or corrective measures can be adopted in a timely and effective fashion. The Project Coordinator will enhance the progress indicators and project performance/impact in consultation with the whole team during the IW, with support from UNDP Colombia and assistance from the RCU of UNDP/GEF. Specific goals for progress indicators with verification mechanisms for the first year of implementation will be developed during the IW. The indicators will be used to assess whether implementation is progressing at the desired time and in the right direction and will form part of the Annual Work Plan. Goals and indicators for subsequent years will be defined annually as part of the internal evaluation and planning processes carried out by the project team.

144. **Periodic monitoring.** Periodic monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the project team, or more frequently as deemed necessary. These meetings will allow parties to troubleshoot any problems pertaining to the project in a timely fashion and ensure smooth implementation of project activities. UNDP-CO and the RCU of UNDP/GEF, as appropriate, will perform annual field visits, or more frequently, to the project areas to make a first hand evaluation of the the progress, as agreed by a visits schedule that must be detailed in the Inception Report/Annual Work Plan. Any other member of the Steering Committee may also participate in visits, as the Committee deems appropriate. The UNDP-CO will prepare a field visit report and will share it within the project team, the members of the Steering Committee and UNDP/GEF, no later than one month after the visit.

145. **Annual monitoring.** Annual monitoring will be undertaken through the Annual Project Reports (APR) and Project Implementation Reports (PIR), and Steering Committee reviews. The project will be subject to accountability before the Steering Committee at least once a year. The Executing Agency will prepare an APR and deliver it to the UNDP-CO and UNDP/GEF Regional Office. This document may be revised by a tripartite commission composed of a representative of the Colombian Government, and program officials in charge at the UNDP-CO and RO.

146. The APR will be used as one of the basic discussion documents at the different institutions involved in the project (Steering Committee and Technical Committee). The Project Coordinator will present the APR highlighting policy issues and make recommendations for decision-making. The Project Coordinator will also report on any agreement reached with stakeholders during the preparation of the APR on how to troubleshoot operational issues. If required, an individual evaluation of each project component may be made. The Tripartite Commission has the authority to suspend any disbursement if project implementation goals are not met with a fair cause.

147. The Final Steering Committee Meeting will take place during the last month of project operations. The CAEM and its Project Coordination Unit is responsible for preparing the final report and its delivery to the UNDP-CO and the RCU of UNDP/GEF. A draft should be prepared at least two months before the end of the project, so as to allow its review, and will serve as a basis for discussions during the final meeting of the Steering and Technical Committees, and the Tripartite Commission. The final meeting will consider the implementation of the project as a whole, with special attention to whether the project has achieved the objectives proposed and contributed to the broader environmental goal. The Steering Committee or the Tripartite Commission may decide whether further action is required, particularly in relation to sustainability of project outcomes, and act as a vehicle through which lessons learned will be channeled as support for the implementation or development of other projects.

148. In addition to the annual reports and accountability before the project committees, once a year the corresponding information must be entered into the UNDP lessons learned tool, according to the guidelines given.

### 6.3. SUBMISSION OF PROJECT REPORTS

149. The CAEM and the Project Coordinator, together with the UNDP/GEF team, will be responsible for making and submitting the following reports which are part of the monitoring process and of mandatory submission:

a) **Inception Report.** it will be prepared immediately after the Inception Workshop (IW) has been made. It will include a detailed Annual Work Plan for the first year, which will be divided into quarters detailing the activities and progress indicators that will guide implementation during the first year of the project. This work plan will include the dates of specific field visits, support missions from the UNDP-CO, the RCU or consultants, as well as deadlines for the meetings of the decision-making structures of the project. The Inception Report will also include the detailed budget for the entire first year of implementation, which will be developed based on the Annual Work Plan and it will include any monitoring and evaluation requirements to effectively measure project implementation during the time limit established of 12 months. The Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project partners. In addition, a section on progress in the project set-up and start-up activities to date will be included, as well as an update of external conditions that could affect project implementation. Once completed, the Inception Report will be sent to the project partners, which will be given one calendar month to answer questions or queries. Before the circulation of the Inception Report, the UNDP-CO and the RCU of UNDP/GEF will review the document.

