Imbalance costs and risks

An update

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### Agenda

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Objectives

- Provide a quantification of the current and possible future risk associated with imbalance costs
- Deploy a simple, transparent approach consistent with understanding the materiality of the risk for project economics
- Assess the potential impact of changes to balancing arrangements and market fundamentals through sensitivities
- Understand the potential benefit of improved forecasting
Balancing arrangements recap

- Market participants buying and selling physical power are responsible for their own balancing on a half-hourly basis.

- To the extent that a participant’s net position, including contracts, is not zero, this is treated as an imbalance and settled against ‘cash-out’ prices.

- The cash-out price that is applied depends on the direction of the imbalance relative to the overall system:
  - Opposite direction: a market-related price is applied
  - Same direction: a price is applied reflecting the System Operator cost of balancing ("System Buy Price" or "System Sell Price").

- SBP/SSPs can be at a significant and volatile premium/discount to the underlying wholesale price.
Use of historic data

- The actual imbalance faced by participants will be a function of their portfolio and trading strategy.
- We are aiming to isolate the element of imbalance that can be attributed to uncertainty in relation to the level of outturn generation from an asset.
- We have used public domain data for transmission-connected assets (BM Units).
- Final Physical Notifications (FPNs) represent the information on expected output provided by generators to the System Operator at gate closure, 1 hour ahead of delivery – we use these as our proxy for the forecast information.
- We compare this to Metered Output, and treat the difference as a ‘forecast imbalance’.
- We then calculate a forecast imbalance cost by applying the appropriate cash-out price for that half-hour (depending on the relative direction of the forecast imbalance).
Risk assessment through simulation

Simulation Model

Empirical Database
- e.g. Final Physical Notification (FPN), Metered Volume (MV), Net Imbalance Volume (NIV)
- Market prices
- Cash-out prices

Define distributions and parameters
- Define distributions and parameters
- Gate closure
- Day ahead

Simulate FPNs and Metered Volumes

Calculate Implied Imbalance Cost

Parameter Sensitivities
- Market arrangement changes
- Fundamentals changes
- Forecasting changes

Probability Distributions
- Determine overall distributions for given time period
Definitions

Forecast Imbalance Cost

\[ \frac{\sum (MV - FPN) \times (Cash\ Out\ Price - MIP)}{\sum MV} \]

\(MV =\) Metered Volume (MWh)
\(FPN =\) Final Physical Notification (MWh)
\(MIP =\) Market Index Price (£/MWh)

(Note that this is not actual imbalance – but a hypothetical imbalance if contracting matched FPNs at gate closure)

Imbalance Risk

- We define imbalance risk as the potential for increased costs associated with uncertainty around the expected level of imbalance cost
- The proposed metric is the difference between the mean (expected) and a 95th percentile worst case
Analysis goals

- Cost/risk today
- Asset type / portfolio

![Graph showing Imbalance cost (£/MWh) over time from Today to 2030]
Analysis goals

- Cost/risk today
- Asset type / portfolio
- Sensitivities on cost/risk under future scenarios
Analysis goals

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Analysis goals

- Cost/risk today
- Asset type / portfolio
- Sensitivities on cost/risk under future scenarios
- Overall uncertainty
- Potential benefit of forecast improvement

![Graph showing imbalance cost (£/MWh) over time: Today, 2020, 2030]
Historic imbalance costs
Onshore/offshore - 2012

![Diagrams showing the effective imbalance cost (£/output MWh) against annual generation (MWh) for onshore and offshore sources.](image-url)
Historic imbalance costs
Materiality relative to revenue - 2012
Historic imbalance costs
Company - 2012
Historic imbalance costs

FPN patterns
Historic imbalance costs

Key messages

- Significant spread in imbalance cost by BM unit
- Represents 1-6% of annual revenues at minimum
- Different FPN patterns reflected in spread of costs by company
- Independent generators show wider spread
- Relationship between asset size and imbalance cost
- Offshore costs lower than onshore on average
- 2011 shows similar pattern – on average slightly lower, potentially due to overall windier year

- Early simulation results show relatively tight distribution on annual basis for given asset / FPN pattern due to diversity effects across year
Future drivers
Directional impact on cost and risk

Market fundamentals
- Higher wind deployment
- Tighter capacity margin
- Higher levels of ROC/CfD plant
- Increased DSR
- Commodity prices
- Increased interconnection
- ... and EU Target Model

Regulatory arrangements
- More marginal SBP/SSP
- Single price

Longer term risk likely to be driven by uncertainty in fundamentals and regulatory outcomes rather than inherent risk within particular scenarios.

Imbalance cost (£/MWh)

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