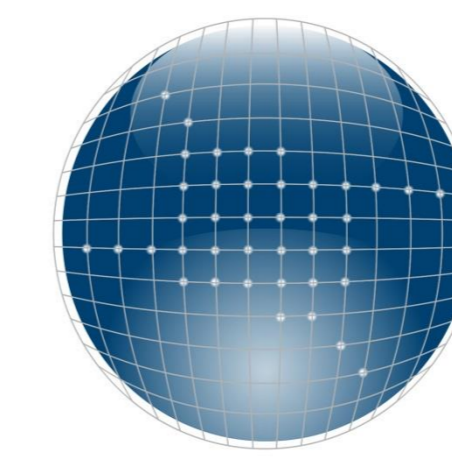


SIMULTANEOUS ASCENDING AUCTION: A LOCAL FLEXIBILITY MECHANISM TOOL

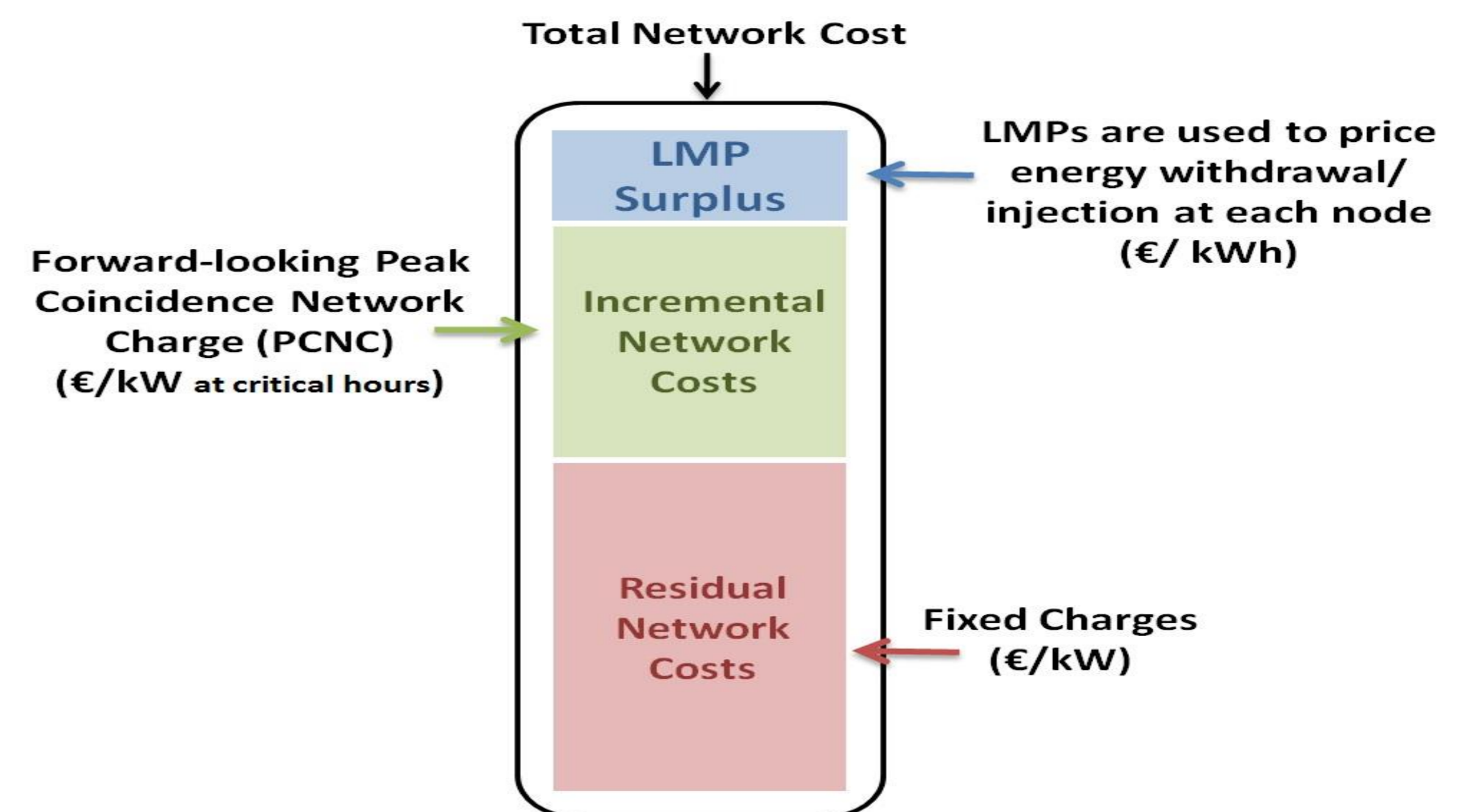


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Need coordination mechanisms in the context of active electricity costumers

