

Programa Brasileiro
GHG Protocol



Inventory of greenhouse gas emissions



Inventory reporting
period: 2020





Companhia Brasileira de Alumínio

Trade name: Companhia Brasileira de Alumínio

CNPJ: 61.409.892/0001-73

Economic sector: Downstream

Sub-sector: Manufacturing of metal products, except machinery and equipment

Address: Rua Eng. Luis Carlos Berrini, 105, 14º andar - 347 - - Cidade Monções - São Paulo - SP - 04571-900

Inventory publication owner: Raquel Martins Montagnoli (raquel.montagnoli@cba.com.br)

About CBA

CBA is a company with more than 60 years of operations in the aluminum market, operating throughout the chain from bauxite extraction to semi-fabrication of the metal, boasting a comprehensive portfolio of primary products (ingots, billets, slabs and rod) and downstream products (sheet, caster rolls, foil and extruded profiles). We also have two nickel production facilities whose operations have been temporarily paused.

Inventory data

Inventory owner

Vivian Martins de Souza

Owner e-mail

vivian.souza.vs1@cba.com.br

Inventory year

2020

Checked by

Has the inventory been assured by a third party: Yes

Assurance body: PwC (PricewaterhouseCoopers)

Assurance owner: Ana Matzenbacher (ana.matzenbacher@pwc.com)

Inventory type

Complete



1. Inventory limits

Organizational Boundaries

See below a list of the organization's facilities and subsidiaries reported in this inventory. Facilities with scope 1 emissions equal to or greater than 10,000 tCO_{2e} per year are required to report their emissions separately. Reporting the emissions of other facilities and subsidiaries is optional. Emissions separated by facility can be seen in Section 2.7 - Emissions by operating facility

Key:

- M Head office
- C Subsidiary
- U Facility

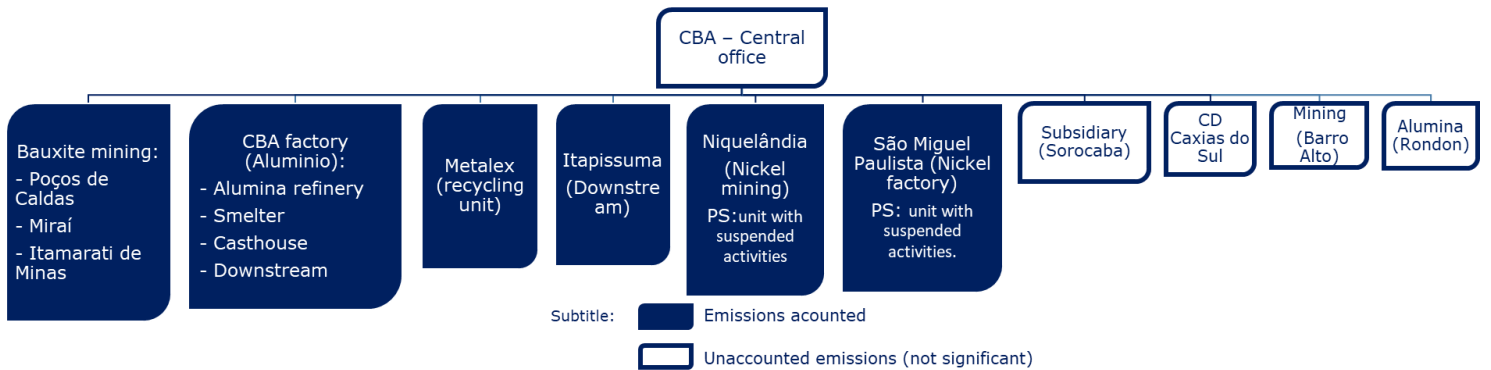
[Does the head office have operational control? | % interest relating to head office]

- M Companhia Brasileira de Alumínio
 - U CBA - Itapissuma
 - U São Miguel Paulista Plant
 - U CBA Mineração Poços de Caldas
 - U CBA Mineração Mirai
 - U Niquelândia Facility
 - U Metalex
 - U CBA Plant
 - U CBA Mineração Itamarati de Minas

1.1 What consolidation approach was used in the inventory?

Emissions report under the Operational Control approach.

