

# Locational pricing in GB

## Potential market arrangements



20.10.2022

## Aim of our implementation assessment of locational pricing in GB



Understand the market arrangements required to enable and facilitate locational pricing.



Identify and understand likely implementation requirements and associated challenges and constraints.



Consider deliverability of required changes, with regard to legislative framework and wider policy arrangements.



We are considering different high-level design options, which are currently used for arranging these markets.



Thinking to date has been informed by:

- A review of market arrangements in other jurisdictions,
- On-going discussions with bodies that would be involved in implementation, eg ESO and Elexon, and
- Conversations with leading academic experts in the area of electricity wholesale market designs.

**It is highly likely that the introduction of either zonal or nodal pricing would require considerable changes to the electricity wholesale market arrangements, and how market participants interact with one another.**

## This session



The aim of this session is to share and discuss our current thinking to build collective understanding and inform our assessment.



This is not an Ofgem proposal for future market arrangements. More detailed design of market arrangements and implementation processes is subject to Government's work on REMA and would require coordinated decision-making and change management across government and industry. This is beyond the scope of this assessment.

Locational pricing may have implications on access rights to the transmission network. The level of granularity in the pricing signals affects how participants access the market and the scale of redispatch needed at real time to respect thermal transmission constraints.

## National pricing

## Zonal pricing

## Nodal pricing

Firm access rights to entire network.

Firm access rights within zone but non-firm rights to other zones.

Firm access rights at node but non-firm access rights to other nodes.

Before  
real time

Any position is accepted without consideration of transmission constraints.

Positions may not exceed inter-zonal constraints (but may exceed intra-zonal constraints).

Positions may not exceed any transmission constraints.

Real time

Redispatch of intended positions to resolve any transmission constraints.

Redispatch within zones to resolve intra-zonal constraints.

Much reduced redispatch needed to resolve constraints.

Outcome

### Overarching theoretical dispatch objectives (not exhaustive):

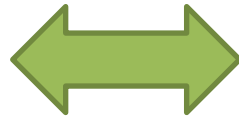
1. **Feasibility** – The pattern of injections and withdrawals within the network and resulting power flows must be feasible.
2. **Efficiency** – Dispatch resources at least cost.
3. **System reliability** – Ensure the system can handle contingencies within a sufficiently short time.

# Theory of market arrangements facilitating locational pricing

*How are market arrangements achieving the dispatch objectives?*

The market arrangements would need to be designed in a way that facilitates the locational pricing signals. Scheduling and dispatching of resources in the wholesale electricity market can be either centralised or decentralised.

**Centralised (or “central scheduling”)**  
Participants submit bids/offers and the market operator optimises the schedule, e.g. how much should be produced by each unit already ahead of real-time.



**Decentralised (or “self-scheduling”)**  
Producers decide how much they want to commit and how they produce it.

Central scheduling allows the SO to create a financially binding schedule that respects the relevant transmission capacity, provides clear operational price signals and reduces the need for real-time re-dispatch.

## National pricing

**Scheduling can be centralised or decentralised.**

## Zonal pricing

**Inter-zonal scheduling is centralised - but could, e.g., be shared responsibility of multiple Market Operators** (c.f. Internal Energy Market).

## Nodal pricing

**Scheduling is typically centralised in any market with nodal pricing** (self-commitment is possible, e.g. for price takers).

Before  
real time

Real time

**Real-time balancing and dispatching is done centrally in any market.**  
E.g. Balancing Mechanism in GB

Before real time

## Forward market

- Hedging against short-term price uncertainties.
- Bilateral trading (including standardised over-the-counter products via brokers) or via exchanges.

## Day-ahead and intraday markets

- Organised marketplaces to pool liquidity and refine previously traded positions on day-ahead scale.
- Facilitated by independently operating Power Exchanges.
- Enable cross-border trading via interconnectors.

Until Gate Closure (60min ahead): Submission of intended positions to ESO via Physical Notifications (PN).

Real time

## Balancing Mechanism

- Real-time balancing of demand and supply, solving of network constraints and reliability requirements.
- BMUs submit bid/offers to *deviate* from PN. Pay-as-bid.

