REPORT ISSUANCE OF GREEN BOND

Reventazón Hydropower Plant

August 2022-July 2023

Instituto Costarricense de Electricidad

Technical Team

Content

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Report August 2022- July 2023

Green Bond Issuance: HP Reventazón

1. Objective and Scope of Green Bond Issuance

To accomplish what established within the Frame Second Opinion Management and Report published on the ICE´s Web page (www.grupoice.com), an external audit report will be made annually, for the period August 2022 to July 2023, which shall validate the commitments undertaken for the purposes of local green bond issuance.

In compliance with the Green Bond Principles, the “Renewable Energy Projects” was selected as the only category of Eligible Green Projects.

Refinancing of acquired debt for the construction and operation of the asset Reventazón Hydropower Project (RHP) which accomplishes the following sustainability characteristics:

- Environmental Impact Assessment (EIA), available and elaborated according to the recognized best practices and social and environmental risks rules.

- Building of the project assessed under the Hydropower Sustainability Assessment Protocol (HSAP) from the International Hydropower Association (IHA).

- Measures to mitigate social and environmental risks 100% implemented and assessed obtaining the maximum score under the before mentioned Protocol and awarded the Blue Planet Prize from the IHA.
- Clean Energy Supply for 525 000 households

The sole purpose of the issuance was prepaying the debt from the RHP financing. This green bond was used to refinancing existing bonds, paying a security issued by ICE in 2011 of USD 250 000 000 (18.12% of the total of RHP financing cost

which was USD 1 379 000 000).

2. Description of Social and Environmental Management of Reventazón Plant

Since the Reventazón Hydropower Plant is a large-scale project at national level, to obtain social environmental viability, it was necessary to conduct an Environmental Impact Assessment (EIA) to accomplish national environmental ruling and to establish the correspondent Environmental Management Plan (EMP) to determine the necessary actions to avoid, mitigate, or compensate environmental impacts produced by the project´s construction. The EIA was conducted by means of a participatory process including the communities and other stakeholders from the direct areas of influence (DAI); thereby, the communities´ representatives engaged in and followed the execution of the EMP actions.

Since this is the fourth use of Reventazón River´s water for energy production, an agreement was reached with the financing banks, (Inter-American Development Bank (IDB), International Financing Corporation (IFC) from World Bank to conduct supplementary environmental studies which gave rise to the Social and Environmental Action Plan (PAAS, **Spanish acronym**).

With the Plant´s commission in 2016, the Social and Environmental Management Plan (EMP-O) for the Operative Stage with the correspondent monitoring and accomplishment is established. During this process, 20 material issues were identified with the correspondent plans, to reach the RHP´s social and environmental management commitments during its operative stage, according to the social and environmental policies frame established by the banks.

Table 1 displays the list of social and environmental topics identified and associated to the performance standards (PS) from IFC and the Operational Policies (OP) from IDB.

Plan / Program	**PS IFC**	**OP IDB**
Stakeholder Engagement and Communication Plan	PS 1	703, 710, 761
Local Contracting Plan	PS 2	703, 710, 761
Reventazón Hydropower Plant´s Community Health and Safety Plan	PS 4	703
Mitigation Plan for the Potential Impact of RHP over the rafting activity on the Reventazón River	PS 1	703

Regulation Plan for the Reventazón Hydropower Plant Reservoir	PS 3	703, 704
Controlling Plan for the Water Lilies in the Reservoir of the Reventazón Hydropower Plant	PS 3	703
Green House Gas Emission (GHGs) Monitoring Plan at the Reventazón Reservoir	PS 3	703
Complaint and Request Management Protocol	PS 1	703,710
H.1 Community Complaint and Request Management Protocol	PS 1	703,710
H.2 Internal Complaint and Request Management Protocol	PS 1	703,710
Security Forces Protocol at the Reventazón Hydropower Plant	PS 4	
Center of Archaeological Information Management Protocol	PS 8	703
Protocol for Land Acquisition and Restitution of Living Conditions	PS 5	703, 710
Protocol to Access the Reservoir	PS 3	703, 704
Parismina Fluvial Compensation Site Management Plan	PS 6	703
Master Plan to Mitigate the Effect of RHP over the Connectivity and Functionality of *Barbilla Destierro* Biological Sub-Corridor (SBBD)	PS 6	703
Reventazón Middle and Low Basin Management Plant	PS 6	703
Adaptive Sludge Management Plan (ASMP) And Water Quality (WQMP) for the Reventazón-Parismina-Tortuguero System (RPT)	PS 1	703
Early Warning System (EWS) and Disaster Management Plan (DMP)	PS 4	704
Integrated Management System (IMS). (ISO 9001, ISO 14001 y OHSAS 18001)	PS 1	703, 704
Occupational Safety and Health Plan in Operation (ESHS-MS) (OSHAS 18001)	PS 2	703
Emergency Plan from Reventazón Plant	PS 4	703, 704

Source: Document- PAAS -18-18.1-1-v5 Generation Division

Attention and development of the mentioned plans are under the responsibility of the support area of Social- Environmental Management of *Huetar* Region from the Generation Division of the Electricity Management. This area has professional and technical staff in the areas of biology, forestry, social, environmental education, basin management, as well as technical support of specialists from other areas of the *Instituto Costarricense de Electricidad* such as the Hydrology Department and the Chemical Laboratory. There is also outsourcing support in topics such as water quality, cabotage, biological water analysis, among others.

There is a strict monitoring of the progress and verification of work programs established by the PGAS-O by the Area of Sustainability Governance ASG, and

work reports are submitted to the banks at the beginning of each year.

3. Allocation of Funds

The Budget Process of the Financial Planning Direction from the Finance Management requested the inclusion of MCRC 84 700 in the extraordinary budget No. 1-2021, on the concept allocation of internal long-term securities, from which, according to such document, MCRC 15 977 correspond to the issuance of green bonds.

This extraordinary budget was approved by the ICE´s Board of Directors on September 21st, 2021, at the 6475 session, article 1, chapter III. It was approved by the *Contraloría General de la República* (National Controlling Entity) through official document DFOE-CIU-0344, of October 15th, 2021. (see Annex 1).

Additionally, on November 8th, 2021, the Direction of Treasury from the Finance Management hereby stated that the credit of CRC 14 627 973 605 was deposited in the current-account No. 4145184, that ICE has open at Banco Popular verified under vouchers FT21312ZB7Y6 y FT21312Y3K4V, such revenue corresponds to green bond allocation.

The revenues received in the mentioned account were managed and used completely as monetary allowance to cover the payment obligations due to the maturity of Eurobonds issued in 2011, which refinanced a part of the existing debt related to Reventazón HP. Therefore, there are no net unallocated funds coming from income received by allocating green bonds remaining in the referred account. (see Annex 2)

4. Definitions

Renewable Energy

All forms of energy produced from renewable sources in a sustainable way (IRENA, 2009).

Plant Factor

It is the quotient between the actual energy generated by the power plant during a period (usually a year) and the energy generated if it had worked at full load during

the same period, according to nominal values of the equipment's ID plates. It indicates the use of the plant´s capacity in time.

Greenhouse Gas Emissions (GHGs)

Gaseous constituents of the atmosphere, both natural and anthropogenic that absorb and emit radiation in specific wavelengths within the spectrum of infrared radiation emitted by the Earth´s surface, the atmosphere, and the clouds. This property causes the greenhouse effect. According to the ruling of the Costa Rican Ministry of Environment and Energy (MINAE) the greenhouse gases that must be included in the inventories are carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), perflourocarbons (PFC), sulphur hexafluoride (SF6), nitrogen trifluoride (NF3), hydrofluorocarbons (HFCs), and chlorofluorocarbons (CFCs) (IPCC, 2013) (INTE-ISO 14064-1: 2019).

Scope 1 and Scope 2

To calculate carbon footprint, we separate three emission types:

Scope 1

Direct emission, "direct emission come from sources owned or controlled by the company".

Scope 2.

Emissions from generation of electricity acquired and consumed by the company. Electricity acquire refers to that bought or brought under the organizational boundaries of the company.

Scope 3.

It is an additional report category that allows to include the rest of indirect emissions. Scope 3 emissions are a consequence of the company´s activities but that happen in sources that do not belong nor are controlled by the company.

Source: GHG Protocol: (Accounting and Reporting Corporate Standard)

https://ghgprotocol.org/sites/default/files/standards/protocolo_spanish.pdf

5. Methodology to Calculate Sustainability Indicators

5.1 SEN´s Production of Renewable Gross Energy

Table 2 displays the renewable energy production by source of the *Sistema Eléctrico Nacional (National Electric System) (SEN)*, for 2021, 2022 and the recorded until September 2023.

Table 2. Renewable Energy Year-on-Year Generation from SEN (2021-2023)

Source	Renewable Energy Generation from SEN					
	2021		2022		2023 (by September)	
	GWh	**%**	**GWh**	**%**	**GWh**	**%**
Hydropower	9 286	74.1	9 449	75.6	5 910	71
Geothermal	1 602	12.8	1 619	13.0	1 184	14
Wind	1 573	12.5	1 369	11.0	1 169	14
Solar	9	0.1	8	0.1	7	0.1
Biomass	67	0.5	55	0.4	47	1
Total	**12 537**	**100**	**12 500**	**100**	**8 317**	**100**

Source: CENCE, DOCSE: Generation and Demand, Annual Operation Report from National Electric System 2021,2022 and 2023 (by September)
https://apps.grupoice.com/CenceWeb/CenceDescargaArchivos.jsf?init=true&categoria=3& Código Tipo Archivo=3008
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx

Notes:
1. Data for December 2023 is preliminary, definitive data will be available by February 2024.
2. With few exceptions, data is rounded to whole numbers without decimals.

