



Input presentation

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## Flexibility participation in wholesale markets

# Flexibility Participation in Wholesale Markets

Displacing thermal generators requires flexibility participation in day-ahead & intraday markets

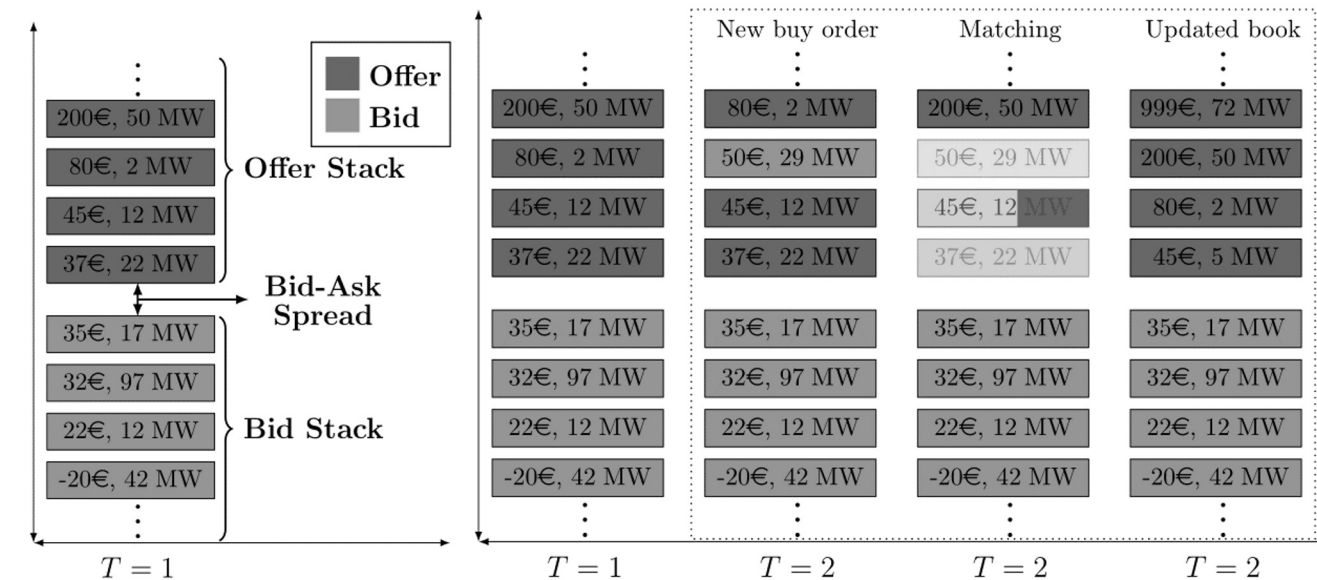
- **Flexible Resources:** How to participate?
- **Market Design:** How to facilitate participation?



# Mechanisms of Day-Ahead and Intraday Markets

## Continuous Trading

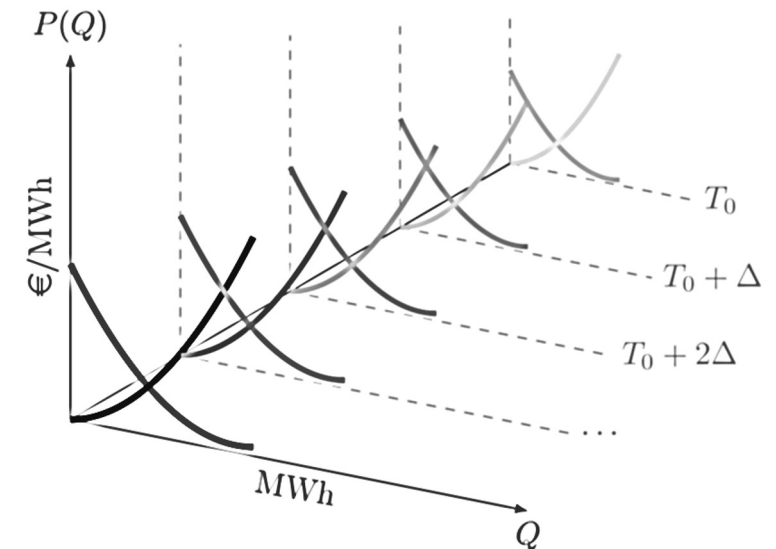
- Bids are matched on a first-come-first-serve basis
- Inefficient allocations & unreliable price signals



Graf, C., Kuppelwieser, T., & Wozabal, D. (2024). Frequent auctions for intraday electricity markets. *The Energy Journal*, 45(1), 231-256.