b) **Annual Project Report (APR):** It is a requirement of the UNDP/GEF and is part of project supervision, monitoring and management. It is a self-assessment report prepared by the CAEM and the project coordinator of the UNDP-CO and contributes to the process of reporting and CO Annual Results Report; it constitutes an essential element for the CTP Revision. The APR can be made at any time of the year, ideally before the CTP Revision. The APR should be discussed in the CTP Revision to establish the progress made in compliance with the Annual Work Plan and assess the implementation of the project to contribute to achieve the expected outcomes through products and collaborate work. The APR should be flexible but it must include at least the following sections: a) risks, problems and adaptive management of the project; b) project

progress with respect to indicators and predefined goals; c) performance with respect to outcomes; and d) lessons learned/best practices.

c) **Project Implementation Report (PIR):** It is an annual monitoring process required by the GEF. It is an essential management and monitoring tool for project coordinators and it is the main means to extract lessons learned from implementation projects. Once the project meets the first year of implementation, the UNDP-CO and the project team must prepare the PIR. The PIR can be made at any time of the year, ideally before the CTP Revision. The PIR should be discussed during the TCC meeting so that it is agreed by the project team, the executing agency, the UNDP-CO and the RCU in Panama. PIRs are collected, reviewed and analyzed individually by the RCU before being sent to the focal area groups at the headquarters of UNDP/GEF. Given the similarity between the APR and PIR, UNDP/GEF has prepared an integrated format for reference.

d) **Quarterly Progress Reports:** They are brief reports that include updates on the project progress and will be presented to the UNDP-CO and the RCU of UNDP/GEF by the project team. Progress will be monitored through the Management Platform based on results from UNDP and the risk register shall be updated on a regular basis on the ATLAS system based on the initial risk analysis contained in Section 2.6 of this project document.

e) **Thematic Periodic Reports:** They may be requested to the project team by the UNDP, UNDP/GEF or the Executing Agency on specific issues or areas of activity. The request for a Thematic Report will be made by UNDP in writing to the project team and should state clearly the theme or activities which must be informed. These reports may be used as an exercise to establish lessons learned, specific monitoring on key issues, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to minimize the requests for Thematic Reports, and where required, reasonable time must be given to the project team for their preparation.

f) **Project Terminal Report:** It shall be made by the CAEM together with the project team during the last three months of the project. This comprehensive report will summarize all activities, achievements, and products of the project; lessons learned; objectives achieved and not achieved; structures and systems implemented, etc. and will be the definitive statement on the activities of the project during its implementation. It will also establish recommendations for further actions required to ensure the sustainability and replicability of project activities.

g) **Technical Reports:** They are detailed documents that cover specific areas of analysis or scientific specialty as part of the project. As part of the Inception Report, the CAEM together with the project team will prepare a list of reports document detailing the technical reports that are expected to be made in key areas of activity during the course of the project, including tentative deadlines. As necessary, this list of reports will be reviewed and updated, and included in subsequent APR. Technical Reports may also be prepared by external consultants and they should be comprehensive and specialized analysis on clearly defined areas of research within the project framework. These technical reports will represent, as appropriate, a substantive contribution to specific thematic areas and will be used as part of the efforts to disseminate relevant information and best practices at local, national and international level. Technical reports play a larger role and their frequency and nature are specific to each project.

h) **Project Publications:** They are a key way for crystallizing and disclosing project outcomes and achievements. These publications may be scientific or informative texts on project activities and achievements, and may include articles in specialized publications, multimedia publications, etc. These publications can be based on Technical Reports, depending on their relevance, scientific value. etc., or may be summaries or compilations of a series of Technical Reports and other research. The CAEM together with the project team will determine if any of the Technical Reports merit formal publication and (in consultation with UNDP, the Government of Colombia and other relevant stakeholder groups) plan and produce these publications in a consistent and



recognizable format. It will be necessary to identify and allocate project resources to these activities properly and according to the project budget.

