

Research Highlights

In this study we identified promising approaches to effective financial support of Reduced Emissions from Deforestation and Degradation (REDD) [1].

1. Parties' *risk aversion* increases the volume of contracted REDD-based offsets at fair prices.
2. *Benefit sharing mechanism* increases contracted amount and at the same time decreases the price.
3. Public funds might help closing the price gap and ultimately enable REDD.

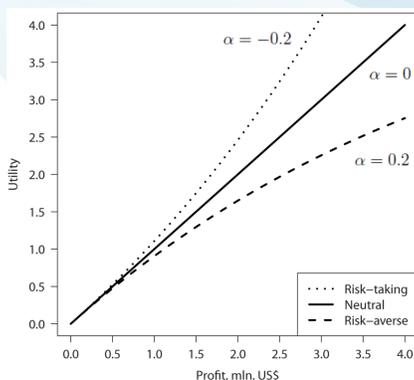
Methodology and Results

We construct a microeconomic model of interaction between the forest owner (REDD-supplier), electricity producer, and electricity consumer [2].

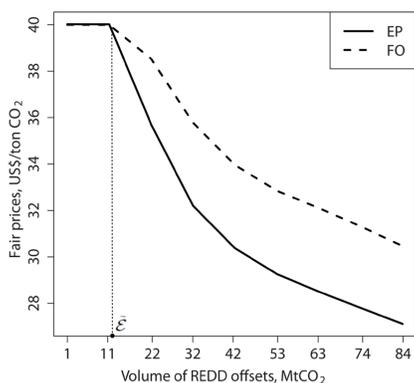
The decision-making process of the electricity producer (under uncertain CO₂ tax/price) consists of:

1. Choosing power plant load factors to minimize the cost given the hourly electricity demand profile and installed capacities of particular power generation technologies;
2. Setting electricity price to maximize the profit based on the demand function indicating consumer's sensitivity to electricity price;
3. Hedging by REDD-based offsets.

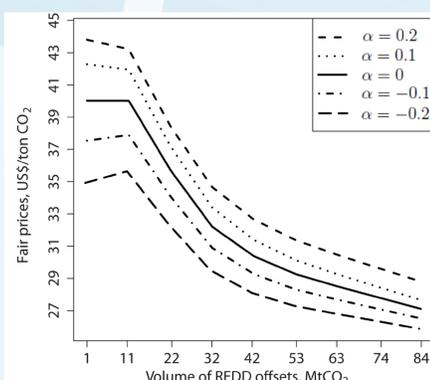
The **fair REDD offset price** in the study is understood in the sense of parties' **indifference** to whether contract a given amount of offsets, or not. **Fair prices** represent **risk-adjusted supply and demand curves** for REDD-based offsets.



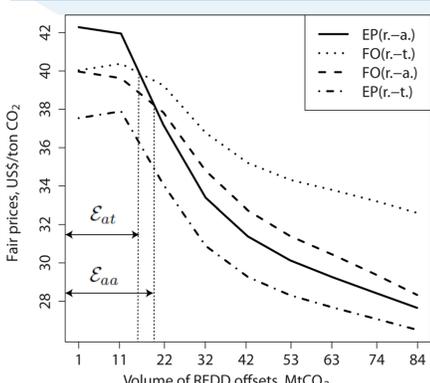
Risk preferences are modeled by exponential utility functions [3].



Fair prices of the *risk-neutral* electricity producer (EP) and forest owner (FO) depending on the volume of REDD offsets. The future CO₂ price distribution is uniform within the range 0-80 US\$/ton CO₂.



Fair prices with respect to risk preferences: $\alpha < 0$ – risk-taking, $\alpha = 0$ – risk-neutral, $\alpha > 0$ – risk-averse.

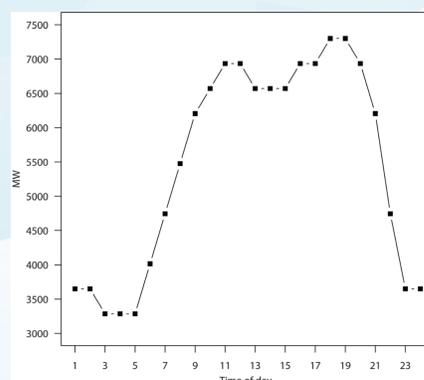


Risk-averse (r.-a.) behavior considerably increases the contracted amounts of REDD offsets and creates a higher potential for REDD implementation.

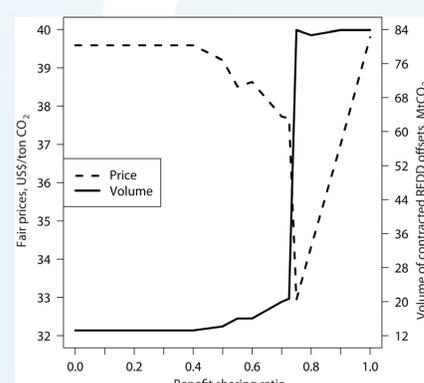
Technological data for the case-study*

Technology	Annual fixed cost, thousand US\$/MWy	Variable cost, US\$/MWh	Installed capacity, MW (≈ size of Belarus)	Emission factors, ton CO ₂ /MWh
Coal-fired	224	18.9	3800	1.02
Natural gas-fired combustion turbine	64	55.6	1900	0.55
Natural gas-fired combined cycle	96	39	2200	0.33

* Sources: [4]-[6].

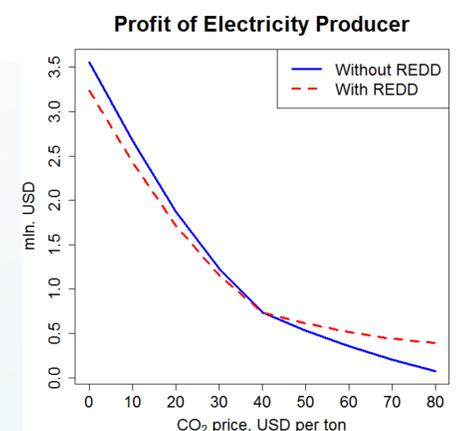


Average hourly electricity demand (based on [7]).



References

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Financial instrument supporting REDD might help avoid bankruptcy of CO₂-intensive producers at high levels of CO₂ price.

Benefit sharing mechanism increases contracted amount and at the same time decreases the price.

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