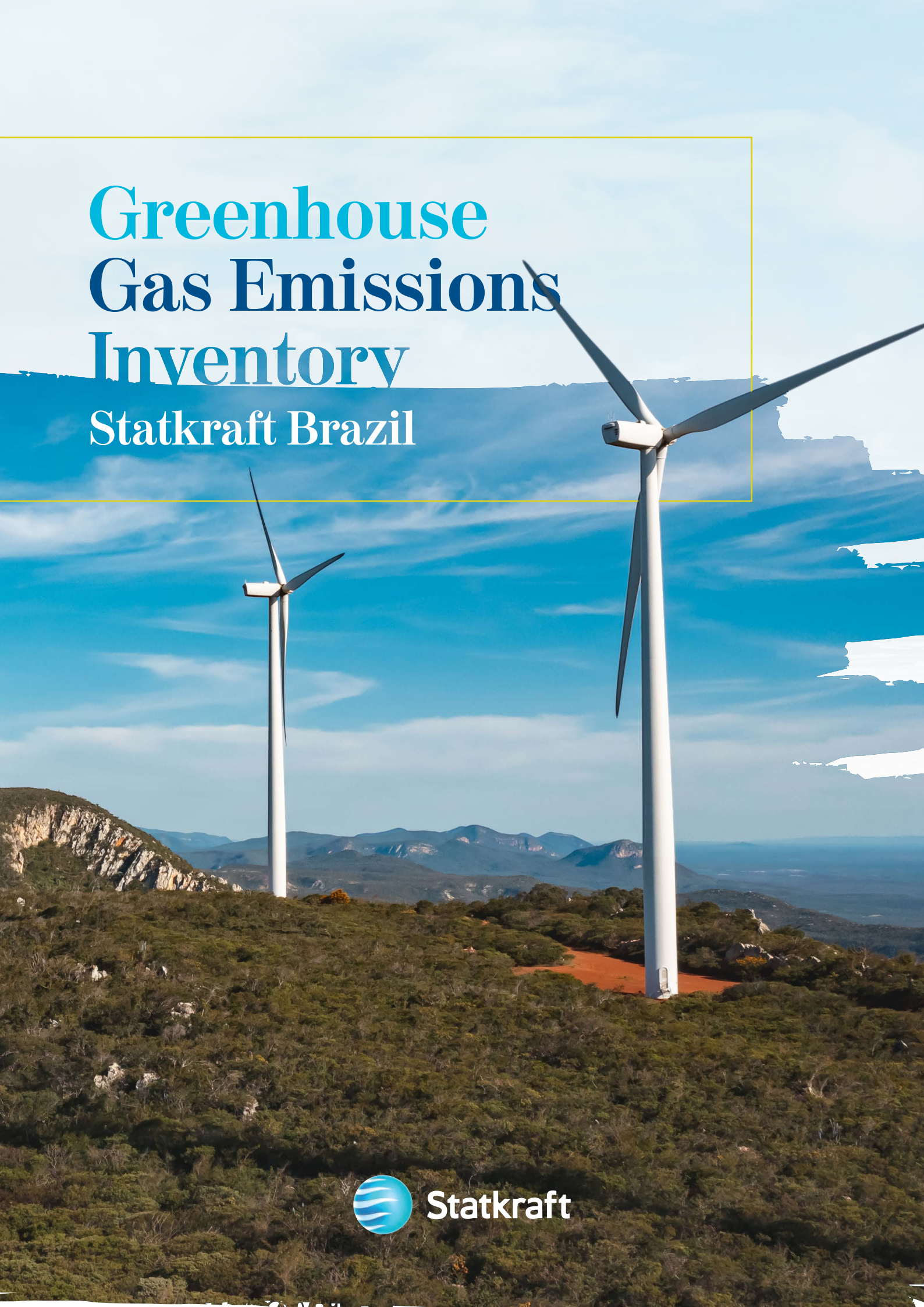
Greenhouse Gas Emissions Inventory

Statkraft Brazil



Statkraft

Summary

Executive Summary

This report presents Statkraft Brasil's 2022 greenhouse gas (GHG) emissions inventory and the main mitigation courses mapped, a key step in the company's decarbonization journey.

Statkraft Brasil carried out its first greenhouse gas inventory in 2021 and has been advancing maturely in carbon management, **expanding the mapping of its direct and indirect emissions, considering the principles of relevance, consistency, accuracy, transparency, and completeness of the inventory.**

In this report, we will start by showing the challenges that climate change imposes on the world and on Statkraft's business, starting from a global view of GHG emissions, followed by the presentation of the Brazilian context and the positioning of some companies in the power generation sector in the country. **Next, the results of the Greenhouse Gas Emissions Inventory for the year 2022 will be presented, followed by an evaluation of the data found.**

Finally, the courses of action mapped to mitigate Statkraft Brasil's GHG emissions will be presented, designed from the analysis of the company's emissions profile, **aiming to mitigate the most relevant sources of emissions, based on the experience acquired from the 2021 and 2022 inventories, focusing on the ambitions of Statkraft's Global Sustainability Strategy.**

General contextualization and relevance
The Climate Challenge

The world has grown rich in the last 50 years. World GDP went from $19 trillion in 1970 to $85 trillion in 2019. In the same period, the number of people living in extreme poverty fell from 1.8 billion (35% of the world's population) to 770 million (11% of the world's population).[1] This enrichment process is directly linked to the growth in energy demand.

The economic and social improvements, linked to the extraction and burning of fossil energy, have resulted in a relevant environmental cost. The use of coal and oil to produce energy, deforestation for agricultural production, and industrial emissions have caused an increase in the concentration of greenhouse gases in the atmosphere, leading to global climate change, one of humanity's most urgent challenges.

