Energy and Non-Energy Actions

Why flag and tag?

I-SEM HLD

4.5.17 The classification of energy and non-energy balancing actions will be a key feature of the balancing market. Non-energy bids may be taken by the TSOs from the same set of bids and offers as energy balancing but will be treated differently in pricing. Therefore the TSOs will be required to put in place a system to identify energy and non-energy actions.

Flagging and tagging seeks to avoid “system pollution” of energy imbalance prices, such that pricing reflects the costs of activating balancing energy and not the operational requirements of a secure power system.

Distinguishing energy & non-energy actions

Method	Approach	Examples
Cause	• Attempt to identify the primary driver for each balancing action	• GB BM applies mechanistic tagging rules to identify actions related to constraints or of short duration (<15 mins) • Nordic regulation market flags actions taken out of price order or of short duration (<10 mins)
Price	• Determine an unconstrained marginal price via optimisation • Actions more expensive than the marginal price are deemed non-energy	• US ISO markets typically calculate a real time marginal price (e.g. every 5 mins) which is then averaged over the (e.g. hourly) settlement period • US markets settle pay-as-bid for units instructed over market price, and apply off-market dispatch and settlement for reliability must-run units • In GB, NIV tagging removes the most expensive actions from price-setting (if above net imbalance)
Timing	• TSO assumed to only conduct energy balancing after Gate Closure • Actions before Gate Closure therefore non-energy	• TSOs in markets such as Germany typically “do not change the big number” while the intra-day market is still open • Assumes the TSO can secure the system by gate closure without impacting the market imbalance (non-energy actions always offset)

Relevant non-energy action types for I-SEM?

Action
Maintaining reserve headroom
Frequency response and regulation
Intra-period balancing
Maintaining SNSP limit
Positioning for inertia, ramping
Transmission constraints (thermal, voltage, transients)
DSO constraints
Emergency instructions
Priority dispatch
Maintaining I/C transfer capacity
SO-SO actions and countertrading
Wind curtailment
Testing
Load response
Automated governor response*

Relevant non-energy action types for I-SEM?

Action	GB process
Maintaining reserve headroom	
Frequency response and regulation	
Intra-period balancing	✓
Maintaining SNSP limit	
Positioning for inertia, ramping	
Transmission constraints (thermal, voltage, transients)	✓
DSO constraints	
Emergency instructions	✓
Priority dispatch	
Maintaining I/C transfer capacity	
SO-SO actions and countertrading	✓
Wind curtailment	
Testing	
Load response	
Automated governor response*	

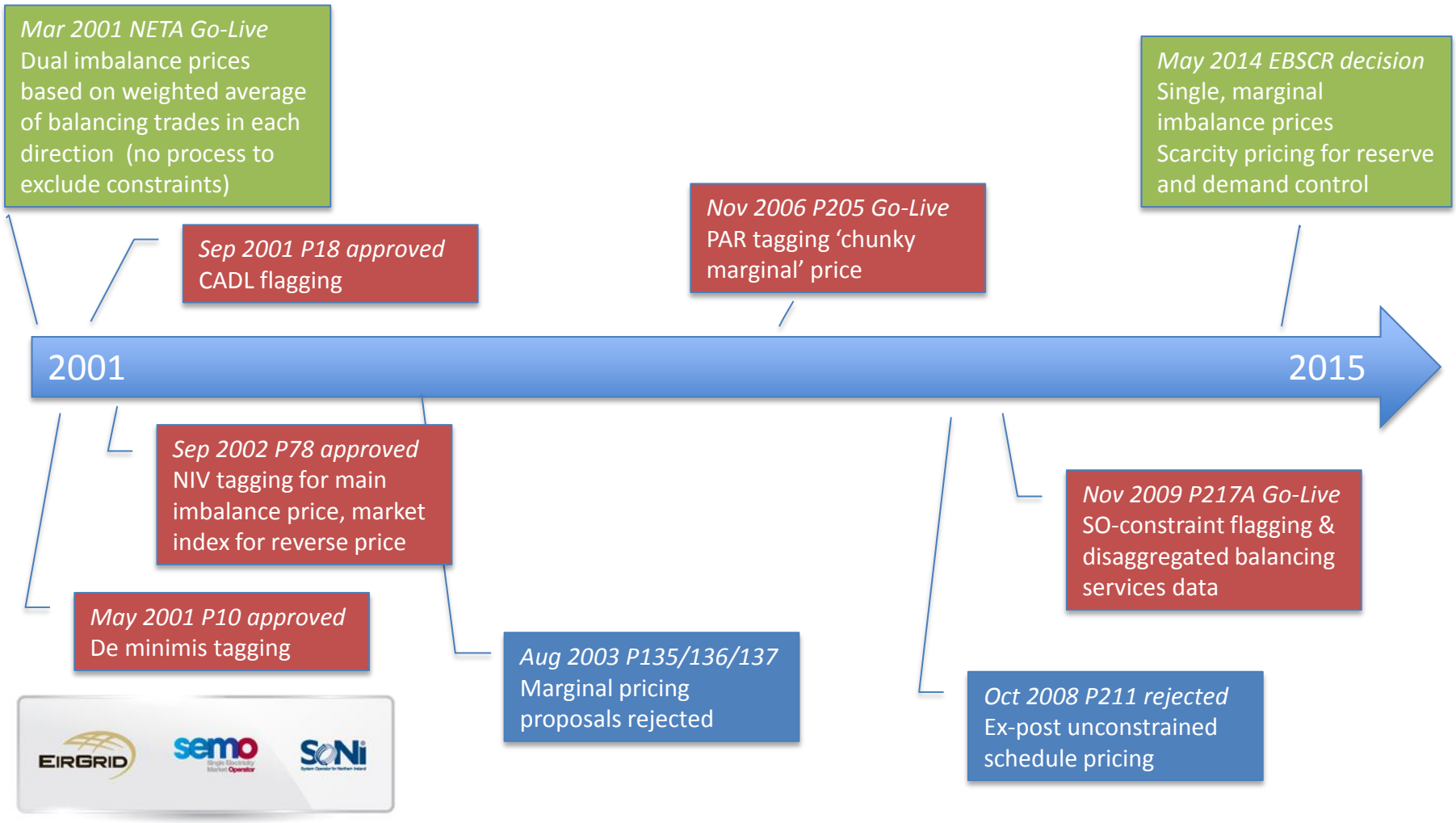
- The GB tagging and flagging approach only identifies a subset of potential I-SEM non-energy actions
- Note the GB approach is partly constrained by the requirement to publish imbalance prices within 15 minutes of the settlement period