#### 6.4. INDEPENDENT EVALUATIONS

150. The project will be subject to at least two independent external evaluations as follows:

**Final Evaluation:** It will be held three months before the CTP’s final meeting, which will focus on the same themes of the mid-term evaluation. The final evaluation will also consider the impact and sustainability of outcomes, including the contribution to capacity building and the achievement of global environmental goals. The final evaluation shall provide recommendations for monitoring the activities and it requires management measures to be included in the Project Institutional Memory System (PIMS) and the ERC. The terms of reference for this evaluation will be prepared by the UNDP-CO based on guidance from the RCU of UNDP/GEF. The GEF capability building tracking tool should be completed during the final evaluation cycle.

#### 6.5. AUDITS

151. The project will be audited in accordance with the UNDP Financial Regulations and Rules, and those applicable for audits.

#### 6.6. LEARNING AND KNOWLEDGE SHARING

152. The project outcomes will be disseminated within and beyond the project intervention zone through a number of information sharing networks and forums. Additionally, the project will participate, as relevant and appropriate, in networks sponsored by the UNDP/GEF, organized by expert staff working on projects that share common characteristics. The RCU of UNDP/GEF shall establish an electronic platform to share lessons learned among project coordinators. The project will identify and participate, as appropriate, in scientific, political, or other networks that could benefit from lessons learned in the implementation of the project. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar projects in the future. Identifying and analyzing lessons learned is an ongoing process, and the need to publicize these lessons as one of the core contributions of the project is a requirement that must be met with a frequency of no less than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting the lessons learned.

#### 6.7. MONITORING AND EVALUATION BUDGET

| M&E Activity   | Responsible Partner  | Target Cost USD | Time   |
|--|--|-----------------|--|
| Inception Workshop (IW)  | - CAEM – Project Team<br>- UNDP-CO<br>- UNDP/GEF                                   | 1,000           | Within the first three months of project start   |
| Inception Report   | - CAEM<br>- Project Team<br>- UNDP-CO  | -               | Immediately after the IW   |
| Measure of project progress verification mechanisms and implementation | - CAEM<br>- Project Coordinator<br>- Strategic Partners                            | -               | Annually, prior to the submission of the APR/PIR and when defining the Annual Work Plans |
| APR and PIR  | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- UNDP-CO<br>- UNDP/GEF | -               | Annually   |

| M&E Activity   | Responsible Partner  | Target Cost USD                | Time   |
|--|--|--------------------------------|--|
| Project Steering Committee Meetings                                | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- UNDP-CO<br>- Representatives of the Colombian government          | 1,000                          | Bi-annually  |
| Quarterly Progress Reports   | - CAEM<br>- Project Coordinator<br>- Strategic Partners  | -                              | Quarterly  |
| Technical Reports  | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- External Consultants  | May vary according to the need | It will be determined by the Project Team and UNDP-CO                              |
| Mid-term Informal Review (optional although not mandatory)         | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- UNDP-CO<br>- UCR PNUD/FMAM<br>- External Consultants              |                                | Mid-term of project implementation   |
| Final Evaluation   | - CAEM<br>- Project Coordinator and Team<br>- Strategic Partners<br>- UNDP-CO<br>- RCU UNDP/GEF<br>- External Consultants      | 25,000                         | At least three months before finishing project implementation                      |
| Project Terminal Report  | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- UNDP-CO   | -                              | At least three months before the project ends                                      |
| Lessons Learned  | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- RCU UNDP/GEF (suggested formats to document good practices, etc.) | -                              | Annually   |
| Audit  | - UNDP-CO<br>- Project Coordinator and Team  | 10,000                         | Annually   |
| Field Visits   | - CAEM<br>- Project Coordinator<br>- Strategic Partners<br>- Representatives of the Colombian government                       | 4,000                          | Annually for the Coordinator. For other partners, when they consider it necessary. |
| <b>TOTAL TARGET COST</b><br>(Excluding UNDP staff travel expenses) |  | GEF                            | 50,000 USD   |
|  |  | <b>Total</b>                   | 41,000 USD   |

## 7. LEGAL CONTEXT

153. This document with the CPAP signed by the Government and UNDP, which is incorporated herein by reference, together constitute the Project Document as referred to the Standard Basic Assistance Agreement (SBAA); as such, all CPAP provisions apply to this document. All references in the SBAA to "Executing Agency" shall be read as "Implementing Partner" as such term is defined and used in the CPAP and in this document.

154. Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:

- a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried out;
- b) Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

155. UNDP reserves the right to verify whether such a plan has been created according to the guidelines, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document and the Project Cooperation Agreement between UNDP and the Implementing Partner.

156. The Implementing Partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via [http://www.un.org/sc/committees/1267/aq\\_sanctions\\_list.shtml](http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml). This provision must be included in all sub-contracts or sub-agreements entered into under/further to this Project Document.

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**ANNEX 1: PROJECT MANAGEMENT UNIT PRELIMINARY TORs**

Project Coordinator / Bogota

| Responsibilities / Roles  |
|---|
| <p>4.1. Technical Functions</p> <ul style="list-style-type: none"><li>a) Define and develop the action plan required to meet the activities planned in each of the project components in coordination with the CAEM, complying with GEF requirements.</li><li>b) Plan, guide and monitor the progress of the necessary activities to be carried out (international and local) by technical consultants for the development of the different components of the project.</li><li>c) Set the minimum technical requirements to be considered for performing the different activities planned in each of the project components.</li><li>d) Define the scope of activities to develop in each of its components (Terms of Reference) together with the Executing Agency and UNDP, international and local consultants, as well as entities of the public and private sector involved in the project</li><li>e) Supervise the activities to be conducted by members of the project team and local and international consultants for project conduction and approve the reports they present.</li><li>f) Make informs and technical reports that the CAEM, UNDP and the GEF require in connection with the project.</li></ul>   |
| <p>4.2. Project Management Obligations</p> <ul style="list-style-type: none"><li>a) Make the Annual Work Plans and Procurement Plans in coordination with the CAEM, UNDP-CO and other key partners, according to the Project Document.</li><li>b) Make the Quarterly Plans in coordination with CAEM and the UNDP-CO, according to the Annual Work Plan.</li><li>c) Make and submit quarterly reports on project achievements and budget execution, along with the other reports requested by the CAEM, UNDP and the GEF (i.e. Annual Reports).</li><li>d) Coordinate project actions in accordance with the Annual Work Plans and the Budget.</li><li>e) Supervise and coordinate the work to guarantee that the project outcomes match the Project Document, the logical framework and performance indicators envisaged.</li><li>f) Coordinate and make together with the CAEM and UNDP mandatory reports that are part of the monitoring, evaluation and budgeting process of the project, according to the requirements specified in the GEF Project Document (PRODC) and/or whenever required.</li><li>g) Conduct the periodic and continuous monitoring of project impact in regards to the outcomes and activities envisaged therein.</li><li>h) Prepare the terms of reference and other documents required for the recruitment process of the project team, and local and international consultants, and other acquisitions that are required for conducting the different activities.</li><li>i) Identify risks that could affect the achievement of expected project impact in coordination with the CAEM, and the definition and implementation of appropriate mitigation strategies, ensuring that they are updated in the UNDP ATLAS system with the UNDP official.</li><li>j) Manage that the project partners meet the co-financing commitments for development of such.</li><li>k) Ensure that work plans are directly related to project outcomes and indicators.</li><li>l) Guide and supervise the work of the project team, consultants and subcontractors, and ensure the successful completion of the work plans that are agreed.</li><li>m) Keep the CAEM and UNDP informed of the project progress and arrange meetings with all its members.</li><li>n) Ensure project knowledge management, and compliance with the project monitoring and evaluation timetable.</li><li>o) Review and approve the draft meeting minutes of meetings held within the project's framework and process their signatures.</li><li>p) Serve as Technical Secretariat for the Project Steering Committee.</li></ul> |
| <p>4.3. Administrative Obligations</p> <ul style="list-style-type: none"><li>a) Ensure that the project complies with GEF and United Nations policies in terms of regulations, procedures, reporting requirements and ethical standards.</li><li>b) Ensure administrative procedures established by the CAEM and UNDP and guarantee their proper implementation.</li></ul>  |

- c) Ensure the proper use of the logos of the entities involved according to the instructions contained in the Prodoc.
- d) Prepare the terms of reference for consultants hired by the project, supervise and coordinate their work, and review and approve their products.
- e) With the support of the project management team, guarantee the efficient and transparent allocation of the physical and financial resources in accordance with the rules of the CAEM, the GEF and UNDP.
- f) Manage project finances following the regulations of the CAEM and UNDP, and approve the administrative and financial reports, external communications, as well as monitor the travel authorization procedures, staffing, goods and services of all partners and members participating in project implementation.
- g) Control costs, budget balance, and ensure that the commitments made in the project budget are met.
- h) Address the audits made to the project and provide the documents required during their conduction.
- i) Monitor and ensure that the project file is properly managed.