There is a strong correlation between the concentration of greenhouse gases in the atmosphere and average temperatures on Earth. Over the past 400,000 years, the concentration of CO2 in the atmosphere has never exceeded the 280 ppm (parts per million) mark until the Industrial Revolution. Today, we have already exceeded 415 ppm and have been increasing this concentration by approximately 3 ppm per year. **Every year, we release into the atmosphere the equivalent of approximately 50 billion tons of carbon dioxide,** previously stored underground in the equivalent form of oil or coal.

Different scenarios have been considered to model the climate impacts resulting from this increase in gases in the atmosphere, but **there is a consensus that they can especially affect precipitation regimes, ocean acidification, sea level rise, melting of polar ice caps, extreme weather events and desertification of tropical regions,** resulting in global Gross Domestic Product (GDP) reduction, irreversible loss of biodiversity and waves of mass migrations (IPCC, 2018).

According to the Intergovernmental Panel on Climate Change (IPCC), **to maintain safe levels of global temperature increase (up to 1.5°C), we need to achieve a "net zero" emissions economy by 2050 (IPCC, 2021)**, and for this milestone to be achieved, it is fundamental to decarbonize the energy matrix.

Over the next decade, energy from wind and solar sources is expected to grow rapidly. In 2020, wind energy production increased by 12% while solar energy production increased by 20%.

Still, energy transition is a major challenge. For the world to decarbonize by 2050, we will need to replace the current production with fossil fuels of about 12,500 Mtoe/year[2], with renewable sources (IEA, 2020). This is the equivalent of about 1,500 Itaipu power plants, or 1 of it every week for the next 30 years.

[1] Climate Change, Sergio Margulus, Konrad Adenauer Stiftung, 2020.
[2] Millions of equivalent tons of crude oil per year.

National and global profile of GHG emissions

Each year, it is estimated that around 50 billion tons of carbon dioxide equivalent (tCO_2e) are released into the atmosphere worldwide. Brazil is responsible for about 3% of these emissions, approximately 1.5 billion tons of CO_2e.

Global emissions come mostly from energy use, and, in this regard, Brazil is well positioned. Our energy matrix is considerably clean when compared to other countries. Despite this, our power generation emissions show an increasing trend, due to the decrease in hydroelectric potential, resulting from climate change itself.

On the other hand, **Brazil has enormous potential from wind and solar sources,** and the energy from these sources has already reached very competitive price levels.

Another comparative advantage of Brazil is the widespread **use of renewable fuels, such as ethanol and biodiesel.**

Energy from renewable and fossil sources in Brazil and worldwide

BRAZIL

CONSUMPTION

56% FOSSIL — 44% RENEWABLE

GENERATION

18% FOSSIL — 82% RENEWABLE

WORLD

CONSUMPTION

86% FOSSIL — 14% RENEWABLE

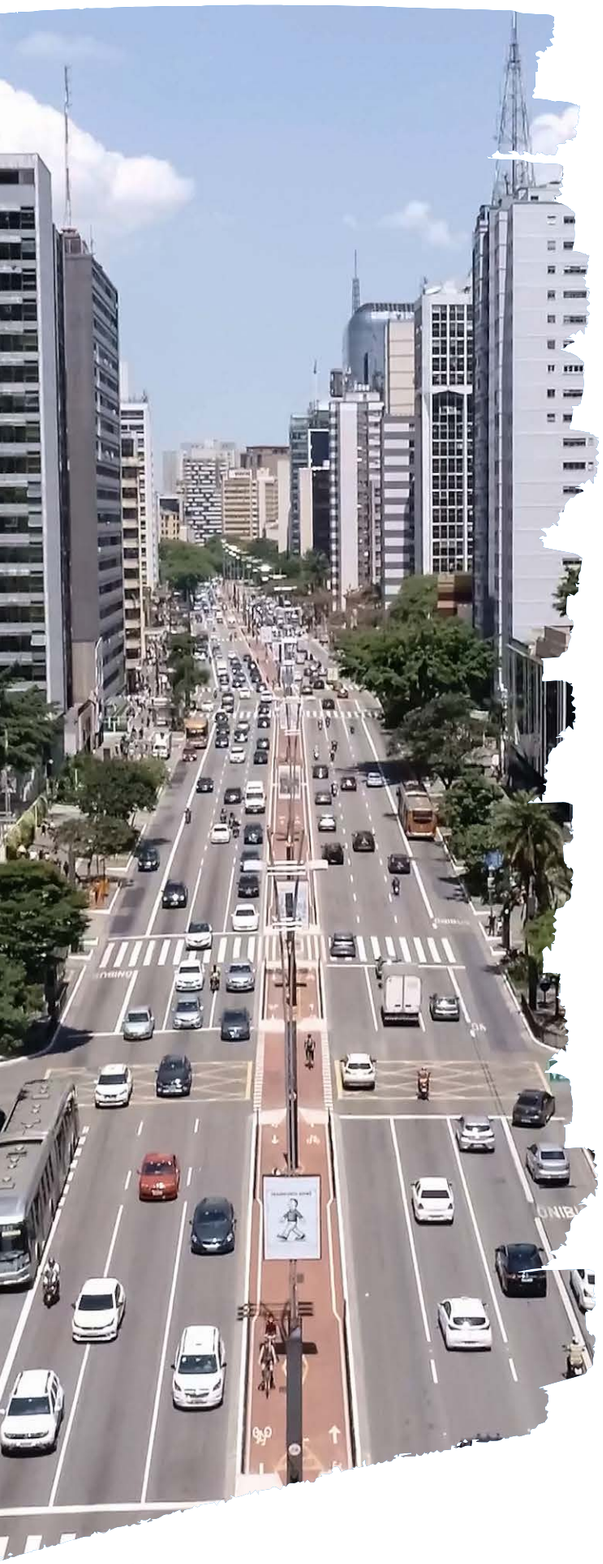
GENERATION

76% FOSSIL — 24% RENEWABLE

Source: EPE, 2021

Announced targets by major emitting countries

Considering the challenges posed by the increase of greenhouse gases in the atmosphere, governments have been acting in different ways to mitigate climate risks. Under the Paris Agreement, **many countries have set emission reduction targets.**



Public policies in Brazil

In Brazil, among the national climate change frameworks, the main one is the **National Policy on Climate Change (PNMC),** established in 2009.