1.2 Organizational chart



Operational Boundaries

1.3 Operational boundaries reported in the inventory

Scope 1

Mobile combustion
Stationary combustion
Process emissions
Fugitive
Agricultural activities
Changes in land use

Scope 2 - Location-based approach

Electricity acquisition
Thermal electricity acquisition
Transmission and distribution losses

Scope 2 - Market-based approach

Electricity acquisition
Thermal electricity acquisition
Transmission and distribution losses

Scope 3

1. Goods and services purchased
3. Fuel- and energy-related activities not included in Scope 1 or Scope 2
4. Transportation and distribution (upstream)

2. Emissions

Operational Control

2.1 Summary of total emissions

| GHG | Tonnes of gas | | | | Tonnes of CO ₂ equivalent (tCO ₂ e) | | | |
|------------------|---------------|-----------------------------------|---------------------------------|---------------|---|-----------------------------------|---------------------------------|----------------------|
| | Scope 1 | Scope 2 - Location-based approach | Scope 2 - Market-based approach | Scope 3 | Scope 1 | Scope 2 - Location-based approach | Scope 2 - Market-based approach | Scope 3 |
| CO ₂ | 862,227.734 | 340,489.070 | 67,349.583 | 1,489,674.583 | 862,227.734 | 340,489.070 | 67,349.583 | 1,489,674.583 |
| CH ₄ | 7.541 | 79.498 | 79.498 | 1.517 | 188.525 | 1,987.450 | 1,987.450 | 37.925 |
| N ₂ O | 1.717 | 10.600 | 10.600 | 1.184 | 511.666 | 3,158.800 | 3,158.800 | 352.832 |
| HFC | 1.924 | 0.000 | 0.000 | 0.000 | 3,806.826 | 0.000 | 0.000 | 0.000 |
| PFC | 25.640 | 0.000 | 0.000 | 0.000 | 197,127.500 | 0.000 | 0.000 | 0.000 |
| SF ₆ | 0.004 | 0.000 | 0.000 | 0.000 | 91.200 | 0.000 | 0.000 | 0.000 |
| NF ₃ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Total | | | | | 1,063,953.451 | 345,635.320 | 72,495.833 | 1,490,065.340 |

2.2 Scope 1 emissions separated by category

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|-------------------------|--------------------------------|--|---------------------------------------|
| Mobile combustion | 15,347.420 | 1,804.276 | 0.000 |
| Stationary combustion | 284,698.948 | 8.499 | 0.000 |
| Process emissions | 759,621.710 | 0.000 | 0.000 |
| Fugitive | 4,203.150 | 0.000 | 0.000 |
| Agricultural activities | 82.223 | 0.000 | 0.000 |
| Changes in land use | 0.000 | 455.100 | 11,923.030 |

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|----------|--------------------------------|--|---------------------------------------|
| Total | 1,063,953.451 | 2,267.875 | 11,923.030 |

2.3 Scope 2 emissions separated by category

Location-based approach

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|--------------------------------------|--------------------------------|--|---------------------------------------|
| Electricity acquisition | 333,351.655 | 0.000 | 0.000 |
| Thermal electricity acquisition | 5,146.250 | 266,229.440 | 0.000 |
| Transmission and distribution losses | 7,137.415 | 0.000 | 0.000 |
| Total | 345,635.320 | 266,229.440 | 0.000 |

Market-based approach

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|--------------------------------------|--------------------------------|--|---------------------------------------|
| Electricity acquisition | 66,022.024 | 0.000 | 0.000 |
| Thermal electricity acquisition | 5,146.250 | 266,229.440 | 0.000 |
| Transmission and distribution losses | 1,327.559 | 0.000 | 0.000 |
| Total | 72,495.833 | 266,229.440 | 0.000 |

2.4 Scope 3 emissions separated by category

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|---|--------------------------------|--|---------------------------------------|
| 1. Goods and services purchased | 1,400,209.290 | 0.000 | 0.000 |
| 3. Fuel- and energy-related activities not included in Scope 1 or Scope 2 | 67,623.710 | 0.000 | 0.000 |
| 4. Transportation and distribution (upstream) | 22,232.340 | 2,602.495 | 0.000 |

| Category | Emissions (tCO ₂ e) | Biogenic CO ₂ emissions (t) | Biogenic CO ₂ removals (t) |
|----------|--------------------------------|--|---------------------------------------|
| Total | 1,490,065.340 | 2,602.495 | 0.000 |

2.5 Other greenhouse gases not embraced by the Kyoto Protocol Not reported.

2.6 Emissions outside

Brazil Not reported.

