



# Greenhouse gas emissions Inventory

## Nexa Resources 2023

**Nexa Resources**

**Company name:** Nexa Resources

**CNPJ:** 42.416651/0016-93

**Economic sector:** Extractive industries

**Sub-sector:** Extraction of non-ferrous metallic minerals

**Address (administrative office):** Engenheiro Luiz Carlos Berrini, 105 - 6º andar - São Paulo - Cidade Monções - SP - 04571-900

**Responsible for publishing the inventory:** Júlia Morelli Faria  
([julia.faria@nexaresources.com](mailto:julia.faria@nexaresources.com))



## 1. INSTITUTIONAL INFORMATION

We are among the five largest zinc producers in the world, thanks to almost seven decades of experience in the development and operation of mining and metallurgical assets in Latin America. In addition to producing zinc metal and its by-products, we produce silver, gold, copper, and lead concentrates. Nexa Resources S.A. was formed from the integration of Brazilian and Peruvian operations in 2017 and is part of the conglomerate of investee companies of Votorantim S.A., our main shareholder, with 64.25% of the total capital.

Zinc is our main metal. Its diverse applications generate products that are indispensable for the energy transition, for the development of a low-carbon economy and for people's daily lives. Due to its versatility, the zinc we produce is used in a variety of sectors, ranging from agricultural plantations to aircraft manufacturing. In addition, the copper concentrate we produce is also widely from infrastructure to the manufacture of batteries.

Our shares have been traded on the New York Stock Exchange (NYSE) since 2017 and Nexa Peru's shares are traded on the Lima Stock Exchange in Peru (BVL). Our headquarter is in Luxembourg City (Luxembourg) and our administrative offices are in São Paulo (Brazil) and Lima (Peru). Our commercial offices are in Brazil, Peru, the United States and Luxembourg.

We operate 6 polymetallic mines, 3 in Peru (Cerro Lindo, El Porvenir and Atacocha) and 3 in Brazil, considering that 2 of them in the state of Minas Gerais (Vazante and Morro Agudo) and the most recent one in the state of Mato Grosso (Aripuanã). In 2023, a total of 13.8 million metric tons of processed ore were produced at our mines. We also operate 3 zinc smelters (refineries): Cajamarquilla, in Peru, Três Marias and Juiz de Fora, in Brazil, which produce zinc metal, zinc oxide and by-products. We also have mineral exploration projects in Peru, Brazil, and Namibia.

Our Cajamarquilla plant is the largest zinc smelter in Latin America and the fifth largest in the world. In 2023, we sold 589.8 thousand tons, 555.9 thousand tons of zinc metal and 33.9 thousand tons of zinc oxide, to customers around the world from various segments, such as transport, energy, agriculture, health, and consumer goods.



## 2. INVENTORY DATA AND LIMITS

**Responsible for drawing up the inventory:** Júlia Morelli Faria

**E-mail address of person responsible:** julia.faria@nexaresources.com

**Year of inventory:** 2023

**The inventory has been verified by a third party:** Yes

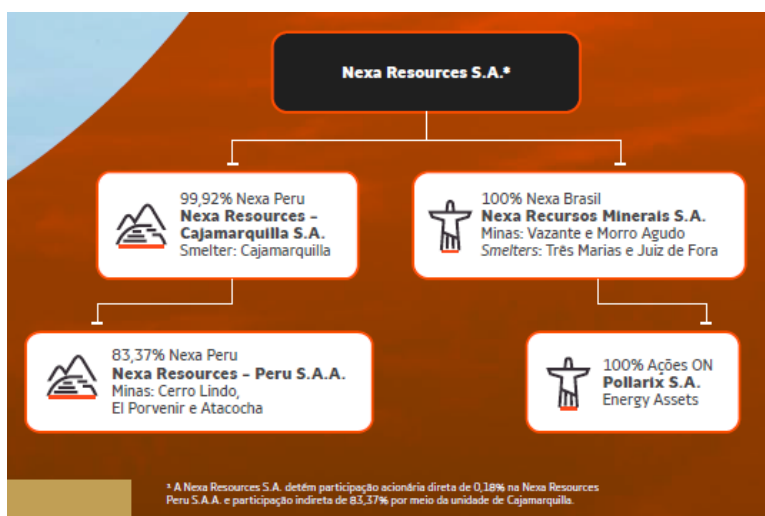
**Verifying body:** Bureau Veritas

**Responsible for verification:** Rubens Ferreira (ferreira.rubens@uol.com.br)

**Type of inventory:** Complete

### 2.1. Organizational Limits

Below is a list of the organization's units **and subsidiaries** included in this inventory. Disaggregated reporting of emissions from units with Scope 1 emissions equal to or greater than 10,000 tCO<sub>2</sub>e per year is mandatory. Reporting the emissions of other units, as well as those of subsidiaries, is optional. Disaggregated emissions by unit can be found in Section 2.7 - Emissions by operating units.





