Faster Acting Response

July 2018

Agenda

Background and Context – Adam Sims

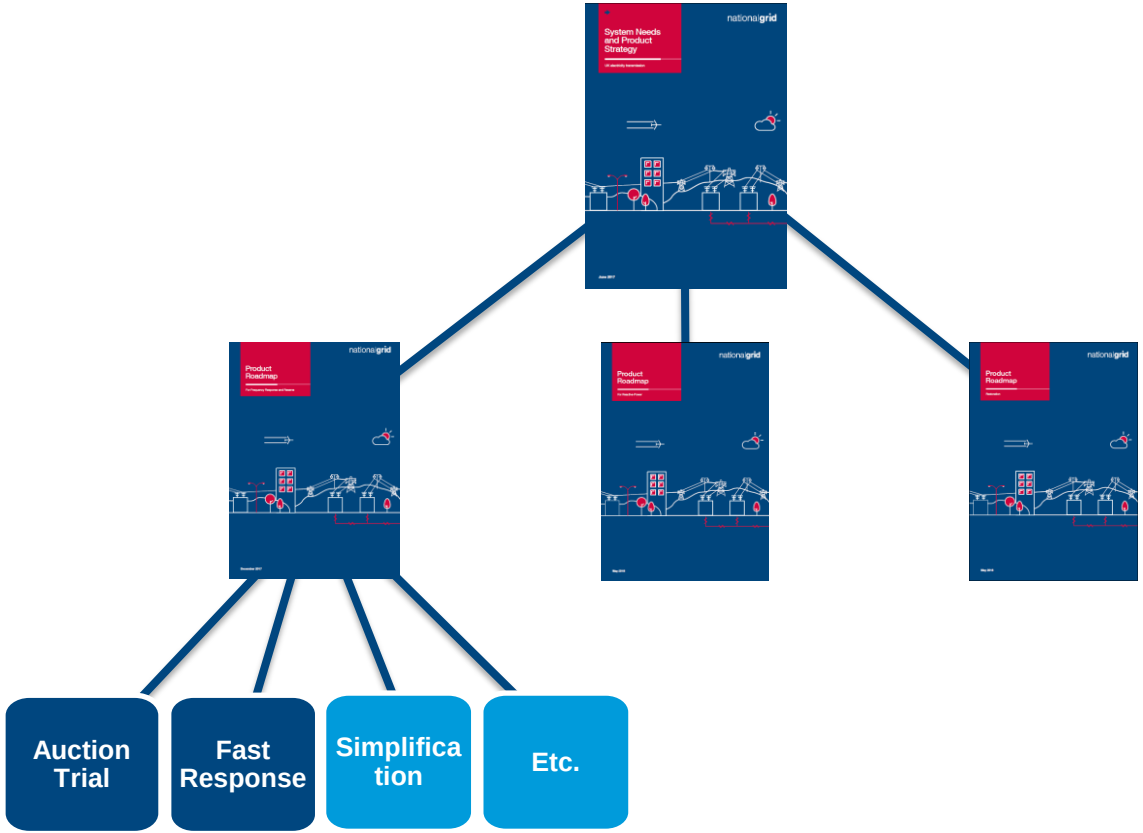
Requirements and Designs – Will Ramsay

Survey Feedback – Lizzie Blaxland

Background and Context

Adam Sims

Balancing Services Reform

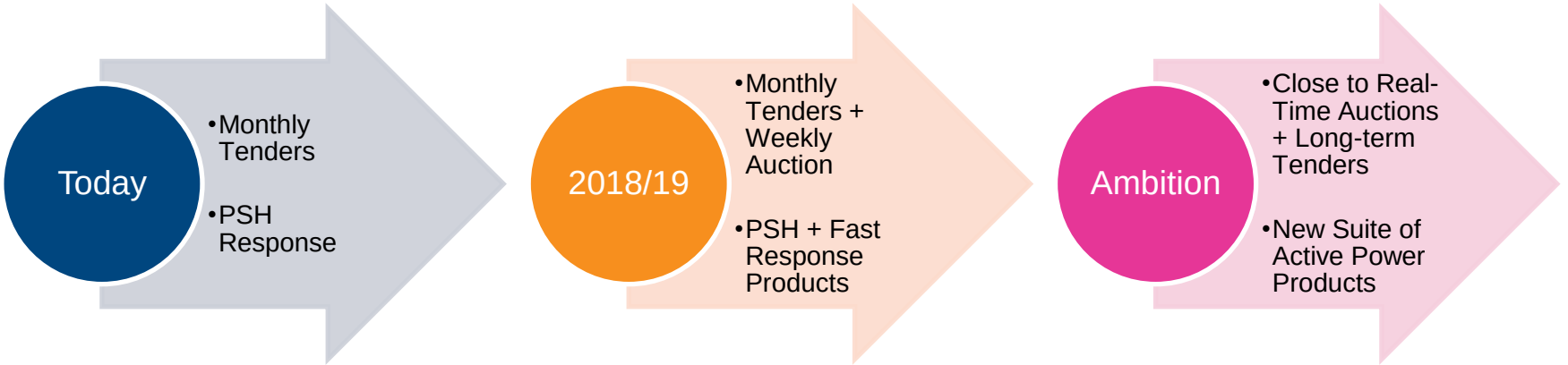


System Needs & Product Strategy

Product Roadmaps and Reports

Specific Developments

Ambition


Today
•Monthly Tenders
•PSH Response
2018/19
•Monthly Tenders + Weekly Auction
•PSH + Fast Response Products
Ambition
•Close to Real-Time Auctions + Long-term Tenders
•New Suite of Active Power Products

Work to Date

Initial Design Work
Dec17-Feb18

- Design concepts
- Internal workshops
- Theoretical modelling

Initial Consultation
Mar18

- Webinar and survey
- Feedback used to identify further modelling

Collation of Feedback
Apr18

- 60+ responses to survey
- Detailed views provided
- Questions identified

Detailed Consultation
May18

- Three technical workshops
- Feedback used to refine concepts and identify blockers