Table 3 displays the renewable energy production by source of the *Sistema Eléctrico Nacional (National Electric System) (SEN)*, from August 2022 to July 2023.

Source	GWh	%
Hydropower	8 978	74.27
Geothermal	1 574	13.33
Wind	1 400	11.86
Solar	4	0.03
Biomass	55	0.46
Total	11 805	100

Source: CENCE, DOCSE: Generation and Demand, Annual Operation Report from National Electric System 2022 and 2023
Corporate Information Systems, DOCSE, 18/01/2024.
https://apps.grupoice.com/CenceWeb/CenceDescargaArchivos.jsf?init=true&categoria=3& Código Tipo Archivo=3008
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx

Note:
1. With few exceptions, data is rounded to whole numbers without decimals.

5.2 Gross ICE´s Renewable Power Production

ICE´s Renewable Power Production = ∑Generation hydroelectric + geothermal generation + wind generation + $solar$ generation

Table 4 displays the ICE´s renewable energy production by source, for 2021, 2022 and the recorded until September 2023.

Table 4. ICE´s Renewable Energy Year-on-Year Generation by Source (2021-2023)

Source	Renewable Energy Generation from ICE					
	2021		2022		2023	
	GWh	**%**	**GWh**	**%**	**GWh**	**%**
Hydropower	6 575	80.1	6 816	80.5	6231	80.49
Geothermal	1 602	19.5	1 619	19.1	1479	19.11
Wind	34	0.4	35	0.4	31	0.40
Solar	0.78	0.0	0.43	0.0	0.87	0.001
Total	**8 212**	**100**	**8 470**	**100**	**7741**	**100**

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
https://apps.grupoice.com/CenceWeb/CenceDescargaArchivos.jsf?init=true&categoria=3& codigoTipoArchivo=3008
Corporate Information Systems, DOCSE, 18/01/2024.
DOCSE Generation and Demand. Monthly Report. September 2023
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

1. Data for December 2023 is preliminary, definitive data will be available by February 2024.
2. With few exceptions, data is rounded to whole numbers without decimals.

Table 5 displays the ICE´s renewable energy production by source, from August 2022 to July 2023.

Table 5. ICE´s Renewable Energy Year-on-Year Generation by Source from August 2022 to July 2023

Source	GWh	%
Hydropower	6 433	80.01
Geothermal	1 574	19.57
Wind	32	0.40
Solar	0.76	0.009
Total	8 040	100

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
https://apps.grupoice.com/CenceWeb/CenceDescargaArchivos.jsf?init=true&categoria=3&
codigoTipoArchivo=3008
DOCSE Generation and Demand. Monthly Report. September 2023
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

1. With few exceptions, data is rounded to whole numbers without decimals.

5.3 Annual Power Production from RHP

Table 6 displays the annual power production of Reventazón Hydropower Plant for 2021, 2022, and 2023

Table 6. Annual RHP Electricity Production (GWh) (2021-2023)

Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
2021	66	55	59	106	139	102	86	123	124	90	76	84	**1108**
2022	52	40	51	78	140	126	118	113	129	122	48	77	**1 094**
2023	57	45	57	62	44	96	109	79	90	87	113	84	**923**

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
DOCSE, Generation and Demand. Monthly Report, September 2023
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

1. Data for December 2023 is preliminary, definitive data will be available by February 2024.
2. With few exceptions, data is rounded to whole numbers without decimals.

Table 7 displays the annual power production of Reventazón Hydropower Plant from August 2022 to July 2023.

Table 7. Annual RHP Electricity Production (GWh) from August 2022 to July 2023

Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
2022								113	129	122	48	77	**489**
2023	57	45	57	62	44	96	109						**470**
Total													**959**

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
DOCSE, Generation and Demand. Monthly Report, September 2023
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

1. With few exceptions, data is rounded to whole numbers without decimals.

5.4 Plant Factor Reventazón

Estimate:

$$\text{Factor de planta (\%)} = \frac{\text{Energía anual generada (GWh)}}{\text{Potencia (GW)} * 24\,\text{horas / día} * 365\,\text{días}}$$

(Plant factor (%) = Annual generated energy (GWh)/capacity (GW)*24 hours/day*365 days

Table 8 displays the Reventazón HP´s plant factor for 2021, 2022, and 2023

Table 8. Reventazón Hydropower Plant´s Plan Factor (2021-2023)

Variable	Unit	2021 (base year)	2022	2023
Capacity	GW	0.3069	0.3069	0.3069
Annual Energy	GWh	1 108	1 094	640
Plant Factor	%	41.2	40.7	31.7

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

2. Data for December 2023 is preliminary, definitive data will be available by February 2024.
3. With few exceptions, data is rounded to whole numbers without decimals.

As it is displayed in table 9, the plant factor for the period August 2022 to July 2023 is 36.7

Table 9. Plant Factor Estimated from August 2022 to July 2023

Month	January	February	March	April	May o	June	July	August	September	October	November	December	Average
2022								49.2	58.02	53.16	21.46	33.37	**43.0**
2023	24.96	21.65	24.74	28.09	19.39	46.53	47.8						**30.5**
Total													**36.7**

Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
DOCSE, Generation and Demand. Monthly Report, September 2023
http://sabcence04/intranet/Pages/pGReporte.aspx?id=rptGeneracionRenovable
http://sabcence04/Intranet/Pages/pSegLogin.aspx?ReturnUrl=%2fIntranet%2fPages%2fpOMTPrincipal.aspx
Notes:

1. With few exceptions, data is rounded to whole numbers without decimals.

5.5 RHP Reservoir´s GHGs Emission Factor

Reservoir´s GHGs Emission Factor Indicator:

The reservoir´s greenhouse emission gases emission factor for 2022 was 24.84 TCO_2e/GWh.

Estimate:

$$\text{Factor emisión GEI embalse} = \frac{Emisiones\ directas\ insumo\ \text{generación}\ (TCO2e)}{Energía\ anual\ generada\ de\ la\ planta\ (GWh)}$$

Reservoir´s GHGs Emission Factor= Direct emissions generation input (TCO2e)// Annual energy generated by the plant (GWh)

The direct emissions of generation input are expressed by the following equation:

Direct emissions generation input= methane emissions + biogenic carbon dioxide emissions from the reservoir

Table 10: Reventazón HP Reservoir´s GHGs Emission Factor for 2021 and 2022

Emissions	Unit	2021	2022
Methane	TCO_2e	23 321	23 383
Biogenic	TCO_2e	4 107	3 790
Direct	TCO_2e	27 428	25 955
Annual Energy	GWH	1 108	1 094
Emission Factor	TCO_2e/GWh	24.8	24.84

Source: Inventory of Emissions and Reductions on GHGs 2021, 2022
Reventazón Hydropower Plant:
Source numerator figure. Source: CENCE, Annual Operation Report from National Electric System 2021 y 2022
Source: Denominator figure

It is worth it to mention that the reservoir´s emissions are measured monthly and take part of the GHGs Report from the Generation Division, which is elaborated under the ISO 14064-1, INTE B5 Standards and the Carbon Neutral 2.0 Program (PPCN Spanish), because of which the *Huetar* Region was awarded a Carbon Reduction Prize from the *Programa País* (country program) from the Climate Change Direction.

See Annex 3 Inventory of emissions and reductions of greenhouse gas emissions 2022 Reventazón Hydropower Plant and Annex 4. Report on GHGs Verification.

5.6. Annual Reduction of Greenhouse Effect Gas Emissions (GHGs) at the RHP Facilities (Scopes 1 and 2).

In 2021, reduction initiatives were planned and monitored to be executed in 2022 as shown below:

Reduction = (Direct emissions ($TCO2\ e$) + Indirect emissions ($TCO2\ e$)) n- (Direct emissions ($TCO2\ e$) + Indirect emissions ($TCO2\ e$)) n + 1

Action	Source of Reduced Emission	Ton CO2e	
		Planned	Executed
Installation of automatic shutdown systems	Electricity consumption (scope 2)	0,24	0,13
Reduction of products that generate emissions	Aerosol Consumption (scope 1)	0,01	0,01
Substitution of Low consumption lamps	Electricity Consumption (scope 2)	0,96	1,50
Total		1,20	1,64

Differences between what was planned and what executed responded to changes in the installation of automatic shutdown systems, due to slight technical delay, in the case of lamp replacement, the estimation is made considering a damage projection, which has an uncertainty level.

The reduction initiatives 2023 and 2024 were updated and are presented below:

Table 12: Reduction initiatives 2023 and 2024

Action	Reduced Emission Source	Ton CO2e		
		2023	2024	Total
Implementation of Work-from-home Program	Fuel Consumption-indirect emissions for transportation (scope 3)	32,23	0,00	32,23
Installation of Automatic Shutdown Systems	Power Consumption (scope 2)	0,47	0,22	0,69
Substitution of Low consumption lamps	Power Consumption (scope 2)	1,28	0,00	1,28

6. Results Sustainability Indicators 2023

6.1 SEN´s Production of Gross Renewable Power Energy

According to the Division Operation and Control of the Electric System (DOCSE), the national Electric System showed a diminish of 14.911% of generation from renewables from August 2022 to July 2023 compared to th period between August 2021 to July 2022. This responds to the fact that the power matrix is mainly hydroelectric (74.27%) and because of the ENSO (*El Niño*) climate phenomenon which has provoked a reduction in rainfall and, by consequence in river flows, affecting renewable power generation.