Caption:



Parent company



Subsidiary












Unit

[Parent company has operational control? | % of shareholding related to Parent company]



Nexa Resources

	Aripuanã – Mining - Brazil	[Yes   100%]
	Vazante – Mining - Brazil	[Yes   100%]
	Morro Agudo – Mining - Brazil	[Yes   100%]
	Três Marias – Metallurgy - Brazil	[Yes   100%]
	Juiz de Fora – Metallurgy - Brazil	[Yes   100%]
	Cajamarquilla – Metallurgy - Peru	[Yes   99,92%]
	Cerro Lindo – Mining - Peru	[Yes   83,37%]
	El Porvenir – Mining - Peru	[Yes   83,37%]
	Atacocha - Mining - Peru	[Yes   83,37%]

The Operational Control approach was used to consolidate the inventory.



## 2.2. Operational limits reported in the inventory.

### Scope 1

- ❖ Stationary combustion
- ❖ Mobile combustion
- ❖ Fugitive emissions
- ❖ Industrial processes
- ❖ Agricultural activities
- ❖ Land use change
- ❖ Solid waste
- ❖ Effluents

### Scope 2

- ❖ Electricity Purchase - Location Approach
- ❖ Thermal Power Purchase
- ❖ Electricity procurement - Purchasing choice approach

### Scope 3

- ❖ 1. Goods and services purchased
- ❖ 4. Transportation and distribution (upstream)
- ❖ 5. Waste generated in operations
- ❖ 7. Home-work emissions
- ❖ 9. Transportation and distribution (downstream)
- ❖ 10. Processing of products sold
- ❖ 11. Use of goods and services sold



### 3. EMISSIONS

#### 3.1. Summary of total emissions

GHG (t)	Emissions in metric tons, by type of GHG				Emissions in metric tons of CO2 equivalent (tCO2e)			
	Scope 1	Scope 2 (approach by "location")	Scope 2 (approach by "market base")	Scope 3	Scope 1	Scope 2 (approach by "location")	Scope 2 (approach by "market base")	Scope 3
<b>CO<sub>2</sub></b>	235.450,02	447.248,48	11.769,40	1.198.876,46	235.450,02	447.248,48	11.769,40	1.198.876,46
<b>CH<sub>4</sub></b>	130,72	32,06	32,06	5,15	3.660,22	897,68	897,68	144,15
<b>N<sub>2</sub>O</b>	6,56	4,28	4,28	1,67	1.737,08	1.132,88	1.132,88	442,50
<b>HFCs</b>	2,67			-	4.144,49			-
<b>PFCs</b>	-			-	-			-
<b>SF<sub>6</sub></b>	-			-	-			-
<b>NF<sub>3</sub></b>	-			-	-			-
<b>Total</b>					244.991,80	449.279,04	13.799,95	1.199.466,06

#### 3.2. Scope 1 emissions broken down by category (tCO2 eq)

Scope 1	Emissions 2023	Biogenic emissions
Stationary combustion	123.521,66	653,07
Mobile combustion	90.228,58	7.287,82
Fugitive emissions	4.147,34	0,00
Industrial processes	23.896,11	0,00



Agricultural activities	66,23	0,00
Land use change	0,00	0,00
Solid waste	12,31	0,00
Effluents	3.119,38	0,00
<b>Total</b>	<b>244.991,59</b>	<b>7.940,89</b>

### 3.3. Scope 2 emissions (tCO2 eq)

Scope 2	Emissions 2023	Biogenic emissions
Electricity (location approach)	447.248,5	119.511,3
Losses (location approach)	0,0	0,0
Electricity (approach market base)	13.800,0	119.511,3
Losses (approach market base)	0,0	0,0
Thermal Energy Purchasing	2.030,56	0,0