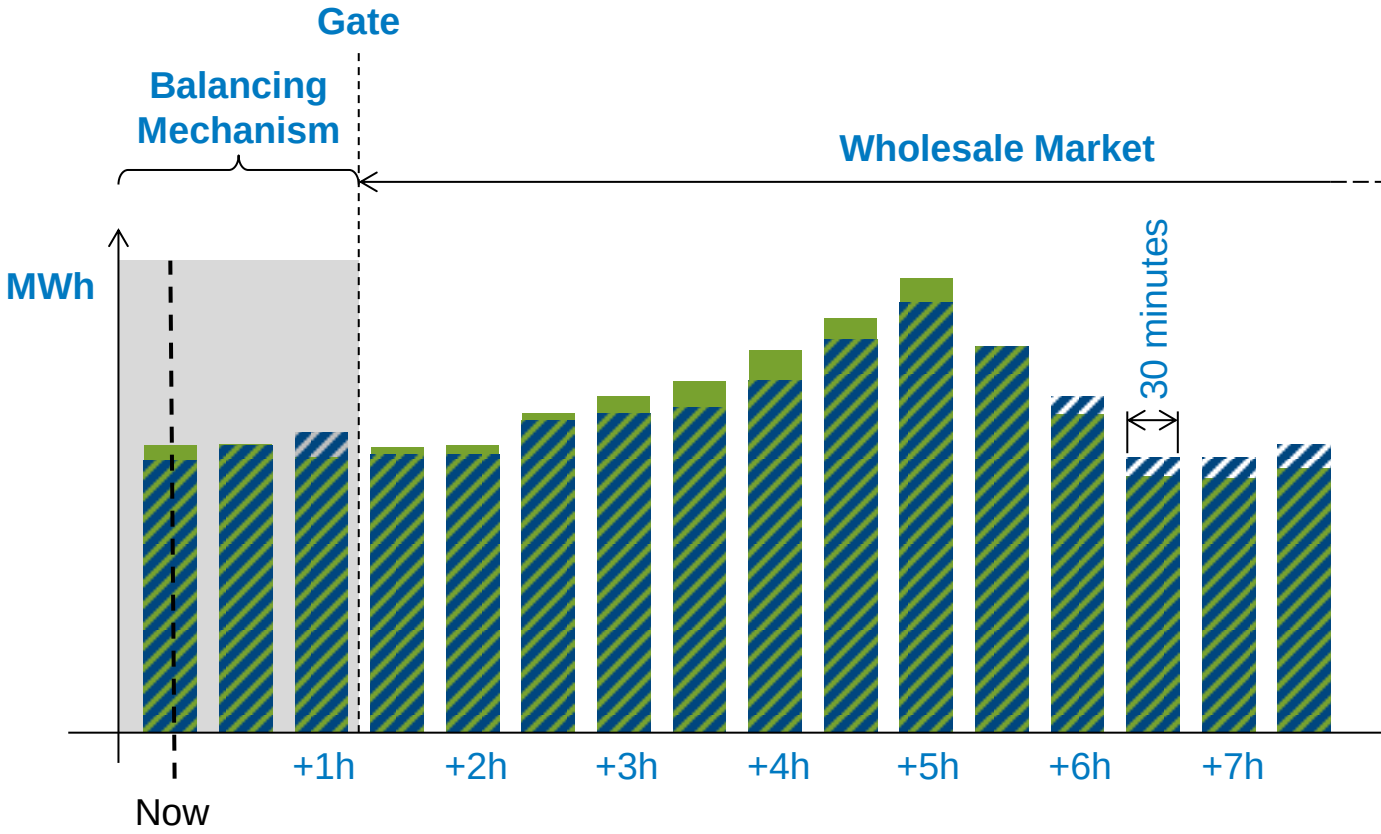
Next Steps

Detailed Modelling By Oct	Contracting & Procurement By Nov	Testing & Compliance By Nov	Systems By Dec	Regulatory Reporting By Dec
Operability analysis	Identify procurement approach	Metering & Data requirements	Changes to Settlements (ASB)	Changes to MBSS
Future requirements	New Standard Contract Terms	Performance monitoring policy	Changes to Control Support programs	Changes to C16 Methodology
Sensitivity analysis	Framework Agreements		Consequential changes to EBS	

Requirements and Designs

Will Ramsay

Wholesale Market



The market delivers 30-minute blocks of energy.

The Balancing Mechanism operates 60-89 minutes before delivery.