Post delivery

## Settlement

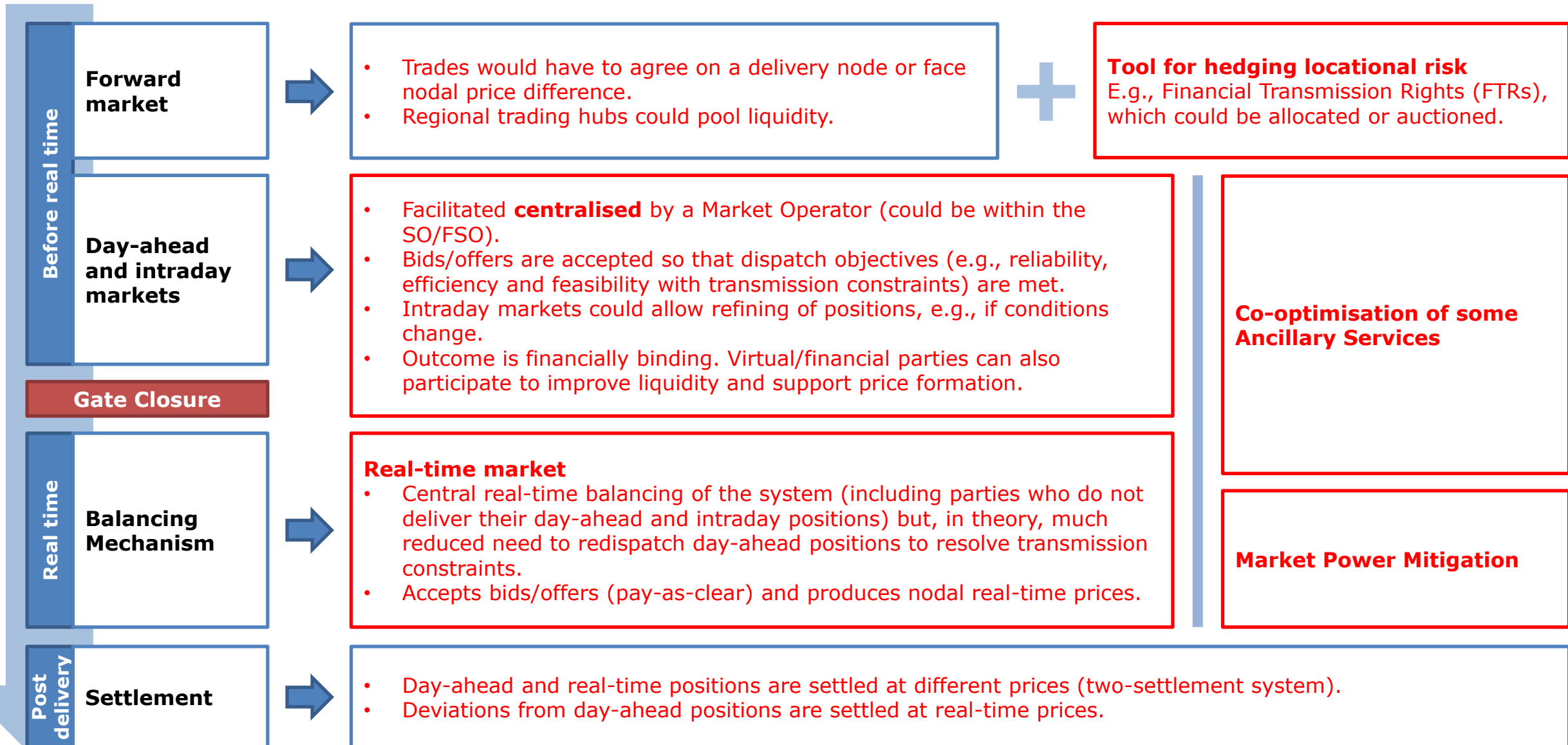
- Settlement of imbalances between contracted and metred positions through Elexon.
- Settlement of day-ahead and intraday trading done by Power Exchanges