How does this work elsewhere?

- Tagging and flagging most relevant if the same set of balancing offers and bids may be used for both energy and non-energy actions (as in I-SEM and GB)
- Less relevant if non-energy balancing requirements largely resolved outside of the Balancing Market
  - Separate markets after DAM for adjustment (e.g. Spain) and ancillary services (e.g. Italy)
  - Zonal pricing in DAM and IDM for major constraint boundaries (e.g. Italy, Sweden, Norway)
  - Non-energy balancing actions for taken outside of balancing market pre-gate closure (e.g. TenneT in Netherlands)
  - Forward obligations to provide reserve or other ancillary services

GB: Evolution of arrangements

Numerous changes made or proposed to GB arrangements since NETA Go-Live, driven by desire to improve price signals and remove “pollution” by non-energy actions



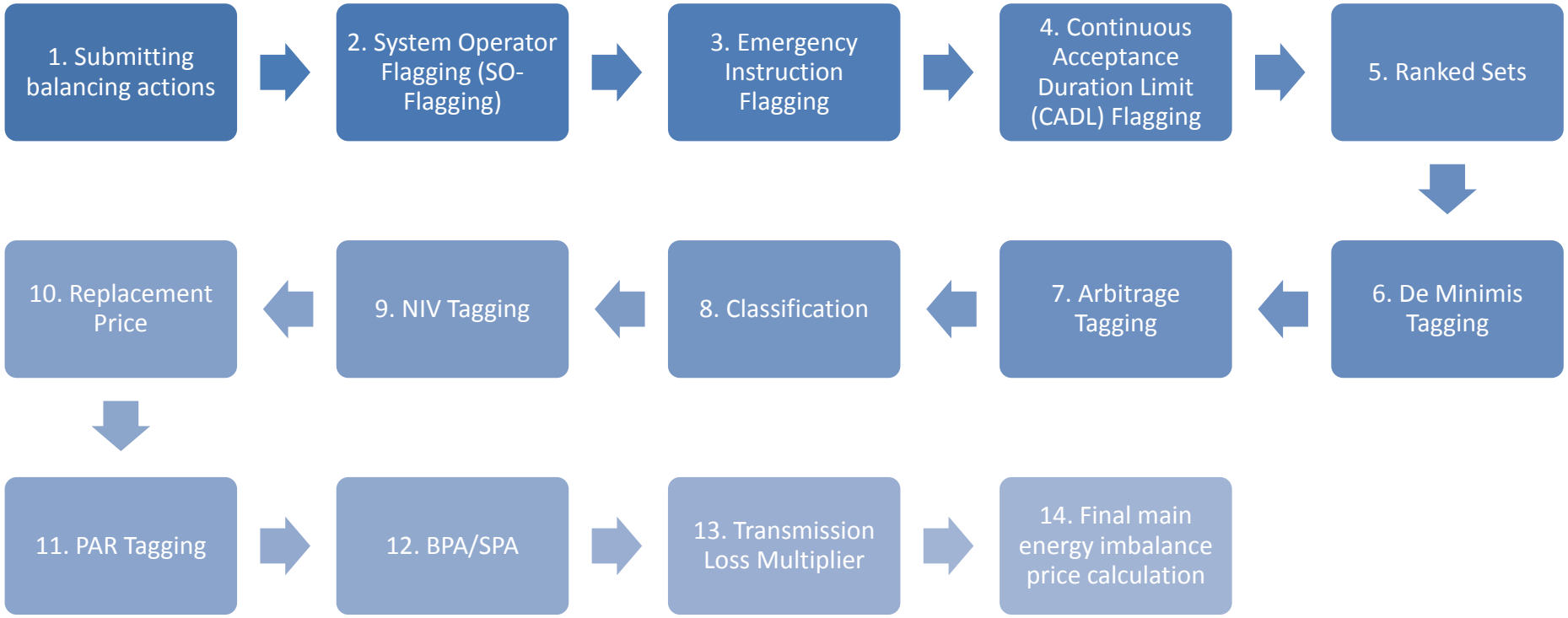
GB: Flagging or Tagging?