Skills and success factors

**Corporate Skills:**

- Demonstrates commitment to the mission, vision and values of the United Nations.
- Shows sensitivity and adaptability to work with a differential approach.
- Ability to establish and maintain good working relationships with people at different levels from different cultures.
- Ability to work in a team and collaboration in his area of responsibility.

**Functional Skills:**

Learning and Knowledge Management

- Demonstrate interest in career development and applying new skills and best practices.
- Promotes knowledge management and a learning environment in the office by being a leader and role-model.

Leadership and Self-Management

- Has the skills to timely respond to the demands of complex settings.
- Focuses on outcomes and responds positively to feedback.
- Demonstrates a positive and constructive attitude.
- Ability to adapt and to work under pressure.
- Demonstrates openness to change and ability to manage complex situations.
- Demonstrates effective oral and written communicative skills.
- Sets clear goals and standards, carrying out his responsibilities accordingly.

Result Orientation and Operational Effectiveness

- Demonstrates ability to perform a variety of specialized tasks related to managing outcomes.
- Capacity to program, plan and work oriented in outcomes.
- Ability to collect information for monitoring, reporting and technical documents.

Uses information technology effectively as a tool and resource, especially Excel, Word and PowerPoint.

**Qualifications for recruitment**

|                          |  |
|--------------------------|--|
| Education:               | <p><b>Minimum requirement:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Professional degree in administrative sciences, economic sciences, engineering or environmental sciences.</li> </ul> <p><b>Desirables:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Specialization or Masters in related career.</li> </ul>  |
| Experience and knowledge | <p><b>Minimum requirements:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Minimum 5-year verifiable professional experience in project coordination related to energy efficiency, sustainable development or environmental management.</li> <li><input type="checkbox"/> Minimum 3-year experience in coordination of environmental projects or energy efficiency.</li> </ul> <p><b>Desirables:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Speaks and writes in English, desirable.</li> <li><input type="checkbox"/> Experience in international cooperation projects with international and multilateral agencies.</li> </ul> |

