



# High-Precision Forestry Harvesting and Drone-Assisted Laying

September 2020



**Trecsa**  
GrupoEnergíaBogotá

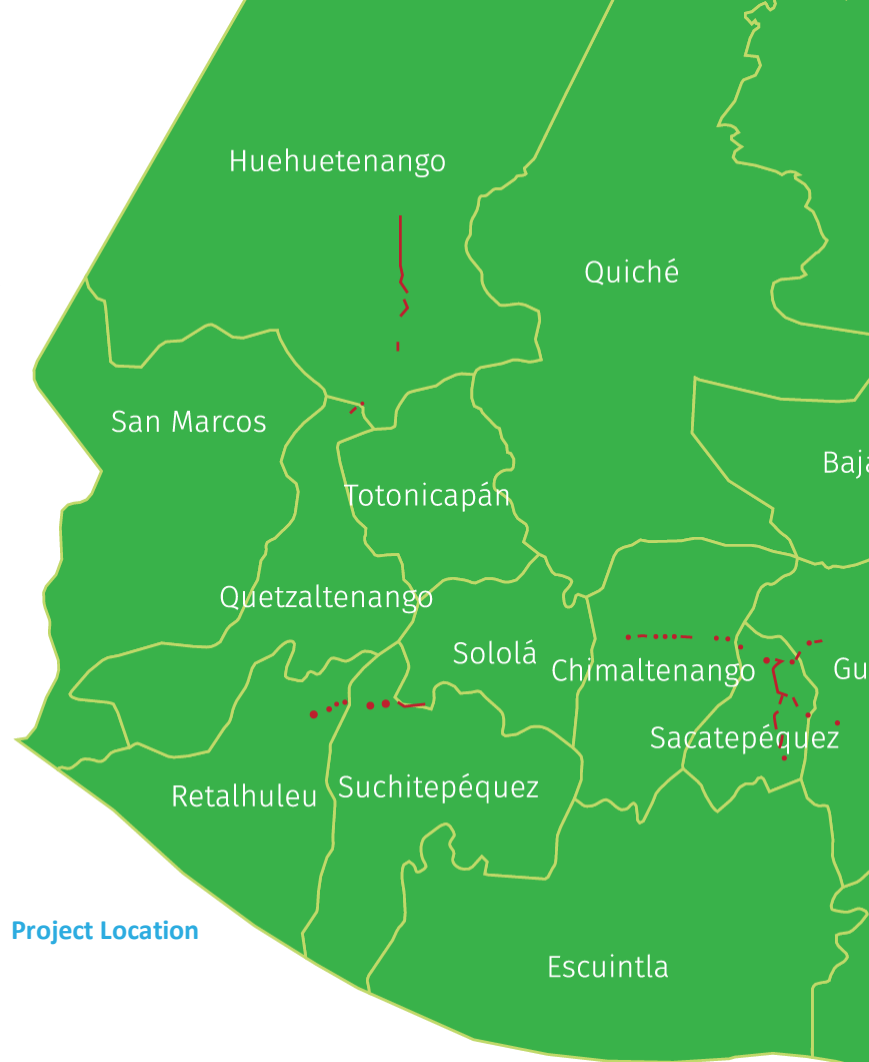
# About us

- **Guatemalan** company, a subsidiary of Grupo Energía Bogotá (2010)
- Specialist in management, development, operation, and maintenance services for **energy transportation** infrastructure
- We build and operate the **PET-01-2009**, a Nation Project that contributes to the sustainable development of Guatemala
- 1<sup>st</sup> Central American power transmission company **certified under the ISO 9001:2015**



# About the Project

- **Name:** *High-precision forestry harvesting and drone-assisted laying on high-voltage lines, aimed at reducing the impact on forest cover within Trecca projects*
- **Category:** *Materials, production process optimization*
- **Period:** 2017-2019
- **Scope:**
  - 7 transmission lines
  - 6 departments
  - 27 municipalities
  - 120.84 hectares
  - 576 premises (1000 m<sup>2</sup> – 7.6 Ha)