### 3.4. Scope 3 emissions broken down by category (tCO2 eq)

Scope 3	Emissions 2023	Biogenic emissions
1. Purchased goods and services	253.863,74	0,00
2. Capital goods	0,00	0,00
3. Activities related to fuel and energy not included in Scopes 1 and 2	0,00	0,00
4. Transportation and distribution (upstream)	22.076,17	1.870,79
5. Waste generated in operations	73,50	0,21
6. Business trips	0,00	0,00
7. Employee commuting (home to work)	1.145,47	135,13
8. Leased assets (organization as lessee)	0,00	0,00
9. Transportation and distribution (downstream)	14.634,06	1.020,49
10. Processing of products sold	415.536,91	0,00



11. Use of goods and services sold	492.133,44	0,00
12. End-of-life treatment of products sold	0,00	0,00
13. Leased assets (the organization as lessor)	0,00	0,00
14. Franchises	0,00	0,00
15. Investments	0,00	0,00
Total	<b>1.199.463,29</b>	<b>3.026,62</b>

In 2023, we have progressed in managing and reporting our emissions inventory, resulting in a significant increase in tCO<sub>2</sub>e reported, especially in Scope 3 emissions. It's important to note that this increase does not mean a rise in emissions quantity; rather, it reflects our transition to a new reporting framework that better aligns with global standards advocated by the International Zinc Association (IZA). We have included three new Scope 3 categories in our inventory: category 1 (consumption of goods and services - upstream), category 10 (sale of zinc metal - downstream) and category 11 (use of goods and services sold).

The emissions in category 11, which are representative in the Scope, are derived from the product Zincal (limestone), a soil improver made from the old tailings from the process, the sale of which enables zero waste at the Morro Agudo operation.

### 3.5. Emissions per unit

Emissions in metric tons of CO <sub>2</sub> equivalent (tCO <sub>2</sub> e)				
	Scope 1	Scope 2 LOCATION	Scope 2 MARKET BASE	Scope 3
<b>CAJAMARQUILLA</b>	18.182,9	287.789,6	8.318,1	470.341,2
<b>TRÊS MARIAS</b>	34.622,2	31.010,7	2.030,6	150.165,7



<b>JUIZ DE FORA</b>	97.117,1	15.824,5	1,3	71.330,8
<b>ARIPUANÃ</b>	16.827,5	3.645,6	3.447,7	953,3
<b>VAZANTE</b>	16.019,6	11.393,7	0,5	4.718,3
<b>MORRO AGUDO</b>	11.940,9	3.027,6	1,8	492.505,9
<b>CERRO LINDO</b>	26.952,9	56.688,8	0,0	6.427,1
<b>ATACOCHA</b>	8.759,7	12.229,0	0,0	749,8
<b>EL POVENIR</b>	12.304,5	27.669,5	0,0	2.271,1
<b>CORPORATE BR</b>	881,8	0,0	0,0	0,0
<b>CORPORATE PERU</b>	1.382,7	0,0	0,0	0,0
	<b>244.991,8</b>	<b>449.279,0</b>	<b>13.800,0</b>	<b>1.199.463,2</b>

The data below includes all Nexa Resources' mining and smelter units, located in Brazil and Peru.



### 3.6. Emissions outside Brazil

The data reported below consolidates emissions from operations in Peru.

GEE (t)	Emissions in metric tons, by type of GHG				Emissions in metric tons of CO2 equivalent (tCO2e)			
	Scope 1	Scope 2 LOCATION	Scope 2 MARKET BASE	Scope 3	Scope 1	Scope 2 LOCATION	Scope 2 MARKET BASE	Scope 3
CO <sub>2</sub>	65.904,7	384.376,9	8.318,1	479.539,5	65.904,7	384.376,9	8.318,1	479.539,5
CH <sub>4</sub>	4,0	-	-	1,3	110,9	-	-	35,3
N <sub>2</sub> O	2,0	-	-	0,8	534,5	-	-	214,4
HFCs	0,5	-	-	-	1.032,6	-	-	-
PFCs	-	-	-	-	-	-	-	-
SF <sub>6</sub>	-	-	-	-	-	-	-	-
NF <sub>3</sub>	-	-	-	-	-	-	-	-
<b>Total</b>					<b>67.582,7</b>	<b>384.376,9</b>	<b>8.318,1</b>	<b>479.789,1</b>

### 3.7. Other greenhouse gases not covered by the Kyoto Protocol

No emissions of other GHGs not regulated by the Kyoto Protocol were recorded.