2.7 Emissions per facility

| Facility | Scope 1 (tCO ₂ e) | Scope 2 (tCO ₂ e) | Scope 3 (tCO ₂ e) |
|----------------------------------|------------------------------|------------------------------|------------------------------|
| CBA Mineração Itamarati de Minas | 138.361 | 51.420 | 55.990 |
| Niquelândia Facility | 526.923 | 472.689 | 192.680 |
| São Miguel Paulista Plant | 253.952 | 107.370 | 42.970 |
| CBA Plant | 1,007,973.320 | 340,698.446 | 601,893.896 |
| CBA Mineração Mirai | 4,255.751 | 271.880 | 1,208.050 |
| Metalex | 15,291.854 | 230.346 | 440,001.870 |
| CBA - Itapissuma | 33,217.210 | 3,778.670 | 446,101.380 |
| CBA Mineração Poços de Caldas | 2,296.062 | 24.500 | 568.040 |

3. Methods

3.1 Intersector methods and/or tools

Was an intersector method and/or tool used other than those provided by the Brazilian GHG Protocol program?

No.

3.2 Methods and/or tools for specific sectors

Was a method and/or tool used for specific sectors?

| Specific method | Reference | Source of emission applied |
|---|---|---|
| Carbon sequestration in pasture area | Segnini, A.; Milori, D.M.P Simões, M. L.; Silva, W.T.L.; Primavesi, O. e Martin-Neto, L. Potencial de Sequestro de Carbono em Área de Pastagem de Brachiaria Decumbens. XXXI Congresso Brasileiro de Ciência do Solo. 2007 | Scope 1 - Land-use change |
| Carbon sequestration in eucalyptus area | Campanha, M.M.; da Costa, T. C. C.; Gontijo Neto, M. M. Crescimento, Estoque de Carbono e Agregação de Valor em Árvores de Eucalipto em um Sistema de Integração LavouraPecuáriaFloresta (ILPF) no Cerrado de Minas Gerais. Embrapa. Boletim de Pesquisa e Desenvolvimento 157. ISSN 1679-0154. 2017. | Scope 1 - Land-use change |
| Carbon sequestration in coffee plantation area | Coltri, P.P., Lazarim, C., Dias, R., Zullo Junior, J., Pinto, H. S. ESTOQUE DE CARBONO EM SISTEMAS CAFEEIROS A PLENO SOL E CULTIVADO COM MACADÂMIA NO SUL DE MINAS GERAIS, BRASIL. VII Simpósio de Pesquisa dos Cafés do Brasil. 2011 | Scope 1 - Land-use change |
| Carbon sequestration in corn plantation area | Amado, T. J. C.; Bayer, C.; Eltz, F. L. F.; Brum, A. C. R. POTENCIAL DE CULTURAS DE COBERTURA EM ACUMULAR CARBONO E NITROGÊNIO NO SOLO NO PLANTIO DIRETO E A MELHORIA DA QUALIDADE AMBIENTAL. R. Bras. Ci. Solo, 25:189-197, 2001. | Scope 1 - Land-use change |
| Emissions and carbon sequestration in native forest land-use change in accordance with the biome. | Ministry of Science, Technology and Innovation. TERCEIRO INVENTÁRIO BRASILEIRO DE EMISSÕES E REMOÇÕES ANTRÓPICAS DE GASES DE EFEITO ESTUFA. RELATÓRIOS DE REFERÊNCIA. SETOR USO DA TERRA, MUDANÇA DO USO DA TERRA E FLORESTAS. 2015 | Scope 1 - Land-use change |
| The Aluminum Sector Greenhouse Gas Protocol | International Aluminum Institute. The Aluminum Sector Greenhouse Gas Protocol: Addendum to the WRI/WBCSB Greenhouse Gas Protocol - 1.4 Calculation of carbon dioxide emissions from the Soderberg Process. 2006 | Scope 1 - Industrial Processes - Electrolysis emissions |

3.3 Emission factors

Was an emissions factor used other than those suggested by the Brazilian GHG Protocol program?