Project Administrative Assistant / Bogota

|  |
|--|
| <p><b>Responsibilities / Roles</b></p> <ul style="list-style-type: none"> <li>a) Support the various administrative tasks (registration, entry, organization, update and delivery of information necessary and appropriate for the proper conduct of the process) that lead to the proper development of the project.</li> <li>b) Perform all activities related to the handling of documentation (minutes, letters, reports, file) that are required during project formulation.</li> <li>c) Support the administrative tasks necessary for the efficient execution of the different activities and actions referred to in the project.</li> <li>d) Prepare and manage correspondence and communication/information mechanisms needed during project formulation with internal and external stakeholders.</li> <li>e) Facilitate coordination mechanisms of meetings, workshops, travel, administrative actions, quotes, purchasing, and others that require project formulation for proper their development.</li> <li>f) Support accounting, financial or logistical work necessary, which allow having an updated budget and the status of implementation of resources for project formulation.</li> <li>g) Conduct studies and financial analysis of the project and based on this analysis, develop recommendations for the Project Coordinator regarding financial matters.</li> <li>h) Support the making of necessary management reports requested.</li> <li>i) Ensure that the project complies with the policies of the UNDP in terms of regulations, procedures, reporting requirements and ethical standards.</li> <li>j) Ensure the proper use of logos of UNDP, donor, CAEM and other relevant stakeholders, in accordance with the instructions contained in the Prodoc and of the entities themselves.</li> <li>k) Know the administrative procedures established by the CAEM and UNDP and ensure their proper implementation.</li> <li>l) Guarantee the quality control of the administrative processes and procedures, procurement, consulting and service contracts, among others</li> <li>m) Perform operational monitoring of the project (including product tracking and delivery times established in project contracting).</li> <li>n) Accompany the development of procurement plans and their monitoring.</li> <li>o) Monitor the implementation of the project budget.</li> <li>p) Maintain the administrative documents and files related to the project up to date.</li> <li>q) Have accounting, financial and logistical data of project formulation up to date.</li> </ul> |
| <p><b>Skills and success factors</b></p> <p><b>Corporate Skills:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Demonstrates commitment to the mission, vision and values of the United Nations.</li> <li><input type="checkbox"/> Shows sensitivity and adaptability to work with a differential approach.</li> <li><input type="checkbox"/> Ability to establish and maintain good working relationships with people at different levels from different cultures.</li> <li><input type="checkbox"/> Ability to work in a team and collaboration in his area of responsibility.</li> </ul> <p><b>Functional Skills:</b></p> <p><u>Learning and Knowledge Management</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Demonstrate interest in career development and applying new skills and best practices.</li> <li><input type="checkbox"/> Promotes knowledge management and a learning environment in the office by being a leader and role-model.</li> </ul> <p><u>Leadership and Self-Management</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Has the skills to timely respond to the demands of complex settings.</li> <li><input type="checkbox"/> Focuses on outcomes and responds positively to feedback.</li> <li><input type="checkbox"/> Demonstrates a positive and constructive attitude.</li> <li><input type="checkbox"/> Ability to adapt and to work under pressure.</li> <li><input type="checkbox"/> Demonstrates openness to change and ability to manage complex situations.</li> <li><input type="checkbox"/> Demonstrates effective oral and written communicative skills.</li> <li><input type="checkbox"/> Sets clear goals and standards, carrying out his responsibilities accordingly.</li> </ul> <p><u>Result Orientation and Operational Effectiveness</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Demonstrates ability to perform a variety of specialized tasks related to managing outcomes.</li> <li><input type="checkbox"/> Capacity to program, plan and work oriented in outcomes.</li> <li><input type="checkbox"/> Ability to collect information for monitoring, reporting and technical documents</li> </ul> <p>Uses information technology effectively as a tool and resource, especially Excel, Word and PowerPoint.</p>   |
| <p><b>Qualifications for Recruitment</b></p>   |

|                          |  |
|--------------------------|--|
| Education:               | <p><b>Minimum requirement:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Professional degree in business management, administrative sciences or economic sciences.</li> </ul> <p><b>Desirables:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Specialization or Masters in related career.</li> </ul>  |
| Experience and knowledge | <p><b>Minimum requirements:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Minimum 5-year verifiable professional experience in managing physical and financial resources.</li> <li><input type="checkbox"/> Experience in areas related to administration, budget management and project cash flows.</li> <li><input type="checkbox"/> Demonstrated experience in the use of computers and office software packages (MS Word, Excel, etc.) and advanced knowledge in database packages, as well as in the management of Internet-based management systems.</li> </ul> <p><b>Desirables:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Speaks and writes in English, desirable.</li> <li><input type="checkbox"/> Experience in international cooperation projects with international and UN agencies.</li> </ul> |



