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## Overview

OPTFOLIO is an analytical tool for the management of an energy portfolio composed of physical assets (hydro and thermal plants) and financial instruments such as forward contracts and options which takes into account the most modern risk management techniques based on VaR, CVaR, utility functions or other risk x return metrics.

The model can be applied to short, medium and long-term studies, including investment in new equipment, selection of a mix of contracts and purchase of financial hedges. The objective is to maximize the agent's profit, subject to risk-related constraints.

Model input data includes:

- existing generation assets
- buying and selling energy contracts with their flexibility, take-or-pay and other option related clauses
- set of candidate generators to be built or acquired;
- set of candidate financial instruments (contracts and options)
- scenarios for spot prices, plant generations, generation costs etc.
- risk constraints associated to net revenues over a given time period, utility function or other risk x return metric

OPTFOLIO output comprises:

- schedule of plants to be built/acquired
- set of financial instruments to be established
- probability distribution of revenue stream
- risk-related statistics (certainty equivalent, VAR, CVaR, "downside risk", etc.) associated with annual revenues or accumulated revenues over pre-established time periods
- graphs of time series associated with several quantities, such as produced energy, performance of financial instruments, spot market transactions, net revenues etc

Optimal solution is obtained through MIP (Mixed Integer Programming) advanced techniques.

Besides optimizing OPTFOLIO can also compute performance indices, in terms of a risk x return metrics, and financial exposures in the short, medium and long run associated to an existing portfolio

of physical and financial instruments, estimate futures and options energy prices, and internal rate of return (IRR) associated to an specific project.

### **OPTFOLIO uses**

OPTFOLIO has been used among other applications, to carry out financial evaluation of portfolios of physical and financial instruments, to determine the optimal hydro-thermal mix for generation utilities; to devise hedging strategies in the short, medium and long time horizon for generating and commercialization companies; to evaluate the risk profile of the multi-country generation assets of an international investor; and to determine whether a market for option contracts would be attractive for generation investors in Brazil, some Latin American and Europe countries and Turkey.