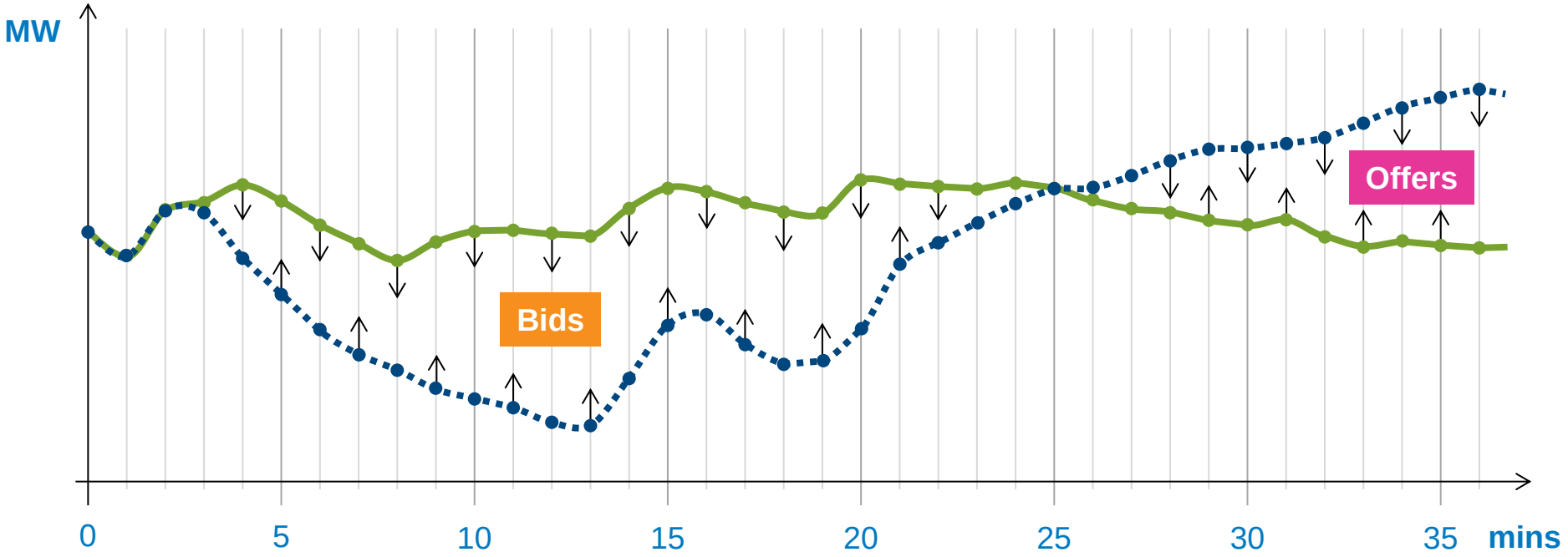
Balancing Mechanism: Bids and Offers

Bids:	**▲Demand**	**▼Generation**
Offers:	**▼Demand**	**▲Generation**

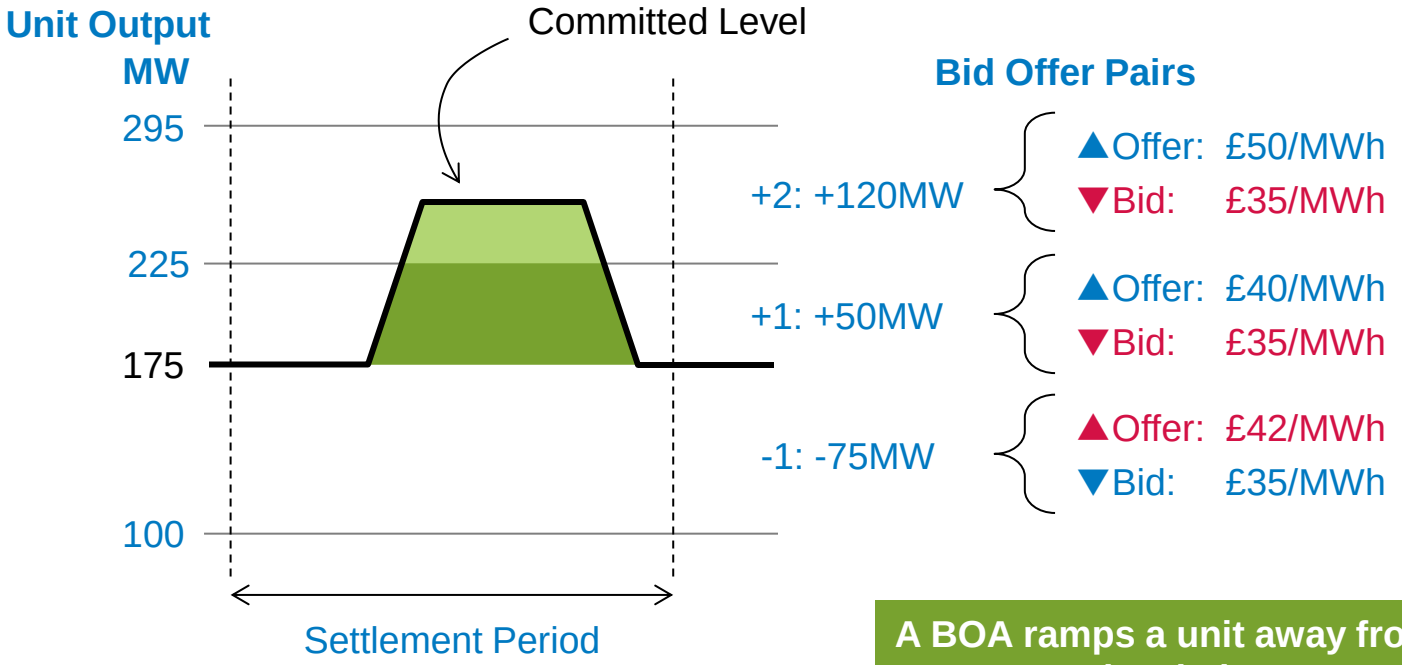
Actions in the Balancing Mechanism take place on integer minutes.

Generation

Demand



Bid Offer Acceptances (BOAs)



