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Developments in Frequency Response

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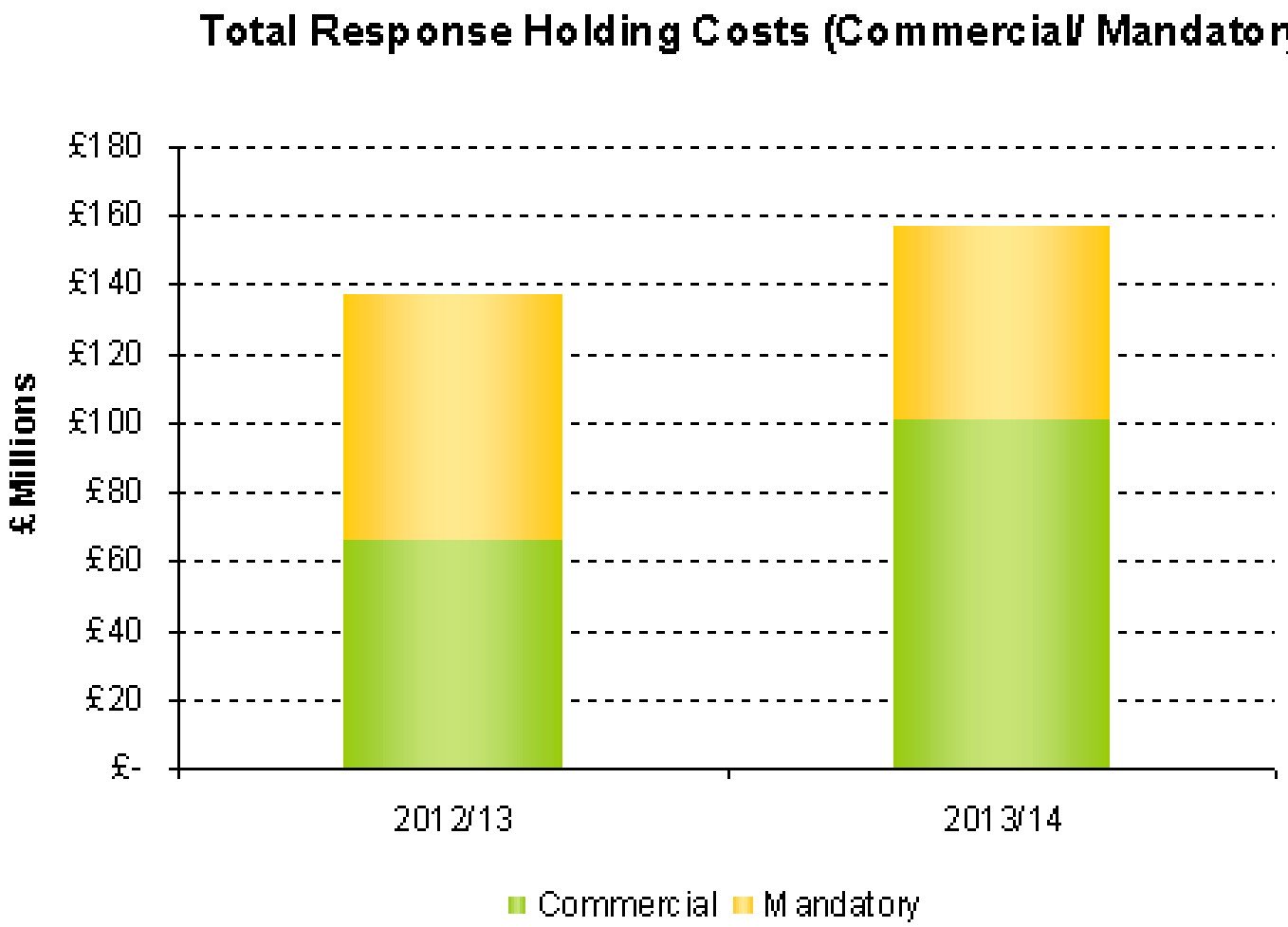
Frequency Response Spend