Coordination of local resources is required to efficiently utilize the increasingly flexibility available from customers in the short-term and investment in distributed energy resources (DERs) in the long-term. Local Flexibility Mechanisms (LFMs) complement efficient distribution network charges. Such mechanisms will lead to efficient end-user responses, integration of new flexibility services, avoidance of unnecessary network investments and consequently lower total system costs. One type of LFM is presented here: short-term LFM that operates through Simultaneous Ascending Auction (SAA). SAA operates within the day-ahead time frame. When network peak hours are expected the next day, SAA operates to utilize customers' flexibility by allowing them to book their network capacities in advance, and hedge against expected high distribution network charges.



Distribution Network Charges

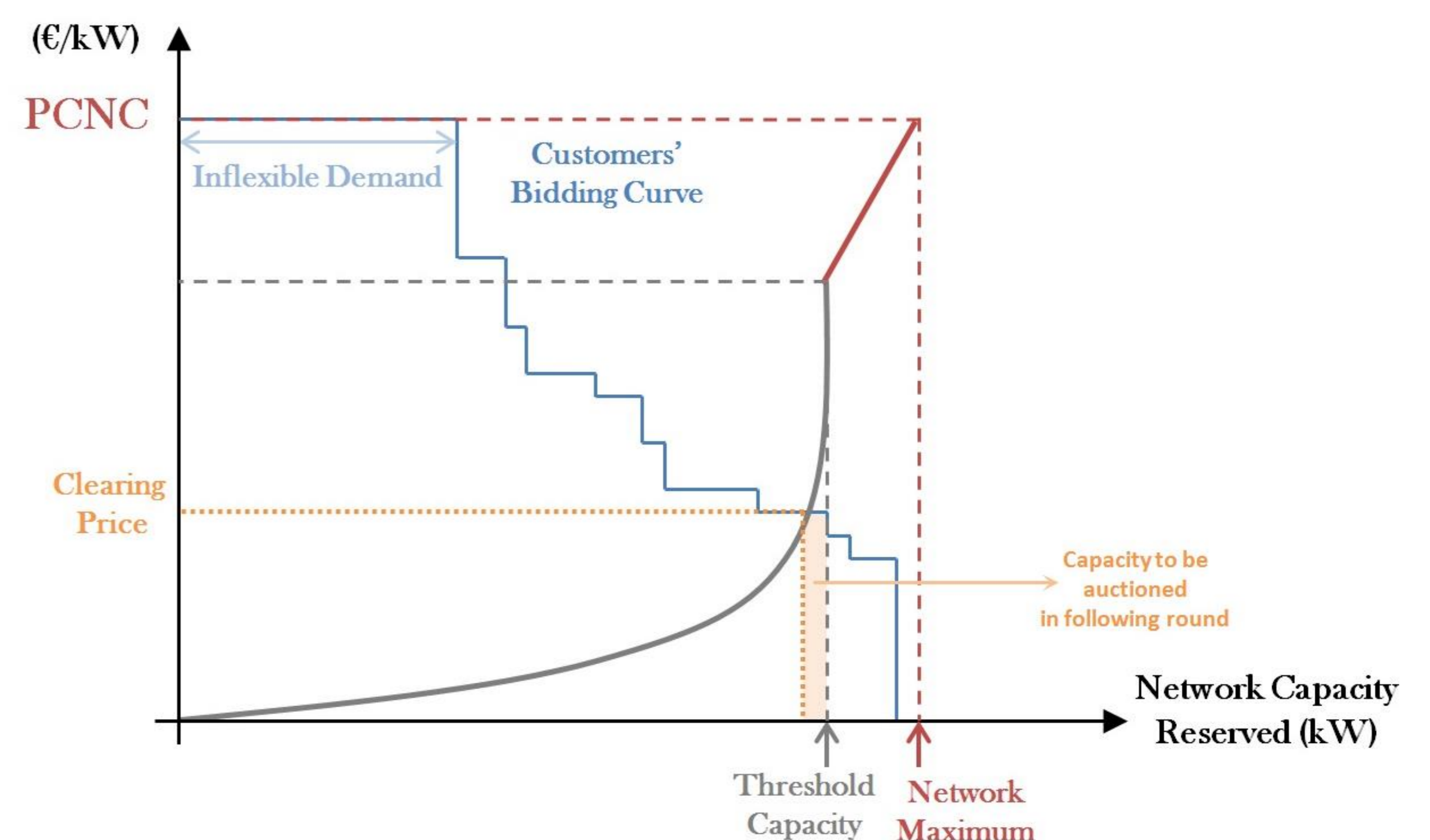
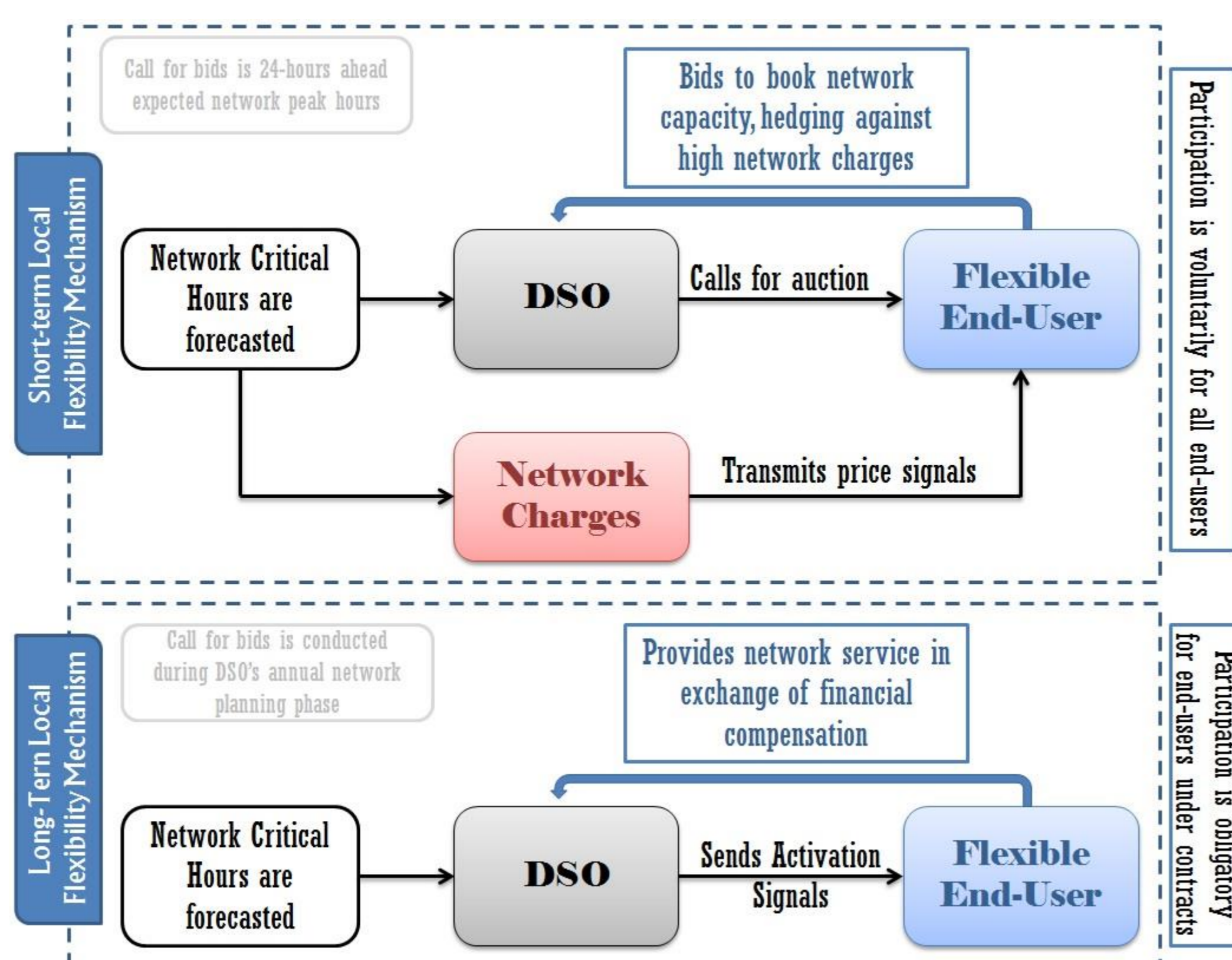
Short-term LFM follows an efficient distribution network charge design that consists of two parts:

- 1- Peak Coincidence Network Charge (PCNC): is allocated to customers based on their contribution to network's peak hours, which are identified based on a pre-defined capacity threshold. PCNC is

applied only when the network reinforcements are needed due to increase in the network's utilization level.

- 2- Fixed Charge: aims to recover residual network costs in a way that does not distort economic signals established through cost-reflective dynamic PCNC.

Uncoordinated response of consumers to PCNC can shift network peaks and overinvestment in DERs.



What is new about LFM?