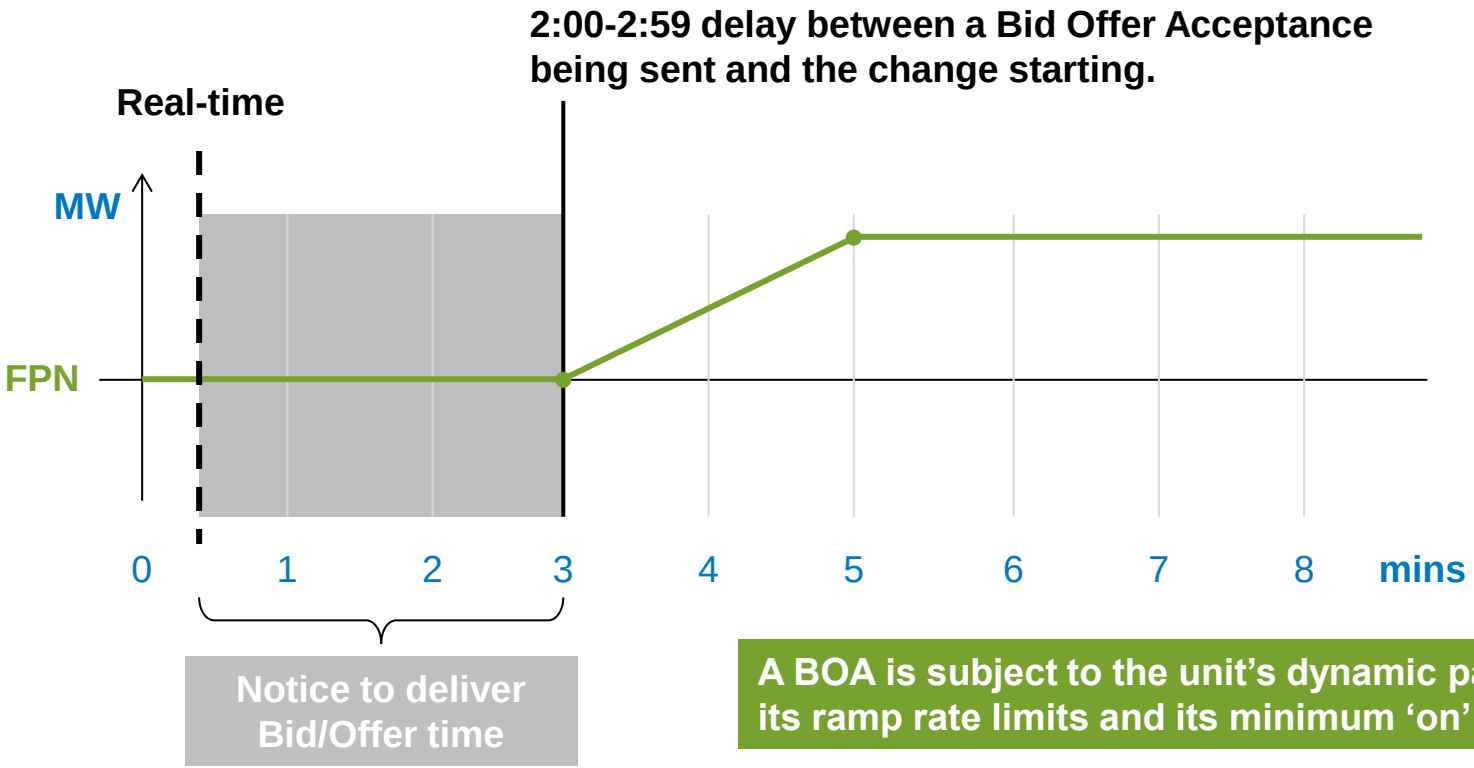
Units set prices in Bid Offer Pairs by gate closure.

Each pair includes an "undo" option.

A BOA ramps a unit away from its planned level to a new output level, then returns it to the planned level.

Committed Level: the unit's planned profile, as modified by BOAs.

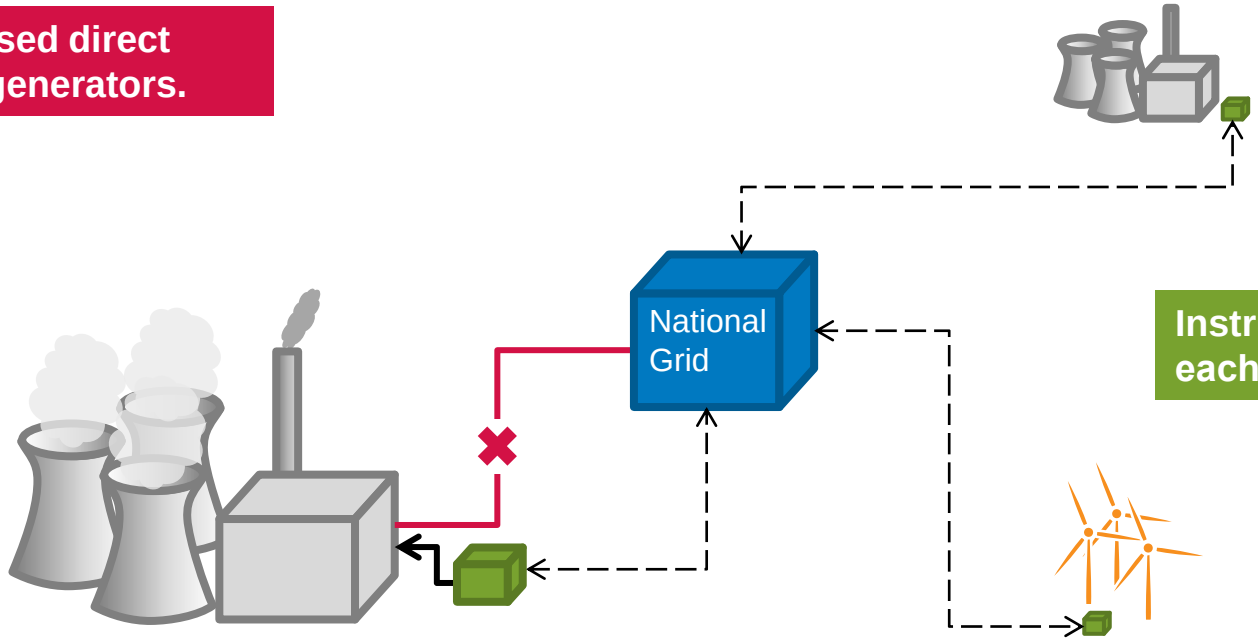
BOA Constraints



A BOA is subject to the unit's dynamic parameters, such as its ramp rate limits and its minimum 'on' and 'off' times.