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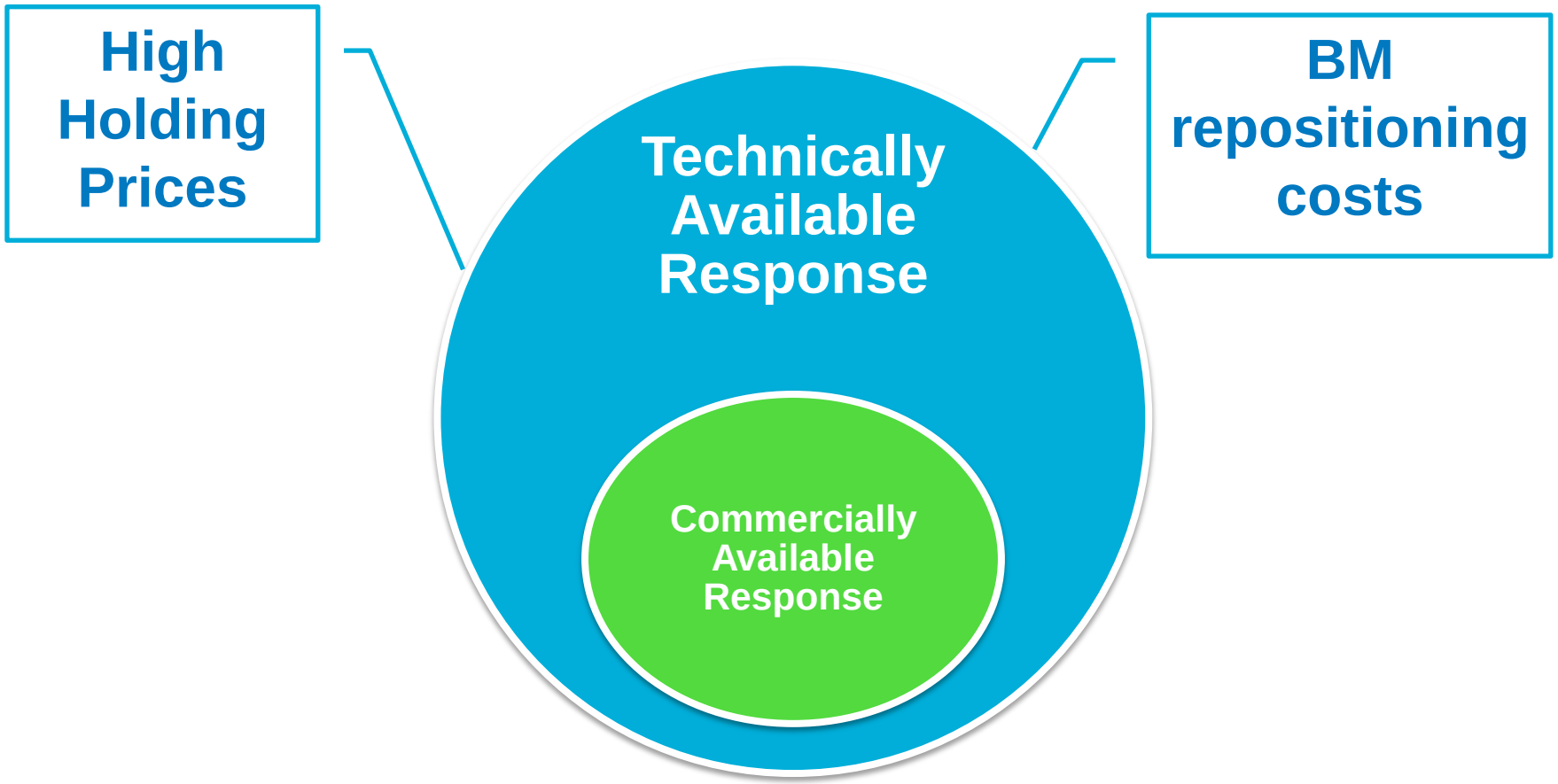
Why Develop Frequency Response?