## Ancillary services

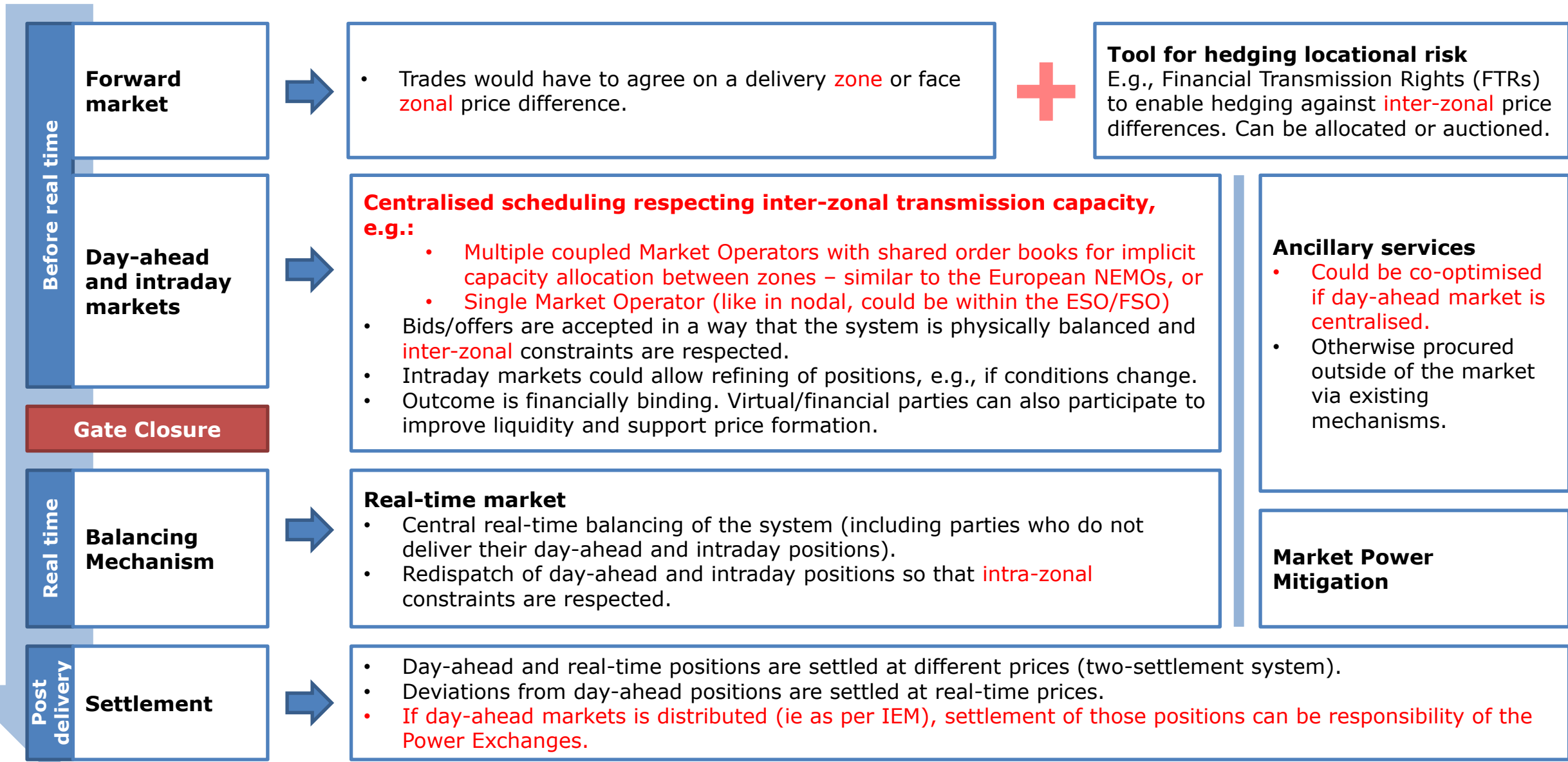
- Providing for non-energy needs of the system, such as frequency reserve, reactive power, voltage support and black-start capability.
- Procured competitively by the ESO outside of the energy market via auctions or tender for each ancillary service product.

## Market Power Mitigation

# Potential market arrangements for nodal pricing in GB



# Potential market arrangements for zonal pricing in GB



**As part of our assessment of locational pricing, we are considering different high-level options for market arrangements that would facilitate locational pricing.**

**It is highly likely that the introduction of either zonal or nodal pricing would require considerable changes to the electricity wholesale market arrangements, and how market participants interact with one another and the System Operator.**

- Markets with locational pricing have more coordinated scheduling arrangements compared to current GB market arrangements. These arrangements ensure that relevant transmission constraints are already respected ahead of real-time.
- In GB, this could lead to a transition from current self-scheduling arrangements to scheduling through a central day-ahead market. This could be supported by intraday markets to increase short-term flexibility.
- With zonal pricing, scheduling could also be done through coupled Power Exchanges, similar to current Internal Energy Market (IEM) arrangements.
- Centralised scheduling constitutes a significant change from current market arrangements, particularly for market participants. The opportunities and challenges associated with this require further careful consideration.

**We note that these slides are not an Ofgem proposal for future market arrangements. We welcome further conversations with stakeholders on potential market arrangements for locational pricing.**

More detailed design of market arrangements and implementation processes is subject to Government's work on REMA and would require coordinated decision-making and change management across government and industry. This is beyond the scope of this assessment.