Based on preliminary data provided by DOCSE, we can say that the SEN production, using the five renewable sources, reached 97.25% from August 2022 to September 2023. Energy produced from fossil fuels is considered a backup to the system. However, from August 2022 to July 2023, a total of 333.31 GWh has been generate compared to the 90.17 GWh generated on the same period last year. It represents 3.69 times more respecting 2021-2022, as a direct consequence of reduction in river flows. Data from DOCSE (Division of Operation and Controlling of the Electric System).

By July 2023, water used in run-of-river and impoundment Hydropower plants is the main source in the Costa Rican power matrix, with 74.27% of participation. Geothermal represent 13.33% and wind represent 11.86%; biomass and sun provide together 0.49 %, and thermal 2.82%.

6.2 ICE´s Production of Renewable Gross Energy

ICE´s renewable gross energy production from August 2022 to July 2023 was 8 040 GWh, which represents 68.11% of SEN´s Gross Production for the same period.

6.3 Plant´s Annual Power Production

From August 2022 to July 2023, the Reventazón Power Plant Generated 959 GWh which represents 11.89% of ICE´s power generation 8.09% of SEN´s power generation for the same period.

6.4 Reventazón Plant Factor

The Reventazón Plant records a plant factor of 36.7% from August 2022 to July 2023.

6.5 RHP´s GHGs Emission Factor

The RHP´s GHGs emission factor for 2022 was 24.8 tCO2e/GWh, very similar to the 24.8 tCO2e/GWh from 2021

7. Comments

- 84.6% of the emissions included in the GHGs Inventory Report 2022 are emissions that come from the reservoir, by *PPCN*, the power consumer is responsible of reducing and compensating those emissions.
- Emissions that come from organic waste decomposition from the Reventazón reservoir (lily, wood, among other green waste), represent 15,0% of the GHGs plant´s inventory, which is why, it is convenient to

consider waste management methods to reduce emissions from the reservoir.

- Emissions from Reventazón reservoir have shown downward trend, which is expected since the decomposition of organic matter flooded during the reservoir´s filling stage is already stabilized; however, one must consider that the reservoir is an opened system and thus exposed to an inflow of organic matter drawn by the tributary rivers. This phenomenon increases during heavy rains. Changes in the use of basin areas can produce an increase in sediments and organic waste.
- Emissions from power consumption are the third emission source in the RHP´s GHGs Inventory and, even though reduction initiatives were launched, emission from this source increased 30% respecting the base year 2021.
- In 2022, the sources that reduced more their impact were emission from waste decomposition of the reservoir (81.6%) and emission from refrigerant consumption (83.0%).
- Consumption of chemical products such as aerosols, grease, oil, lubricants, fertilizers, and gases increased during 2022, which generated higher emissions; however, these sources represent only 0,02% of the RHP´s total inventory of emissions, they have a lower impact.
- The RHP emission factor decreased respecting base year since total emissions reduced 40.0% respecting base year due to the reduction in the two main emission sources: reservoir emissions and emissions from reservoir´s waste management.
- Indirect emissions (scope 3) were identified and only emissions from “use of company´s products”, specifically emission from loss during transmission and distribution were quantified.
- The 2022 Reduction Plan was successfully executed achieving a reduction of 1.6 t CO_2e, some deviations from what has been planned correlate to deference in execution timing, since there is a projection that sometimes changes due to operation and maintenance work priorities.
- For 2023 we propose to reduce 34,0 tCO_2e considering the work-from-home initiative established in the company mid-year 2022.

8. Annual Reduction of Green House Gas Emissions (GHGs) at the RHP Plan´s Facilities (Scope 1 and 2)

- In 2022, the reduction initiatives planned for 2021 were executed for a total of 1.64 tCO_2e (Table 11). For 2023, some reduction measures will be implemented that could reduce up to 1.28 tCO2e (Table 12). This can be verified in the Verification Opinion: VGEI-023/2021-1, section IV (Annex)

9. References

CENCE. (2021). *Informe anual de la operación del Sistema Eléctrico Nacional 2021.* San José, Costa Rica.

CENCE. (2022). *Informe anual de la operación del Sistema Eléctrico Nacional 2021.* San José, Costa Rica. (En edición final)

CENCE. (2022). *Informe de atención de demanda y producción de energía con fuentes renovables 2021.* San José, Costa Rica.

Generación, D. (2022). *Inventario de emisiones y reducciones de gases de efecto invernadero Planta Hidroeléctrica Reventazón 2021.* Limón, Costa Rica.

Annex 1.

Budget Process Certification

Concerning Resource Revenue

(Letter)

INSTITUTO COSTARRICENSE DE ELECTRICIDAD

Corporate ID 400004213902

DIRECCIÓN OF FINANCE PLANNING – BUDGET PROCESS

Phone. (506) 2000-6973

The undersigned Errol Muñoz Cortés, in the capacity of Coordinator of the Budget Process from the Direction of Finance Planning of the *Instituto Costarricense de Electricidad* hereby certifies that:

- The Direction of Treasury requested to include in the extraordinary budget No.1- 2021, 84.700 MCRC for the allocation of long-term, internal security titles, from which, according to such document, 15.977 MCRC represent the Green Bond allocation.

- Such Extraordinary Budget was approved by the ICE´s Board of Directors on September 21st, 2021, in Session 6475, Article 1, Chapter III. It was also approved by the *Contraloría General de la República* (Costa Rican controlling entity) by official document DFOE-CIU- 0344, on October 15th, 2021.

- According to records made by the Financial Assets and Liabilities Process of the Direction of Treasury; the Budget Module “Fund Management” (FM), reflects a revenue budget implementation in document SAP N° 6700002849, on November

08th of 14.443 MCRC, which corresponds to the green bond issuance, according to the Process mentioned before.

Issued in San José, Costa Rica, on February 10th, 2022, upon Direction of Treasury´s request.

Budget Process
Direction of Financial Planning
Finance Management
Errol Muñoz Cortés, Coordinator

Annex 2.

Certification from Direction of Treasury

On the Use of Resources

(letter)

2022-02-04

5401-52-2022

INSTITUTO COSTARRICENSE DE ELECTRICIDAD

Corporate ID 400004213902

DIRECTION OF TREASURY

Phone. (506) 2000-2664

The undersigned Wilson Alvarado Rodríguez, in the capacity of Director of Treasury from the Finance Management of Instituto Costarricense de Electricidad (ICE) hereby certifies that:

- On November 8th, 2021, the credit of CRC 14 627 973 605 was deposited in the current-account No. 4145184, that ICE has open at Banco Popular verified under vouchers FT21312ZB7Y6 y FT21312Y3K4V, such revenue corresponds to green bond allocation.
- The revenues received in the mentioned account were managed and used completely as monetary allowance to cover the payment obligations due to the maturity of Eurobonds issued in 2011, which refinanced a part of the existing debt related to Reventazón HP.
- Therefore, there are no net unallocated funds coming from income received by allocating green bonds remaining in the referred account.

Issued in San José, Costa Rica, on February 4th, 2022.

Attentively,

Direction of Treasury

Finance Management

Wilson Alvarado Rodríguez director

Annex 3

Inventory of Emissions and Reductions of Greenhouse Effect Gases, Reventazón Hydropower Plant

	INSTITUTO COSTARRICENSE DE ELECTRICIDADGENERATION DIVISION
	Inventory of Emissions and Reductions of Greenhouse Effect Gases, Reventazón Hydropower Plant

Inventory Year: 2022 Editing Date: 07/09/2023 Version: 1

Updating Date: N/A

Executive Summary **GHGs Inventory Reventazón Hydropower Plant**

The ICE Group´s Strategy is set out considering the purposes on each triple usefulness dimension, for the environmental axis, specifically considering " to sustainably enhance the renewable electrification of national economy and the creation of a last generation digital telecommunication ecosystem, leaving a positive environmental foot print and efforts to regenerate the planet", to this, it commits to "work on the efficient and sustainable use of resources, on biodiversity management, work on resilience in the face of climate events, on invest, on sustainable and competitive businesses focused on regeneration and net positive impact. It includes proactive attention to ecoefficiency and climate action, as well as measuring 100% of carbon footprint of the companies´ operations aligned with SDG". (*Estrategia Corporativa Grupo ICE* 2023-2027). Corporate Strategy.

1. Purpose

The purpose of this report is to communicate information related with the Inventory of Greenhouse Gases (GHG) Emissions and Reductions from the Reventazón Hydropower Plant performed in accordance with the INTE-ISO 14064-1 and INTE-ISO B5 Standards, to the user from the Senior management for decision-making on carbon management and to communicate this information to the Verification and Validation Organisms (VVOs) and Direction of Climate Change identified as intended users.

2. Responsible Team

The team responsible for the declaration on greenhouse gases is made up of:

Name	Position in the plant
Marian Rojas Acosta	Professional Direccion of Social-Environmental Management
Maynor Zamora Salazar	Professional Social-Environmental Management O&M Huetar
David Meza Brenes	Engineer Reventazón Hydropower Plant

3. Inventory Scope

- Inventory period: January 1st-December 31st, 2022
- Approach: operational control
- Base year: 2021

- **Organizational and Operational Scope**: operations from the power generation process, transformation of mechanical energy into electric energy in a powerhouse executed at the Reventazón Hydropower Plant.
- **GHG included:** carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbon (HFC), hydrochlorofluorocarbon (HCFC) y Sulphur hexafluoride (SF_6).
- **Categories of emissions:** identification and quantification of direct emissions (scope 1) and indirect (scope 2); other indirect emissions were identified (scope 3) and are quantified the ones considered as relevant. Biogenic anthropogenic emissions are reported separately, each one in a different category.
- **Exclusions:** non relevant direct emissions are excluded.