- System Operability Framework 2014 conclusion:
  - System inertia is expected to reduce, requiring high RoCoF settings or alternative protection approaches
  - Without these measures, there could be a significant increase in volume of response required
- Conventional plant is closing, alternative sources of response are required
- Need to ensure frequency response services are economic and fit for future requirements

Why Develop Frequency Response?



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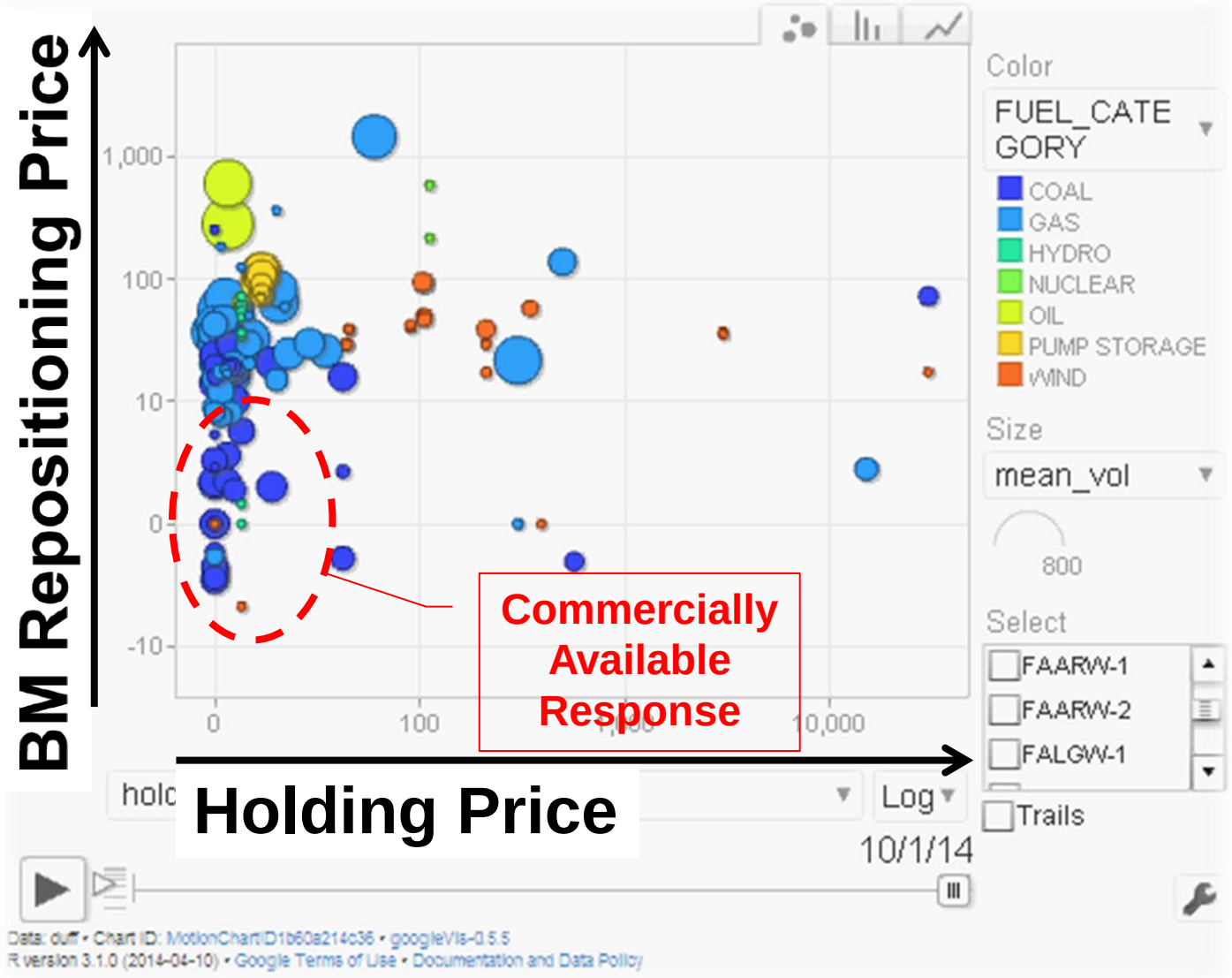
Commercially Available Response in 2013