Flagging: Identifying balancing actions that are potentially system balancing. Once identified, the Classification process decides if they are system or energy balancing

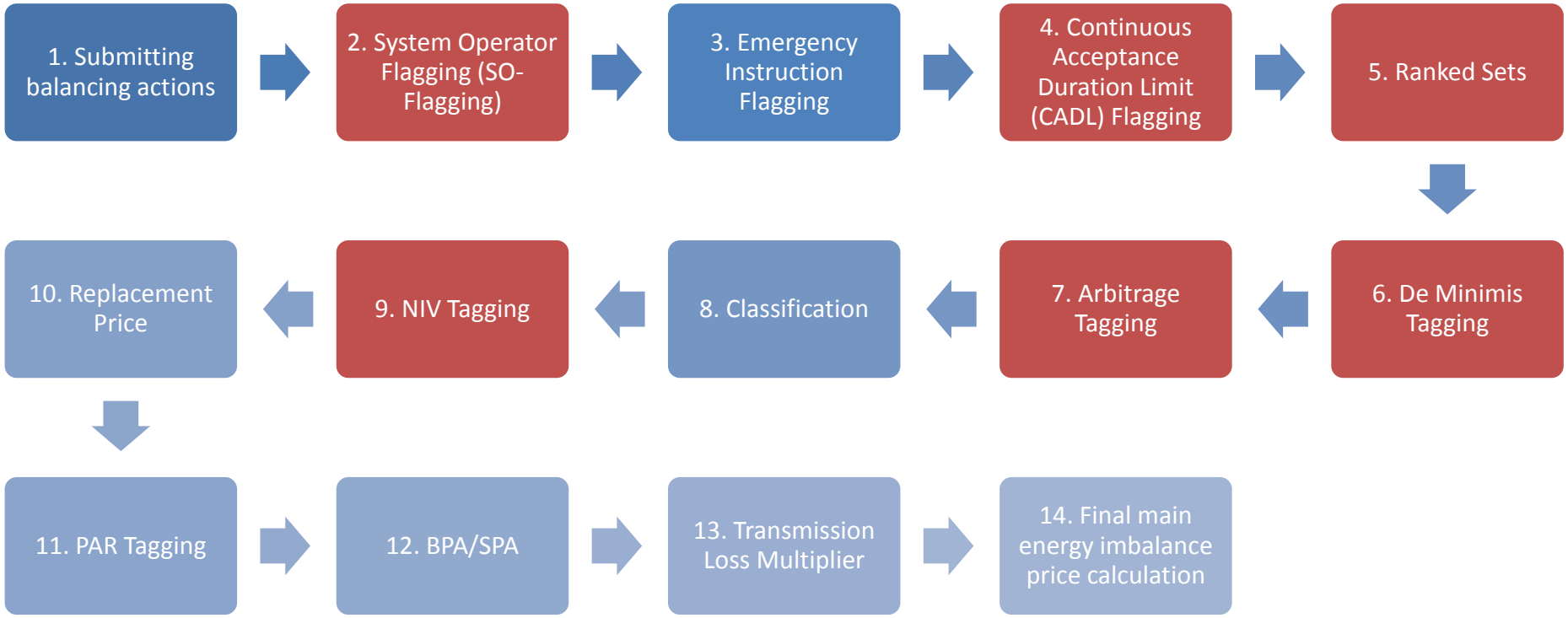
Classification: Assessing the Flagged balancing actions against the Unflagged balancing actions to determine whether they are energy balancing or system balancing. If a Flagged Action is more expensive than any Unflagged Action then we consider it to be a system balancing action and remove its price from the calculation

Tagging: Completely removing both the price and volume of balancing actions so that no part is used in the final calculation.

GB: Flagging, tagging and pricing process



GB: Flagging, tagging and pricing process



GB step 2: SO Flagging

GB approach

- SO flags balancing actions related to thermal, voltage and transient stability constraints
- Ex-ante identification of units behind active constraints
  - Control room analysis identifies active constraints on the system
  - Balancing Mechanism Units (BMUs) behind the constraint are SO-flagged
  - BM actions on these units are automatically flagged by the control room in real time
  - Once the constraint is no longer active the BMUs are de-flagged
- Ex-post cross-checking
  - D+1 process to cross-check SO flags with BSIS (incentive plan) analysis
- TSO reports annually on flagging accuracy
  - Over 98% accuracy reported in 2010/11 and 2011/12