A reference of excluded emissions and the percentage of contribution to the inventory (including emissions scope 1 and 2) is displayed below:

Emission source	Ton of CO_{2e}	% of contribution to the total inventory
Fuel consumption for machinery and equipment	7,571	0,02
Wastewater Generation	5,342	0,02
Consumption of oil, lubricants, and grease	4,220	0,01
Fertilizer application	2,421	0,01
Organic waste management	0,069	0,0002

Even though the source refrigerant consumption contributes with only 0.005%, it is not excluded because of the relevance of this Plant´s inventory to the GHG report from the whole Generation Division. The source aerosols consumption represents only 0.00001% of the inventory, but there is a reduction initiative related to this source.

4. Methodology

Considering the INTE-ISO 14064-1 e INTE-ISO B5 standards and the ruling from the Carbon Neutral Country Program (Spanish PPCN 2.0), the methodology for emission and reduction inventory management is standardized using the following documents:

- ✓ DG-83-PR-92-002 GHG emission inventory quantification and development
- ✓ DG-83-ET-92-004 Guideline to calculate GHG inventories
- ✓ Record DG-83-FO-92-044 GHG emission comprehensive calculation and analysis
- ✓ Record DG-83-FO-92-042 Identification, validation y quantification of indirect GHG emission sources.
- ✓ Record DG-83-FO-92-036 Identification and calculation of GHG reduction measures.

5. Results and Analysis

5.1 GHG Direct Emissions (scope 1) Reventazón Hydropower Plant

Source	TOTAL (TonCO2eq)
Reservoirs CH4	23 383,489
Reservoirs CO2 (biogenic anthropogenic)	3 790,308
Management of waste from the reservoir	2 542,975
Management of waste from the reservoir (biogenic anthropogenic)	2 276,514
Fuel consumption for transportation	27,350
Consumption of refrigerant gases	1,466
Consumption of gases	0,261
Consumption of chemical products (aerosols)	0,004

5.2 GHG Indirect Emissions (scope 2) from Reventazón Hydropower Plant

Source	Total, CO2eq
Electricity Consumption	94,064

5.3 GHG Indirect Emissions (scope3) from Reventazón Hydropower Plant

Fuente	Total
Indirect for using products from the organization: emissions produced by technical power loss during transmission and distribution	3 115,374

5.5 Summary of GHG Emissions (Ton CO2e)

Type of emission	Total TonCO_2 e	CO_2	CH_4	N_2O	HFCs	HCFCs	SF_6
Direct (scope 1)	25955,545	26,873	23 516,392	2 410,392	1,466	0,00	0,00
Biogenic anthropogenic (scope 1)	6 066,822	6 066,822	-	-	-	-	-
Indirect (scope 2)	94,064	-	-	-	-	-	-
Other indirect (scope 3)	3 115,374	-	-	-	-	-	-

5.4 Indicator

5.5.1 Reservoir Emission Indicator

$$Factor\ emisión\ GEI\ embalse = \frac{Emisiones\ directas\ insumo\ generación\ (Ton\ CO_2\ eq)}{Energía\ anual\ generada\ de\ la\ planta\ (GWh)}$$

Reservoir GHG emission factor= direct emissions input generation (Ton Co2 eq)/ annual energy generated by the plant (GWh)

Direct emissions input generation =

Methane emissions + carbon dioxide biogenic emissions from the reservoir

Total emissions from the reservoir (Ton CO2e)	27 173,797
Power generation GWh (information obtained from DOCSE)	1 093,940
Ton CO_2e/GWh generated	24,84

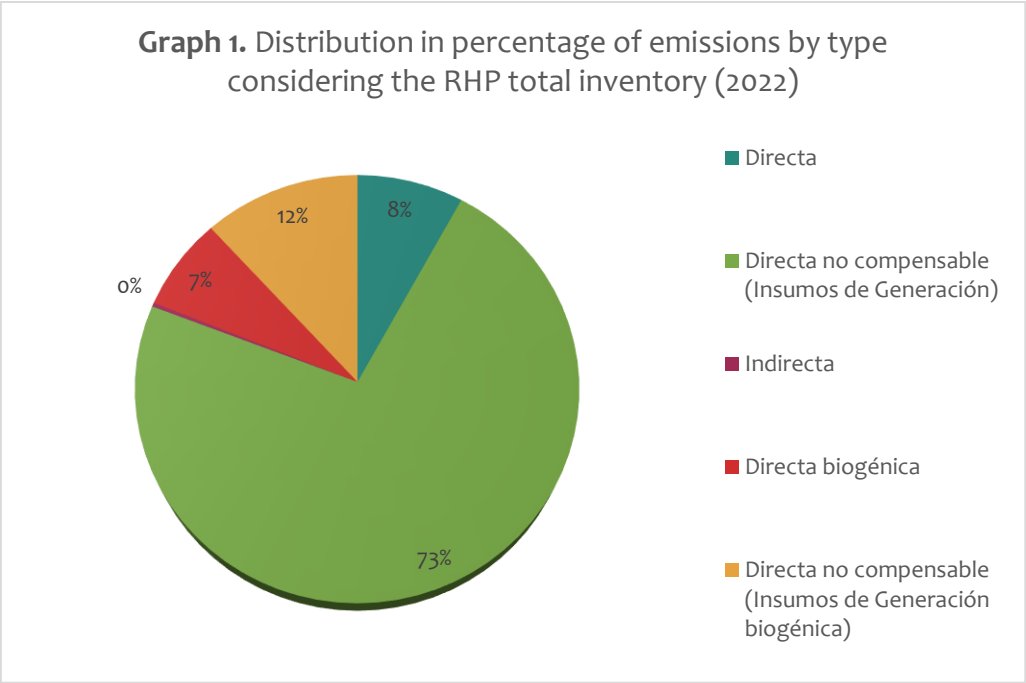
5.2.2 Emission Indicator direct/ indirect

The strategic indicator corresponding to the reason of emissions in tons of carbon dioxide equivalent divided by the power generation for the inventory year (they are considered as emissions scope 1 and 2).

GHG emissions (scope 1 + scope 2) in Ton CO2 e	32 116,431
Power generation MWh (information obtained from DOCSE)	1 093 940 ,84
Ton CO_2e/MWh generated	**0,029**

5.3 Analysis of Results

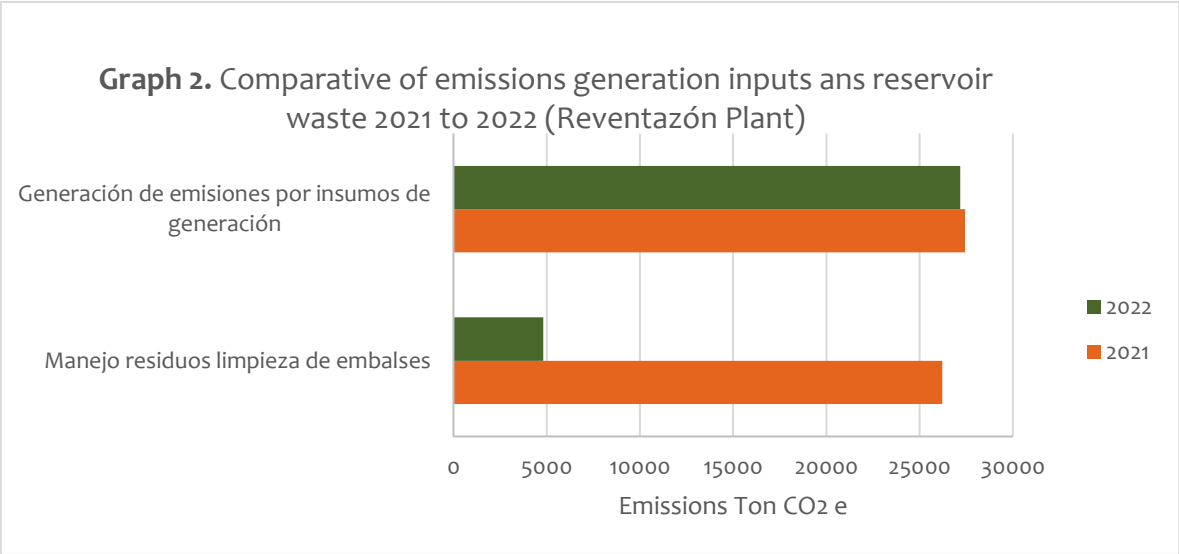
5.3.1 Percentage Contribution of Each Type of Emission to the GHG Inventory from PHP



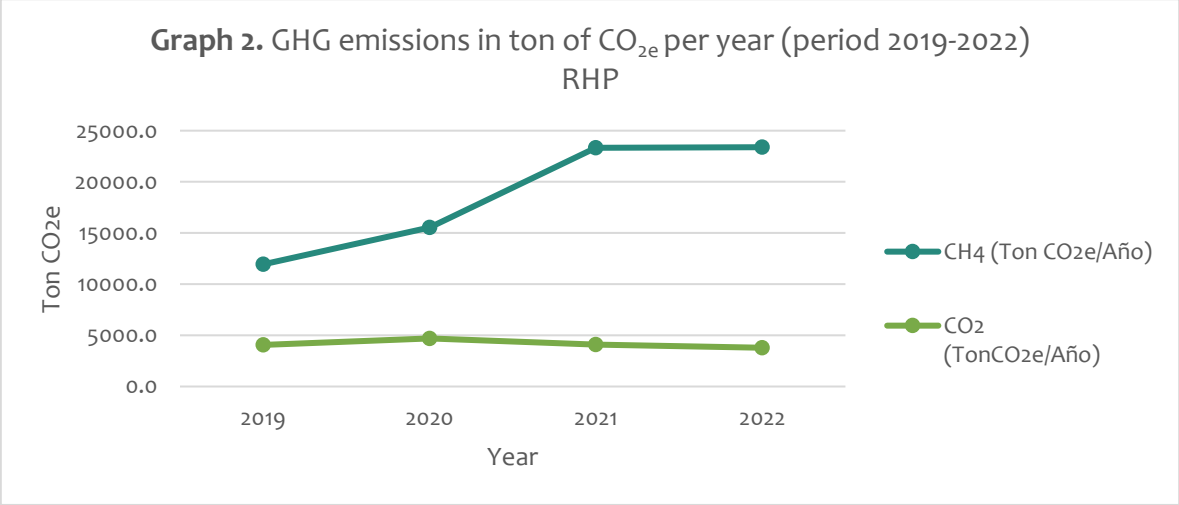
Note: The emission types are considered according to the guidelines of ISO 14064-1 y PPCN 2.0. Standards.

