Future of Frequency Response

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The power of action.

Terms of Reference Summary I

- Joint Grid Code and CUSC Working Group established in May 2008
- Assessing the technical and commercial aspects of frequency response
- Current generation mix and anticipated future generation technology
- Impact from the SQSS Review also being considered

Terms of Reference Summary II

- The WG will:
  - Examine the appropriateness of the existing Grid Code obligations and commercial framework
  - Assess feasible options (for current and future generation technology) whilst ensuring the maintenance of system security
  - Agree and recommend a preferred option (including legal drafting)
  - Reporting back to:
    - September 2010 GCRP (Simulated Inertia); and
    - November 2010 for broader Response recommendations

Working Group Membership

- Working Group has representation from CUSC and Grid Code parties including:
  - System Operator
  - Generators
  - DNOs
  - Transmission Owner
  - Ofgem
- Considering current **mandatory** FR obligations
- Current arrangement for commercial response are not being principally considered by the Working Group

Working Group progress I

- Current code obligations require all generation to have capability to provide Frequency Response
- Future generation mix is expected to contain substantial volumes of wind and next generation nuclear and coal
  - Concern was raised whether such plant could be built with the capability to meet current FR obligations
- Future FR requirements were modeled
- A further model was developed to estimate the impact on System Operation costs if new technologies did not provide FR
  - Using the ‘Gone Green’ 2020 Scenario
  - An estimated increase of response holding cost by a factor of 4 to 6 (~£1.45bn p.a. or BSUoS +£2.2MW/h)

Working Group Progress II

- Detailed discussions held with manufacturers of future generation technology
- Anticipate that wind turbines and ‘new nuclear’ can be capable of meeting Frequency Response obligations
- Although there are significant generator operating risk and cost implications
  - Increased stress on machines and additional maintenance and inspection triggered
  - Opportunity costs associated with reduced output (i.e. ROCs)

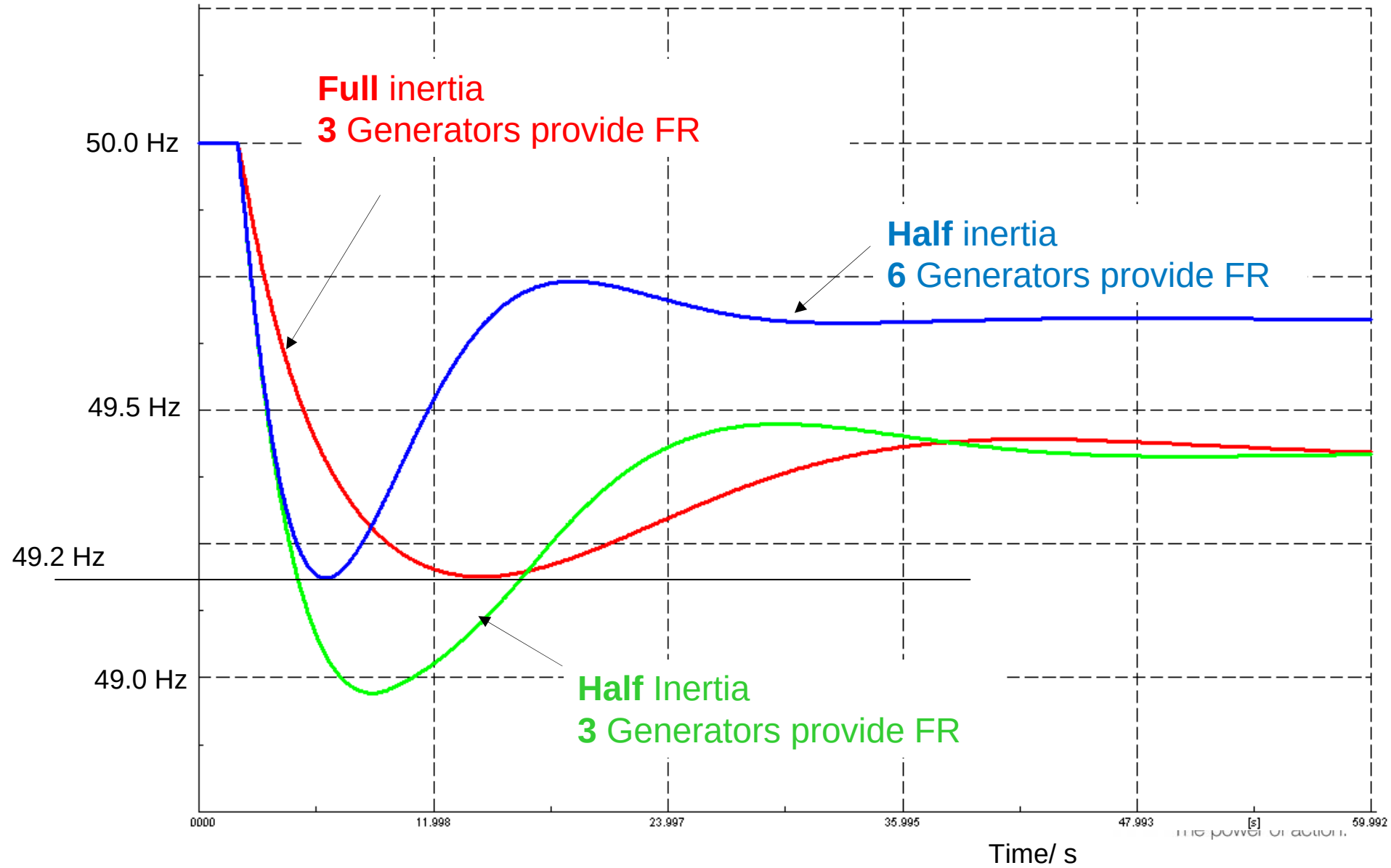
Working Group Progress III

- Four main options being developed in detail:
  - Developed Grid Code obligations and commercial mechanisms
  - Market solution – Tradable delivery
  - Market solution – Tradable capability and delivery
  - Frequency Response ‘Economic Test’

System Inertia

- Inertia is the stored ‘spinning’ energy of the system
- For a system with a large inertia, after the trip of a generator, the frequency will drop slowly
- Modern generation technologies (e.g. wind turbines or interconnectors) use power electronic converters which do not naturally contribute to total system inertia
- Under the “Gone Green” scenario by 2020 over half of generators will use such technologies
- Consequently, without change reserve and response will increase

1320MW Loss – Effect of Inertia and FR



WG Initial Conclusions on Simulated Inertia

- A lower system inertia results in a greater frequency dip and therefore more response is required
- It is feasible to modify the control system for new asynchronous generators to simulate inertia
- It would be significantly more expensive to hold more fast acting response than mandating the use of simulated inertia from control systems
- Further detailed discussions are being undertaken with manufacturers
- To report to the Sept 2010 Grid Code Review Panel