| Emission factor | Reference | Source of emission applied |
|---|--|---|
| Fuel- and energy-related activities not included in Scope 1 or Scope 2: | This calculation referenced information provided EPE - Annual Electricity Statistics Series (Excel File). Table 2.11 Losses and Differences (%), MCTI (Combustion emission factor) and emissions factor of DEFRA - UK Government GHG Conversion Factors for Company Reporting. WTT-overseas electricity (generation) Country: Brazil | Category 3 of scope 3 |
| DEFRA database | Emissions factors were used to calculate emissions. Base: DEFRA - UK Government GHG Conversion Factors for Company Reporting. Well-to-tank (WTT) fuels conversion factors. Version 2020. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020 . | Calculating categories 1 and 3 of Scope 3 |
| Ecoinvent Database | The method used was: IPCC 2007 GWP 100a. Emission factors were used to calculate the scope three emissions. The factors were verified and their traceability was assessed during the assurance process with PWC to ensure alignment with the GHG protocol methodology. | Categories 1 and 3 of scope 3. |

4. Other Elements

Completion of these fields is optional

4.1 Information about the organization's performance against internal benchmarks (e.g. from other facilities) or external benchmarks (e.g. organizations within the same sector).

CBA's emissions in the smelting stage of 2.66 tCO₂e/t of molten aluminum, the most emissions-intensive stage in the aluminum value chain (Scope 1 and 2), were well below the global average published by the International Aluminum Institute (IAI) of 12 tCO₂e/t of molten aluminum and the limit required for certification from the Aluminum Stewardship Initiative - ASI (8 tCO₂e/t of molten aluminum). This is primarily due to our use of clean electric power supplied from our own hydropower dams.

Even if CBA's entire value chain were included (Mines, Alumina, Smelters, Casthouses, Downstream and Supporting Areas), the Company's average CO₂e emissions in 2020 (scopes 1 and 2) are well below the global average: 3.52 tCO₂e for each tonne of ingots produced.

By implementing the biomass boiler and other efforts by the company to drive down its emissions, in 2020 CBA managed to achieve its target of reducing its emissions by 16% (2017 baseline). Compared with the baseline, the company managed to reduce its emissions by 17.66%.

4.2 Description of GHG emissions indicators for the organization's activities. For example, tCO₂e/products manufactured.

Emissions indicators in the main stages of the chain (Scope 1 and 2):

- Mining: 0.008 t CO₂e/ t bauxite
- Alumina Refinery: 0.301 t CO₂e/ t alumina
- Smelters: 2.66 t CO₂e/ t molten aluminum
- Casthouse: 0.12 t CO₂e/ t primary aluminum
- Downstream: 0.15 t CO₂e/ t semi-fabricated aluminum
- Metalex: 0.27 t CO₂e/ t billets
- Itapissuma: 0.93 t CO₂e/ t semi-fabricated aluminum

Average emissions indicators (Scope 1 and 2) for products from the Alumínio (SP) plant, including all stages of the chain (Mining, Refinery, Smelters, Casthouses and Downstream):

- Ingots: 3.52 t CO₂e/ t product
- Billets: 2.48 t CO₂e/ t product
- Caster: 2.52 t CO₂e/ t product
- Slabs: 1.90 t CO₂e/ t product
- Extruded: 3.35 t CO₂e/ t product
- Sheet: 2.92 t CO₂e/ t product
- Foil: 4.82 t CO₂e/ t product
- Metalex: 5.97 tCO₂e/ t product

4.3 Description of strategies and projects for managing GHG omissions

In 2020 the company reviewed its materiality and based on this adapted its Sustainability Strategy to the new 2030 ESG strategy. The company's new strategy includes 10 ESG levers, 15 programs and 31 goals. One of the company's development levers is the climate change lever, which is supported by two programs:

- 1) GHG Emissions Management, which aims to reduce our emissions per cast product by 40% by 2030.
- 2) Energy management, which aims to ensure that 100% of our energy is coming from renewable sources by 2030.

In addition, CBA has set a target of reducing its GHG emissions by 16% by 2025 from 2017, which was achieved in 2020. This target was set based on gross emissions from our Mine and Aluminum Plant operations (scope 1 and 2), although internally indicators are monitored for each product produced at each process stage.

In 2020, these emissions decreased by 17.66% compared with the baseline.

CBA expects further GHG emissions reductions will be achieved in the coming years through our pipeline projects. These include two major projects:

- Biomass boiler: As part of an effort to incorporate more sustainable options in our energy mix, CBA's Alumina Refinery is now purchasing steam generated by a supplier using wood-chip biomass. The boiler only initiated its activities in the second quarter of 2020 and has begun gradually working towards achieving normal steam production at the start of the third quarter of the year. This is expected to further drive down CBA's emissions in 2021, as the boiler will be operating at expected levels the whole year round.