- Direct emission: emission from under Plant´s operational control (scope 1)
- Not compensable direct emission (generation input): methane emission from the reservoir (scope 1)
- Not compensable direct emission (biogenic generation input): Carbon dioxide emission produced by the reservoir (scope 1)
- Biogenic direct emission: carbon dioxide emission by decomposition of waste from reservoirs (scope 1)
- Indirect emission: emissions from power consumption (scope 2)

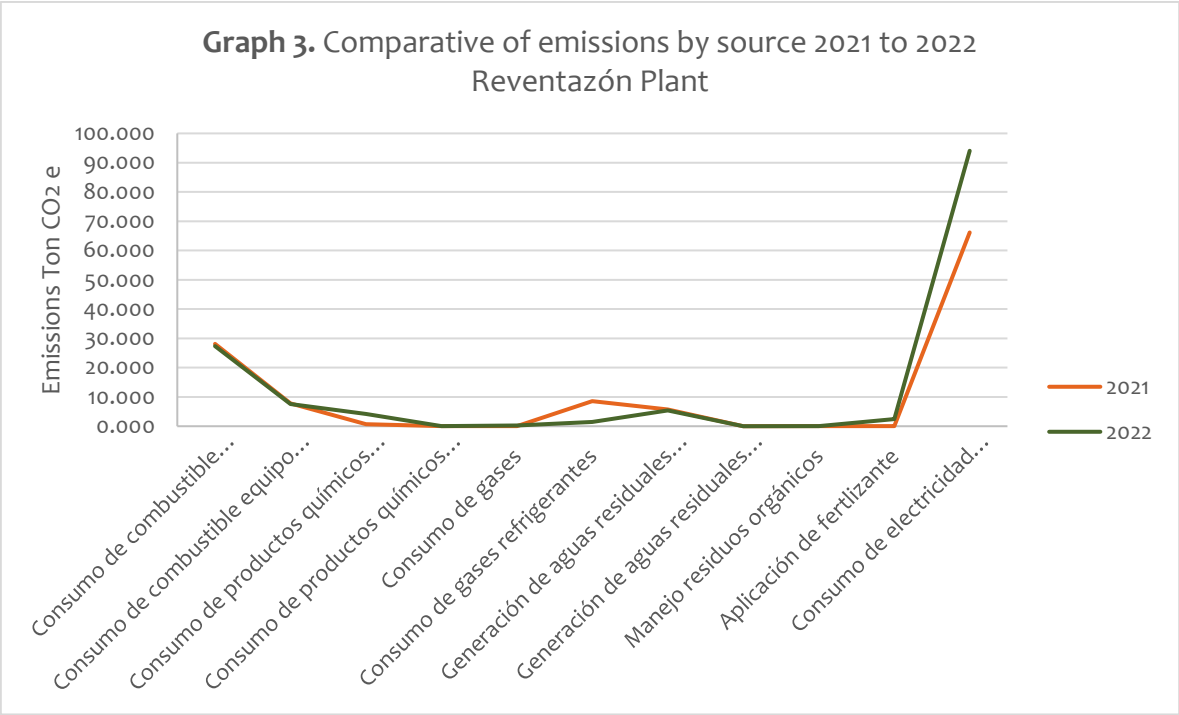
5.3.2 Analysis of two emission sources with greater contribution to the RHP inventory, compared to base year



5.3.3 Analysis of Direct Emissions from the Reservoir



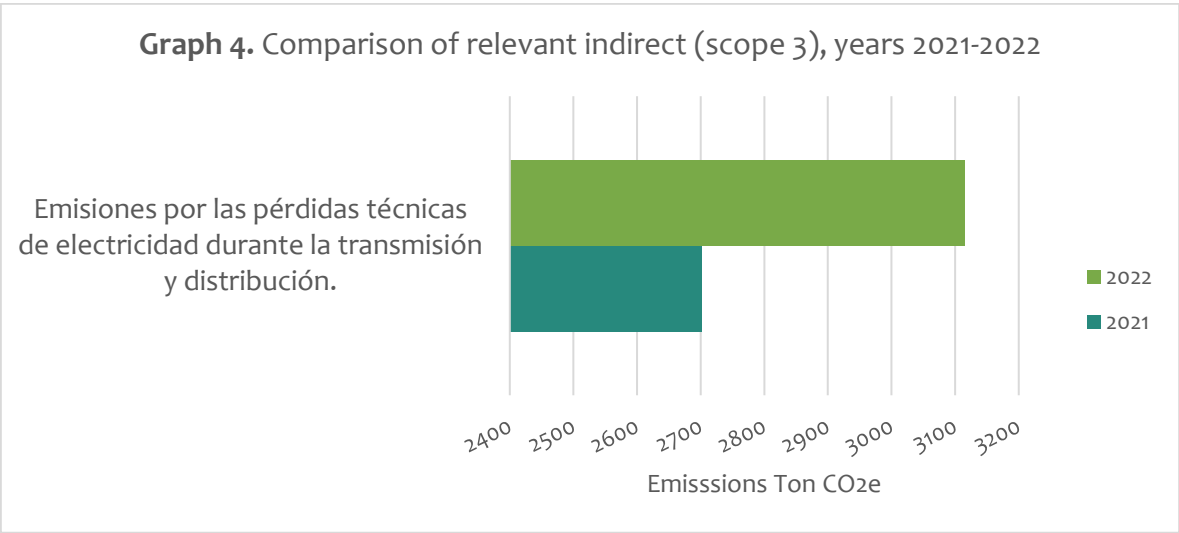
5.3.4 Analysis of direct and indirect (scope 1 and 2) from RHP 2022, compared to base year



Fuel consumption/fuel consumption equipment…/consumption of chemical products/ consumption of gases/ consumption of refrigerant gases/ wastewater generation…/wastewater generation…/organic waste management/ fertilizer application/ power consumption…

Note: All emission sources were considered in the analysis, including the ones excluded in the inventory 2022, to magnify the contribution, the analysis of emissions from generation input and decomposition of reservoir waste is excluded to analyze the impact of manageable emissions.

5.3.5 Analysis of RHP relevant indirect emissions (scope 3) 2022, compared to base year



Note: indirect emissions from transportation (corresponds to vehicles from suppliers), indirect from products used by the organization (emissions from waste disposal and life span of fuels), indirect from products used by the organization (emissions from losses in transmission and distribution).

5.4 Reduction Initiatives

In 2021, reduction initiatives were planned and monitored to ensure their implementation in 2022 as it is displayed below.

Initiative	Source of reduced emission	Ton CO2e	
		Planned	Implemented
Installation of automatic shutdown systems	Power consumption (scope 2)	0,24	0,13
Reduction of emission generating products	Aerosols consumption (scope 1)	0,01	0,01
Replacement of low consumption lamps	Power consumption (scope 2)	0,96	1,50
Total		1,20	1,64

The differences between what was planned and what implemented obeys to changes in the installation dates of automatic shutdown systems, to slight technical delays, in the case of lamp replacement, the estimation is made considering a projection of changes due to damage, which has an uncertainty level.

The reduction initiatives 2023 and 2024 were updated, as it is displayed below.

Initiative	Source of reduced emission	Ton CO2e		
		2023	2024	Total
Implementation of Work-from-Home Program	Fuel consumption-Indirect emissions for transportation (scope 3)	32,23	0,00	32,23
Installation of automatic shutdown systems	Power consumption (scope 2)	0,47	0,22	0,69
Replacement of low power consumption lamps	Power consumption (scope 2)	1,28	0,00	1,28

6. Conclusions and recommendations

6.1 84% of reported emissions in the GHG Inventory Report 2022 from RHP come from the reservoir, according to the PPCN guidelines, the power consumer is responsible for reducing and compensating those emissions.

6.2 Emissions from decomposition of organic waste from the Reventazón reservoir (lily, wood, and other green waste) represent 15.0% of the Plant´s GHG inventory.

6.3 Emissions from Reventazón reservoir have shown downward trend, which is expected, since the flooded organic matter during the filling stage of the reservoir is already stabilizing its decomposition; however, one must consider that the reservoir is

an opened system and thus exposed to an inflow of organic matter drawn by the tributary rivers. This phenomenon increases during heavy rains. Changes in the use of basin areas can produce an increase in sediments and organic waste.

6.4 Emissions from power consumption are the third emission source in the RHP´s GHGs Inventory and, even though reduction initiatives were launched, emission from this source increased 30% respecting the base year 2021.

6.5 In 2022, the sources that reduced more their impact were emission from waste decomposition of the reservoir (81.6%) and emission from refrigerant consumption (83.0%).