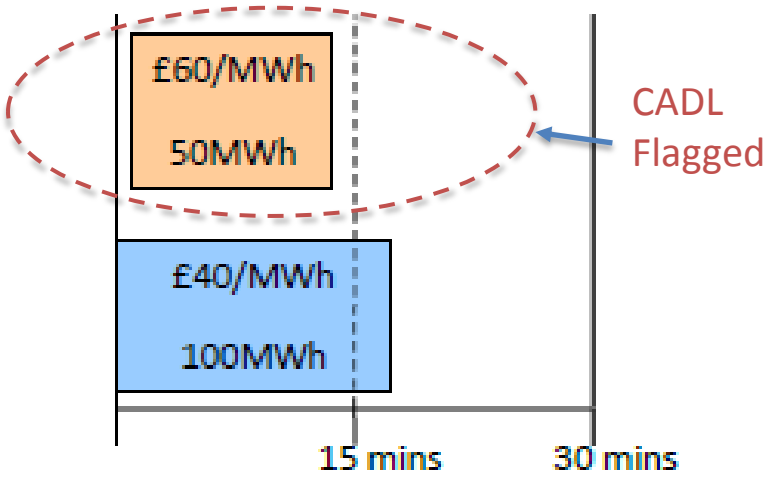
I-SEM considerations

- Unlike GB, potentially need to distinguish different actions on the same generation unit, e.g.
  - Bring a unit on at min stable level for inertia or voltage support (Non-energy)
  - Dispatch above min stable level (Energy)

GB step 4: CADL Flagging

GB approach

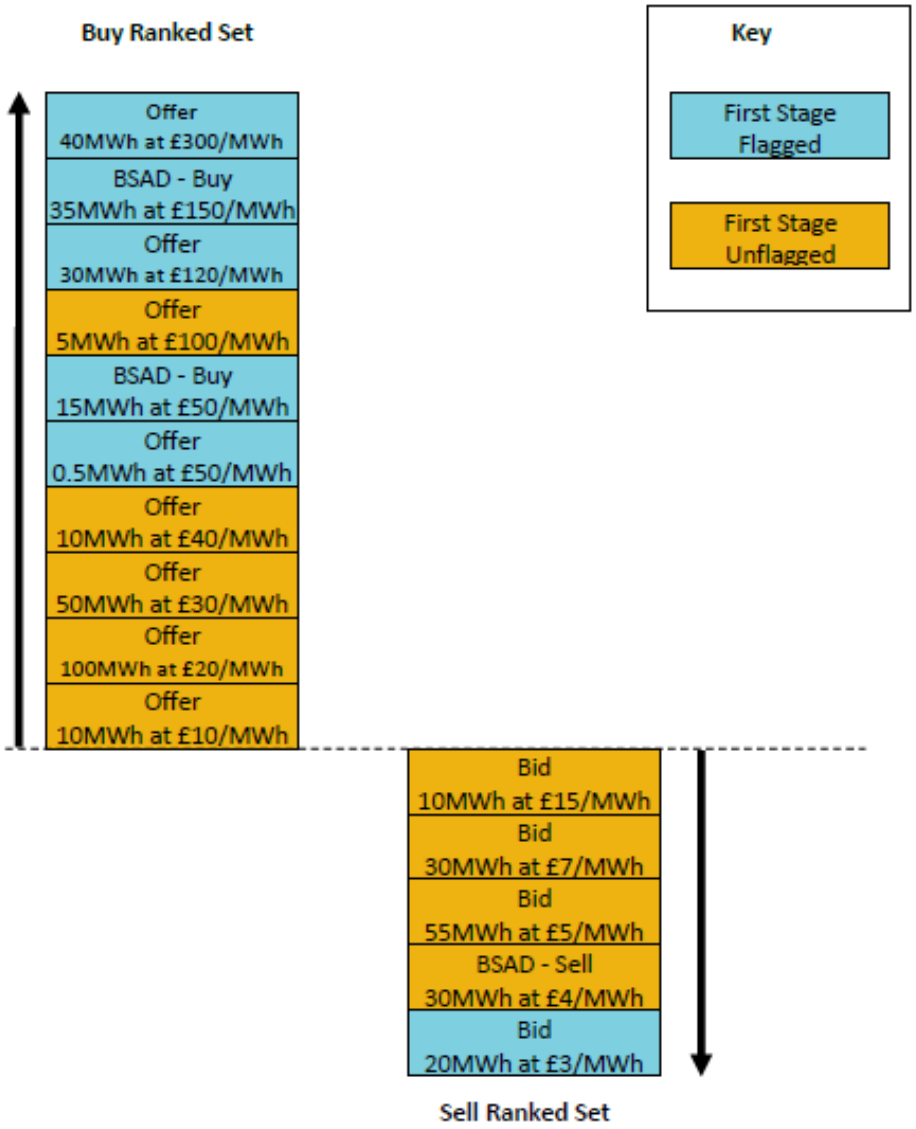
- Accepted bids and offers with short duration are flagged in the price calculation to remove the impact of sub half-hourly balancing actions from cash-out prices
- Continuous Acceptance Duration Limit (CADL) set to 15 minutes



GB step 5: Ranked sets

GB approach

- All accepted BM Incs and Decs (BOAs) ranked in price order, together with non-BM balancing services (BSAD)



