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Strategic Choices Between PPAs and Short-Term Trading

Price Dynamics and Optimal Allocation

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Renewable Forecast | Portfolio Optimization | Profitable Trading

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Introduction to Energy Trading Decisions

Context

- Exploring the evolving electricity markets in Germany, Poland and Romania focusing on renewable energy price dynamics.

Challenge

- Deciding between long-term stability offered by PPAs and the lucrative potential of short-term market trading.

Objective

- Understanding how strategic decisions combining these options can maximize revenues and support sustainable growth.

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PPA vs. Short-Term Trading: A Comparative Overview

- Power Purchase Agreements (PPAs) provide a fixed or index-linked payment structure over a period of time offering predictability against market volatility.
- **Short-Term Trading** involves capitalizing on market price fluctuations in shorter intervals such as daily, hourly or 15 min offering higher returns at increased risk levels.
- **Decision Factors**: Considerations include risk tolerance, market prediction capabilities, and financial goals.

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Source of Risk

- **Short-term trading**:

Renewable generation uncertainty

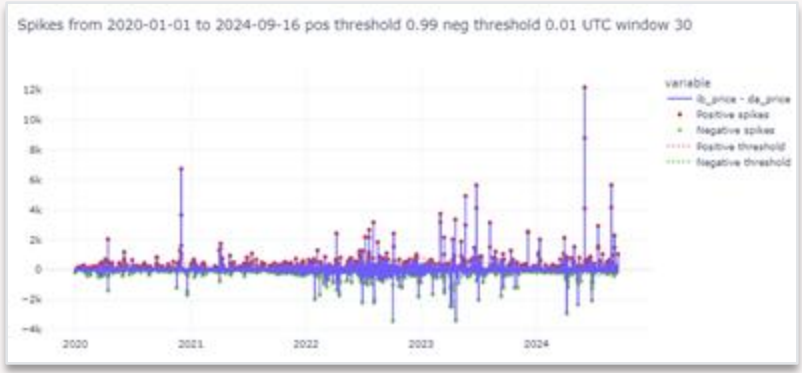
+

Day-ahead, Intraday & imbalance price volatility

- **PPA**:

Locked in a low-price revenues for a long term

German Imbalance Prices



Select variable for Germany Market

Variable Name:

EPEX/1200-CET Hourly Day-ahead price

reconstruction-aux/Imbalance Price

GET DATA

Show two Y axes

Select variable for Poland Market

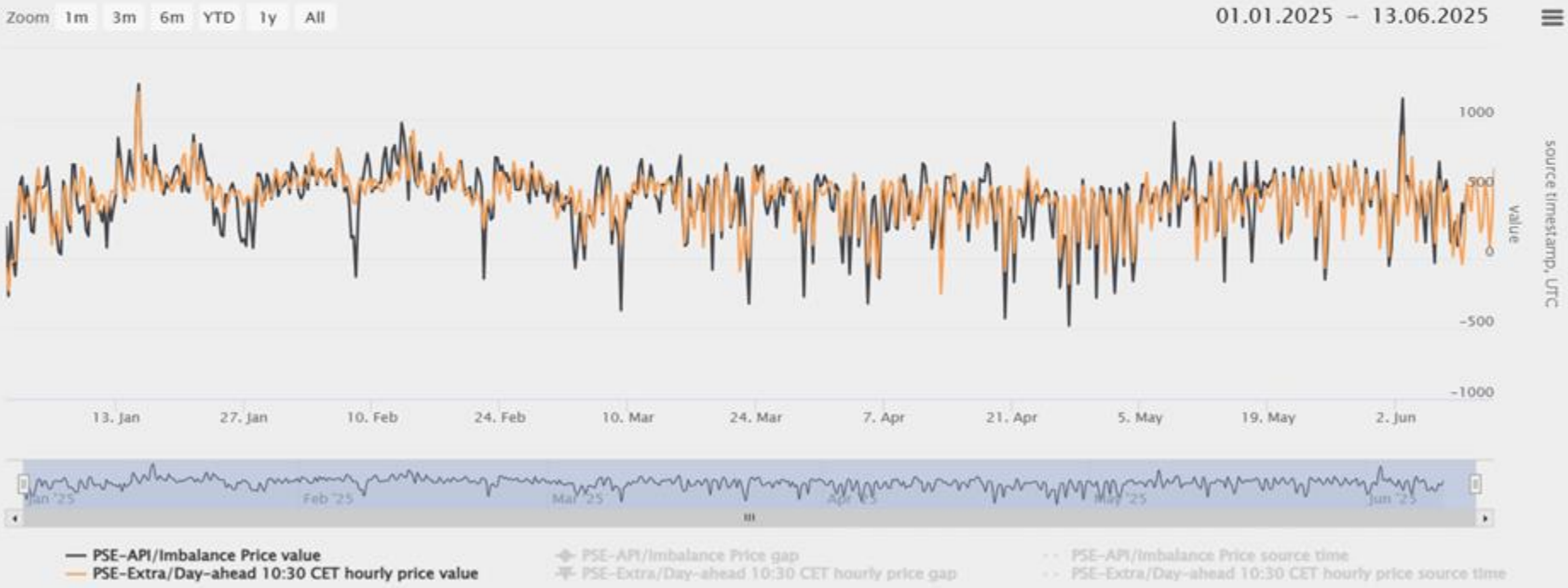
Variable Name:

PSE-API/Imbalance Price

PSE-Extra/Day-ahead 10:30 CET hourly price

GET DATA

Show two Y axes



Select variable for Romania Market

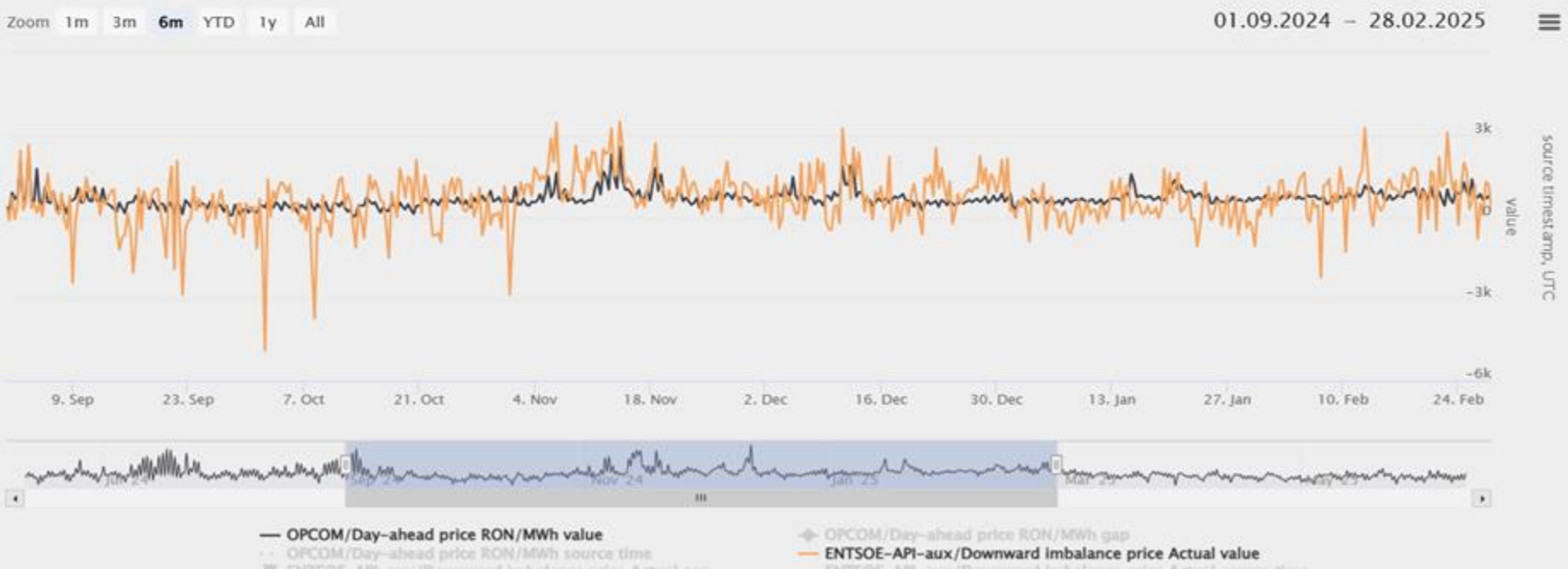
Variable Name:

ENTSOE-API-aux/Downward imbalance price Actual

OPCOM/Day-ahead price RON/MWh

GET DATA

Show two Y axes



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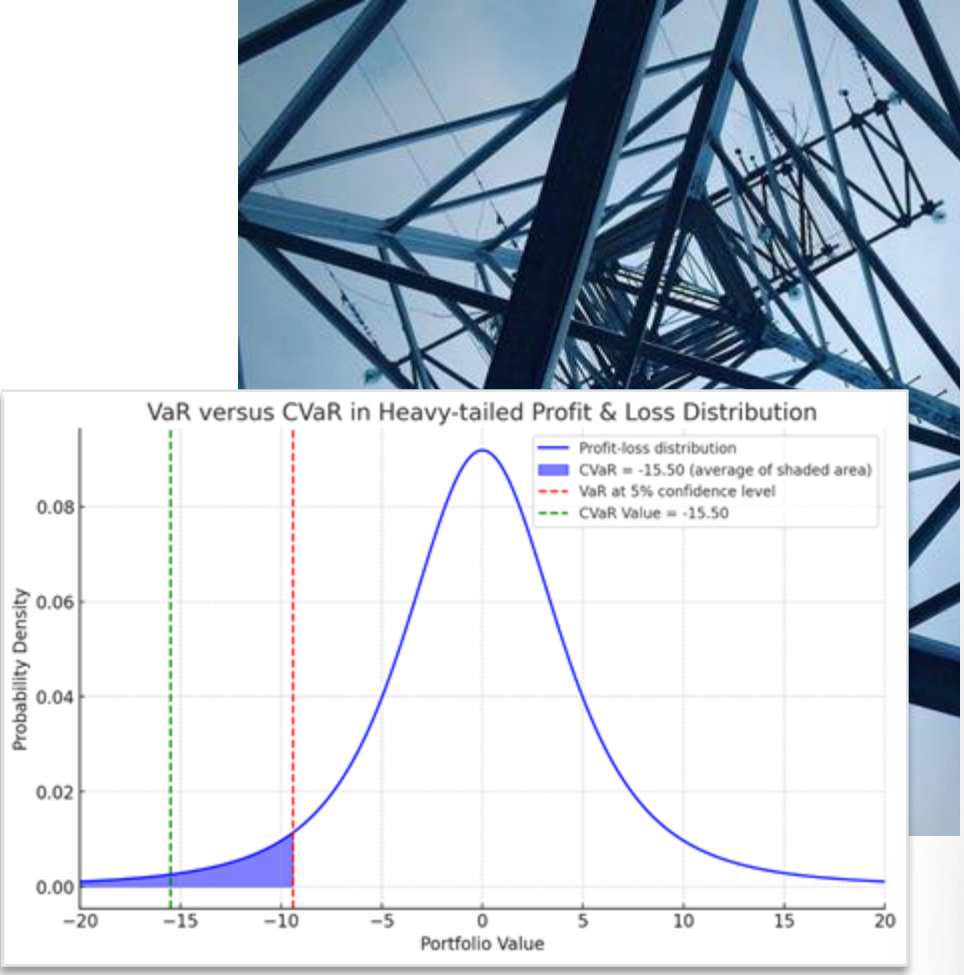
CVaR Constrained Optimization



Goal: Optimally allocate volumes between PPA and short-term trading to maximize the overall portfolio value while keeping the Conditional Value-at-Risk (CVaR) within a specified limit.