6.6 Consumption of chemical products such as aerosols, grease, oil, lubricants, fertilizers, and gases increased during 2022, which generated higher emissions; however, these sources represent only 0,02% of the RHP´s total inventory of emissions, they have a lower impact.

6.7 The RHP emission factor decreased respecting base year since total emissions reduced 40.0% respecting base year due to the reduction in the two main emission sources: reservoir emissions and emissions from reservoir´s waste management.

6.8 Indirect emissions (scope 3) were identified and only emissions from “use of company´s products”, specifically emission from loss during transmission and distribution were quantified.

6.9 The 2022 Reduction Plan was successfully implemented achieving a reduction of 1.6 t CO2e, some deviations from what has been planned correlate to deference in execution timing, since there is a projection that sometimes changes due to operation and maintenance work priorities.

6.10 For 2023, we propose to reduce 34,0 tCO2e considering the work-from-home initiative established in the company mid-year 2022.

7. Documentary Control

Prepared	Unit	Date
Marian Rojas Acosta	Direction of Social Environmental Management	September 2023
Edited	**Unit**	**Date**
Luz Marina Rodríguez	Social Environmental Management O&M Huetar	September 2023
Eduardo Alvarado Soto	Manager Reventazón Hydropower Plant	September 2023
German González Hernández	Direction of Social Environmental Management	September 2023
Approved	**Unit**	**Date**
German González Hernández	Direction of Social Environmental Management	September 2023

Annex 4

Verification Opinion

Verification Opinion

Instituto Costarricense de Electricidad (ICE: Generation Division- Chorotega Region, Huetar Region, and Central Region

Verification of Inventory Declaration

Verification Criterion (standard) INTE/ISO 14064-1

PPCN 2.0

Carbon Reduction

File Number:	EXP-008/2021/UA		
Assessment Stage:	Monitoring par		
Assessment Dates:	23/10/2023	to	27/10/2023
Report Number:	3		

ASOCIACION INSTITUTO DE NORMAS TECNICAS DE COSTA RICA

400 metros norte de Muñoz & Nanne. Contiguo al Laboratorio de Materiales de la Universidad de Costa Rica. San Pedro de Montes de Oca, San José Costa Rica

I. General Information

Trade Name:	Generación Electricidad	
Address of the Organization:	Hybrid process	
PAÍS:	Costa Rica	
Company Representative:	Name:	Marian Rojas Acosta
	Position:	Environment Professional

OBJETIVE OF THE VERIFICATION:

To assess the sources, extend of mistakes, potential omissions, and distortions and to analyze detention control risks inherent to process of the information system, through the application of evidence gathering techniques to reach a conclusion on the accuracy of the GHG declaration and accordance with the stated verification criteria.

PRE-VERIFIED PERMANENT AND TEMPORARY LOCATIONS:

○ Not apply ◉ Applies. Indicate hereunder:

An on-site visit is held at Pailas Geothermal Plant

II. VERIFICATION TEAM

ROLE	NAME	INICIALS	ENTITY
Leading Verifier	Susana López Fuentes	SLF	INTECO
Verifier	Rebeca Arrones Corrales	RAC	INTECO
Verifier	Verónica Vargas Madrigal	VVM	INTECO
Verifier	Manuel González Rodríguez	MGR	INTECO

III.GENERALITIES

SUMMARY AND COMMENTS

The organization was responsible for preparing and accurately presenting the GHG declaration.

INTECO is responsible for preparing and accurately presenting the GHG declaration according to the criteria, it is also responsible for providing an opinion on the GHG declaration based on the verification.

INTECO applies a methodology based on risks according to the INTE/ISO 14064-3 and to assess the GHG declaration it uses but do not limit to the application of the following procedures: PG-OP-03 Provision of the environmental assessment service PG-TE-10 Pre verification, verification and risk assessment. PG-OP-01 Process control.

A risk analysis to the information, report, and declaration of Greenhouse Effect Gases and carbon neutral system has been made, according to the INTE/ISO 14064-1, INTE B5 y PPCN 2.0 Standard Organizational Category // Equator Carbon Zero Program (henceforth reference standard).

INTECO shall provide an opinion related to the GHG declaration based on the verification conducted.

The verification intends to reach a conclusion on the accuracy of the GHG declaration and its accordance with the criteria specified in this document.

Intended user: Senior Management, Validation and Verification Organisms (OVV´s). and Direction of Climate Change.

Level of assurance: Reasonable

Materiality
5% in direct GHG emissions and removals, in indirect GHG emissions from imported energy and total in the inventory. 10% in indirect GHG emissions from: transportation, products used by the organization, and from other sources. (PPCN 2.0 – Applies for Organizations and Educational Institutions)

Scope: Direct and indirect emissions of carbon dioxide methane, nitrous oxide, hydrofluorocarbons, hydrochlorofluorocarbons (HCFCs), and Sulphur hexafluoride (SF6) for all operations from the power generation process, Transformation of Mechanical energy into electric energy in the powerhouse and delivery to the transmission network. It includes indirect emissions from imported energy and relevant indirect products used by the organization (carbon dioxide emissions from reservoirs with more than 20 years in operation) and from the use of products of the organization (emissions from technical power losses during transmission and distribution)

Direct and indirect GHG emissions generated by activities from the power generation process transformation of *the organization reports as limitations* mechanical energy into electric energy in a powerhouse and delivery to the transmission network, performed at the plants from the organization: electricity generation ones managed by the Generation Division of the Instituto Costarricense de Electricidad for the Central, Chorotega, and Huetar Regions.

It includes direct emissions from fuel consumption for transportation, major equipment , small equipment, and other uses, consumption *The organization reports* as chemical products (oils, Grease, and lubricant), consumption of aerosols and gases (acetylene, butane, propane LPG, SF6), use report limitations (emissions) extinguishers, refrigerant gases, regular and special wastewater, waste management in compost, fertilizer application and direct removals and waste management for reservoir cleaning and generation inputs (reservoirs, non- condensable gases and fuels). Indirect GHG emissions from imported energy, relevant indirect emissions related to the use of the organization products (emissions from the identified): technical power losses during transmission and distribution) and emissions from products used by the organization.

(Biogenic carbon dioxide emissions from the reservoirs with more than 20 years in operation).

Base year selected: 2021

Report year verified: 2022

INFORMATION AND DOCUMENTATION:

The organization maintains among its documents related to the system management the following:

Calculo Inventario 2022 (Inventory estimate)

Indirectas 2022 (indirect)

Registros asociados al cálculo por cada fuente de emisión (Records related to the estimate for each emission source)

Informe de Gases de Efecto Invernadero (Greenhouse Gases Report)

DG-83-ET-92-004 Guía cálculo de huella de carbono (Guideline Carbon Footprint Calculation)

DG-83-PR-92-002 Cuantificación y desarrollo de Inventarios de emisiones de GEI Plan de Verificación interna (GHG emission inventory quantification and development Internal Verification Plan)

ALLOCATION OF RESOURCES AND DESIGNATION OF RESPONSIBILITIES:

The organization designates a team responsible for managing data and the system activities, including representation from all the involved Regions. The organization empowers its Regions to manage and report data from the activity of the GHG inventory.

There is evidence of resource allocation to maintain the management system.

INFORMATION SYSTEMS, CONTROLS, AND INTEGRITY (it includes the workability confirmation of software and hardware used to process or generate the inventory data and information):

Documentation and evidence are digitalized.

The GHG inventory is recorded in an Excel file, but each emission source is calculated in an independent file in which one can find the activity data.

ROUTINES FOR ERROR CONTROL (APPLIE ONLY FOR ORGANIZATIONS) / UNCERTAINTIES ESTIMATION:

The organization conducted an internal verification from July 26th to August 1st. In addition, several workshops are conducted to assess the inventory before conducting the internal verification. The uncertainty is not assessed because the organization takes part on the *Programa País* (Country Program).

IV. MODIFICATION OF ORIGINAL TASK ALLOCATION (inform if there are changes (explain the change and justify it) timeline changes or others respecting original plan).

Some adjustments to the proposed assessment techniques are made to exclude non relevant sources.

V. SUMMARY OF THE TECHNICAL ACOMPLISHMENT OF GREENHOUSE GASES

EMISSION SOURCE	DESCRIPTION OF SOURCE	% OF INVENTORY (ESTIMATED)	REVISION METHODOLOGY
Emissions reservoirs	Data is gathered from the reports of methane and carbon dioxide analysis in reservoirs and map viewer Geographic location ICE Plants. Using samples from methane and carbon oxide flow taken directly from laboratory reports. The included area is the reservoir area on map viewer Geographic Location with information from GIS. See considerations by reservoir in the results report. Quantification of CO2 emissions for reservoirs older than 20 years criteria provided by the last refinement of IPCC and the theoretical methodology of emission estimation for reservoirs without flow measurement. .	47.36	Data from activities in every area of the reservoirs included in the maps were verified. They were also verified the sampling campaigns in Arenal and Pirris, as well as the unit conversions, calculation formulae to reach the activity data. The sampling plan was updated because there is much data.
Emissions geothermal steam generation	Report from SIGEST is obtained for the total consumed steam Flow (in the case of Miravalles plant) and the operation report (in the case of Pailas) in tons and reports from Laboratory regarding the % of non-condensable in steam gases. The steam consumption values are represented monthly in the SIGEST report and must be precisely transcribed in the calculation sheet. The steam composition reports are monthly, and each report informs about each plan and geothermal camp; from these reports, the % of non-condensable gases present in the flow and the percentage of CO2 y CH4 in those non-condensable gases and then introduce them in the correspondent place.	24.61	A sample from flow meters is taken which are properly calibrated internally. The flow measurement reports are verified and a sample of GNC from the reported plants is taken for laboratory analysis.
Emission from reservoirs with more than 20 years operating	Data is obtained from the methane and carbon dioxide reports in reservoirs and map viewer Geographic location ICE Plants, with information from GIS using samples from methane and carbon oxide flow taken directly from laboratory reports. The included area is the reservoir area on map viewer Geographic Location with information from GIS. See considerations by reservoir in the results report. Quantification of CO2 emissions for reservoirs older than 20 years criteria provided by the last refinement of IPCC and the theoretical methodology of emission estimation for reservoirs without flow measurement.	8.47	The Arenal campaigns are verified, no typing mistake has been found; calculation and formulae to reach the reported activity data are verified.