**ANNEX 2: CAPACITY ASSESSMENT SUMMARY FOR CAEM**

| <b>Capacity to Assess</b>  | <b>Summary of Capacities for CAEM - <i>CORPORACIÓN AMBIENTAL EMPRESARIAL</i></b>  |
|--|---|
| <b>Legal Status</b>  | Non-profit Organization   |
| <p><b>Knowledge and Technical Capacities:</b></p> <p>Do the skills and experience of the technical professionals of the organization match those required for the Project?</p> <p>Would the professionals be available for the project?</p> <p>Is the organization's management willing and able to implement this project?</p> <p>Who would monitor this project within the organization?</p> | <p>The lines of knowledge of the organization are the following: (i) Climate change, (ii) Energy efficiency, renewable energy and rational use of energy, (iii) Comprehensive corporate environmental management, (iv) quality agricultural sector, (v) Ecological restoration and compensation. Despite its knowledge on issues related to climate change, and implementation and allocation of related resources, it does not demonstrate specific expertise in the subject of climate finance.</p> <p>The organization has 5 project managers who are specialty educated and trained in the following areas: economics, engineering (environmental, forestry, environmental development), renewable sources and energy management, project management, and management and planning, who would be available to the project.</p> <p>The management shows its willingness and interest in being responsible for the project.</p>  |
| <p><b>Project Management:</b></p> <p>Do the organization and its staff have experience implementing international cooperation projects?</p> <p>How is project implementation monitored within the organization?</p> <p>Does the organization apply management methodologies based on outcomes?</p>   | <p>It has managed international cooperation projects.</p> <p>Among the strategic partnerships, the highlights are those established with international organizations such as USAID, GIZ, IDB and SwissContact.</p> <p>It follows a methodology whose advantage is that outcomes are quantifiable and measurable; it achieves sustainable large-scale changes in different contexts and sectors, and is aimed at meeting the project objectives and goals. The methodology is flexible and can be complemented with other methodologies such as the logical framework to allow the identification of risks and assumptions.</p> <p>Internally, the company has an area of internal control that ensures and guarantees compliance with the procedures of the organization, through monitoring of the technical, administrative, and operational implementation of the projects. Also, the management of the organization ensures the proper management and compliance of the commitments and their successful completion, reporting the technical and financial progress of projects to the board of CAEM every two months.</p> <p>CAEM applies the Balanced Scorecard methodology for impact and management indicators.</p> |
| <p><b>Contracting and Procurement:</b></p> <p>Does the organization have the legal authority to enter into contracts and agreements with other organizations?</p> <p>Does the organization have access to an attorney to ensure that contracts are enforceable, meet performance standards and protect the interests of the organization and UNDP?</p>   | <p>The organization has full legal authority to enter into contracts and agreements with other organizations.</p> <p>Also, since it is a subsidiary of the Chamber of Commerce of Bogota, the organization is under its verification and internal control of such, which periodically reviews the execution of contracts and agreements made by the CAEM through the Comptroller's office.</p> <p>Regarding procurement capacity, the CAEM has liquidity, solvency and debt capacity required for the project; this can be evidenced in the financial statements and the execution of contracts and agreements.</p>   |

| Capacity to Assess  | Summary of Capacities for CAEM - <i>CORPORACIÓN AMBIENTAL EMPRESARIAL</i>   |
|---|---|
|   | <p>The CAEM's management has the legal capacity to hire the staff required for performing the activities established in the corporate purpose of the organization.</p>  |
| <p><b>Financial Management:</b></p> <p>Does the organization have a bank account?</p> <p>Does the organization have rules and regulations for financial management that are consistent with international standards?</p> <p>What is the maximum amount of money the organization has achieved to manage in an annual implementation? If the proposed project were to be carried out by this organization, what percentage of the total funding of the organization would the amount of the project represent?</p> <p>Can the organization track and make independent reports on the use of funds from different donors individually?</p> <p>Is the organization periodically subject to external audit?</p> | <p>At the time, CAEM has 4 active bank accounts. Additionally, it operates a multi-account system; a separate account can be opened for each resource request or donation.</p> <p>Since 2010, the organization filed for implementing IFRS standards for their accounting, being a non-binding requirement for non-profit organizations.</p> <p>CAEM delegates financial management in the administrative, accounting and financial areas, under the direction of the administrative and financial sub-directorates, whose team has extensive experience in the management of resources in the form of projects and is constituted by the sub-directorate, the accountant, internal control, accounting assistant, and administrative assistants of ongoing projects.</p> <p>The financial statements of the organization report solvency and stable financial position; on average the organization has managed annual resources for more than COP\$3,000 million pesos; for 2014, there is a management of resources of COP\$5,724 million pesos forecasted.</p> <p>According to the experience of the organization and its financial position, the partner would be in the capacity to allocate 30% of the total budget allocated to the project for its implementation.</p> <p>Given that a cost center is created for each project, the making and reporting of financial reports is done separately, where both revenue and expenditure and the execution is established according to the information provided by administrative assistants of each project, each financial report is accompanied by the supporting documentation, which go from quotation to the payment made, ensuring traceability in the allocation of resources.</p> <p>CAEM has a Statutory Auditor from the KPMG firm, who permanently audits internal processes of the organization and report opportunities for improvement; overall, the organization is in the process of continuous improvement and recommended improvement measures are fully implemented.</p> |

**ANNEX 3: GOVERNMENT ENDORSEMENT LETTER**



Bogotá D. C.