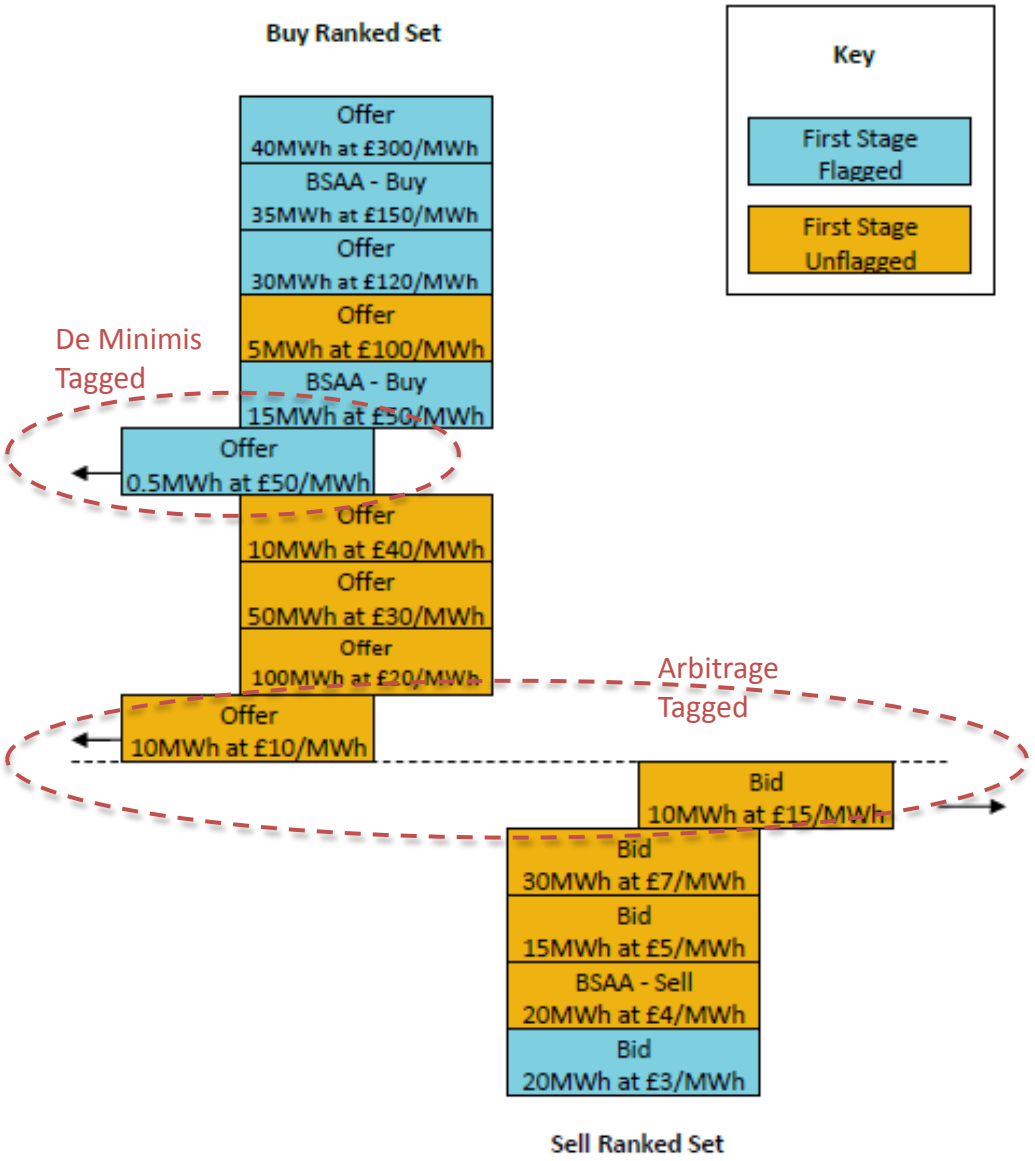
GB steps 6,7: De Minimis & Arbitrage Tagging

GB approach

- De Minimis Tagging prevents spurious volumes arising in the half-hourly integration of dispatch instructions from influencing prices
- Threshold currently 1 MWh
- Arbitrage Tagging prevents arbitrage trades from dampening the volume-weighted imbalance price

