



## Assessing the Urban Forests Program Results Related to Global Climate Regulation

### EXECUTIVE SUMMARY

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Copel, Paraná State Energy Company, operates in the generation, transmission and distribution of energy, as well as telecommunications. In distribution, it operates in 395 municipalities in the State of Paraná and one in Santa Catarina, summing up 194,854 km<sup>2</sup> of concession area, and over 195,000 km of networks.

In energy distribution, one of the main environmental impacts is the need to continuously trim trees in urban areas so as to keep the quality in electric power supply.

The Urban Forests Program gathers Copel's actions related to tree compliance and electric systems aiming at minimizing the need for trimming. The program started in 2006 and one of its actions is to produce tree saplings from different species in a standard size (over 2.10 m tall) to be planted in sidewalks at municipalities that show interest, either to replace inadequate trees or for new planting. From 2008 through 2016 they provided over 40,000 saplings for planting, not counting the saplings distributed to replace losses.

The goal of this case study was to value the results of the Urban Forests Program for the global climate regulation ecosystem service. Thus, they calculated permanent CO<sub>2</sub>e removal enabled by planting of saplings distributed by Copel, assuming the trees will grow.

All the planting performed so far (40,000 saplings) remove 499.2 tCO<sub>2</sub>e/year. Considering each planted tree is expected to have a life cycle of at least 25 years, total removal estimate is 12,480 tCO<sub>2</sub>e from the atmosphere (considering linear re-

moval throughout the tree life cycle, since there is no data available about the tree growth curve).

To value the externality, the Social Cost of Carbon (SCC) was used, accounting for the estimated costs of likely impacts caused by adding a ton of carbon to the atmosphere. Positive externality generated by the planting was valued as almost BRL 66,394 per year.

Considering Copel invests BRL 43.88 to produce each sapling, the value of the externality associated with the global climate regulation ecosystem service obtained during the tree life cycle is similar to its implementation cost.

According to the calculation made in this case study, Copel can quantify one of the positive results produced by the Urban Forests Program, supporting the justification for its continuity and for establishing goals for sapling production.

It is worth noting that urban forests contribute with other ecosystem services and benefits to the population, such as urban temperature regulation, improvement in air quality, pollination regulation, and cultural services, such as recreation, cultural identity, and aesthetic services, among others.

Moreover, planting saplings of adequate species in the right places, compatible with the distribution network, benefits the population by offering better quality in power supply, and reduces risks of accidents. For Copel, the benefits extend beyond excellence in service, minimizing economic and regulatory risks.



## Reporting of Dependencies, Impacts and Externalities

Responsible for completing: Luciana Leal

### Project drivers

**Goals:** Estimate total value and/or net impact; Communicate internally or externally; Understand the business relationship with ecosystem services.

**Description:** Identify and value ecosystem services related to the Urban Forests Program, as well as their externalities, to justify the Program continuity and show the benefits offered.

### Project scope

**Object of the Project Analysis:** Project

**Description:** Valuation of the global climate regulation ecosystem service aiming at getting familiarized with the Urban Forests Program externalities.

**Geographic Area:** Municipalities in Paraná State

**Step(s) of the Value Chain Included:** Own operations

**Type of Approach:** Retroactive

**Time Horizon:** 25 years

**Ecosystem Services:** Global Climate Regulation

### Global Climate Regulation

Role played by ecosystems in carbon and nitrogen biogeochemical cycles, thus influencing emissions of important greenhouse gases, such as CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O.

**Method(s) Used:** Replacement Costs Method (RCM)

**Results:**

**Externality:** BRL 66,393.60/year

**Data Used:**

**Type of Data:**

**Net Emissions**

**Actual emissions resulting from deforestation or environmental degradation, in tCO<sub>2</sub>e: 0**

Primary/Own data

**Actual removals resulting from environmental recovery, in tCO<sub>2</sub>e: 499.2 / year**

Primary/Own data

**Avoided Deforestation**

**Biome phytophysiology and land use:**

**Area of avoided deforestation, in ha:**

**Deforestation rate considered as base line:**

**Deforestation rate with the project:**

**Avoided emissions, in tCO<sub>2</sub>e:**

### Further Information

**Exchange rate used to convert the Social Cost of Carbon (SCC), in Brazilian Reais:** BRL 3.50

**Assumptions adopted in the valuation estimates:** The same carbon equivalent unit value was considered, regardless of the species planted, the corresponding phytogeographic unit and the conditions in the location where the saplings are planted.

**Adjustments or derivation applied to the methods and tools used:** The methodology used was adapted to the analysis performed in an urban scenario, considering planting of individual trees.

**Others:** —

### Explanatory Notes:

Primary data considered the company internal data, with 40,000 saplings produced in its gardens being distributed for urban afforestation (not counting saplings provided to replace losses).

Due to the unavailability of data in literature about carbon fixation and the dynamic of sapling growth in urban afforestation, the values considered as reference for carbon equivalent were the results presented in the work produced by Lacerda et al. (2009)\* “Estimativa da Biomassa e Carbono em Áreas Restauradas com Plantio de Essências Nativas” (Estimate of Biomass and Carbon in Areas Restored with Planting of Native Essences), of 12.48 kg CO<sub>2</sub>-eq./year/tree (average value).

Calculation made:

- Carbon removal  
40,000 saplings \* 0.01248  
1 year - 499.2 tCO<sub>2</sub>e  
25 years - 12.480 tCO<sub>2</sub>e
- Externality  
499.2 \* 38 \* 3.5 = BRL 66,393.60 / year

## Analysis of the results

Planting of saplings distributed by Copel in the municipalities' urban areas offers direct benefits to global climate regulation. Calculations indicate positive externality, with removal of 499.2 tons of CO<sub>2</sub>e from the atmosphere per year owing to the saplings planted. Considering each tree planted in the urban area is expected to have a life cycle of at least 25 years, total removal is estimated as 12,480 tons of CO<sub>2</sub>e from the atmosphere.

The results show the importance of the Urban Forests Program and can be used to justify the program continuity, including the establishment of production goals and sapling distribution.

## Management of ecosystem services

**Use of ecosystem service valuation results:** Cost-benefit analysis; Definition of strategic goals and progress monitoring; Social and environmental impact assessment; Reporting.

**Description:** Combined with the various benefits offered by urban afforestation (microclimate, aesthetic, economic and social benefits), the global climate regulation analysis points to a positive externality, showing the importance of continuous actions in the municipalities, through the Urban Forests Program.

\* LACERDA, J. S.; COUTO, H. T. Z.; HIROTA, M. M.; PASISHNYK, N.; POLIZEL, J. L. Estimativa da Biomassa e Carbono em Áreas Restauradas com Plantio de Essências Nativas (“Estimate of Biomass and Carbon in Areas Restored with Planting of Native Essences”). METRVM, n.5, p.1-23, 2009.

Realização



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