



Smart TSO-DSO interaction schemes, market architectures and ICT
Solutions for the integration of ancillary services from demand side
management and distributed generation

External workshop | 20.06.2018

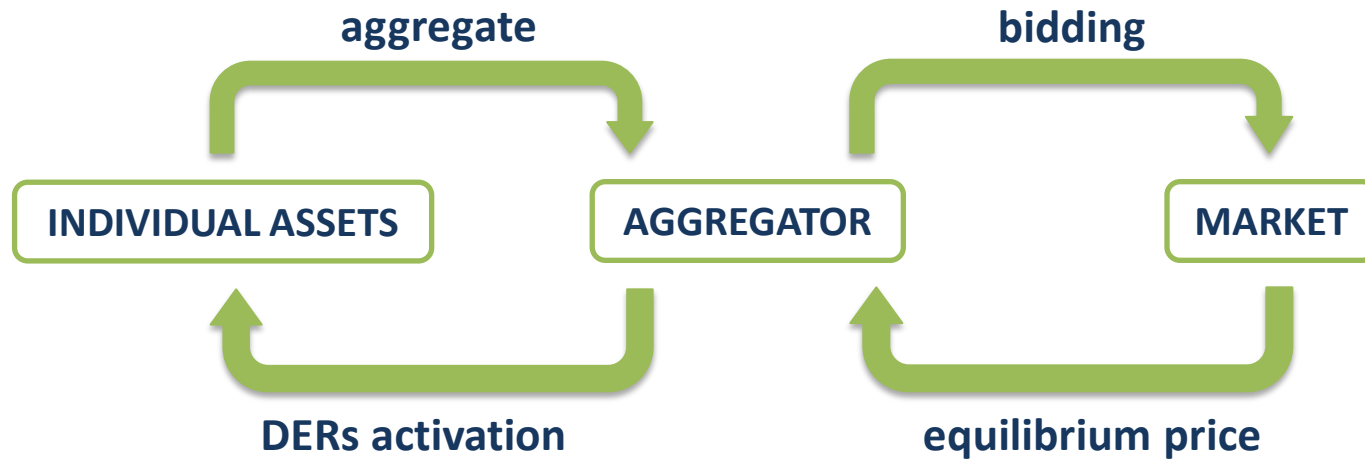
Aggregation models

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Aggregator's role



- visibility to MO (≥ 100 kW)
- filters necessary data to MO
- balance responsibility
- activation

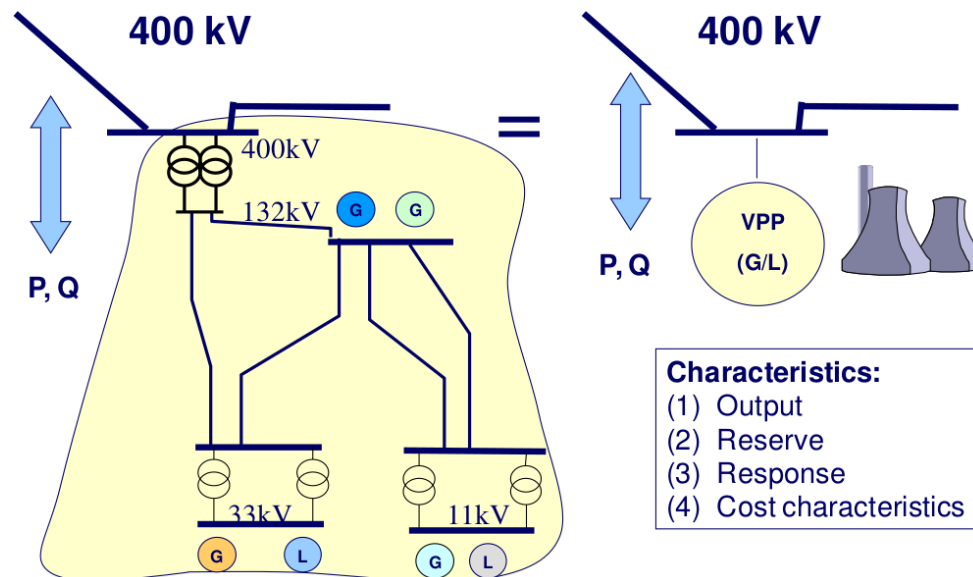
Aggregation approaches used for bidding in electricity markets:

- Physical (bottom-up) approach
- Traces approach
- Data driven approach
- Hybrid approach

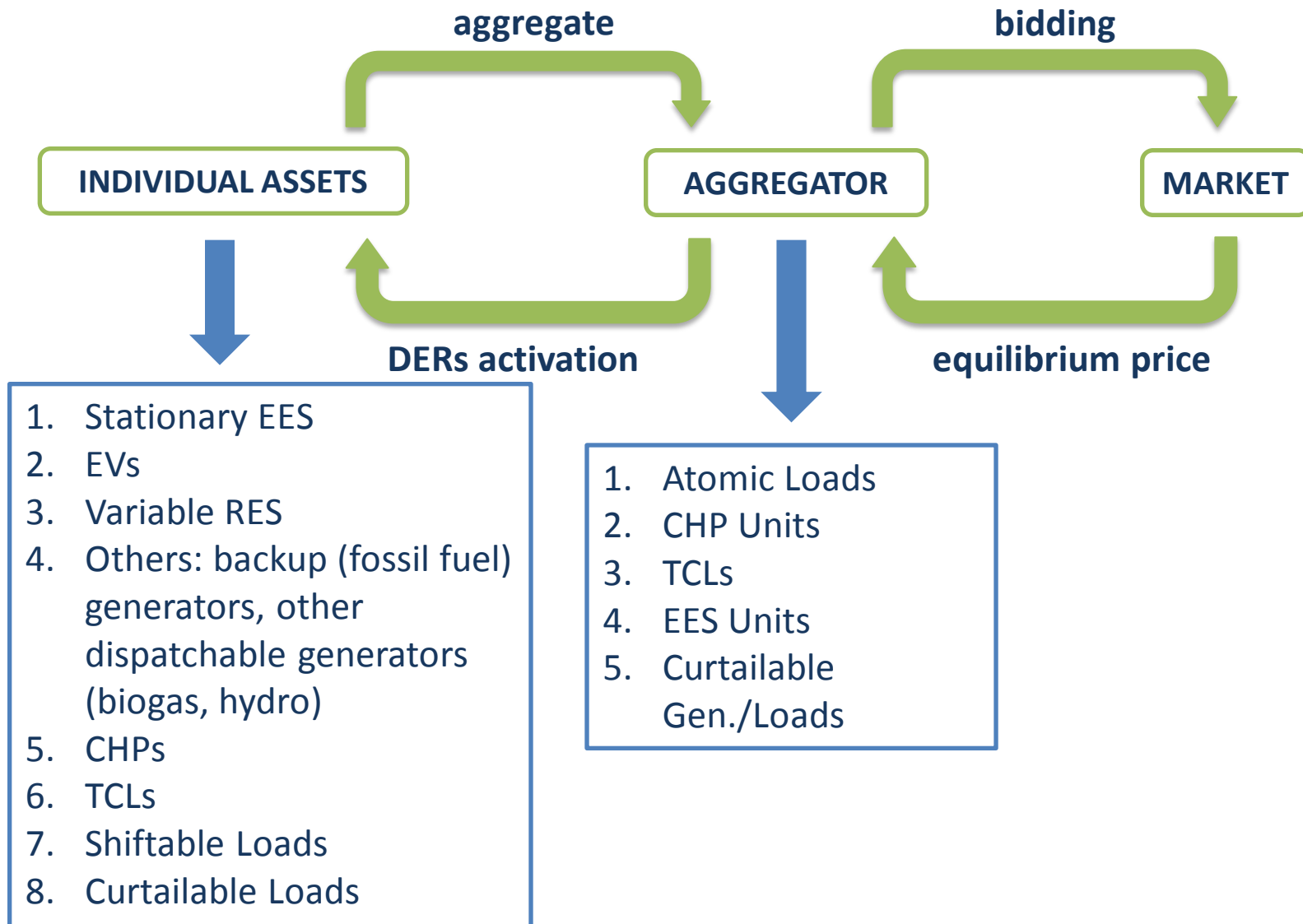
Each of them has certain advantages: accuracy, required data, disaggregation.