CVaR is a risk measure for this strategy, representing the average of all potential losses exceeding the Value-at-Risk (VaR). This metric is also known as expected shortfall, average value-at-risk, or expected tail loss.

It is preferred because it captures extreme risk (tail risk) and provides a more comprehensive risk assessment than VaR, ensuring that the strategy is robust against unlikely but severe potential losses.

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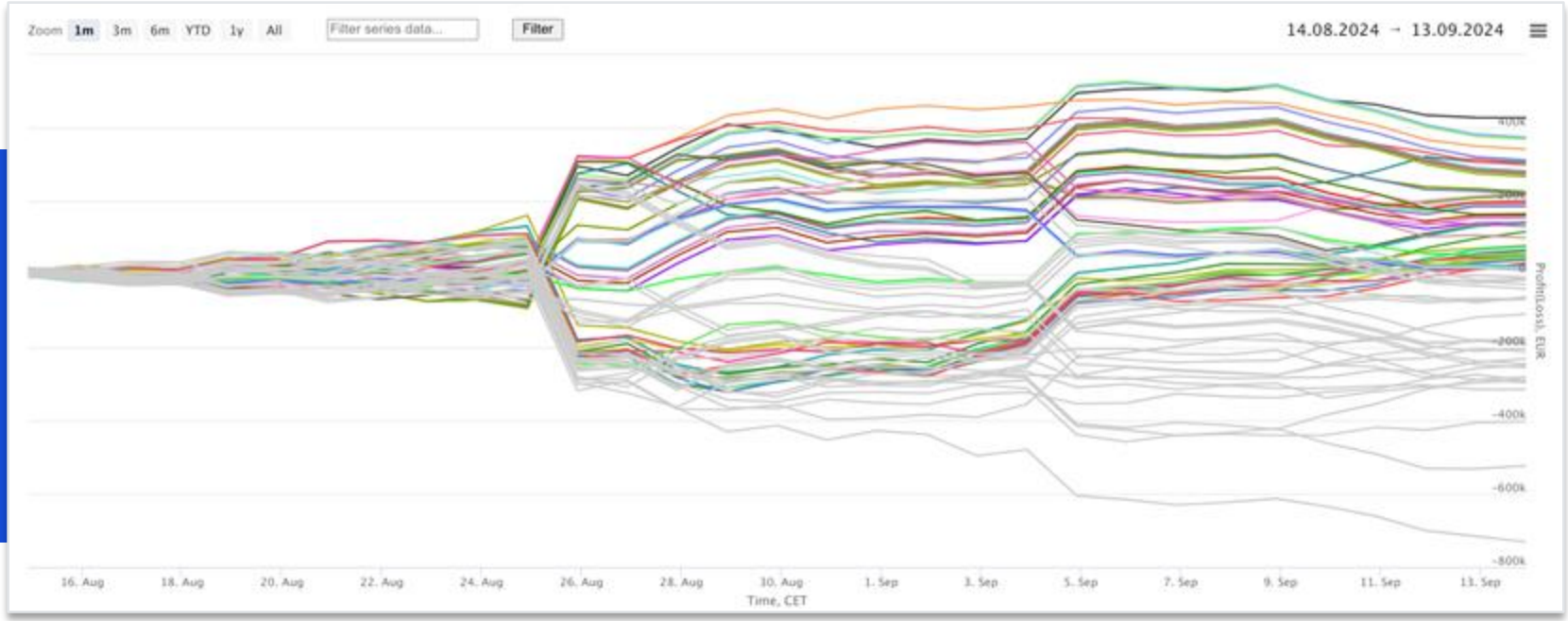
Scenarios for Short-Term Trading Revenues over a 1-Month Horizon