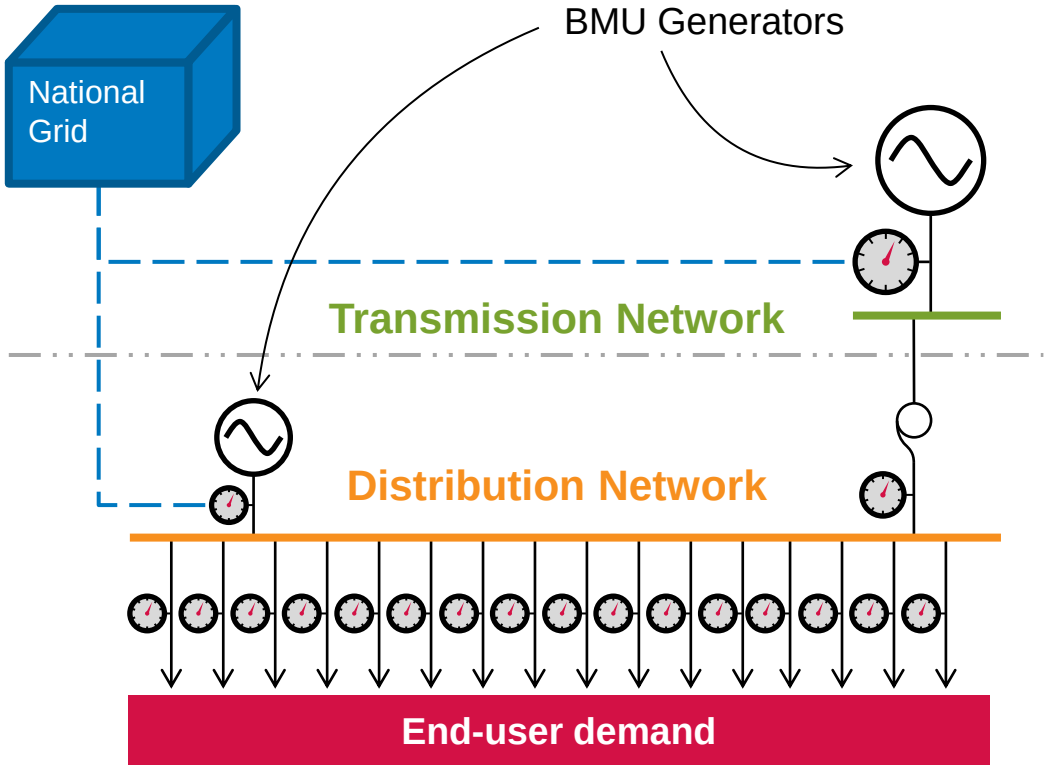
Balancing Instructions

No centralised direct control of generators.



Instructions are sent to each unit's control point.

What is Demand?