- aggregating household devices
- clusters of consumers
- aggregator max. revenue, sends price-volume signal to cluster
- cluster minimizes end-users' electricity bill
- access day-ahead and intraday markets
- P. Koponen et al., "Toolbox for Aggregator of Flexible Demand"

- single aggregation model
- physical approach
- agg. DERs @ trans. – distr. interface, concept of VPP
- D. Pudijanto et al., "VPP and system integration of DERs"



Aggregation models (1)



Model	Aggregation approach
CHP Units	Physical
Curtailable generation and curtailable loads	
EES Units	
TCLs	
Atomic Loads	Traces

- **Physical (bottom-up) approach**

The aggregator knows all parameters of DERs and its real time status.

- ✔ The disaggregation is straightforward.
- ✘ Potentially hard to implement when many heterogeneous energy resources are included.

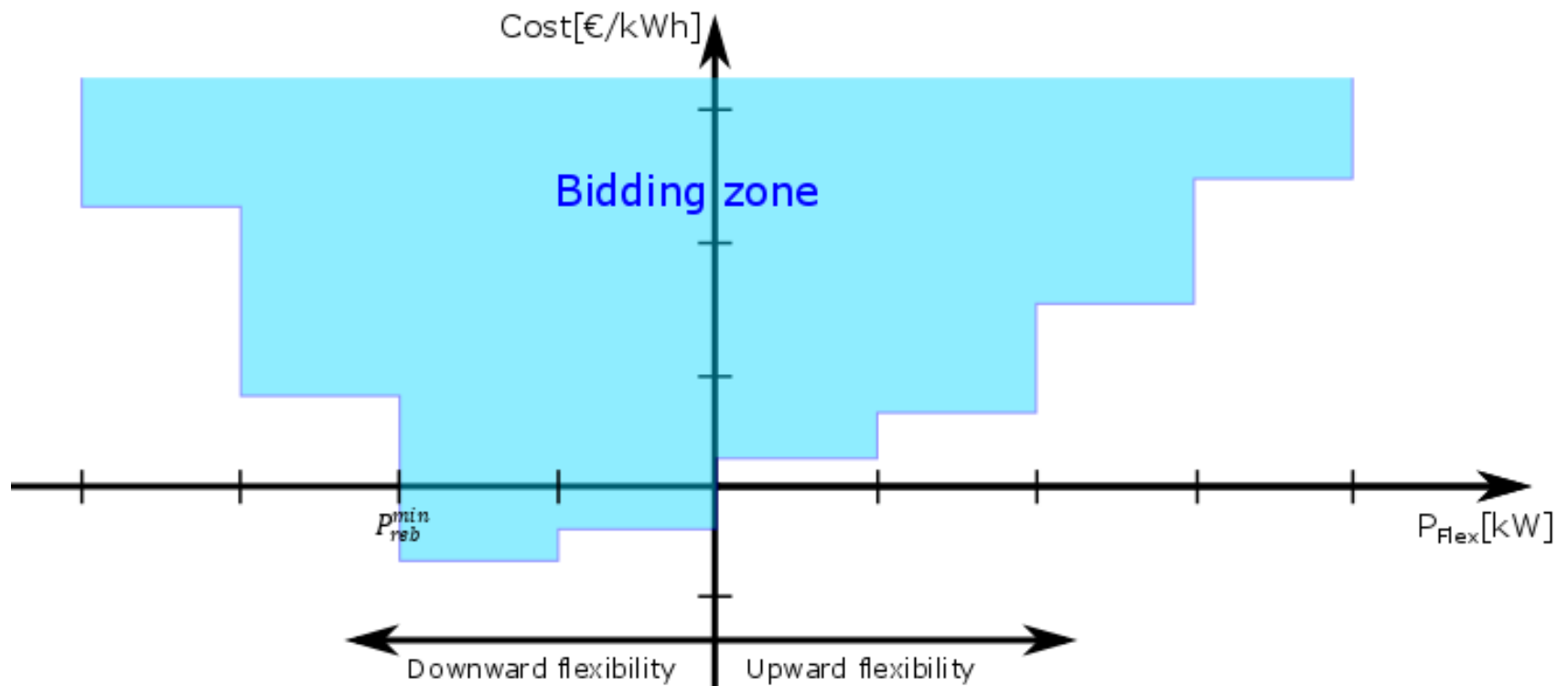
- **Traces approach**

Characterized by load profiles and the cost associated to each profile, and not by the exact physical DERs' characteristics.

