FINANCIAL ANALYSIS OF LONG-TERM DECARBONIZATION ALTERNATIVES

Giovanna Tosto, UFRJ, giovanna.tostoo@gmail.com
Luize Cristine Sobreira de Oliveira, UFRJ, luizecris18@gmail.com
Pedro Rodrigues de Abreu, UFRJ, pedro.abreu240103@gmail.com
Renan Rocha D'assumpção, UFRJ, renanrochadassumpcao@gmail.com
Cristina Pimenta de Mello Spineti Luz, UFRJ, cristinapimenta@facc.ufrj.br

Overview

In a scenario where climate change is an increasingly undeniable reality, the Paris Agreement (2015), based on the reports from the Intergovernmental Panel on Climate Change (IPCC), envisions the necessity for countries to collaborate in mitigating their Greenhouse Gas (GHG) emissions. This collective effort aims to limit the global temperature increase to 1.5ºC compared to pre-industrial levels. Companies play a crucial role in the decarbonization of the planet, and as a result, various tools have been developed to assist them in achieving their objectives (Zhou & When, 2020). One such tool is carbon credits, each representing one ton of CO2 equivalent (Oliveira, 2022). These credits can be traded by companies with a surplus of carbon capture and those with a deficit, the latter seeking to offset their excessive carbon emissions. In this context, carbon credits can be traded in markets known as Voluntary or Regulated (Souza et al., 2012) and, in Brazil, Bill nº 412/2022, which regulates the carbon market, was approved in October 2023 (Feitosa, 2022).

Within the context of potential carbon constraints affecting Brazilian organizations, this study aligns with the recommendation postulated by Zhou and When (2020) advocating for regional investigations. Thus, we analyse the financial impact on a local publicly traded company regarding different strategies to meet the constraints. We assess the offsetting of Greenhouse Gas (GHG) emissions through the purchase of carbon credits versus the impact of implementing decarbonization projects. While the expenses related to the compulsory purchase of carbon credits are simulated as a baseline scenario in which the company mitigates 100% of its emissions, the feasibility and financial impact for the company of two fictional decarbonization projects (fleet electrification and tree planting) that aim to reduce GHG emissions are analysed. The results show potential and limitations of projects, contributing to the discussion about firms' carbon constrain decisions.

Methods

This is a quantitative study in which financial modelling was conducted for two fictional decarbonization projects using public data from the company and the market. Scenario analyses were performed, and financial indicators such as NPV, IRR, PI, and Discounted Payback were calculated. Finally, the feasibility of the projects was analysed quantitatively and qualitative conclusions could be drawn.

The modelling was based on real data extracted from the Sustainability Report (Raízen, 2022) and the Results Report (Raízen, 2023) of the publicly traded company Raízen S.A., a joint venture between Shell and Cosan. This choice was made due to the company's presence in a highly emitting sector and its demonstrated commitment to innovation and diversification, being a significant ethanol producer. A simplified income statement was projected for the years 2023 to 2037 based on the 2022 results report, the projected IPCA available in the Central Bank's Focus Report (Banco Central do Brasil, 2023) and a growth factor. Subsequently, GHG emissions were projected for the same period using the company's actual emissions from the 2021-2022 sustainability report and the ratio between emissions and net revenue.

In the baseline scenario, the projected income statement was used, adding the calculation of carbon credit acquisitions to the company's expenses to offset 100% of the previously calculated emissions. The cost of the carbon credit simulated was based on the price of CBIO (decarbonization credit), part of Brazil's National Biofuels Policy (RenovaBio) (Tiburcio et al., 2023). The increasing CBIO price over the years was considered, reflecting the growing adoption of its purchase by companies and, consequently, increased demand for the credit.

For the calculation of Project 1, which involves the electrification of the fleet, data corresponding to Mobile Combustion emissions (represented by the company's truck fleet) were obtained from the Public Emissions Registry (FGV, 2023). An initial fleet of 1,500 trucks, growing in line with emissions, was considered. An initial electrification penetration of 5% in 2023, progressing to reach 30%, was adopted, assuming that an electric truck emits 63% less CO2 compared to non-electric trucks. The amount of CO2 emitted by electric and non-electric trucks, the new total reduced emissions, the reduction in the cost of carbon credit acquisition, and the total cost of replacing the non-electric truck fleet were calculated. An incremental cash flow was prepared compared to the baseline scenario, and the indices (NPV, IRR, PI, and Discounted Payback) were calculated, considering the WACC of 9.16% from the Results Report (Raízen, 2023).

Regarding Project 2, related to tree planting, a plot of 1,500 hectares was considered, and the average annual amount of CO2 sequestered by trees of different ages was identified. The initial average age of five years for the trees was adopted for calculating the total amount of sequestered CO2. Subsequently, the new total emissions were calculated based on the observed reduction, along with the reduction in the cost of carbon credit acquisition and the increase in annual operating and maintenance costs for the land. Similar to Project 1, an incremental cash flow was prepared compared to the baseline scenario, and the same indices were calculated. Results were also simulated based on different initial ages.

Results

In Project 1, the indices demonstrate project viability, with a positive NPV, IRR higher than the WACC, PI greater than 1, and a Discounted Payback of approximately 13 years. Despite these favourable indices, it is clear that the project's returns require a long-term perspective. Thus, the electrification of part of the fleet as a means of reducing carbon emissions with an initial fleet of 1,500 trucks could be an interesting long-term planning strategy, yielding positive returns for the company. The progressive penetration of electric vehicles into the fleet also revealed that an increase in penetration enhances the NPV.

In Project 2, even with the costs of acquisition, operation, and maintenance of the land, the indices demonstrate the project's viability, with three of them being superior to those presented by Project 1. Regarding the simulation of scenarios with different initial tree ages, if the company needed to plant the forest from scratch, the project would not be viable. However, if the company already has an existing forest plantation or can acquire one with greater maturity, the expected financial return is higher, as the NPV increases with the rising average initial age of the trees.

Conclusions

The projects demonstrated viability based on the indices, although the return demand a long-term. These emphases the importance of analysing decarbonization strategies and their impact on companies' Income Statements, given the context of discussions about a new law with implications for greenhouse gas emissions. Thus, considering sustainable strategies that reduce dependence on the purchase of carbon credits tends to position companies favourably compared to other players who will be impacted and do not take such measures.

It's worth noting that regarding Project 1, the market for electric trucks is still scarce and comes with high costs. However, as electric commercial fleets advance technologically and gain traction in Brazil, there will be a tendency for cost reduction and increased attractiveness for this type of project. Meanwhile, decarbonization projects through the acquisition and maintenance of forests appear more realistic at the moment, depending on their maturity.

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