I-SEM considerations

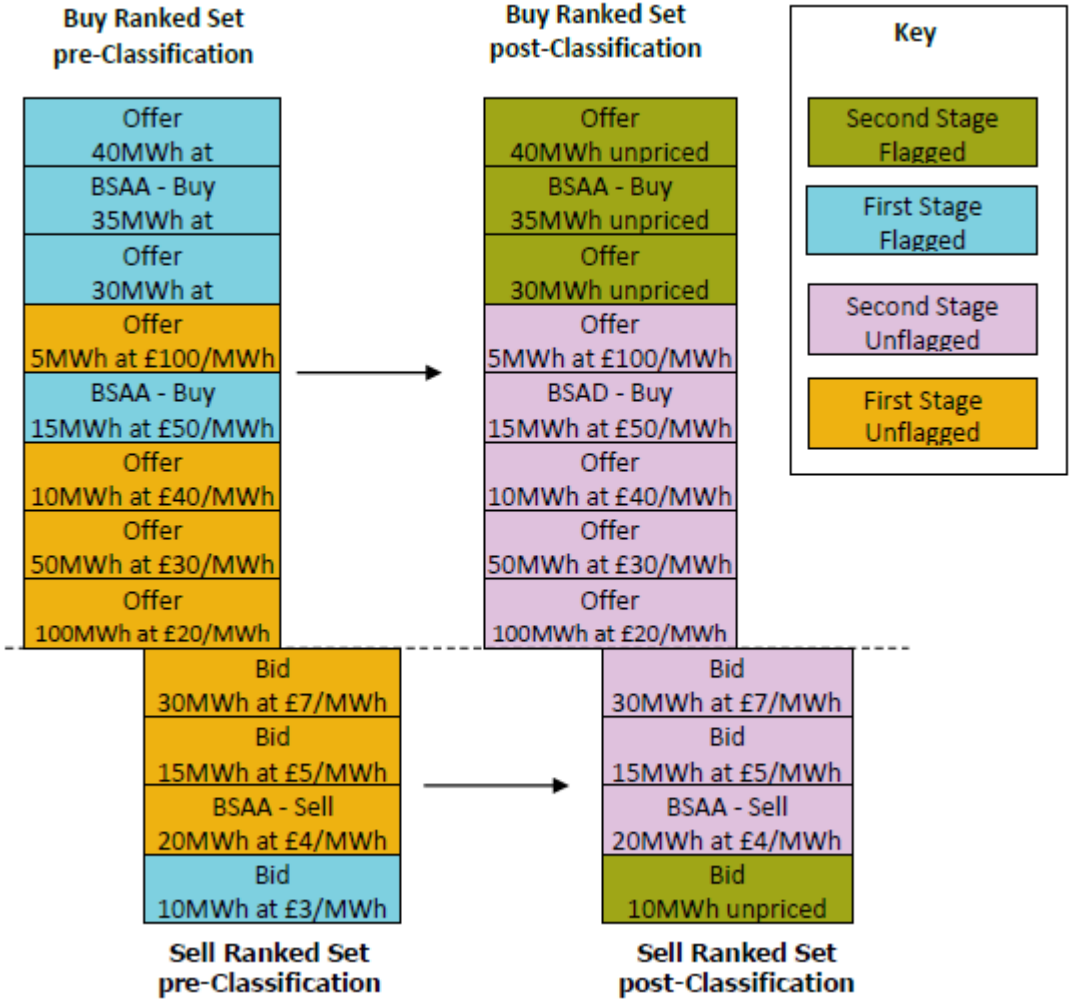
- Is Arbitrage Tagging relevant under marginal pricing and pay-as-cleared?



GB step 8: Classification

GB approach

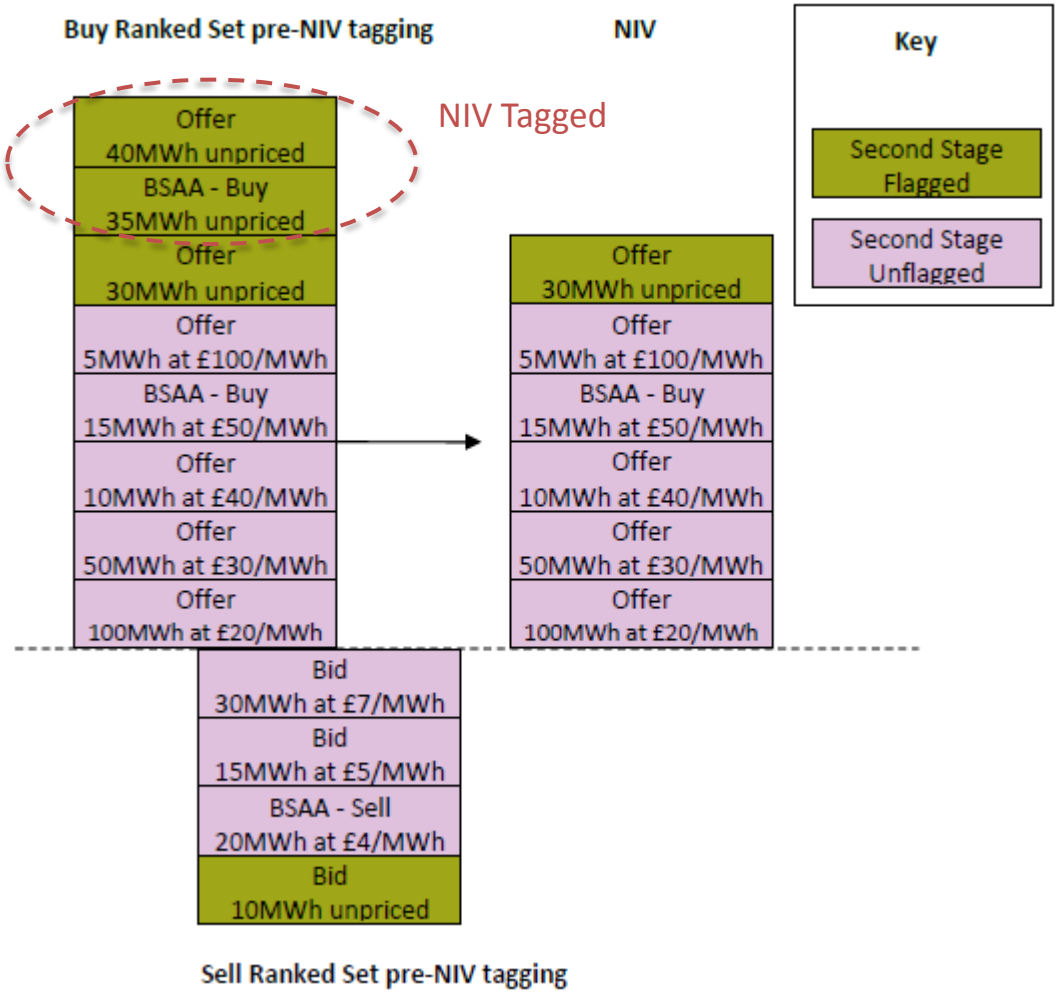
- 'In merit' First Stage Flagged balancing actions are classified as Second Stage Unflagged and retain their price
- 'Out of merit' First Stage Flagged balancing action become Second Stage Flagged and unpriced. These actions are subsequently assigned a Replacement Price.