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Developments in Frequency Response

- **Remove barriers to participation**
  - Change Response Energy Payment for low-fuel
  - Non-BM IT project
  - FFR bridging/growth contract
- **Improve FFR market**
  - e-tendering
  - Split products
  - Weekly tenders
- **Develop new services**
  - Rapid Frequency Response (<5s)
  - Enhanced Frequency Control Capability (<1s)

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Remove barriers to participation

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Response Energy Payment

- Concerns with some wind generators pricing themselves out of the response market
- One reason given is the calculation of the REP, which is supposed to reflect the cost of providing the energy
- REP is predicated on conventional generation, i.e. where a fuel is consumed at a cost
  - For an increase in output, generator receives MIP*1.25
  - For a decrease in output, generator pays MIP*0.75
- For low fuel cost plant (e.g. wind) the REP calculation is not cost reflective

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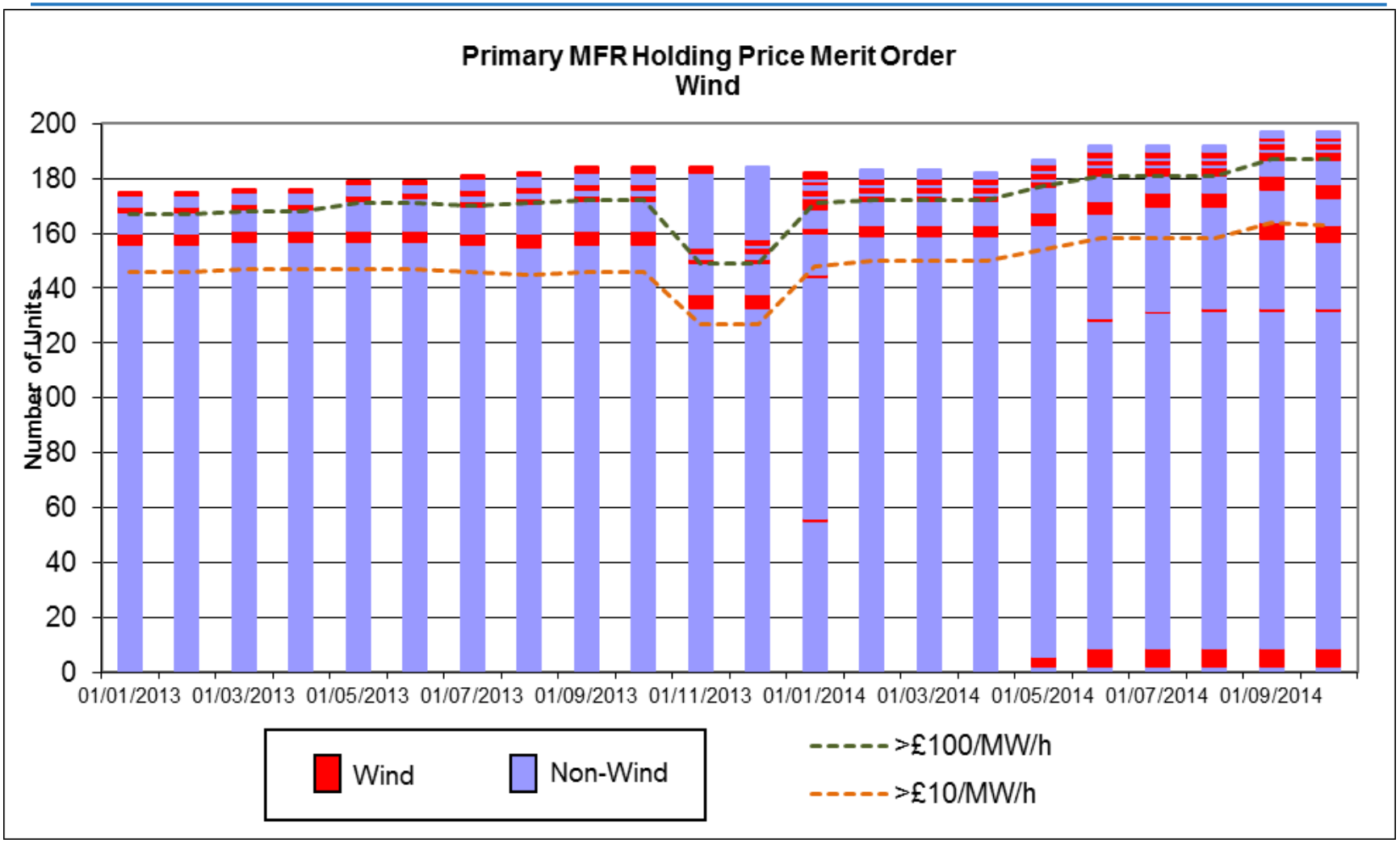
Why is this a Problem?