The instrument for carrying out adaptation actions is the National Plan for Adaptation to Climate Change (PNA), set in 2016. The PNA was prepared by the federal government in collaboration with civil society, the private sector, and state governments and aims to promote the reduction of the national vulnerability to climate change and manage the risks associated with this phenomenon. Its importance was reinforced in the Nationally Determined Contribution (NDC), a document that records Brazil's main commitments and contributions to the climate plan defined by the Paris Agreement. The NDC sets greenhouse gas emission reduction targets at 37% by 2025 and 43% by 2030 when compared to 2005 levels.

Another relevant initiative is the **Partnership for Market Readiness (PMR)**, an initiative of the World Bank to support middle-income countries in the process of introducing carbon pricing and other innovative instruments to reduce GHG emissions.

For the time being, there are no concrete definitions in Brazil for the two main paths that have been adopted in other places of the world, in different degrees and formats:

- the adoption of taxation systems on greenhouse gas emissions;
- the implementation of "cap-and-trade" systems, with the imposition of emission limits on certain sources, accompanied by a structure of tradable credits among these sources.

Initiatives to regulate the carbon market in Brazil have gained momentum, especially in the sense of creating a "cap-and-trade" system. In this scenario, **companies with emissions above 10,000 tCO_2e per year must publish their GHG emissions inventories annually.** Companies with annual emissions over 35,000 tCO_2e will be part of the trading system, receiving emission limits per period. The details of this system are still under discussion in the Brazilian Senate.

Brazilian companies' climate commitments

The private sector, both in Brazil and around the world, has increasingly made commitments to climate action.

The number of Brazilian companies reporting information on their actions and commitments to combat climate change increased 46% in 2021 over the previous year: from 838 in 2020 to 1,227 in 2021. Together, the participating companies are worth R$ 3 trillion in terms of market capitalization in Brazil. Overall, **396 companies (32%) have reported for the first time, which shows that the topic has shown up on the corporate sector radar once and for all.**

The total **scope 1 and 2** emissions of Brazilian companies reporting their data to CDP was **0.169 billion tCO_2e in 2021**, while **scope 3 emissions represented 1.4 billion tCO_2e.**

In Statkraft's case, as the energy generation is renewable, **scope 1 emissions are very small. Scope 3 emissions**, specifically related to vegetation suppression and the construction of new power plants, **represent the largest share of emissions.**

The emission reduction target of Brazilian companies is about 43 million tCO_2e. The most ambitious sector is power generation, with about 66% of the total.

The strategies outlined for the transition to a low-carbon economy require companies to integrate climate risks and opportunities into their planning. According to CDP data, **48% of the responding Brazilian companies have a transition** plan, another 36% intend to create one in the next few years and 76% of the companies have the intention to publish their transition plan.

Statkraft Brazil, reaffirming its commitment to Sustainable Development Goal 13 – Action Against Global Climate Change, presents its 2nd Greenhouse Gas Emissions Inventory, as well as its Goals and Actions.

Statkraft in Brazil

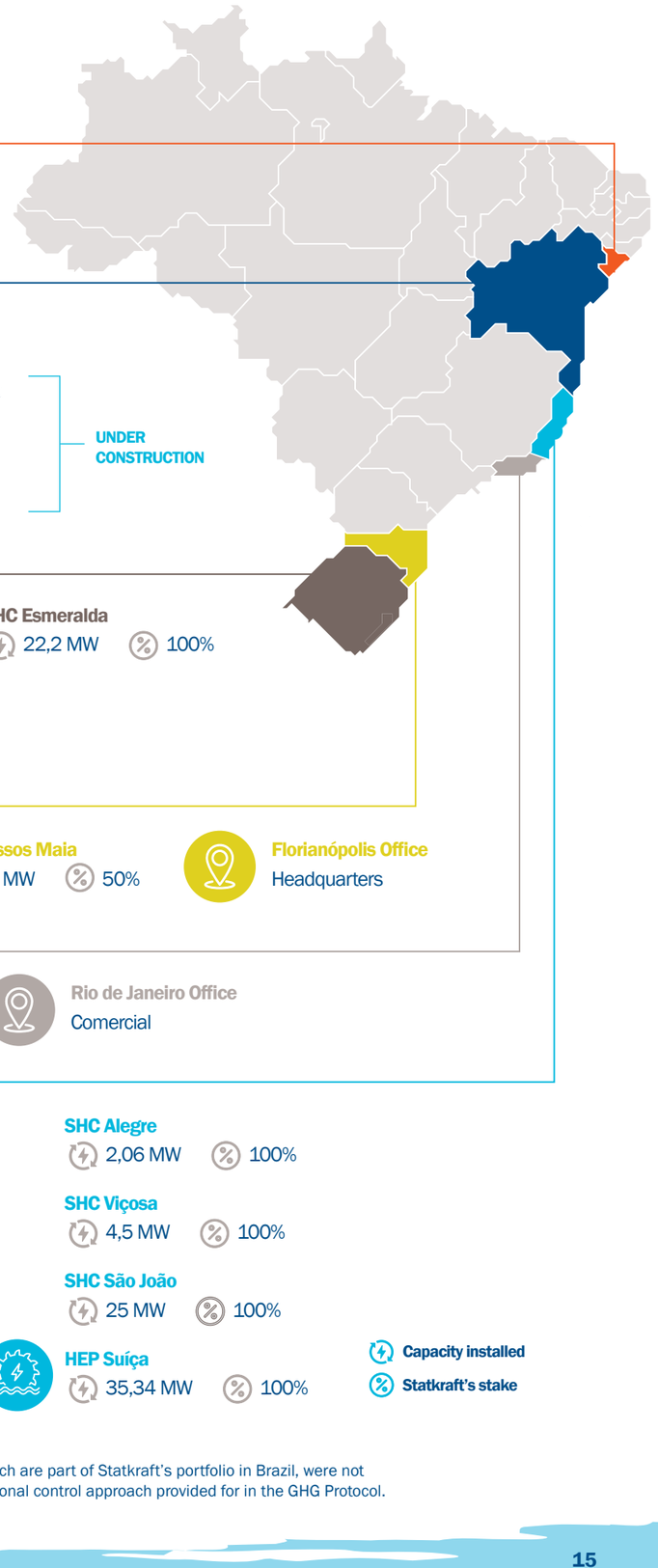
Statkraft has been in Brazil since 2009 and started operations in 2011 as an electricity trader. In the following year, it established its activities in renewable energy generation as Statkraft Energias Renováveis S.A. (SKER), a holding company of Special Purpose Entities - SPEs that concentrate renewable energy generation assets.

