5 Valuing Demand Response as a Flexibility Resource in Spot and Balancing Markets

Context

Demand response (DR) can provide flexibility by reducing or shifting consumption in response to price signals. This project evaluates the economic value and risk profile of a DR portfolio.

Objectives

- Model a simple DR product that responds to high prices or explicit activation.
- Quantify revenues from DR in spot and/or balancing markets.
- Analyse risk and compare with alternative flexibility options.

Data

- Historical spot prices (and optionally balancing prices),
- Typical load profiles for participating consumers (see e.g., `https://figshare.com/articles/dataset/ELMAS_dataset/23889780`)

Suggested Tasks

1. Specify a DR scheme (e.g. load sheds when price exceeds a threshold or upon operator request).
2. Define technical limits: maximum reduction, number of activations per day/week, rebound effect.
3. Compute DR revenues under a given remuneration scheme (e.g. capacity payment + activation payment).
4. Evaluate the impact on consumer cost and on the aggregator's revenue and risk.
5. Explore different thresholds, capacities and price scenarios.