GB step 9: NIV Tagging

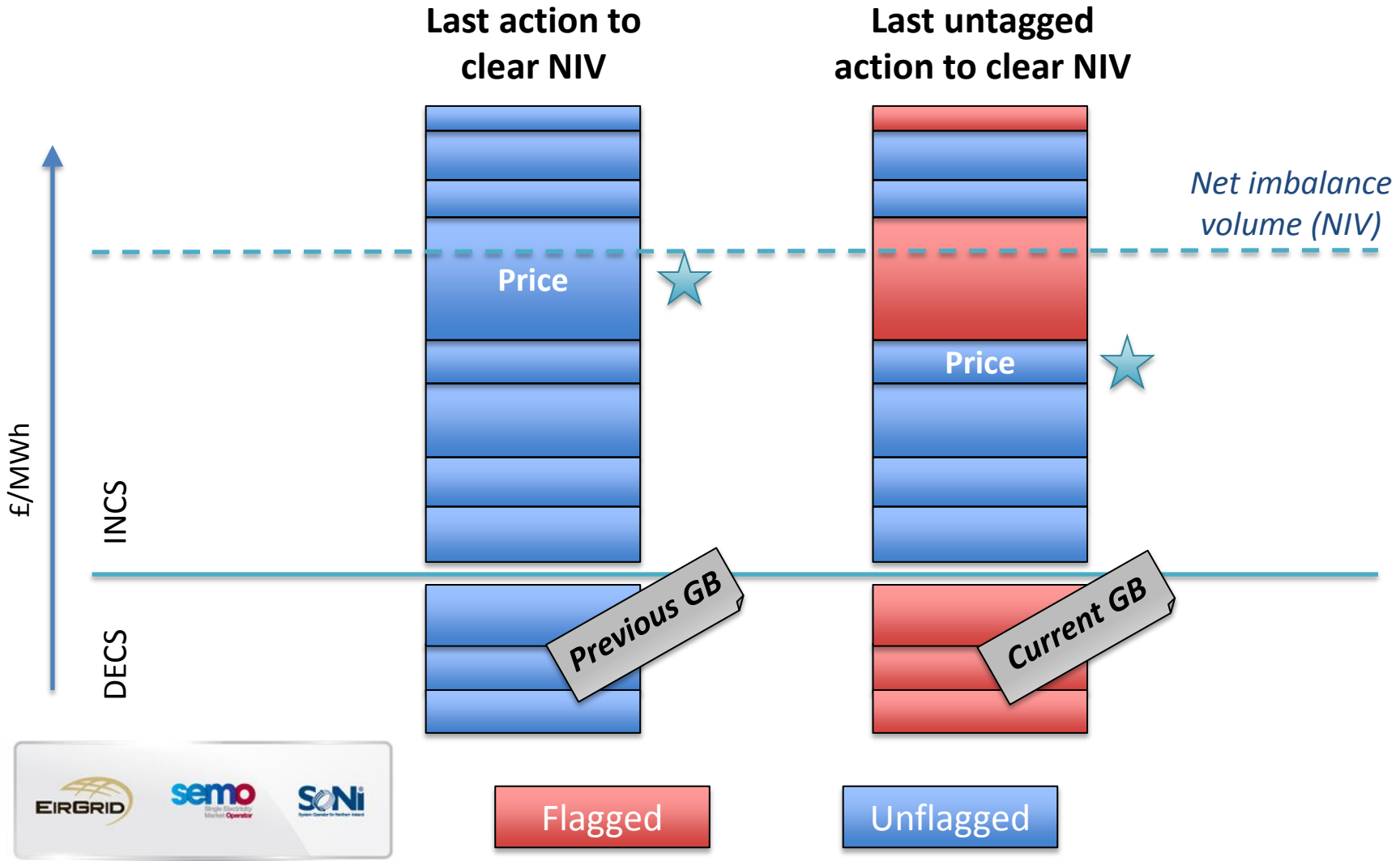
GB approach

- The Buy and Sell Ranked Sets are netted off, leaving the residual Net Imbalance Volume (NIV) of Buy or Sell balancing actions
- The most expensive balancing actions are netted (irrespective of CADL / SO flagging)
- NIV Tagging was introduced prior to SO Flagging of constraints:
  - Netting most expensive actions could be regarded as a proxy for constraint tagging?
  - Arguably consistent with an unconstrained schedule for net energy imbalance