Emissions from technical energy losses during transmission and distribution	Emissions from power generation consumed in a T&D system can be reported in scope 3 under the category “power generation consumed in a transmission and distribution system” by final consumers. Standard GHG Protocol Appendix 1. Net Energy by Plant delivered to the Transmission Division is considered, losses for Transmission calculated considering the 3.43% (technical losses, value that includes imports). Losses for distribution are calculated from net energy less transmission losses, considering 8.32% (considering technical and non-technical losses; it is the average datum from distributors and includes the difference between what is delivered In the substation and sales). Transmission and distribution losses are added. The emission factor is calculated for each Plant considering direct emissions from generation inputs divided between net energy. To estimate the equivalent carbon dioxide emission the emission factor is applied to transmission and distribution losses.	9.29	Generation data with an interview is verified and are taken directly from a controlling system. Metrological controls are requested because are a case of proprietary measurement data.
Reservoir waste management	The civilian manager responsible of cleaning the reservoir is consulted via email/ DREDGER operation record book, technical reports, laboratory analysis of dredged sediments- The person responsible of cleaning is consulted to identify if collections were made. The dredger operation record book is consulted to check the operators dredging work and cubic meters extracted. Technical reports are consulted to check the quantity of extracted matter.	0.19	All bibliographic references and activity data from cleaning reports were verified, the calculation methodology from the guide is verified.
Emissions from fuel generation	There is a report from SIGEST that monthly records operation variables indicating the quantity of diesel and bunker consumed. For the GHG inventory consumption values are used which are internally determined from the measurement of tank and input levels. Tank levels are monitored using automatized instruments; the official consumption data is determined daily, and it is incorporated in the SAP system. The data on litters for the GHG inventory is gathered month	8.45	RECALCULATION (Calculation is verified and repeated.) – control TEST (Personnel in charge is interviewed to verify control in data generation (levels, metrological control, and internal monitoring, other) VERIFICATION (CONSUMPTION REPORT FROM sap IS VERIFIED)
Fuel consumption for transportation	Diesel or gasoline bought for transport plate 103. Detailed report of expenses by “fondo de trabajo” (Budget management) of the Division (file gathered from SAP and that summaries all movements to settle bills made by *fondo de trabajo*) using the vehicle database to determine the type of vehicles by plate number and the type of fuel this latter to verify according to *fondo de trabajo*).	0.11	Reports from SAP in all regions and the whole period are verified Data monitoring and calculation method are verified.

Refrigerant consumption	Data is gathered from work orders, A/C equipment inventories, movements from the warehouse (transaction MB51) and reports from ARIBA (for detail), maintenance reports SAP, CMA, maintenance reports from outsourcing companies, Operational control refrigerant gases DG-83-FO92-037	0.04	RECALCULATION (figures are verified) – CONTROL TEST (CONTROL FOR DATA MANAGEMENT ARE VERIFIED) - CORROBORATION (consumes warehouse inputs are verified, maintenance reports from suppliers, vehicle maintenance reports) SAMPLING (reports are verified until the required sample is completed)
Emissions from geothermal camps	Alludes to indirect emissions from different products used by the organization such as: from steam extraction in geothermal camps. To estimate emissions in this category data from the activity of internal records and references from emission factors of IMN and IPCC are used	0.06	RECALCULATION (figures are verified) – CONTROL TEST (CONTROL FOR DATA MANAGEMENT ARE VERIFIED) - CORROBORATION (related data shall be verified) SAMPLING (6 months shall be verified until the sample is completed)
Power consumption	Data from monthly consumption by meter recorded in plant are taken. Information is gathered from the SACECON and billing reports from external suppliers.	0.04	RECALCULATION (figures are verified and calculation repeated) – SAMPLING (a sample from billing data is gathered and outsourcing reports too for…)

Consumption from major and minor equipment	Diesel, gasoline, bunker, GLP bought for machinery and equipment. It includes emissions from fuel consumption for power generation, as well as the one used in backup plants; construction equipment for purposes other than transportation or mobilization such as: cranes, dredgers, bulldozers, mixers, mini loaders (chargers), dump trucks, loading platforms, , motor-pumps, pressure washer, portable power stations, water pumps, combustion welding machines, chainsaws, brush cutters, outboard engines, mowers. Data is gathered from the expenses detail report of *Fondo de Trabajo,* movements from the warehouse (transaction MB51) and reports from ARIBA (for detail), provided by Supply Chain).	0.02	(RECALCULATION) Calculation is verified, planned techniques are planned because the source is excluded from the inventory due to low relevance.
Gas consumption	Including bought gases that generate carbon dioxide by chemical reaction and those gases that become GHGs by leakage. Data is gathered from warehouse Report (transaction MB51) / Evidence of anual load of extinguishers, extinguishing batteries, or switches/ files of *fondo de trabajo*.	0.05	Gas SF6: RECALCULATION (calculation is verified) – Test control (management and data gathering methodology is verified) - CORROBORATION (the person in charge is interviewed to verify information)
Ordinary wastewater	Septic tanks: an assumption is made that the monthly report represents all days in the period and that human resource stays inside the generation plant during working days, a modification considering people in work-from-home program and the outsourcing personnel for cleaning service and maintenance of green areas. If the systems differ from septic tanks an adjustment is performed as applicable.	0.01	(RECALCULATION) Calculation is verified, planned techniques are planned because the source is excluded from the inventory due to low relevance.
Special Wastewaters	It is gathered from operational Reports of the wastewater treatment system. Design flows included in the operational report are considered (consider that, for the Guápiles case the design flow is not mentioned in the report which shall consider 10 m3/day, as it was reported on previous years); since there is no direct measurement, the input DQO is calculated considering a removal of 65.61%, The DQO and exit flow shall be gathered from the operational report, considering, for this last case, the daily average flow.	0.01	(RECALCULATION) Calculation is verified, planned techniques are planned because the source is excluded from the inventory due to low relevance.
Aerosols consumption	The quantity of propellant is gathered from the Safety Data Sheet (SDS/ Spanish FDS) of the acquired product. In there is not current reference from SDS of the specific product inventoried for the report period, the values of reference of products that match the description shall be considered instead. Data is gathered from warehouse Report (transaction MB51) and files of *fondo de trabajo*.	0.00	Emissions are recalculated

Fertilizer application	Data is gathered from warehouse Report (transaction MB51) and waste inventory. Warehouse: file is filter by plant according to the warehouse number and by material brief text filtering by compost, fertilizer, then by movements related to SM for cost center, SM crew consumption, SM for order. Organic compost: Data is gathered from compost generated through NG-50-FO-92-015 Control Compost generation. An emission factor of 1% is applied and a 3.7% theoretical nitrogen content is assigned.	0.00	(RECALCULATION) Calculation is verified, planned techniques are planned because the source is excluded from the inventory due to low relevance.
Organic waste management Comport Production and natural decomposition	Are addressed as compost producing. Data is gathered from the Waste Inventory or operational composting control Natural decomposition of waste: in this source it is considered the emission from natural decomposition of green waste collected during facilities cleaning and green areas maintenance.	0.00	RECALCULATION (figures are verified) – CONTROL TEST (Interviews shall be conducted to verify data management) - CORROBORATION (records of organic waste weighing for the period shall be verified)
Consumption of chemical products (oils and grease)	For oxidation and combustion. Data is gathered from warehouse Report transaction MB51/ bay the corresponding *fondo de trabajo* of each region, purchases by *fondo de trabajo*, and vehicle maintenance reports from CMA	0.03	(RECALCULATION) Calculation is verified, planned techniques are planned because the source is excluded from the inventory due to low relevance.
Organic waste management CO2	Are addressed through compost producing. Data is gathered from the Waste Inventory or operational composting control Natural decomposition: in this source it is considered the emission from natural decomposition of green waste collected during facilities cleaning and green areas maintenance.	0.00	Calculation methodology and related record is verified for the whole period.
Waste management reservoir CO2	It is gathered by consulting via email the civil supervisor and responsible of cleaning the reservoir/ DRAGA operation logbook, technical reports, laboratory analysis of dredged sediments. The person responsible of cleaning is consulted to verify if collection was made. The dredge operation logbook where operator report dredging work and cubic meters removed is checked. Technical reports that include the amount of material removed are consulted.	0.57	All bibliographic references and activity data from cleaning records are verified; calculation methodology related to the guide is verified.

Emissions from reservoirs CO2	Data is gathered from the reports of methane and carbon dioxide analysis in reservoirs and map viewer Geographic location ICE Plants. Using samples from methane and carbon oxide flow taken directly from laboratory reports. The included area is the reservoir area on map viewer Geographic Location with information from GIS. See considerations by reservoir in the results report. Quantification of CO2 emissions for reservoirs older than 20 years criteria provided by the last refinement of IPCC 2019 and the theoretical methodology of emission estimation for reservoirs without flow measurement.	0.62	Data from activities in every area of the reservoirs included in the maps were verified. They were also verified the sampling campaigns in Arenal and Pirris, as well as the unit conversions, calculation formulae to reach the activity data. The sampling plan was updated because there is much data.