- ✔ The disaggregation is straightforward.

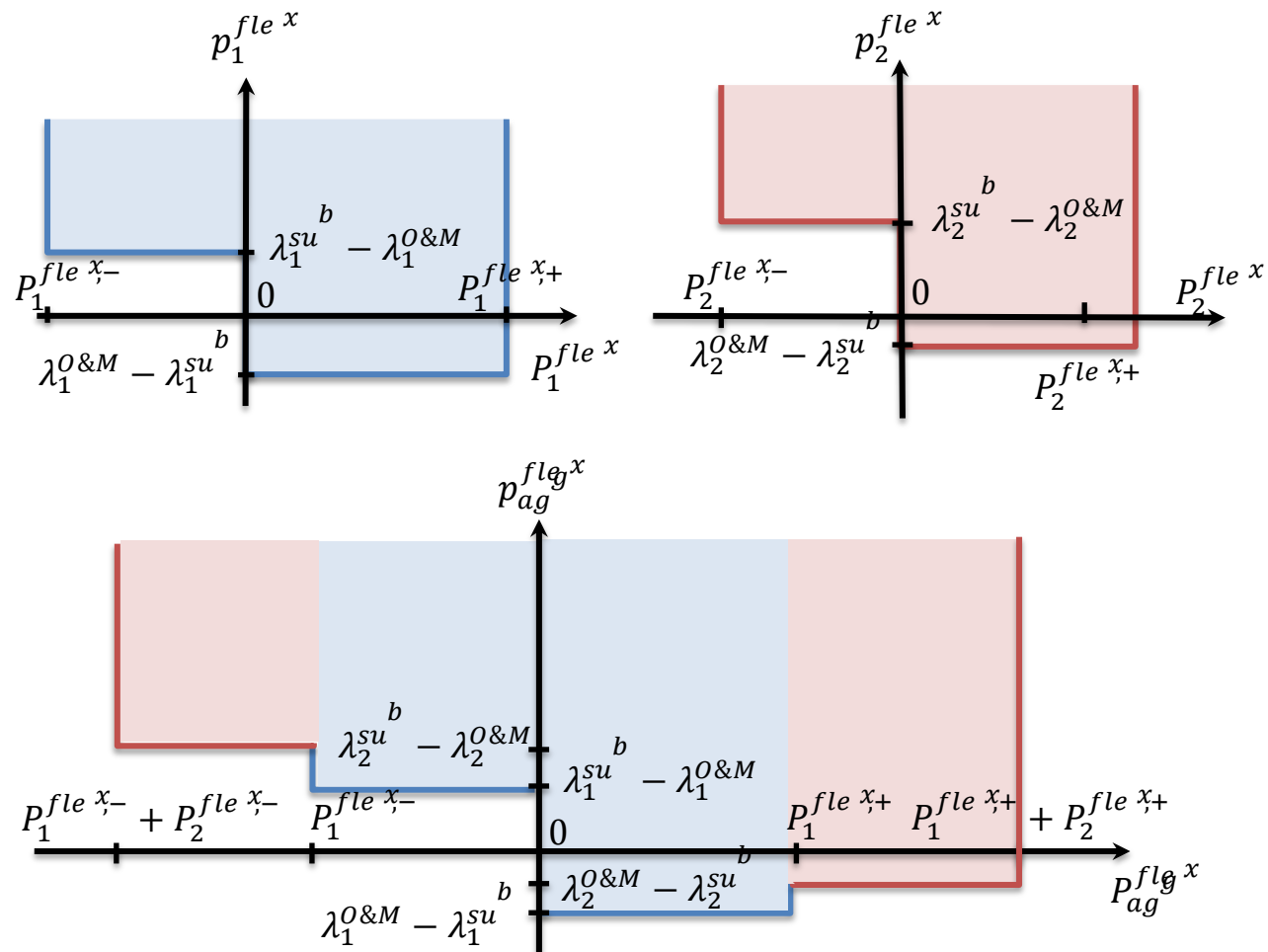
CHP units bidding curve

- zero corresponds to baseline power

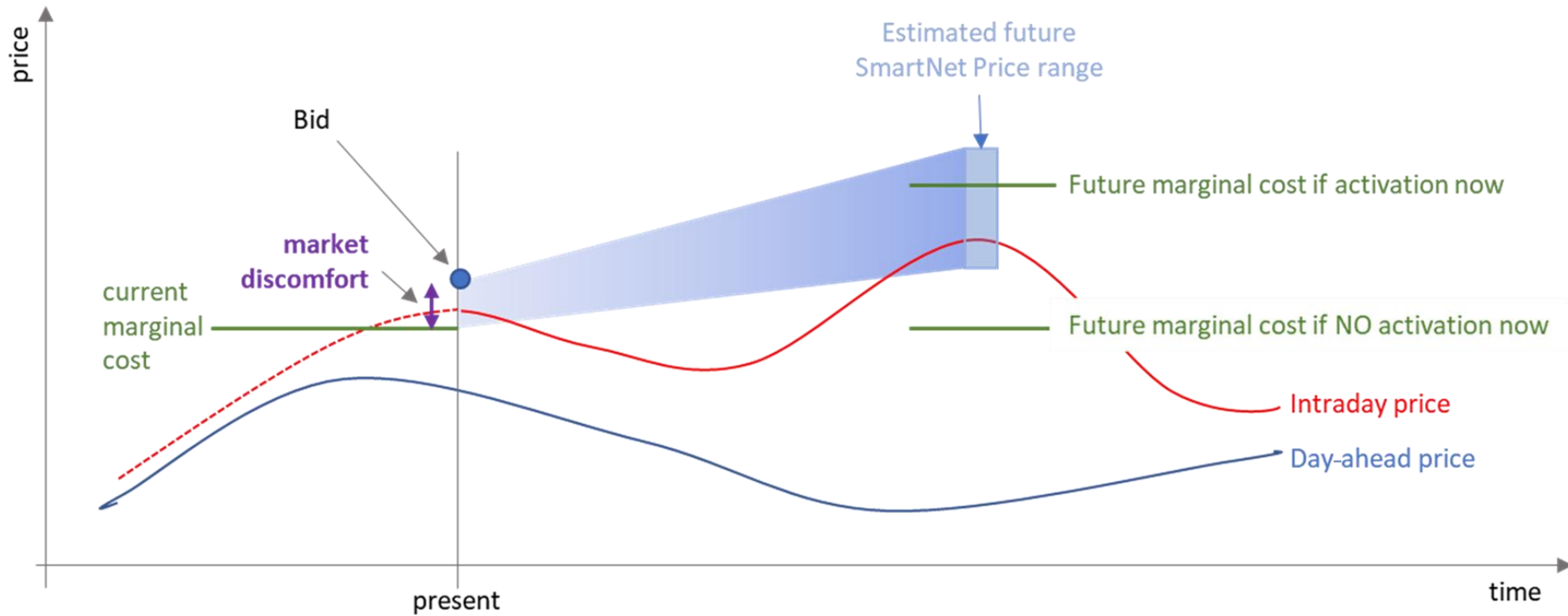


Curt. gen. bidding curve

- zero corresponds to baseline power



Market discomfort cost



(source: Miguel Marroquin)

- valorise the benefit of a **future** activation vs. current activation



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Aggregation models

D2.1

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- M. Dzamarija et al., “D2.1: Aggregation models” (24/05/2018)
- H. Marthinsen et al., “Aggregation model for curtailable generation and sheddable loads”
- J. Camargo et al., “A network flow model for price-responsive control of deferrable load profiles”
- smartnet-project.eu



<http://smartnet-project.eu/>

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