GB: Illustrative pricing stacks

Summary of GB approaches (marginal pricing assumed for illustration)

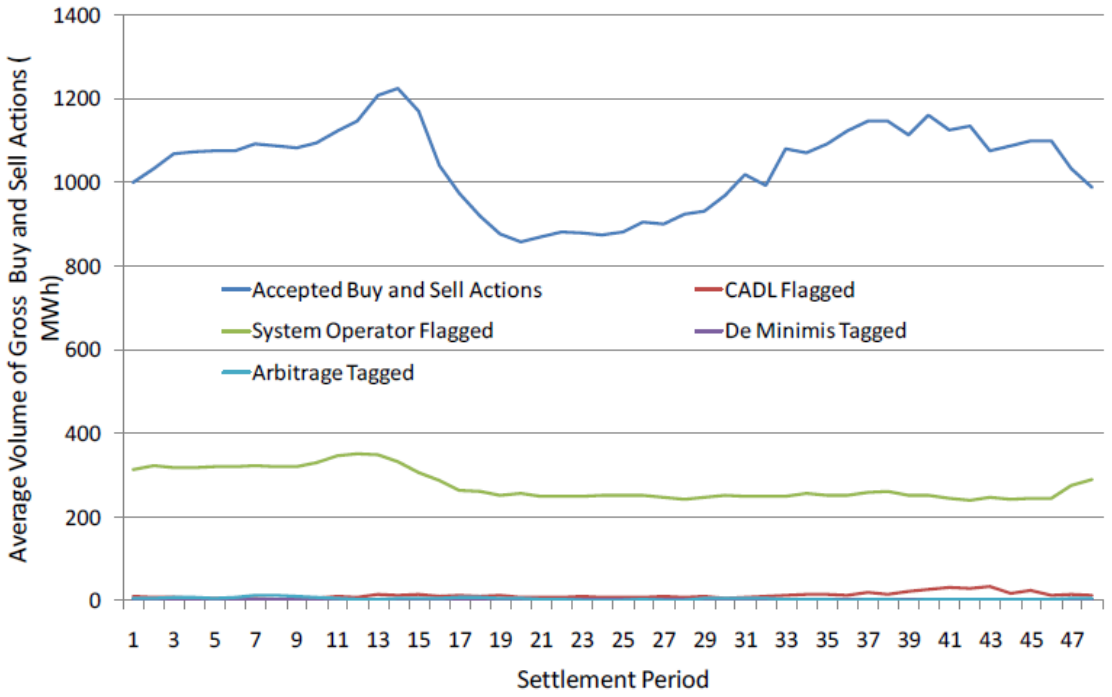


GB: tagging volumes

28% of balancing volumes tagged or flagged

- Majority (27%) SO flagged for constraints
- More sell actions (38%) flagged or tagged on average than buy actions (16%), as export constraints more common than import constraints
- More “out-of-merit” actions on the sell side (60% of sell actions flagged) relative to the buy (40%).

Average tagging/flagging volumes, Apr 2010 – Mar 2012



Source: Ofgem, EBSCR P217A Preliminary Analysis, Aug 2012

Nordic: Balancing market harmonisation

- The Nordic Operational Information System (NOIS) provides a common platform with all the regulating power bids submitted in Norway, Sweden, Finland and Denmark
  - A common price applies across the Nordic areas in the absence of bottlenecks
  - A regulation bid must have been effective for at least 10 consecutive minutes in the delivery hour for the bid to be price-setting, otherwise it is paid-as-bid
  - Nordic regulation pricing only considers the bids activated

Upward regulation is necessary in the Nordic countries, and the following bids from the NOIS list have been activated:

Bid no.	Area	Price DKK/MWh	Activated
1	DK1	200	Yes
2	DK1	210	Yes
3	DK2	220	Yes
4	SE	230	Yes
5	DK1	240	No
6	NO1	250	Yes
7	SE	260	Yes
8	FI	270	Yes

DK1=W. Denmark, DK2=E. Denmark, NO1= S. Norway

Bid#5 in DK1 cannot be activated due to a transmission bottleneck

Regulation price in DK1 set at 230 by Bid#4, the highest activated bid before the bottleneck

Regulation price in all other areas set at 270 by Bid#8

Tagging & flagging – issues for consideration

Issues
• Publication of pricing – time constraints? • What types of NEB actions should be identified? • Risk that all balancing actions for a trading period are NEB tagged? • How can different actions on the same unit be distinguished? • Only consider actions taken or full stack of available actions? • Treatment of emergency actions? • Short duration actions?