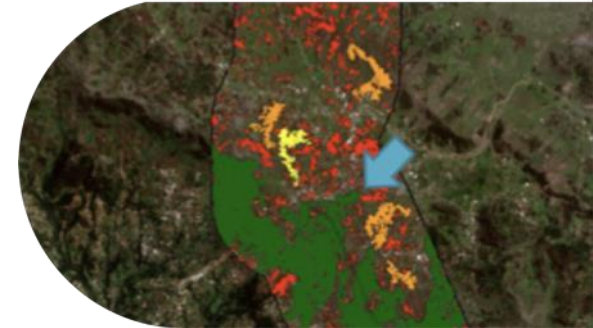
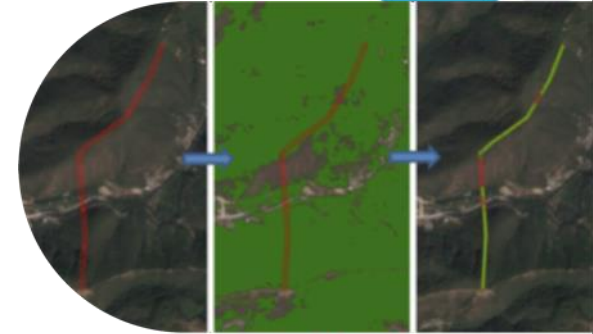


Project Location

# About the Project

- Referential traces of the PET, established by MEM, form the basis for establishing rights of way and obtaining forestry harvesting licenses
- **Trace optimization** (TRECESA) considers technical, economic, environmental, and sociocultural
- Annually, **forest cover analysis** is conducted within the easements, using updated and high-resolution satellite images
- It is also considered **the index of ecological fragmentation and connectivity** to prevent the deterioration of forest stands that serve as **wildlife refuge**
- In previous years, after said analysis, conventional forest harvesting was carried out

Forest cover analysis



Ecological Connectivity Analysis

# About the Project

- Since 2017, **Drone flyovers** are also conducted to estimate with **high precision** the areas where forest harvesting is necessary.
- Furthermore, the laying of high-voltage power lines using drones helps **prevent tree clearance** for the movement of people and machinery.
- Currently, 5 Drone trips are required to complete the laying preparation:
  - nylon thread laying
  - cord laying
  - quarter-inch loop laying
  - yield / rope laying
  - steel wire or cord laying

Nylon thread for laying



Laying of nylon thread

# About the Results

- Of the 59.75 hectares that have been intervened, 32.12 hectares (53.76%) **maintain their forest cover**.
- From 38.47 hectares at **risk of erosion**, 29.77 hectares (77.38%) have been proactively preserved.
- Project allows **conservation and reduction of impact** on forest cover within the project traces.
- Precision forest harvesting favors:
  - Protection of flora and fauna species
  - Reduce the risk of erosion
  - Promotes water collection and infiltration
  - Carbon dioxide continues to be absorbed





# About the Results

## Data on forest cover of the project

Name	Area	Percentage
Total area of premises (rights of way)	120.84	100.00
Total area authorized for use by INAB	114.47	94.72
Area with installed electrical wiring	59.75	49.46
Current forest cover and authorized for exploitation by INAB	65.73	57.42
Coverage of forest preserved by the project	32.12	53.76
Premises with a slope greater than 45° (erosion risk)	38.47	31.84
Coverage on premises with a slope greater than 45°	29.77	77.38

Source: Elaboration with data from Cadastral Topography. 2020



# About the Results

- The implementation of the project has helped to reduce costs and operational times, enhance corporate image, and strengthen the conservation of forest cover in the direct influence areas of the PET.
- Estimates include:
  - A **15% reduction in the time** required to complete 1 kilometer of laying
  - A **saving of 10% in the cost** to complete 1 kilometer of laying
  - **4.7% improvement in the fragmentation index** and ecological connectivity
- Also enabled **timely identification of social disagreements** and minimized situations where machinery is on site but cannot operate.