## 4. METHODS

### 4.1. Methods and/or Cross-Sector Tools

The official tool (spreadsheet) provided by the Brazilian GHG Protocol Program was used to draw up the inventory. No cross-sectoral methods and/or tools were used.

### 4.2. Emissions Factors

Were any emission factors used other than those suggested by the Brazilian GHG Protocol Program?

Yes, for the calculations of emissions from operations located in Peru, we used the country-specific emission factors, officially provided by the Peruvian government's Ministry of Environment, through the Annual Report on Winter Effect Gases (2014), the most recent technical literature available.

## 5. OTHER ELEMENTS

### 5.1. Information on the organization's performance in comparison with internal benchmarks (e.g. other units) or external benchmarks (e.g. organizations in the same sector).

Our direct (Scope 1) GHG emissions totaled 244,991.8 tCO<sub>2</sub>e in 2023, an increase of 18% compared to the previous year. The reason behind this increase refers to Aripuanã operating during the 12 months of 2023, as the ramp up process began in the second half of 2022. In



addition, we have added and calculated the "Industrial processes" category in our Juiz de Fora smelter.

Our emissions from the consumption and purchase of electricity (Scope 2) totaled 13,800.0 tCO<sub>2</sub>e, 6% higher than 2022, also reflecting Aripuanã operations.

As previously mentioned, there were significant increases in Scope 3 emissions, due to a new reporting criteria, based on internal studies and benchmarks in the zinc industry, align with global standards, resulting on the report on 3 new categories: 1, 10 and 11.

**GHG EMISSIONS IN 2023 (IN tCO<sub>2</sub>e)** GRI 305-1, 305-2, 305-3 SASB EM-MM-110A.1 TCFD MMB

	2021	2022	2023	% do total em 2023
Scope 1 – direct emissions	247,218.64	208,472.97 <sup>1</sup>	244,991.79	17%
Scope 2 – electricity consumption (market-based approach) <sup>1</sup>	7,780.93	12,968.40	13,799.95	1%
Scope 3 – value chain	47,570.63	50,841.13	1,199,463.17	82%
<b>Total<sup>2</sup></b>	<b>302,570.20</b>	<b>272,282.49</b>	<b>1,458,254.91</b>	<b>100%</b>

<sup>1</sup> The Scope 2 emissions reported on this page refer to the calculation using the market-based approach. In 2023, we emitted 449,279.04 tCO<sub>2</sub>e for the location-based approach.

<sup>2</sup> The increase in total emissions is mainly due to the addition of scope 3 categories, resulting from advancements following collaboration with IZA and mapping the impact on the value chain.

**5.2. Description of GHG emission indicators for the organization's activities. For example, tCO<sub>2</sub>e/products manufactured.**

The emissions intensity was 0.44 tCO<sub>2</sub>e per ton of zinc and zinc oxide sold. The intensity is calculated considering the ration between the sum of Scopes 1 and 2 and the total volume of zinc and zinc oxide sold. This indicator positions Nexa as one of the zinc producers with the lowest CO<sub>2</sub> emissions in industry. This reinforces our ambition to be one of the zinc producers with the lowest greenhouse gas emissions in the world.



### **5.3. Description of strategies and projects for managing GHG emissions.**

We rely on innovation and new technologies to meet our public targets on emissions<sup>1</sup>. These are:

- ❖ Absolute reduction of Scope 1 emissions by 20% (52 thousand tons of CO2 equivalent, considering 2020 as baseline), keeping Nexa's energy matrix almost entirely composed of renewable sources.
- ❖ Achieve emissions neutrality by 2040
- ❖ Net Zero by 2050.

We have projects that support our strategic goals,, guaranteeing better performance in terms of clean energy and reducing greenhouse gas (GHG) emissions in operations and in our the valor chain.