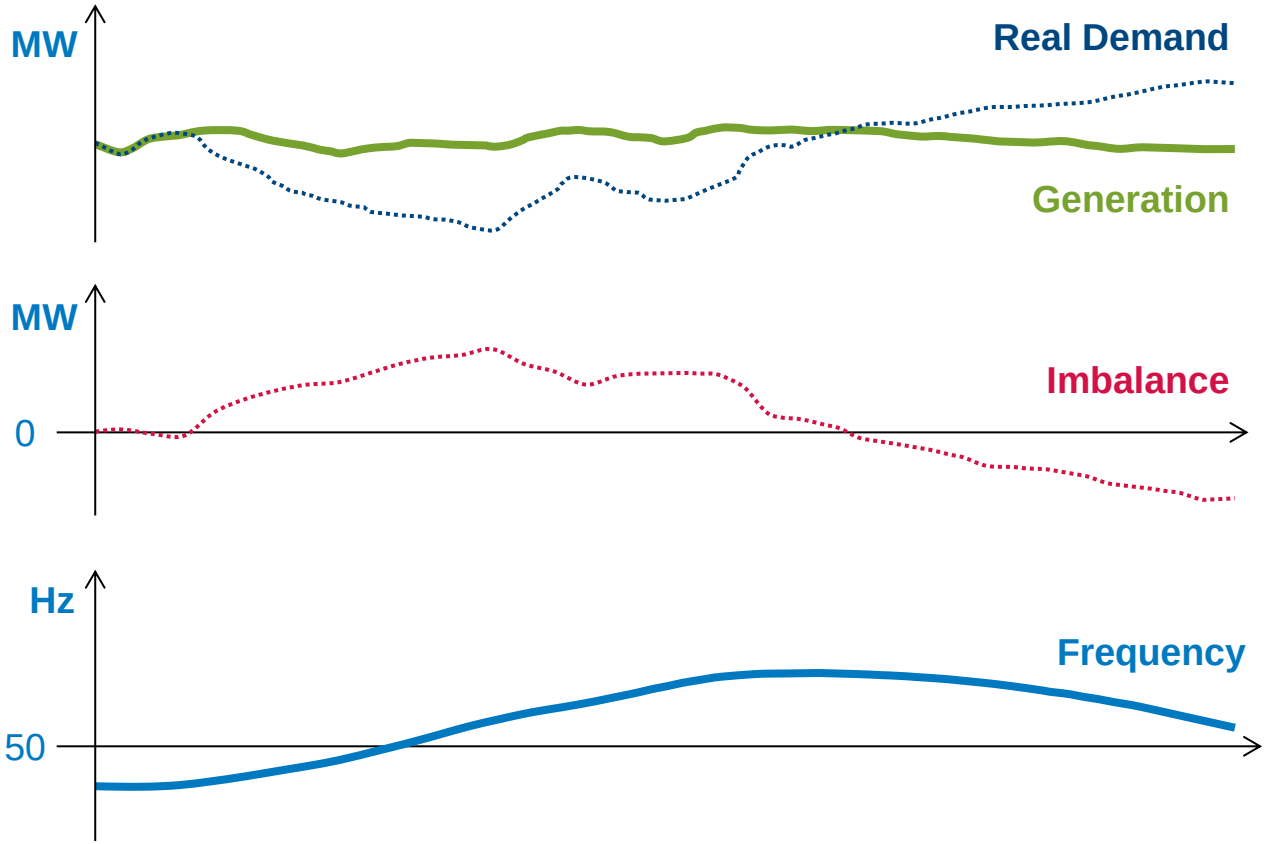


In real-time, the best measure of Demand = Total BMU Output

Measuring the flow from transmission to distribution is not meaningful because some BMUs are embedded within the distribution networks.

It is not practical to measure end-user demand in real-time.