OUR VISION:
Renew the way the world is powered

The Statkraft Group is a Norwegian government-owned company with over

127 years of existence.

Present in 21 countries in **Europe, South America and Asia,** it is an international leader in hydroelectric power production and the largest generator of renewable energy in Europe.



Barra dos Coqueiros EOL
34,5 MW | 100%

Brotas de Macaúbas EOL Complex
95,19 MW | 100%

Ventos de Santa Eugênia EOL Complex
518,7 MW | 100%

Morro do Cruzeiro EOL
78,9 MW | 100%

UNDER CONSTRUCTION

SHC Moinho
13,7 MW | 100%

SHC Esmeralda
22,2 MW | 100%

HEP Monjolinho
74 MW | 100%

SHC Santa Laura
15 MW | 100%

SHC Passos Maia
25 MW | 50%

Florianópolis Office
Headquarters

SHC Santa Rosa II
30 MW | 100%

Rio de Janeiro Office
Comercial

SHC Santa Fé
29 MW | 100%

SHC Alegre
2,06 MW | 100%

SHC Rio Bonito
22,5 MW | 100%

SHC Viçosa
4,5 MW | 100%

SHC Jucu
4,84 MW | 100%

SHC São João
25 MW | 100%

SHC Fruteiras
8,74 MW | 100%

HEP Suíça
35,34 MW | 100%

Capacity installed
Statkraft's stake

The Rio das Antas Complex and HEP Dona Francisca, which are part of Statkraft's portfolio in Brazil, were not included due to the methodological option for the operational control approach provided for in the GHG Protocol.

Emissions Inventory Greenhouse Gas Statkraft Brasil

Statkraft Brasil's Greenhouse Gas Emissions Inventory was prepared in accordance with the guidelines of the GHG Protocol methodology, following the operational control approach, in which the emissions of assets that the Group holds control over the operation are accounted for. To measure the inventory, equations provided by the Intergovernmental Panel on Climate Change (IPCC) were used to calculate emissions from certain sources and sinks, considering operations from January to December 2022 and including direct and indirect emissions.

This year, SF_6 gas emissions were included among the sources of fugitive emissions that are part of Scope 1, in addition to the inclusion of the Morro do Cruzeiro wind farm, under construction in the countryside of Bahia, and the emission sources "Purchased Goods and services" and "Capital Goods" in scope 3. Finally, there was also an increase in the mapping of emissions caused by business trips and the employees' commute on their way from home to work.

Emitting sources considered in this inventory:

Scope 1

Stationary
Emissions resulting from stationary combustion for the generation of electricity, steam, heat, or energy using equipment in a fixed location.

Mobile
Emissions resulting from mobile combustion to transportation using company-owned or company-operated vehicles.

Fugitive
Unintentional release of substances such as hydrofluorocarbons (HFCs) during the use of cooling equipment and air-conditioners and CO2 in cylinders.

Change in Land-Use
Emissions generated by licensed vegetation suppression of the native forests.

Agricultural Activities
Emissions generated from the use of fertilizers in agricultural activities.

Effluents
Emissions provoked by the anaerobic treatment of liquid effluents inside the organization.

Scope 2

Electricity
Emissions related to the purchase of electricity.

Scope 3

Purchased Goods and services
Emissions occurred in the lifecycle (extraction, production, and transportation) of purchased goods. This type of emission should be present, especially in VSE and MdC constructions.

Transportation and upstream distribution
Emissions resulting from the transportation of purchased goods, not using company-owned or company-operated vehicles.

Business trips
Emissions from employee transportation to activities related to the company's businesses.

Capital goods
Emissions occurred in the lifecycle (extraction, production, and transportation) of purchased capital goods.

Waste sent to landfills
Emissions from the final destination of waste generated by the company's operations.

Employees' commuting (home-work)
Emissions caused by employee transportation from their homes to their workplaces.

This inventory also includes the following data on Statkraft's carbon management activities:

Avoided emissions

Emissions that have not occurred due to Statkraft's activities. Considering that the company produces renewable energy, **its activities resulted in an emission reduction from the consumers of the National Interconnected System.**

Carbon stock

Carbon stocked in assets under the company's management. In Stakraft's case, **the carbon stock is foremost related to the preservation of forest assets.**

Biogenic removals

Carbon removed from the atmosphere by biological means, **such as the planting of trees.**