Accumulated Daily P&L



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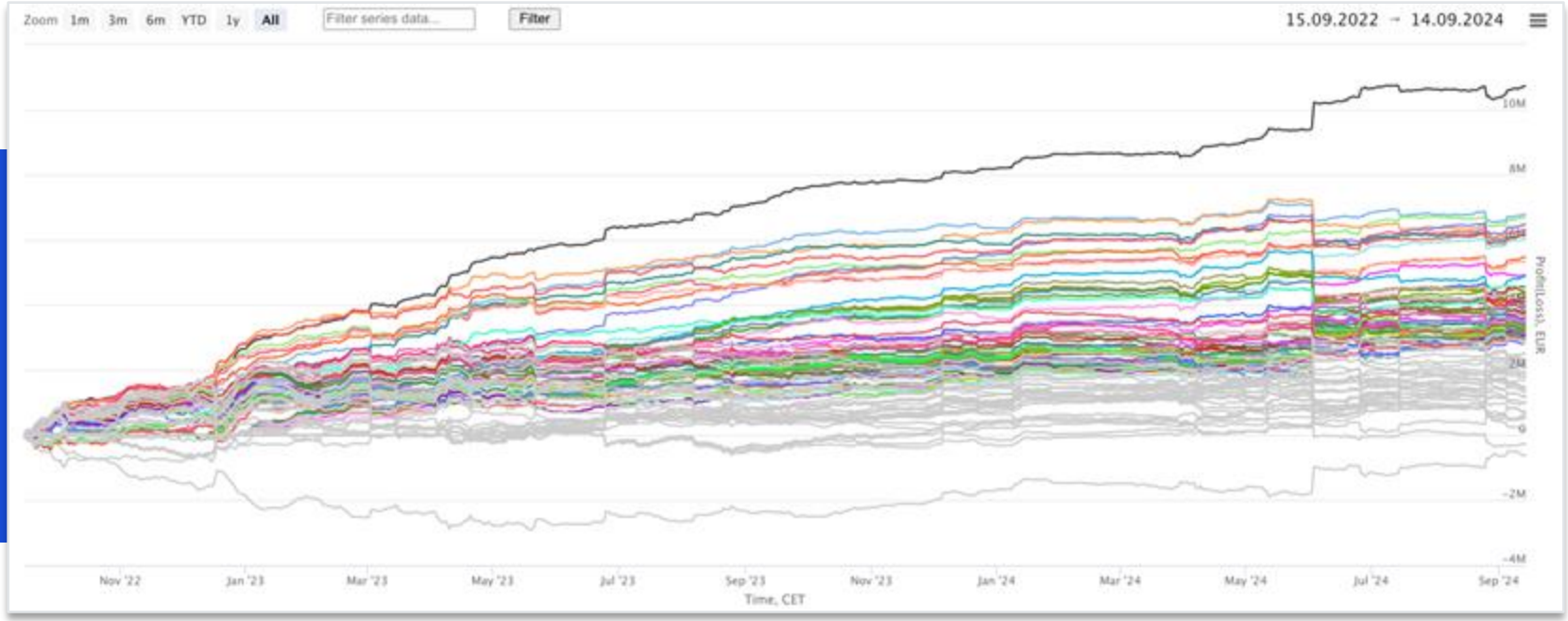
Scenarios for Short-Term Trading Revenues over a 2-Year Horizon

Accumulated Daily P&L



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Stochastic Optimization Algorithm

- Employs stochastic linear programming to determine the best mix of fixed and variable investments, aiming to maximize returns within risk limits.
- Dynamic Allocation: Regularly adjusts the investment mix based on new market data and risk evaluations.
- Scenario Analysis: (Stress-)Tests potential future market scenarios to ensure the strategy adapts to changes in regulations or market dynamics and remains effective.

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Let’s Dive Deeper

- Back-testing of your wind/solar assets
- Shadow trading of your portfolio
- Live trading with market execution