## Frequent Auctions

- Bids are collected and cleared on a social welfare maximisation basis

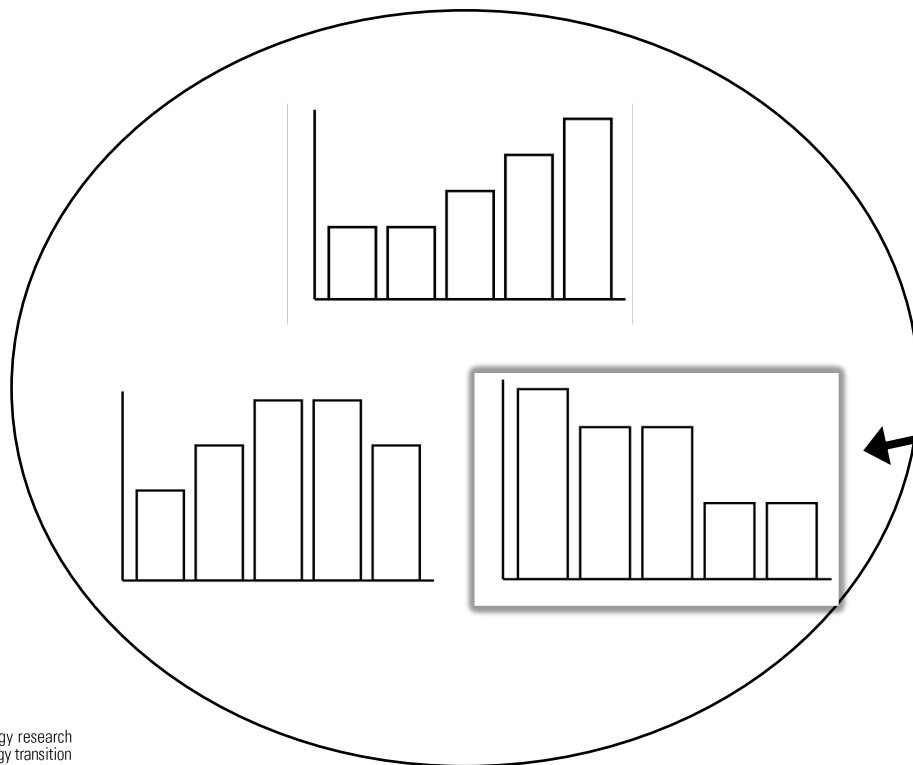


# Bid Formats in Auctions: How to communicate flexibility?

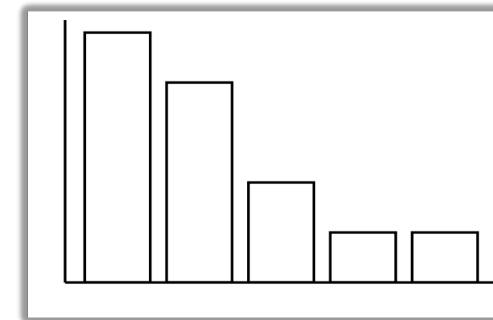
## Flexible resources have complicated physical constraints

- Bid multiple feasible power profiles (*exclusive group of profile bids / XOR bid*)
- Smart market clearing algorithm selects profile which matches renewable production

**Flexible demand buy bid**



**Renewable sell offer**



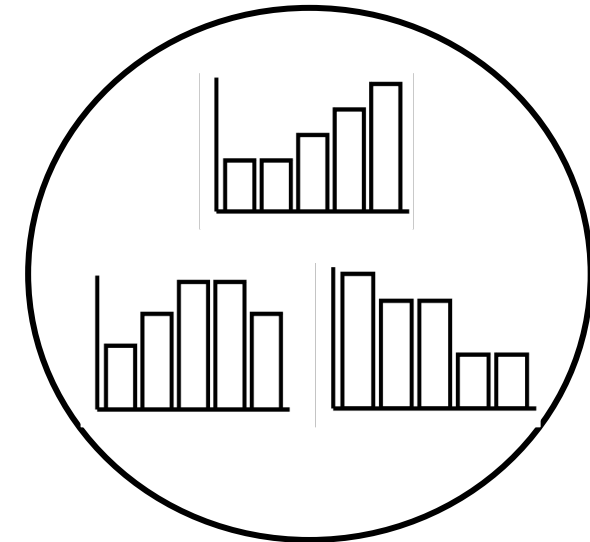
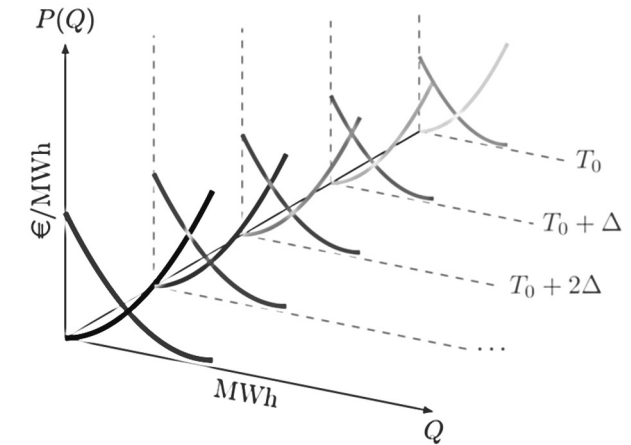
# Overcoming Market Barriers for Flexibility

## Mechanisms of Day-Ahead and Intraday Markets

- Move away from continuous trading
- Batching of bids & orders in frequent intraday auctions

## Bid Formats in Auctions: How to communicate flexibility?

- Group of profile bids (XOR bid) suitable tool
- Increase the permitted number of profiles in groups



Introducing **frequent intraday auctions** and **revising bid formats** in the current wholesale market design would enhance flexibility utilization.