Our Numbers

	CO2 Emissions (in t)	CH4 Emissions (in t)	N2O Emissions (in t)	SF6 Emissions (in t)	Non-renewable CO2e Emissions (in t)	Renewable CO2e Emissions (in t)
SCOPE 1						
Stationary Combustion	26,34	-	-	-	26,51	3,19
Mobile Combustion	173,82	0,01	-	-	174,89	20,22
Fugitive Emissions	1,79	-	-	0,03	593,91	-
Agriculture	-	-	-	-	0,35	-
Land-Use Change	-	-	-	-	2.965,66	0,04
Residues and effluents treated by Statkraft	-	0,01	-	-	0,34	-
SCOPE 2						
Energy purchased	-	-	-	-	121,65	-
SCOPE 3						
Purchased Goods and services	5.605,79	0,31	0,10	-	23.788,12	594,94
Capital goods	-	-	-	-	50.083,19	-
Waste sent to landfills	-	7,06	-	-	197,45	-
Business trips	143,02	-	-	-	366,70	0,09
Employees' commuting (home-work)	12,37	-	-	-	12,40	1,28
Total					**78.331,16**	**619,76**

Emissions by type of greenhouse gas and by operating unit:

	Scope 1 - in kg					
	CO2	CH4	N2O	SF6	Fossil CO2e	Renewable CO2e
HEP Monjolinho	15.288,19	0,85	0,26	-	15.411,91	1.610,80
SHC Esmeralda	16.356,39	0,90	0,28	-	16.456,24	1.696,69
SHC Santa Laura	13.119,22	0,72	0,23	-	13.244,21	1.370,59
SHC Santa Rosa II	9.037,91	0,49	0,16	-	9.092,94	936,52
SHC Moinho	5.772,39	0,32	0,10	-	5.807,30	602,12
SHC Passos Maia	13.345,69	0,73	0,23	-	13.427,24	1.386,72
SHC Viçosa	5.422,70	1,31	0,09	-	5.483,71	590,81
SHC São João	12.255,32	1,68	0,21	-	12.384,19	1.285,92
SHC Alegre	1.706,28	0,10	0,03	-	1.761,50	197,23
SHC Fruteiras	11.329,96	1,65	0,19	-	11.427,26	1.250,71
SHC Rio Bonito	4.688,28	0,26	0,08	-	4.716,44	494,42
HEP Suiça	5.057,23	0,28	0,08	-	5.087,52	530,07
SHC Jucu	3.446,16	0,19	0,06	-	3.466,80	366,43
SHC Santa Fé	4.755,82	0,27	0,08	-	4.829,11	525,49
Brotas de Macaúbas EOL Complex	64.108,44	3,54	1,11	-	64.503,16	6.758,58
Ventos de Santa Eugênia EOL Complex	13,00	8,00	0,94	-	1.374.510,48	-
Barra dos Coqueiros EOL	16.209,92	1,73	0,17	25,00	603.802,55	3.847,40
Morro do Cruzeiro I EOL	6,00	-	-	-	1.594.951,53	-
Morro do Cruzeiro II EOL	-	-	-	-	-	-
Florianópolis (sede)	32,00	1,00	-	-	1.275,00	-
Rio de Janeiro (comercial.)	10,00	-	-	-	10,00	-
Total in tons	**201,96**	**0,02**	**-**	**0,03**	**3.761,65**	**23,45**

	Scope 2 - in kg	Scope 3 - in kg				
	Fossil CO2e	CO2	CH4	N2O	Fossil CO2e	Renewable CO2e
HEP Monjolinho	3.876,19	280,36	48,00	0,01	3.126,05	-
SHC Esmeralda	6.782,09	55,98	46,00	-	2.824,52	-
SHC Santa Laura	7.166,19	495,12	13,00	0,02	1.633,88	-
SHC Santa Rosa II	6.837,31	74,56	13,00	-	1.210,28	-
SHC Moinho	12.002,96	90,57	10,00	-	371,44	-
SHC Passos Maia	5.730,46	73,93	11,00	-	1.572,64	-
SHC Viçosa	1.334,98	38,18	16,00	-	498,55	-
SHC São João	22.938,98	88,97	14,00	-	784,83	-
SHC Alegre	77,01	68,21	51,00	-	2.261,86	-
SHC Fruteiras	150,15	108,56	27,00	-	873,78	2,40
SHC Rio Bonito	5.131,53	185,56	6,00	0,01	1.096,34	-
HEP Suiça	21.558,68	1.011,59	11,00	0,03	5.640,31	-
SHC Jucu	2.664,85	-	11,00	-	231,00	-
SHC Santa Fé	10.636,11	338,36	11,00	0,01	3.039,79	2,40
Brotas de Macaúbas EOL Complex	742,61	7.530,19	520,05	0,25	184.025,96	6.785,07
Ventos de Santa Eugênia EOL Complex	-	30.759,31	4.672,42	88,51	58.042.982,85	30,98
Barra dos Coqueiros EOL	983,45	155,57	1.359,01	0,01	66.677,35	16,14
Morro do Cruzeiro I EOL	-	545.363,62	146,77	9,40	15.938.585,51	-
Morro do Cruzeiro II EOL	-	280,65	-	0,01	15.133,34	-
Florianópolis (sede)	10.509,17	88.930,43	338,84	2,51	150.174,22	1.292,04
Rio de Janeiro (comercial.)	2.527,00	22.472,18	44,11	0,72	25.119,05	-
Total in tons	**121,65**	**698,40**	**7,37**	**0,10**	**74.447,86**	**8,13**

SHC - Small Hydroelectric Central
HEP - Hydroelectric Power Plant
EOL - Wind Power Plant

SHC - Small Hydroelectric Central
HEP - Hydroelectric Power Plant
EOL - Wind Power Plant

As a renewable energy producer, Statkraft Brasil generates and sells I-RECs (Renewable Energy Certificates). Consonant to its scope 1 and 2 emissions mitigation commitments, Statkraft has been retiring I-RECs to offset the company's scope 2 emissions since its first inventory. This year, 2,856 I-RECs were retired for this purpose.