Short-term LFM differs from flexibility markets discussed in the literature as follows:

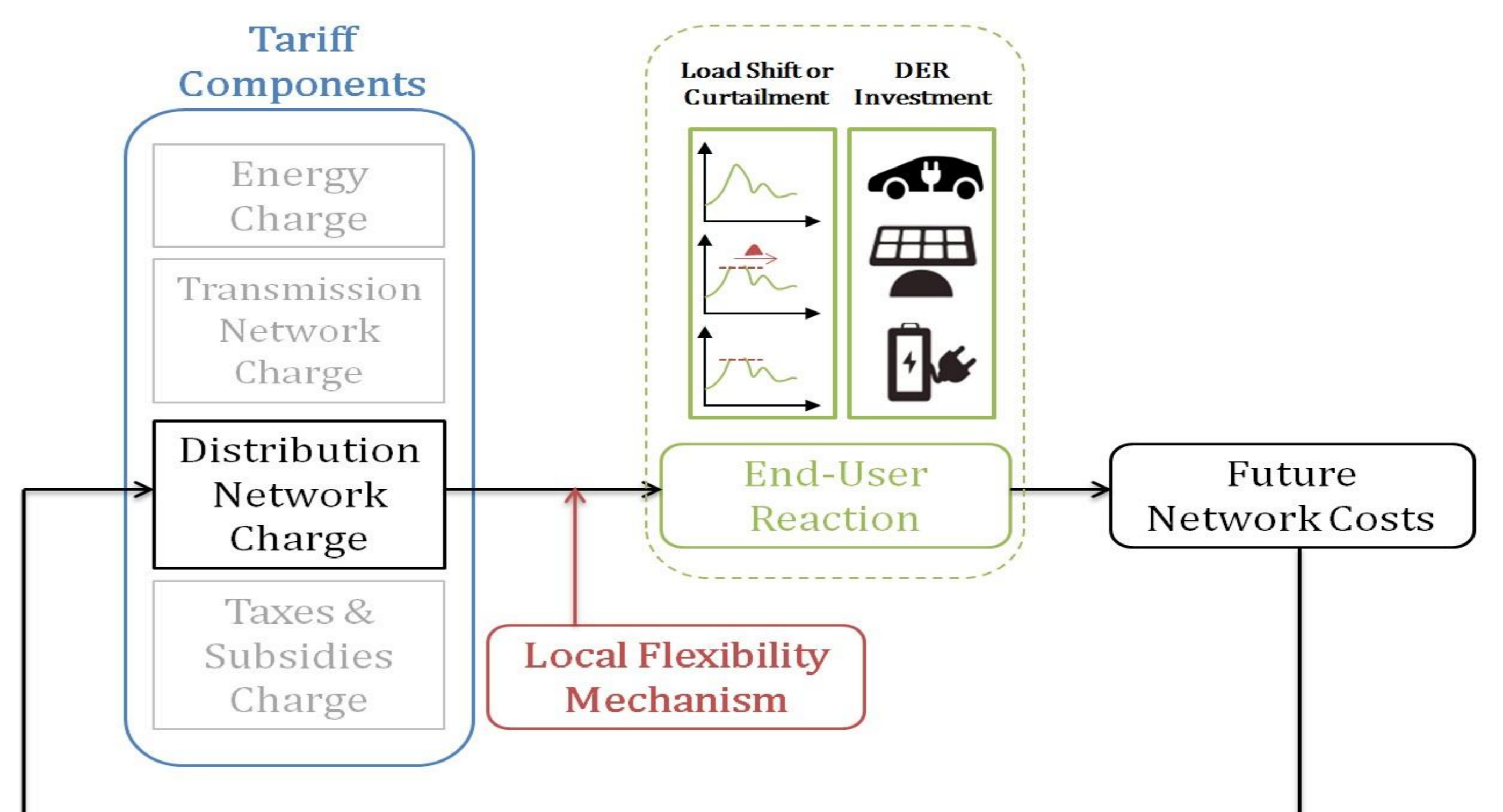
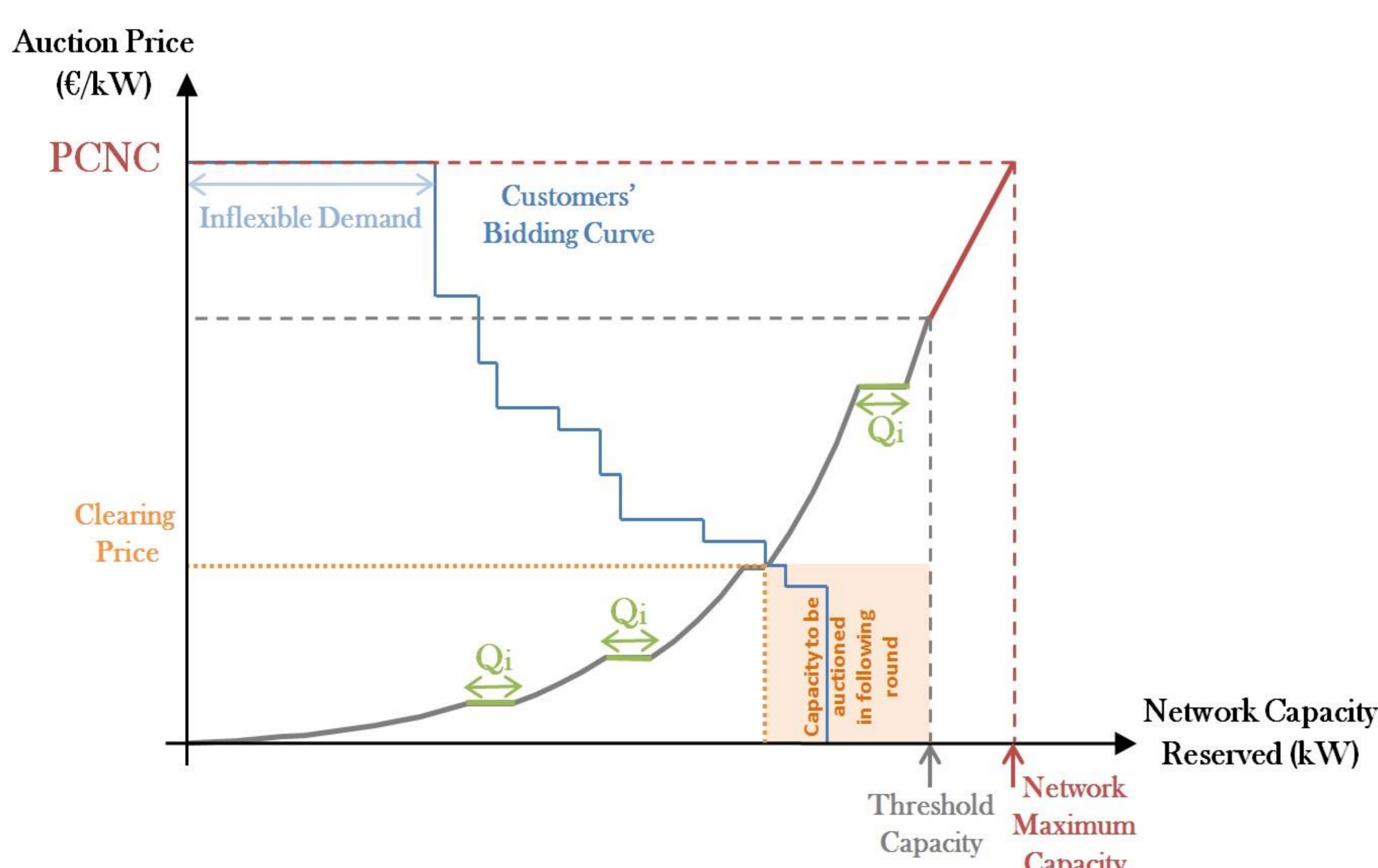
- 1- LFM is linked to distribution network charges, whereas flexibility markets are generally detached from network charges.
- 2- In LFM, customers reserve network capacity during peak hours, rather than offering their flexibility services through increase or decrease in their energy injections/withdrawals.
- 3- In LFM, there is no financial compensation, instead customers hedge against expected high network charges.

How does SAA work?

When peak hours are forecasted in day ahead, customers are invited to participate in the SAA to book their network capacities in advance for peak and borderline peak hours. Each customer bids a series of paired capacities and prices. Bids are then ranked in merit order, with the highest

account for inflexible demand. The auction clears at a uniform price set by the marginal bid intersecting the capacity-price curve.

During real-time, if the network's utilization level exceeds the threshold, unreserved capacities will be charged the PCNC.



Network injection bids in SAA

Prosumers can also bid in SAA with generation injections. The injection bids are added to the network capacity-price curve, allowing more network capacity to be booked at lower prices.

Different resources can be incorporated in this mechanism, including: distributed generation, energy storage, demand response, etc., which can bid in the demand or supply side.

Conclusion

LFM complements network charges to enhance and coordinate customers' responses. It allows customers to offer their flexibility services in an efficient way. According to their willingness to pay, and frequency of peak hours, network injections and withdrawals can be integrated within the

SAA mechanism. This mechanism helps system operators to manage network's increasing utilization and put on the same footing wires and non-wires solutions.