Frequency Variation

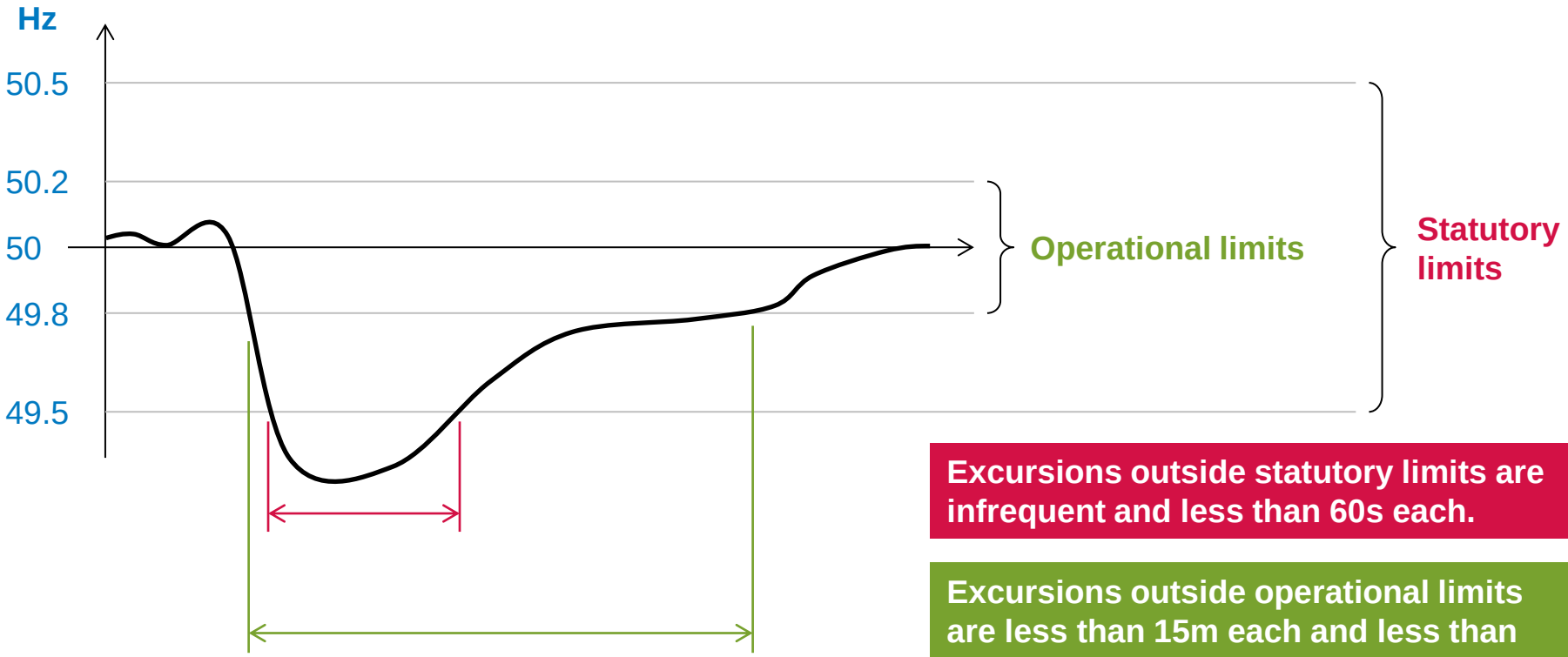


In real-time, only generation output and frequency are known.

Imbalance is the difference between power output and the power required.

The speed of frequency variation indicates the size of the imbalance, relative to system inertia.