Other carbon indicators related to the company's activity:

Avoided emissions 80,235	**Carbon stock 3,073,590**
Biogenic removals 123	**Biogenic emissions 27**

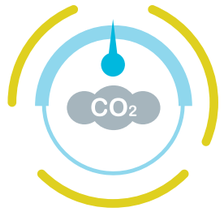
In tCO_2e

Assessment of results

Platforms such as the GHG Protocol consider the purchase of these environmental assets as a mechanism to offset the emissions related to the consumption of electricity from the National Interconnected System (SIN).

Comparing the emissions profile of 2022 to the emissions of 2021, we notice that, in 2022, 95% of emissions are concentrated in scope 3. In 2021, scope 3 accounted for about 54% of emissions. This difference is mainly explained by the different phases in the construction of new operational units.

In 2021, most of the vegetation suppression phase for the construction of the Ventos Santa Eugênia wind complex took place. **This vegetation suppression falls under the GHG Inventory scope 1 land-use change category.** In 2022, vegetation suppression activities occurred, but in smaller quantities than in 2021 due to the different stages and size of the construction each year. In addition, other scope 3 emitting sources have become relevant.



Statkraft's GHG Inventory for 2022 shows a very high concentration of scope 3 emissions. Scope 2 emissions, as expected for the company's operational profile, are small. **In fact, considering the purchase of I-RECs described above, it is possible to consider scope 2 emissions to be zero.**

GHG emission by scope

Scope 1	Scope 2	Scope 3
3.761,65	121,65	74.447,86
4,8%	0,2%	95,0%

In tCO_2e

Therefore, in 2021, **land-use change, that represented the category with the highest emissions, loses relevance in the global context of the inventory**, being the third main source of GHG emissions in 2022, despite still being the main source of scope 1 emissions.

Another key difference is that the 2022 inventory included SF_6 emissions. It is a greenhouse gas with a global warming power 23,000 times greater than carbon dioxide. Thus, although physical emissions are small, in 2022 this category of emissions gained relevance, being the second main source of scope 1 emissions.

Scope 1

Land-use change	Fugitive Emissions	Mobile Combustion	Stationary Combustion	Agriculture	Residues and Effluents treated by Statkraft
78,8%	15,8%	4,6%	0,7%	0,009%	0,008%

In scope 3, the most relevant emission categories were Capital Goods and Purchased Goods and Services.

In the case of Capital Goods, this category had not been included in the 2021 inventory. These are emissions that are not constant during the operation of a generating unit, they are accounted for in the installation of this equipment. In the case of **Ventos Santa Eugênia wind complex, in 2022 most of the 91 wind turbines that make up the wind complex were installed and it is in this year, therefore, that these emissions are accounted for.** Emissions of Purchased goods and services include the application of cement, steel, and their respective transportation. **The other emitting sources represent in total less than 1% of scope 3.**

Scope 3

Capital Goods	Purchased goods and services	Business trips	Waste sent to landfills	Employees' commuting (home-work)
67,3%	32%	0,5%	0,3%	0,02%

Considering the emissions according to the operational units, it is noted that the two units under construction, **Ventos Santa Eugênia and Morro do Cruzeiro, together represent more than 98% of the total emissions.**

This shows that Statkraft's operations, due to the renewable nature of its energy generation, have very low GHG emissions, with the construction of new assets being the main source of emissions, which occur temporarily, while the construction works last, and with a variable profile, depending on the stage in which each project is. On the other hand, the benefits generated by new renewable energy projects are durable, since they contribute to the decarbonization of the Brazilian energy matrix by avoiding GHG emissions over decades. This demonstrates the key role that the renewable energy sector plays in the face of the challenge of curbing climate change caused by global warming.

Overall result of Statkraft Brazil's GHG inventory in 2022

	Scopes 1, 2 and 3 emissions in 2022	
Unities	**Total (tCO_2e)**	**%**
Ventos de Santa Eugênia EOL Complex	59.417,49	75,85%
Morro do Cruzeiro EOL	17.533,54	22,38%
EOL Barra Coqueiros	671,46	0,86%
Brotas de Macaúbas Complex	249,27	0,32%
Florianópolis (headquarters)	161,96	0,21%
SHC São João	36,11	0,05%
HEP Suiça	32,29	0,04%
Rio de Janeiro (comercial.)	27,66	0,04%
SHC Esmeralda	26,06	0,03%
HPE Monjolinho	22,41	0,03%
SHC Santa Laura	22,04	0,03%
SHC Passos Maia	20,73	0,03%
SHC Santa Fé	18,51	0,02%
SHC Moinho	18,18	0,02%
SHC Santa Rosa II	17,14	0,02%
Morro do Cruzeiro II	15,13	0,02%
SHC Fruteiras	12,45	0,02%
SHC Rio Bonito	10,94	0,01%
SHC Viçosa	7,32	0,01%
SHC Jucu	6,36	0,01%
SHC Alegre	4,10	0,01%
Overall Totall	**78.331,16**	**100%**

In 2021, Statkraft's emissions profile showed differences, mainly due to the following points:

- **Different phases of construction of the Ventos Santa Eugênia,** as previously described. Initially, emissions from vegetation suppression are higher. At a later stage, the emissions from Capital Goods or Purchased Goods and Services are higher.
- **Inclusion of the Morro do Cruzeiro I and II** units in the GHG Inventory for 2022.
- **In 2021, SF_6 emissions were not included, and in 2022,** these emissions accounted for around 15% of scope 1 emissions.
- **In 2021, emissions in the Capital Goods category were not included in scope 3.** Considering the impact of these emissions in the company's activity, we think it is important to include this source in Statkraft Brasil's carbon management.

Even with the differences described above, **the 2021 and 2022 inventories show that emissions from units under construction represent more than 97% of Statkraft Brasil's total emissions.** This is important information that should guide the company's car bon management.

Positive impacts of Statkraft's activity

Another relevant element to the company's carbon management is to consider Statkraft's impact in a broader manner. **Statkraft in Brazil has an exclusive focus on renewable energy generation,** contributing to the decarbonization of the Brazilian energy matrix.