**Mr. FABRIZIO HOCHSCHILD**  
 Resident Coordinator  
 United Nations  
 Avenue 82 No. 10 – 62, 3rd floor  
 Bogotá D.C.

**Subject:**Endorsement for GEF Project "NAMA Pilot Implementation of Technology Transfer Projects in the Industrial Sector of the Cundinamarca-Bogotá Region"

Dear Mr. Hochschild,

In my capacity as GEF Operational Focal Point for Colombia, I confirm that the above Project proposal (a) is in accordance with my government's national priorities and our commitment to the relevant global environment conventions; and (b) was discussed with relevant stakeholders, including the global environmental convention focal points.

I am pleased to endorse the preparation of the above Project proposal with the support of the United Nations Development Program (UNDP). If approved, the proposal will be prepared and implemented by the Environmental and Business Corporation of Colombia (CAEM). I request the UNDP to provide a copy of the project document before it is submitted to the GEF Secretariat for CEO endorsement.

The total financing being requested for this Project is US\$ 2,000,000, inclusive of project preparation grant (PPG) and Agency fees for project cycle management services associated with the total GEF grant. The financing requested for Colombia is detailed in the table below.

| Source of Funds            | GEF Agency | Focal Area | Amount (in US\$)    |           |         |           |
|----------------------------|------------|------------|---------------------|-----------|---------|-----------|
|                            |            |            | Project Preparation | Project   | Fee     | Total     |
| GEFTF                      | UNDP       | BD         | 24,305              | 419,622   | 42,173  | 486,1     |
| GEFTF                      | UNDP       | CC         | 75,695              | 1,306,862 | 131,343 | 1,513,900 |
| <b>Total GEF Resources</b> |            |            | 100                 | 1,726,484 | 173,516 | 2,000,000 |

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Ministerio de Ambiente  
y Desarrollo Sostenible

**PROSPERIDAD  
PARA TODOS**

I consent to the utilization of Colombia's allocations in GEF-5 as defined in the System for Transparent Allocation of Resources (STAR). Please note that for this project proposal the flexibility mechanism for a marginal adjustment between STAR allocations is employed.

Sincerely,

**ALEJANDRA TORRES**  
Head, Office of International Affairs  
GEF-OFP Colombia

Copia: **Claudia Cuevas**, Coordinadora de Asuntos Ambientales-Dirección de Asuntos Económicos, Sociales y Ambientales, MRE y GEF-PFP Colombia, **Pablo Vieira**, Viceministro de Ambiente y Desarrollo Sostenible, **Rodrigo Suarez**, Director de Cambio Climático, MADS

Elaboró: **Laura Bermúdez**, Tatiana Nuñez – OAI/GEF  
Fecha: Abril 25 de 2014

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**ANNEX 4: CALCULATION OF DIRECT AND INDIRECT EMISSION REDUCTIONS**

(Attached separately)

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**ANNEX 5: CO-FINANCING LETTERS**

(Attached separately)

**SIGNATURE PAGE**

**Country:**

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**UNDAF Outcome (s)/Indicator (s):** *Link to UNDAF Outcome. If no UNDAF leave blank.*

**CPAP Outcome (s)/Indicator (s):**

**CPAP Output (s)/Indicator (s):**

Executing Entity/Implementing Partner  
Implementing entity/Responsible Partner

|                         |       |
|-------------------------|-------|
| Programme Period:       | _____ |
| Atlas Award ID:         | _____ |
| Project ID:             | _____ |
| PIMS #                  | _____ |
| Start date:             | _____ |
| End Date                | _____ |
| Management Arrangements | _____ |
| PAC Meeting Date        | _____ |

**Agreed by (Government):**

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NAME SIGNATURE Date/Month/Year

**Agreed by (Executing Entity/Implementing Partner):**

---

NAME SIGNATURE Date/Month/Year

**Agreed by (UNDP):**

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NAME SIGNATURE Date/Month/Year