Below there are some initiatives which are underway at our units in Brazil and Peru:

- Use of bio-oil, which is made of tar from charcoal production to replace fossil fuel oil in zinc oxide furnaces at Três Marias. In 2023, we have concluded the conversion of 12 furnaces, out of 47. This project, once completed, has the potential to reduce 25,000 tons of fossil emissions annually (half of the public target for 2030).
- Biogenic fuel to replace petroleum coke, called biobriquette, in our Juiz de Fora smelter. The project consists of a partial substitution of approximately 30% that would save 25,000 tons of CO2 emissions by 2030.
- Injection of hydrogen and oxygen into diesel in vehicles engines, a technology that would reduce diesel consumption by more than 5%. In 2023, we contracted 100 hydraGENTM units with H2Tek to be installed throughout 2024.

---

<sup>1</sup> See our website for more details on Nexa's emissions reduction commitments <https://www.nexaresources.com/en/esg/strategy/>.



- Decarbonization of the Waelz furnace in our Juiz de Fora smelter. Another initiative concentrated on coke's replacement considering a renewable solid fuel developed for our process composed from charcoal and bio-oil.

#### **5.4. Information on contracts with customers and suppliers that include clauses linked to the preparation of GHG inventories and/or the submission of related information.**

A tangible demonstration of the recognition of our ESG commitments occurred in October 2023, when we established a revolving credit facility in the amount of US\$320 million, with interest rates subject to variations based on the emissions reduction indicator. This facility has a term of 5 years with an initial interest rate that may vary depending on the Scope 1 GHG emissions annual outcome.

#### **5.5. Information on uncertainties, exclusions of data sources and other characteristics of the preparation of the inventory.**

Not reported.

#### **5.6. Description of internal actions to improve the quality of the GHG inventory. For example, systematizing data collection, hiring external verification, etc.**

**Emissions management:** in 2023, aiming to align concepts, draw up guidelines and improve our emissions management process we have conducted a three-day training course on GHG Inventory Calculation for almost 30 people at Nexa (corporate and operations).

**ESG (ESG Data Management) platform:**



### **5.7. Information on the purchase of electricity from renewable sources.**

In 2023, we have consumed a total of 3,513,427.53 mWh of electricity (1,631,994.03 mWh in Brazil and 1,881,433.50 mWh in Peru), 95.5% of which from renewable sources.

### **5.8. Information on self-production of energy from renewable sources for our own consumption.**

In 2023, we have consumed 28,077.16mWh from Chaprin's self-production in Atacocha. This volume represents less than 1% of total electricity consumption.

### **5.9. Information on your organization's carbon stock, in tons, as of December 31 of the inventory year.**

The use of carbon credits is a strategic instrument for accelerating our transition to zero-emission zinc. Market regulations premises are still a challenge in Brazil, although we have more than 100,000 tons of CO2 equivalent in credits available for sale due to the switch to biomass steam generation at our Três Marias smelter.



The project was concluded in 2017, developed in partnership with Combio, which operates this particular facility, and the credits were validated by Verra formal registration in 2019 (Project ID: 1804).

## **6. OFFSETS AND REDUCTIONS**

### **6.1. Offsetting emissions**

Does the organization have emission offset projects?

Not reported.

### **6.2. Emissions reductions**

Does the organization have emission reduction projects?

Innovation permeates our operations and supports us in advancing our ESG strategy at all levels. We develop projects to enable better performance in terms of clean energy, reducing greenhouse gas (GHG) emissions in operations and in the business value chain, aiming to achieve targets. The decarbonization roadmap covers all Nexa units and seeks economically and environmentally viable alternatives, with greater energy efficiency and lower carbon emissions.

Main projects developed in 2023:

At Três Marias, we converted 12 diesel consumer furnaces to bio-oil, developed in-house. This bio-oil is made of tar from charcoal production and amines to replace fossil fuel oil, which supplies the zinc oxide furnaces. This project has the potential to reduce 25,000 tons of fossil emissions annually (half of the public target for 2030).



Another initiative that has advanced in 2023 is the study of biogenic fuel to replace petroleum coke, called biobriquette, in our Juiz de Fora smelter. Partial replacement (30%) at present, it will generate another 25,000 tons of savings in emissions by 2030.

These two projects are the main ones on the decarbonization roadmap, due to their reduction impact and because they are being implemented in Nexa's operations with the highest emissions.

However, all operations are involved in this common goal of reduction and progress has also been made on the project to inject hydrogen and oxygen into diesel engines, a technology that reduces diesel consumption by more than 5%. In 2023, we contracted 100 hydraGENTM units with H2Tek for installation throughout 2024.