- The REP does not reflect the costs experienced by these generators in providing frequency response
- This is deterring participation in the response market by members of a sizeable and growing market segment
- Lack of liquidity in the market will result in increased balancing costs
- Some wind generators are pricing themselves out of the market entirely

Submitted Holding Price Bands (Primary)



Proposed CUSC Change

- Original Proposal:
- For plant with no fuel cost, the REP is settled at £0/MWh
- No change to plant with a fuel cost

- Workgroup consultation has identified a number of alternative approaches, these are now under investigation by the Workgroup
- Aim for Ofgem determination by summer

Non-BM IT Project

Current State

- Limited fully integrated IT to contract, optimise, despatch and settle Non-BM

Scope

- Consider IT options available against the requirement to innovate and increase Non-BM balancing services

Goal

- Pathway to increasing National Grid's effective use of Non-BM services

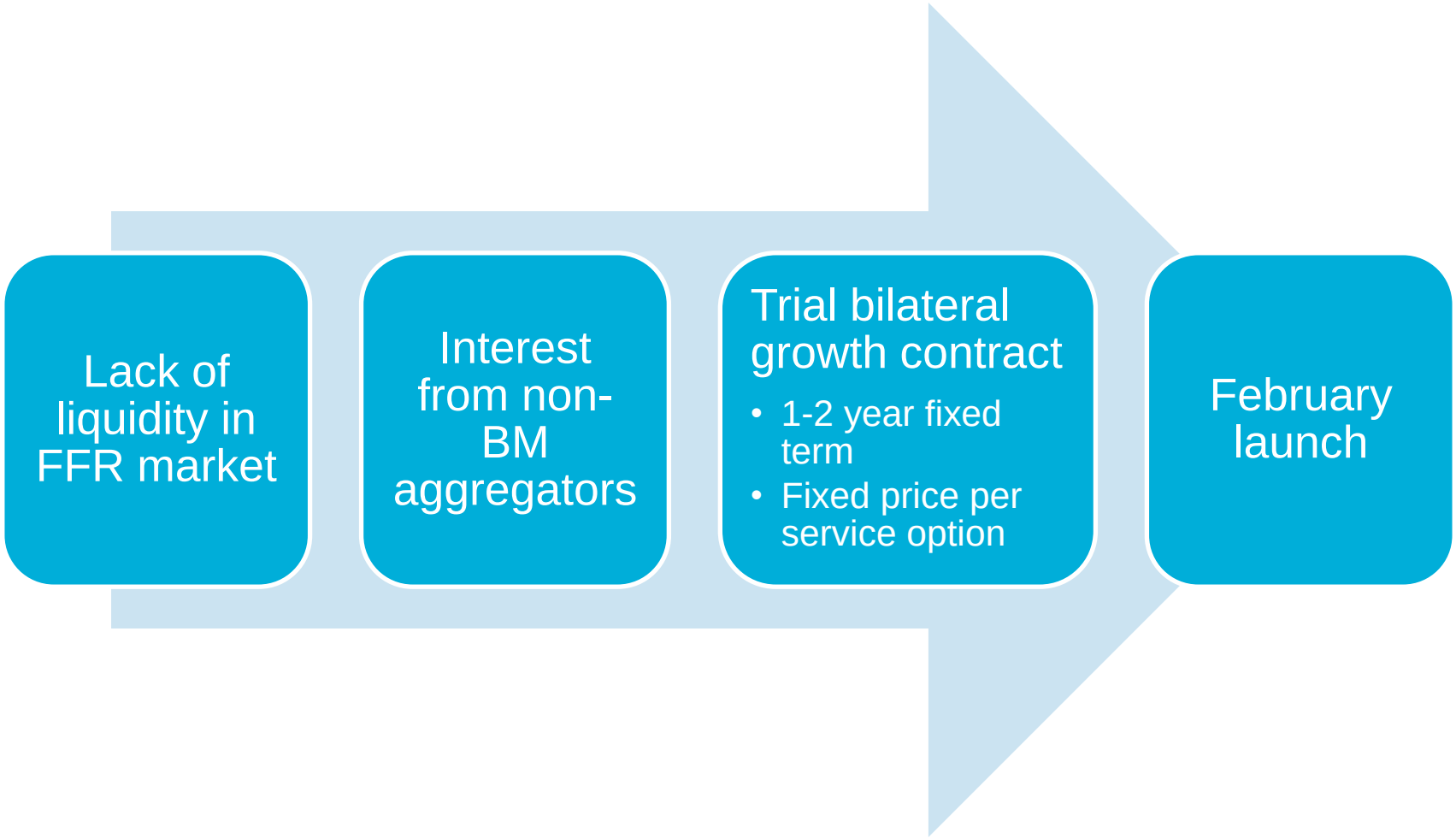
Driver

- IT assets for Standing Reserve Despatch (SRD) and Frequency Control by Demand Management (FCDM) are limited in capability / functionally

Non-BM IT Project

- Lessons learnt from DSBR is that an end-to-end solution is preferred by customers
- Therefore the project will look to cover procurement/tendering through to settlement
- Requirements stage of the project started in January, due to report back in August
- Customer feedback is very much part of this development process

FFR Bridging Contract



Improve FFR market

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FFR e-Tendering

February FFR e-tendering (Ariba)

- Market Day 2nd February
- No obligation at this stage to use

Similar format to STOR e-tender

Ability to use paper tenders initially, intention is to phase out

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Unbundled Products

- Currently, tenders are for bundled products, i.e. Primary & High or Primary, Secondary & High
- Anecdotal evidence that there are parties who can only provide individual products
- Would splitting out Primary, Secondary and High increase liquidity in the FFR market?
- Intention to investigate this once the e-tendering platform is established (March 2015)