# About the Results

## Company situation, before and after the project (estimated data)

Name	Before the project	After the project	Improvement (%)
Required Time	90 days	76 days	15.5%
Cost to complete 1km of laying	18,000 USD	16,200 USD	10.0%
Voluntary forest cover conservation	-	21.12hectares	53.7%
Biodiversity fragmentation and connectivity index	0.02298	0.02407	4.74%

# Continuous Improvement

Two improvement opportunities **have been identified** in the short term:

- **Use of professional drones in the laying activity:**
  - Support greater weight
  - It would reduce, from 5 to 3, the necessary trips by Drone to complete the laying preparation per tower
  - It will create new capacities in companies providing forestry harvesting and high-voltage line laying services.
- **Reception of towers using Drones:**
  - High maneuverability and use of high-resolution cameras in Drones
  - Would prevent employees from physically climbing the towers to check
  - Eliminating safety risks for individuals by preventing them from climbing the tower for reception
  - Significantly improve the reception time, going from 2 to 6 towers received per day

Professional Drone Use



Reception of towers with Drone

# Positively Impacting



# Positively Impacting

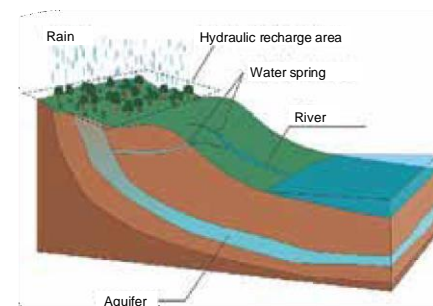
- **Carbon absorption:**
  - It is estimated that the 32.12 Ha of forest preserved by the project absorb **between 188.61 - 306.49 tons of CO2/Ha/year** (Torres et al., 2017).
  - The economic cost of this carbon fixation could reach up to **USD 7,809.34 per year** if Trecsa decides to enter the regulated carbon market.
  - The area with preserved forest is equivalent to **45 Santiago Bernabeu® stadiums**.
  - Contributes to the fight against Climate Change and the fulfillment of the Paris Agreement
- **Oxygen production:**
  - It is estimated that the 32.12 Ha of forest has provided **oxygen to at least 1,445 people per year** (Alfaro, 2020).



# Positively Impacting

- **Soil conservation and water infiltration:**
  - Vegetation cover slows down runoff and facilitates infiltration, which decreases the soil's erosive capacity (Alvarado, 2016).
  - By conserving the 29.77 Ha of forest in premises with a slope greater than 45°, **approximately 4,108.26 tons of soil loss per hectare/year are avoided.**
  - Moreover, it is estimated that the presence of forest cover favors the absorption of between 180 - 196 mm/h, thus achieving a total **infiltration and zero surface runoff equivalent to zero millimeters** (Meunier, 1996 & Robert, 2002).

## Soil conservation and water recharge



# Positively Impacting

- **Wildlife refuge and ecological connectivity:**
  - High-precision forestry harvesting reduces the direct and indirect impacts on wildlife
  - Minimizes the direct removal of individuals
  - Increasing ecological connectivity and
  - Ensures forest stands that serve as a refuge for wildlife
- The improvement in the fragmentation index indicates that the **connectivity between forest patches has improved due to the implementation of the project**, favoring the ecological processes inherent to the life areas where they are located.

## Low Subtropical Montane Moist Forest



Sciurus depeii



Hylocharis leucotis



Zenaida asiatica

# Positively Impacting

Subtropical Montane Moist Forest Subtropical Moist Forest (temperate)



*Juniperus standleyi*



*Setophaga chrysoparia*



Spiny-headed Treefrog (*Ergaticus versicolor*)



# Positively Impacting

Tropical Montane Lower Subtropical Wet Forest Tropical Montane Subtropical Wet Forest



*Basileuterus belli* *Eugenes fulgens* *Accipiter chionogaster* *Cyanocitta stelleri*



# Positively Impacting

Very Humid Subtropical Forest (warm)



*Glaucidium brasilianum* Brazilian pygmy owl Iguana