Thus, considering that **Statkraft provided 1,883,636.93 MWh of renewable electricity in the interconnected system,** it is possible to say that the company promoted the avoidance of 80,234.55 tCO_2e in GHG emissions in 2022.

It should be noted that the amount of emissions avoided in 2022 is much lower than the one calculated in the 2021 inventory. This is mainly due to the National Interconnected System's emission factor used to calculate avoided emissions in 2021 being much higher than in 2022. In any case, it is evident that the company's impact is clearly positive.

Another Statkraft's positive result, in terms of GHG emissions, is the fact that the company keeps about 6,390 hectares of forests and native areas. Most of the company's hydro generation assets are located further south in the country, where the predominant vegetation is the Atlantic Forest. These are protected areas required by law, in the vicinity of reservoirs or protected areas. Further north in the country, the company's wind units are in places where the legal reserves encompass areas of the Caatinga. Considering the average density of the forests and the amount of carbon stored in these natural systems, it is determined that the carbon stock maintained by Statkraft due to the conservation of these forests is 3,073,590 tCO_2e.

Considering that Statkraft provided 1,883,636.93 MWh of renewable electricity in the interconnected system, it is possible to say that **the company promoted the avoidance of 80,234.55 tCO_2e in GHG emissions in 2022.**

Compared to 2021 data, the company's carbon stock in 2022 is larger. This is due to the fact that in 2021 the conservation areas of wind farms, which are leased, were not included in the calculation. On the other hand, considering that for carbon stock estimation, additionality is not assessed, only the fact that there is conservation in areas adjacent to the company's activities, **the carbon stock in the areas of wind assets was included in the 2022 calculation.**

Finally, the planting and maintenance of 8,223 seedlings carried out by Statkraft throughout 2022 must also be mentioned. Considering that the planting of seedlings has the capacity to absorb carbon in the atmosphere, it is estimated that in 2022 about 120 tCO_2e were absorbed.

Goals
Statkraft Group

Statkraft's growth strategy is consonant with the sustainable development of the energy sector and the achievement of the goals of the Paris Agreement. In Brazil, Statkraft's operations are entirely focused on the generation of renewable energy and the company's future growth will be based on the expansion of this type of asset.

In its strategic sustainability plan (2023), Statkraft has committed to the following goals:

Regarding its business activities, **Statkraft is targeting carbon neutrality for its Scope 1 and Scope 2 emissions by 2040**, as well as aiming to reduce emissions from its supply chain.

Accomplish carbon neutrality (scopes 1 and 2) by 2040.

Achieve a carbon footprint (scopes 1 and 2) lower than 50 gCO_2 per kWh by 2025.

Achieve a carbon footprint (scopes 1 and 2) lower than 35 gCO_2 per kWh by 2030.

Reduce emissions in its supply chain (scope 3) by encouraging suppliers to reduce their emissions as well.

Accomplish Net Zero (scopes 1, 2 and 3) by 2050.

[1] https://www.epa.gov/eps-partnership/best-practices-reduce-sf6-emissions

Goal Assessment considering the company's profile

The ambitions mentioned above have several implications that should be considered for Statkraft's activities in Brazil. On the one hand, since the company's energy generation in Brazil is 100% renewable, the carbon footprint in the country tends to be low. In fact, in 2022, considering the generation of 1,883,636.93 MWh and emissions of 3,883.30 tCO_2e (scopes 1 and 2), the company's carbon footprint was 2.06 gCO_2e/kWh. This figure is already in line with the targets set for 2025 and 2030.

However, it should be considered, as already mentioned, that the company's emissions are largely related to the construction of new power plants. This is a dilemma since in the short term the construction of new plants represents an increase in emissions, but in the long term, it supports the effort of Brazil and the world towards decarbonization through energy transition.

NET ZERO

In addition, as Statkraft increases its power generation capacity, and upholds emissions reduction efforts in the construction of new facilities, **the goal of achieving Net Zero for scopes 1, 2, and 3 by 2050 can be met more easily** by also generating a positive impact on activities that go beyond the company's direct operations.

Priorities and future actions

In this chapter, we will present the main courses of action mapped out for the mitigation of GHG emissions by Statkraft Brasil. To support this strategy, it has been considered the global targets announced by the company and Statkraft's emissions profile in Brazil, based on inventories for the years 2021 and 2022.

The implementation of this strategy depends on a specific alignment with the different areas responsible for the activities that can result in emission reductions. In this sense, **the feasibility and adequacy of the mapped courses of action will be validated and concerted with these areas.**

As Statkraft's most relevant emissions in Brazil are related to the construction of new plants, the company's emission profile is not linear. I**ts largest emitting sources tend to be temporary, present during the construction phase, while the emissions from the operation of the company's assets are not representative.**

Considering that the company's activities are essentially positive for the necessary energy transition in the world, the construction of new assets has a positive climate impact over time, even if it causes an increase in GHG emissions at first. Therefore, **the company's carbon management objective should be aimed at reducing its carbon footprint in the construction of new assets, measured, for instance, in tCO_2/MW installed.**

Considering Statkraft's global goals and the company's emission profile in Brazil, **these are the main categories of actions that will be addressed:**

- Change in Land Use
- Purchased Goods and services
- Capital Goods
- Fugitive Emissions
- Other Emission Mitigation Actions

The implementation of specific actions will depend on further discussions within the company's areas, to assess whether the strategy is adequate considering the company's reality.

Land use change

In the 2022 inventory, emissions related to land use change were not as representative. Still, it is necessary to consider that in certain years, this source may be very relevant. In fact, in the 2021 inventory, this was the most relevant emission source. The fact this source belongs to scope 1 is important, as it is a direct emission of the company, under its control and management.