- If successful, could be considered for mandatory market

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Weekly Tenders

- FFR tender is a monthly process
- Some providers, particularly wind, cannot predict output that far ahead
- This is a barrier to wind taking part in FFR
- We are therefore investigating moving to a weekly tender, subject to:
  - Industry engagement
  - e-tendering
  - Resourcing and processes for back-office functions
- Aspiration to publish open letter in March

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Develop New Services

Rapid Frequency Response

- Rapid Frequency Response (<5 second response)
- Response of this speed may already be available from some wind farms
- Analysis for GCRP indicates a benefit from RFR on 60% of summer days and 24% of winter nights in 2020/21
- However, no consensus at GCRP as to whether this should be a mandatory service
- Further Grid Code discussion due to take place in April

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Rapid Frequency Response

- We believe that there is value in developing a commercial service in parallel with Grid Code discussions
- Areas of current work:
  - What volumes should be sought from the market
  - How to value it against existing services
- Future work:
  - Identify technical parameters required for despatch, monitoring, settlement
  - Seek expressions of interest from industry

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Enhanced Frequency Control Capability

- The Network Innovation Commission agreed funding for a three year study on <1 second response from different types of provider
- Collaboration between National Grid, Centrica, Flexitricity, Alstom, Belectric and the Universities of Manchester and Strathclyde
- Covers conventional, wind, demand and storage providers
- 8 workstreams will look at everything from monitoring and control through to developing contractual terms for a new service

Summary

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Summary

- The requirement for response is increasing
- The volume of commercially available response is decreasing
- We are looking at multiple solutions to ensure secure and economic operation of the network