Summary of emissions (All Regions)

DIRECT EMISSIONS from the report period	TOTAL	CO_2*	CH_4*	N_2O*	HFCs*	PFCs*	SF_6*	NF_3*	HCFCs*	CFCs*
	(t CO_2e)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)
	584753.437	238819.741	344910.59	322.703	319.075	NA	375.947	NA	5.381	NA
INDIRECT EMISSIONS from imported energy	TOTAL									
	(t CO_2e)									
	308									
INDIRECT EMISSIONS Relevant from the report period	TOTAL	CO_2**	CH_4**	N_2O**	HFCs**	PFCs**	SF_6**	NF_3**	HCFCs**	CFCs**
	(t CO_2e)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)
From transportation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
From products used by the organization (see note below) *	61288	NA	NA	NA	NA	NA	NA	NA	NA	NA
Related to the use of organization products	67223.882	NA	NA	NA	NA	NA	NA	NA	NA	NA
From other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

sources										

*Indirect biogenic from products used by the organization: carbon dioxide emissions from the reservoirs with more than 20 years operating	
CO_2 emissions from biomass. Category:	t CO_2 emitted
Biogenic, combustion, other (biomass burning, product fermentation, etc.)	8936.98
Due to "force majeure", (wildfire or insect infestation)	NA

SUMMARY OF EMISSIONS (Reventazón Hydropower Plant)

DIRECT EMISSIONS FROM THE period of	TOTAL (t CO_2e)	CO_2* (t)	CH_4* (t)	N_2O* (t)	HFCs* (t)	PFCs* (t)	SF_6* (t)	NF_3* (t)	HCFCs* (t)	CFCs* (t)
	25955.123	26.873	23516.392	2410.392	1.466	NA	NA	NA	NA	NA

*Tons of each gas must be reported in CO_2 equivalent (total values from each column must total similarly the value of t CO_2e)

INDIRECT EMISSIONS from energy	TOTAL (t CO_2e)
	94.064

INDIRECT EMISSIONS	TOTAL (t CO_2e)	CO_2** (t)	CH_4** (t)	N_2O** (t)	HFCs** (t)	PFCs** (t)	SF_6** (t)	NF_3** (t)	HCFCs** (t)	CFCs** (t)
From transportation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
From products used by the organization	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Related to the use of products from the organization	3115.374	NA	NA	NA	NA	NA	NA	NA	NA	NA
From other sources	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

CO_2 emissions from biomass Category:	t CO_2 emitted
Biogenic, combustion, other (biomass burning, product fermentation, etc.)	6066.822
Due to "force majeure", (wildfire or insect infestation)	NA

SUMMARY OF REDUCTIONS (applies for carbon neutral)

Does the organization justify not taking more GHG reduction measures because it could provoke loss of competitiveness/ affect the business, or the organization could reach its technological boundaries /operative and financial?

○ Yes. Justify bellow:

◉ No. Complete the following tables:

PROJECT	DIRECT SOURCE TO APPLY REDUCTION (FUELS, ELECTRICITY, ETC.)	YEAR OF REDUCTION	CO_2e TONS REDUCED
Buying more efficient equipment	Indirect	2022	1.282
Installation of automatic shutdown systems	Indirect	2022	0.132
Reduction of emission generating products	Indirect	2022	0.006
Replacement of low power consumption lamps	Direct	2022	5.062

VERIFICATION OF USE OF TRADEMARK C-NEUTRAL: (indicate aspects related to the use in web, stationery, banners and others and accomplishment respecting the trademark use indicated in PPCN 2.0)

◉ yes, at the verification date the organization has the trademark use endorsement, but has not used it ○ No. Finding

Note: In the event of non-compliance of the leading verifier an email must be send to: cambioclimatico@minae.go.cr and copy to operaciones@inteco.org informing what was identified.

VI. Detected findings

STRONG POINTS:

1. Strong internal verification process, in controls preceding verification, quantity of verifying people trained and participating, and assessment detail and depth.

2. The multiple reduction initiatives of the organization reflect its commitment with the environment.

3. Mention might be made of the implemented improvements in data gathering and reinforcement for the inventory of emissions.

IMPROVEMENT OPPORTUNITIES

Undetected

OBSERVACIONS

Undetected

DISCREPANCIES

Ref. Discrepancy	DISCREPANCY (IES) DESCRIPTION	Guideline Document and reference section
1	The following non-compliances in data selection and gathering for quantification are detected: To the verification date not in every case, of steam that enters geothermal plants is gathered since the quantification methodology does not include steam release by pressure changes on the system. Evidence: during the visit to Pailas II and interview with the Plant´s supervisor and Operator, is detected that there is an intermittent release of steam by operative security and there is a pressure valves opening generating steam release before it is driven to the steam flow meter.	6.2.2 (INTE-ISO 14064-1)
END OF DISCREPANCIES		

VII. CONCLUSIONS AND CONSIDERACIONS FOR FUTURE VERIFICATIONS

Verification opinion proposed by

On the part of the verifier team:

- ○ Satisfactory
- ○ Unsatisfactory
- ◉ Abstention

Note: This opinion is not a result since it could vary after assessing by INTECO of the Corrective Measures Plan. The conclusion shall be formally sent once the independent revision, assessment and decision process is finished.

Extraordinary Verifications:

In this verification are presented the following conditions that could conduct to execution of an extraordinary verification (check with an X if it applies):

	Attention to one or more discrepancies entails the complete verification or activity data sampling for more than a source or sump and/or the inclusion of new emission sources which relevance represents a risk to the inventory´s materiality.
	Attention to one or more discrepancies entails revising the complete calculation of more than one GHG source or sump due to affectations to the inventory´s materiality or to inconsistencies that lead to emission and removal calculation methodology redesigning.
	Some discrepancy was detected that provoked the inclusion of operations not considered in the inventory (changes in scope and in boundaries).
	5 or more discrepancies were detected in the verification process.

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	Some discrepancy was detected that is only possible to verify in situ.

The following dates to conduct the next verification are agreed with the organization:

No comments

Comments if applicable, on next verification plan:

VIII. FINAL PROVITIONS

1. One copy of this report must be kept by the organization.
2. Discrepancies have been clarified and understood.
3. Indicate the discrepancies from this report that the organization intends to appeal (in this case, the verifying team can extend the stay in the organization to gathered more documentary evidence to justify the appeal).
4. If the leading verifier considers that it is not necessary to extend the verification time to pursue the investigations, the organization must be informed that these appeals must be communicated in writing via email: operaciones@inteco.org in a maximum period of 7 working days after the verification report is delivered. Once the appeal is received, the Operations Process gathers the necessary information from the leading verifier to analyze the appeal.
5. This documentation is sent to the Operations Manager, the above must be done in a period no longer that 15 working days. If the Organization is not satisfied with the decision and wants to keep the appeal procedures, the Operations Manager could decide whether to analyze the appeal one more time or to set up a meeting with the organization representatives to raise an agreement.
6. If the organization want to file a complaint, it can be done through the following link from the INTECO Web page: https://www.inteco.org/helpdesk/quejas-sugerencias-y-agradecimientos-2
7. Considering the discrepancies identified and indicated in this report, for which it is necessary to present a Corrective Action Plan (CAP), the organization commits to present such plan before INTECO in a period of 30 calendar days following this verification, which must indicate causes, corrective action, the person responsible for implementation, estimated time, and the corresponding documentary evidence for each discrepancy. For this CAP, it is advisable for the organization to use its own methodology for corrective actions, or it can request the CAP guideline from INTECO.
8. Once the CAP is received, INTECO shall assess it and can accept it to continue the decision process or requesting further information. This information must be sent in a period of 30 calendar days. Subsequently, INTECE shall re assess such amplification and shall communicate the acceptance of CAP to continue the decision process.
9. If CAP and its extensions (if applicable) are not presented in a period of 30 calendar days, without a request for extension, or the corresponding justification to the Direction of Operations could send the file to the Assessment Commission, which can recommend an Extraordinary Verification to the INTECO´s Executive Management prior to the opinion is delivered. This judgment does not relieve the organization of sending INTECO a CAO as soon as possible.

10. The CAP must be presented, preferably, in digital format, stored in independent folders for each action plan by discrepancy indicated in the report and the corresponding evidence, or indicating for each evidence, to which discrepancy corresponds. Otherwise, the verifier could request an information forwarding that must be sent to the following email address: operaciones@inteco.org.

11. The verifying team informs that this verification is been conducted by means of sampling; for this reason, there cannot be other unidentified discrepancies.

12. Discrepancies refer to non-compliances of requirements from the applicable guidelines document or errors that affect materiality.

13. If once the opinion is provided other facts are detected after the emission of the opinion, INTECO will proceed as established in the service contract (FS-CO-11).

14. For anything related to the verification process, the organization can contact the Operations Department e mail: operaciones@inteco.org

Signed

In San José, on October 27th, 2023

THE REPRESENTATIVE FROM THE ORGANIZATION THE VERIFYING TEAM

RELATION OF PARTICIPANTS ON THE VERIFYING PROCESS

(Initial meeting, interviewed during the process and at the final meeting)

NAME AND LAST NAME	DEPARTAMENT (Position)
The file is attached to the attendance list	

ANNEX I

PROJECT SITES WHERE VERIFICATION TOOK PLACE	
Work center: Pailas I y Pailas II Geothermal Plants	ADDRESS: Guanacaste, Costa Rica
VERIFIER: VVM	