- Green Soderberg Project: CBA uses Soderberg technology in its Smelting operations, where aluminum oxide is transformed into molten aluminum. Our Green Soderberg project, launched in 2018, is automating the furnace feed process to reduce emissions from the process while also improving efficiency and safety. Currently 38 pots have the technology installed to test and optimize results. All furnaces are expected to be converted by 2030. Achievements made by this project include the reduction of greenhouse gas and atmospheric commissions, lower consumption of materials (anode paste and fluoride) and improved electric current efficiency in the electrolysis process.

CBA has been encouraging higher scrap consumption, both at its Casthouse in the Alumínio plant and the Metalex plant. This project could also reduce emissions in the chain and enhance our specific internal indicators.

In addition to these projects, CBA has been ramping up its engagement in climate change and in 2020 participated in the Greenhouse Gas Tools Workgroup in the Environmental Climate Change Chamber of São Paulo state. CBA answered the CDP's climate change questionnaire in 2020 and scored A-, the second highest score possible, in just its first year of reporting. The company also participated actively in the emissions trading simulation led by the Center for Sustainability Studies at Fundação Getúlio Vargas (FGV), and began participating in Cebds. In 2020 the leaders of the company's leading emissions facilities were assigned greenhouse gas emissions targets affecting their performance-related pay. These targets use the Science Based Targets guidelines of a 4.2% reduction per annum in emissions to limit global temperature rises to 1.5°C above preindustrial levels. In 2020 the company committed to SBTi (Science Based Targets Initiative) and has been structuring its science-based emissions reduction target.

4.4 Information about contracts with clients and suppliers that contain clauses related to reporting GHG inventory and/or related information.

In 2020 CBA continued its Sustainable Sourcing project to engage its suppliers in sustainability and we intend to expand this project to include climate change in our supplier assessments.

In respect of clients, CBA report its emissions data and has been surpassing its targets and requisites.

4.5 Information about uncertainties, exclusions of data sources and other features in the inventory's preparation.

This inventory did not include emissions by the Machining facility (Sorocaba), Distribution Center (Caxias do Sul), the Central Corporate Office, mining emissions in Barro Alto and the Rondon facility which is undergoing licensing. These emissions jointly account for less than 1% of the company's emissions and are therefore negligible. Emissions from waste in the proprietary landfill at the Niquelândia and Itapissuma facilities were also excluded, as they are considered negligible given that they account for less than 0.1% of Scope 1 emissions. The Itapissuma plant was included in the 2020 inventory.

4.6 Description of internal initiatives to enhance the quality of our GHG inventory. For example, systematizing data collection, procuring independent assurance services etc.

CBA structured an online internal training program and the sustainability team provides support to other company facilities. Each facility currently compiles its own inventory, all of which are sent to the sustainability team to check and consolidate the information. By engaging in SBTi, the company measured the proportional representation of all applicable scope 3 categories and prioritized the annual tracking of categories 1, 3 and 4, with category 1 being the largest accounting for over 50% of the company's scope 3 emissions.

4.7 Information about the purchase of electricity from renewable sources.

| Amount in MWh | Generation source | Source tracing instrument | Additional information | Public information |
|---------------|-------------------|--------------------------------|---|--------------------|
| 4,330,978.230 | Hydro | On-site generation declaration | CBA has 21 proprietary hydroelectric power plants that supply clean energy to its operations. These hydroelectric power plants are managed by Votorantim Energia and CBA was therefore considered not to exercise operational control over them, which is why they were not included in the on-site generation category. The difference in the reported amount for the number of certificates is due to the deduction of energy losses. | No |

4.8 Information on self-production of energy from renewable sources for own consumption

| Amount in MWh | Generation source | Additional information | Public information |
|---------------|-------------------|------------------------|--------------------|
|---------------|-------------------|------------------------|--------------------|

4.9 Information on your organization's carbon stock, in tonnes, as of December 31 of the year inventoried

Not reported.

5. Offsets and reductions

Completion of these fields is optional

5.1 Emissions Offset

Does the organization have emission offset projects?

Not reported.

5.2 Emissions reduction

Does the organization have emission reduction projects?

Not reported.