Challenges in planning RES integration into electricity systems

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Decarbonization

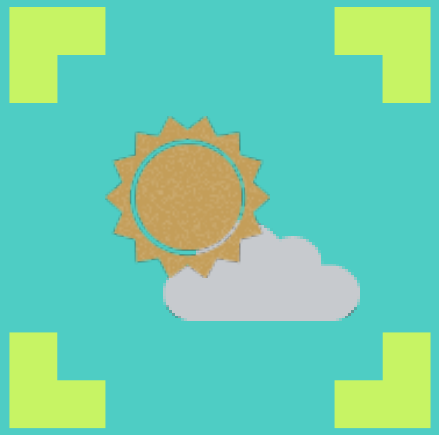
and

Decentralization

Need to integrate RES into systems and markets in a sustainable way

Challenges

- Networks congestion
- Managing intermittent nature of RES
- RES market integration avoiding distortions
- Central management of decentralized assets
- Land planning and ecosystems



Curtailments

Intermittent RE rejected as systems were not designed to address variable energy injections

Variable renewable energy injections

Storage

Investing in storage to avoid rejecting energy of low -zero variable cost

Other forms of Flexibility

Flexible hydro capacity

Decentralised flexible demand response

Centalised flexible gas - fired units

Challenges for storage solutions

High Costs

The technological challenge is still ongoing but there are signals of significant cost reduction

Regulatory Framework

Develop rules for commercial storage use

Provide for economic signals to market participants

Centrally regulate networks involvement

Grid Operators

Overlapping shall be clearly avoided

Commercial procurement of decentralized flexibility services

Challenges for other flexible capacity

Ancillary Services

Ancillary services following ENTSO-E codes on products standardization, in some cases, may lead the flexibility parameter to be either lost or underpaid

Balancing Energy

Constraints in the pricing of balancing products and in the timing of offers submission may again lead to flexibility underpayment

Missing money

Having an energy and AS market that partially remunerates flexibility, investors will seek to recover the missing money from possible capacity markets - not a straightforward process

Bidding zero?

Bidding zero distorts spot market's reference price
– innapropriate signals for hedging

The Day Ahead market challenge

Price takers

RE, under the clean package needs to bid into the DAM and seek the maximum possible income from this market before receiving the premium

The incentive to bid zero and be dispatched contradicts the maximum income wish

Energy markets signals

Incentive to become price makers

Need to redesign the energy -capacity - markets with a view to better exploit RES capex and retail synergies

Smart decentralization

Gen Assets are decentralized, info data and synergies?

Agrregators

RES Aggregators

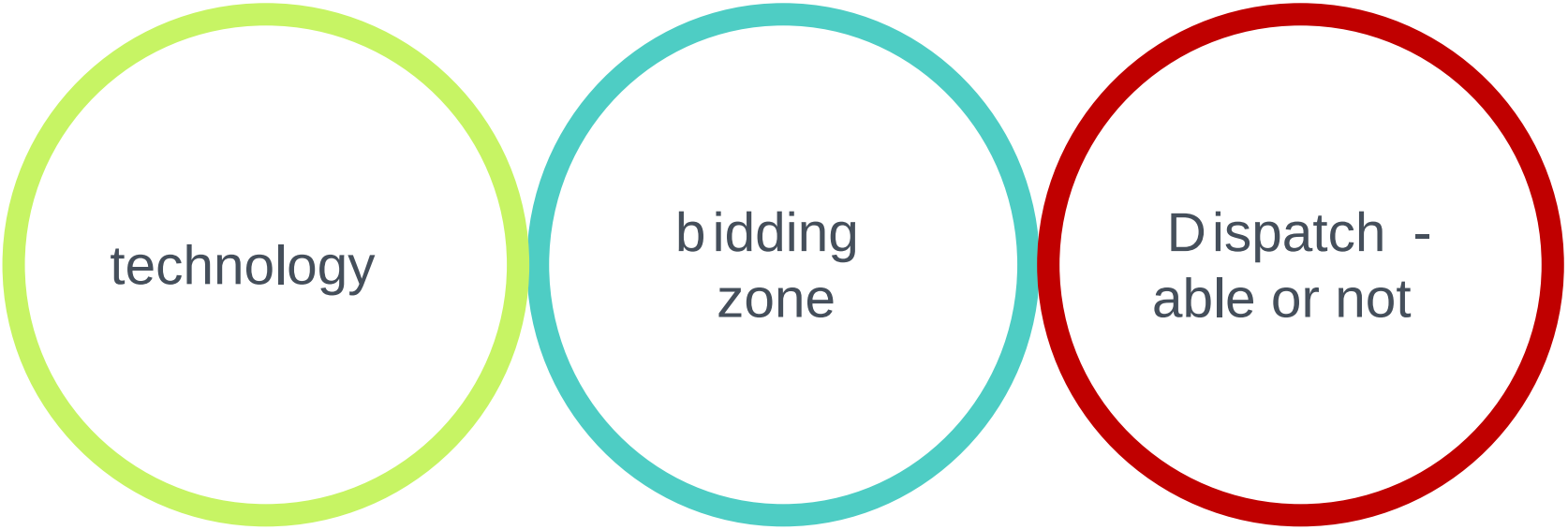
provide forecasting for small operators, manage forecasting of a team, trade forecast errors, trade dispatchable differences (balancing energy), trade imbalances

DR Aggregators

Trade dispatchable load differences through basically two models :

Either separately of the load retail supplier (trade balancing) or embedded within the retail supply (trade balancing and load imbalances)

RES portfolios for aggregation



Synergies for Agrregators

- Diverse portfolio leads to be tter system operation forecast: better system reliability for TSOs
- Economies of scale
- Managing complex rules
- Managing regulatory gaps
- Bottom up data used for better risk sharing
- Innovative solutions exploiting the bottom up approach

RES integration

- Key element in high level policy making
- Clean package to address issues revealed through painful lessons
- However, the bottom up approach in markets' design still not there

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