There is, nevertheless, an inherent difficulty in reducing these emissions. Once an area has been purchased and a project designed, it is very difficult to substantially reduce the amount of vegetation to be removed. **The fact is that, when developing new projects, dedicated efforts are already in place to search for areas where the necessary suppression of vegetation would be as low as possible**. Still, it is possible to take some measures that can lead to the reduction of these emissions.

Some points that should be evaluated in this regard are:

Biome type and area to be deforested: consider the different types of vegetation present in each biome and their characteristics in terms of carbon stock. Assess areas that are already degraded or destined for agriculture, forestry, or other purposes, since deforestation in this type of area causes emissions considered "renewable". In the case of hydroelectric plants, consider the size of the area to be flooded, considering that its environmental impact is proportional to the size of the reservoir.

Offshore Assets: Assess the feasibility of offshore wind assets, considering that the construction of this type of asset does not involve vegetation suppression.

Compensation Mechanisms: consider the use of mechanisms to neutralize non-avoidable emissions. Some alternatives to be thought out are carrying out own reforestation in areas to be preserved on behalf of the company, in addition to the purchase or retirement of carbon credits that are recognized for offsetting emissions.

The points mentioned above can be part of a process of estimating potential new assets to be incorporated and built. It is about bringing into the process of sourcing new areas, the quantitative impact assessment, albeit preliminary, that the different options have concerning greenhouse gas emissions.

Purchased Goods and services

This category of emissions occurs mainly when there are constructions in progress. In the 2021 inventory, this category included the consumption of steel, cement and fuel from third parties. In the 2022 inventory, it was included the consumption of cement, steel, sand, gravel, and fuel from third parties.

To reduce these emissions, there are essentially three points to be evaluated:

Executive Project of the Construction: the amount of material employed, and the specifications of the inputs used are often determined by the executive project of the construction. Thus, a close look at this issue can achieve relevant reductions even in the design phase of the work, and in this case, emissions can be reduced by designing a more efficient project in terms of carbon emissions.

Choice of inputs and materials: emissions from the inputs manufacturing, such as cement or steel, are accounted for in scope 3 of Statkraft's GHG inventory. An alternative to be analyzed is to consider different input options, considering their respective emission factors and distance from the construction sites, seeking to reduce the impact of this category of emissions.

Loss reduction: in addition to the existing incentive based on the reduction of construction costs, the reduction of GHG emissions caused by waste generation can be explored as an extra incentive to seek for maximum efficiency in the construction.

Capital goods

These emissions do not occur every year, only when relevant capital goods such as wind turbines or turbines are supplied to the company. However, when there is this type of emission, they tend to be relevant. In 2022, they accounted for almost 70% of the company's total inventory.

With the energy transition gaining momentum in recent years, the concern about the sustainability of the materials supply to enable this paradigm shift has increased. **As a matter of fact, clean energy technologies are expected to emerge as a major force in driving growth in the demand for critical minerals.** A wide range of future scenarios are possible, mainly related to the level of climate ambition and action, as well as technological uncertainties.

By understanding the nature of the challenge, it is possible to act effectively. On this subject, **two aspects can be taken into account to reduce the carbon footprint per MW built.**

- **Consider the type of technology to be invested** in and its possible impacts on greenhouse gas emissions, acknowledging the materials used in the components of each type of energy generation.
- **Evaluate different supplier options, considering** their respective production processes and the carbon footprint of their products, to reduce the impact of **this category of emissions.**

Global installed wind power capacity has nearly quadrupled in the last decade. The world's solar photovoltaic capacity has increased almost 20 times in the same period.

SF_6 Fugitive Emissions

Sulfur hexafluoride (SF_6) is an inorganic, colorless, odorless, non-flammable gas primarily used as an electrical insulator. Pure SF6 is physiologically harmless to humans and animals, has no toxic potential, and does not harm the ozone layer.

Although, due to its great global warming potential, about 23,500 times greater than that of CO2, it is one of the strongest greenhouse gases in industrial use. SF_6 is mainly used in panels, transformers, and other electrical equipment. It should always be used in gas-tight compartments, which greatly minimize any leakage into the atmosphere. **Even so, it is common that part of this gas ends up escaping, generating greenhouse gas emissions, included in scope 1 of the company's GHG inventory.**

The U.S. Environmental Protection Agency (EPA) has partnered with the electric power industry to identify and highlight cost-effective methods of reducing SF_6 emissions into the atmosphere[1]. The experience of the concessionary companies shows that implementing and following the best developed practices leads to a reduction in these emissions. **In this context, a possible course of action to reduce this type of emission would be:**

- Analyze good market practices, using internationally published procedures as a reference to seek opportunities for improvements in processes and equipment used by Statkraft, to avoid SF_6 emissions into the atmosphere.

[1] https://www.epa.gov/eps-partnership/best-practices-reduce-sf6-emissions

Other emissions mitigation actions

All the emission categories described above account for more than 99% of the company's GHG emissions. There are, however, other emitting sources with reduction potential. Despite actions directed to these sources having a relatively small quantitative impact, it is possible to generate other forms of value from this kind of effort. Employees' awareness about the topic helps to establish a corporate culture focused on sustainability, with diffuse and potentially positive ripple effects.

Some actions that can be developed in this regard are:

- **Evaluate the use of refrigerant gases with lower global warming potential in air conditioners or consider changing equipments if the current ones are not compatible.** As well as the use of renewable fuels such as ethanol and biodiesel in the vehicles of the company's own fleet and leased ones, and alternatively, use electric or hybrid vehicles.
- **Consider the implementation of internal campaigns to raise awareness about the efficient use of electricity,** in addition to the reduction of emissions related to commuting to work and business trips, and finally, about the correct separation of waste and its maximum destination for composting, recycling, and reuse.

Thus, it is noted that the management of this topic must have a holistic approach involving different areas of the company. **The actual implementation of specific actions must be aligned with the company's global strategy and work in coordination with the different areas involved.**

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