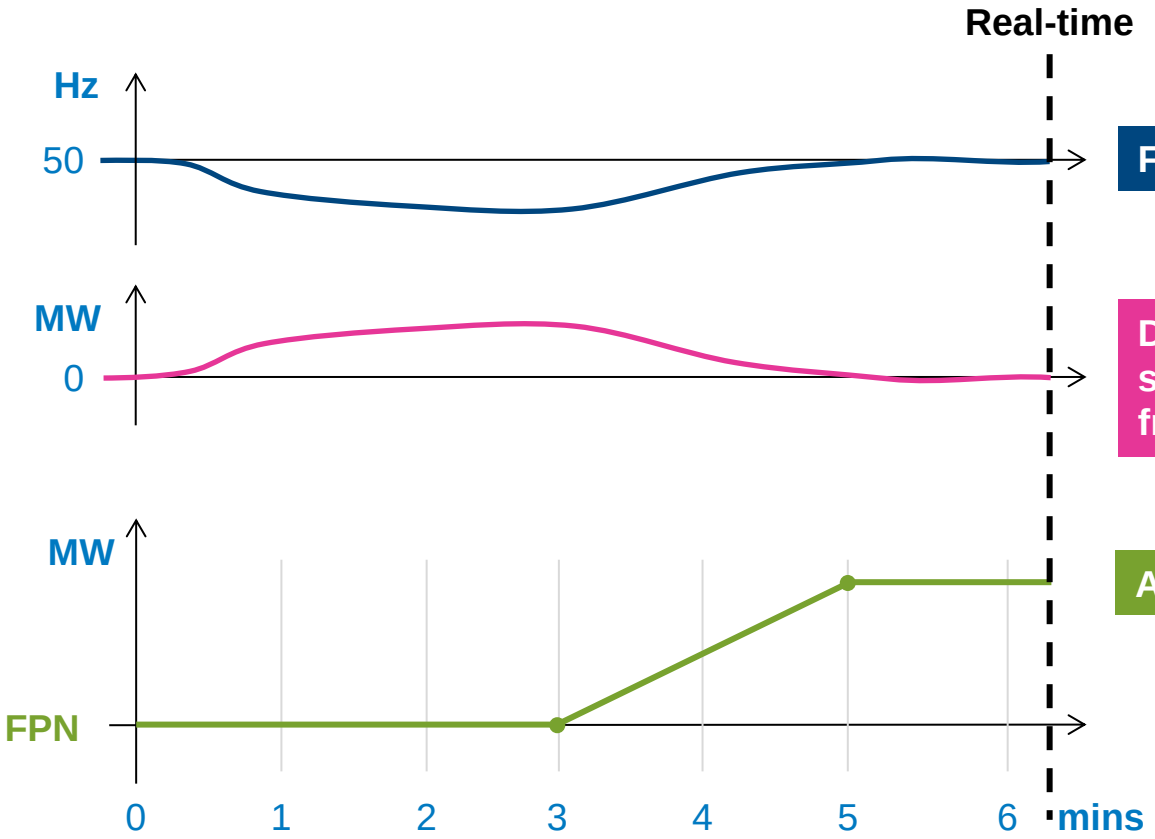
Frequency Standards



Excursions outside statutory limits are infrequent and less than 60s each.

Excursions outside operational limits are less than 15m each and less than 250 hours/year in total.

Frequency Regulation



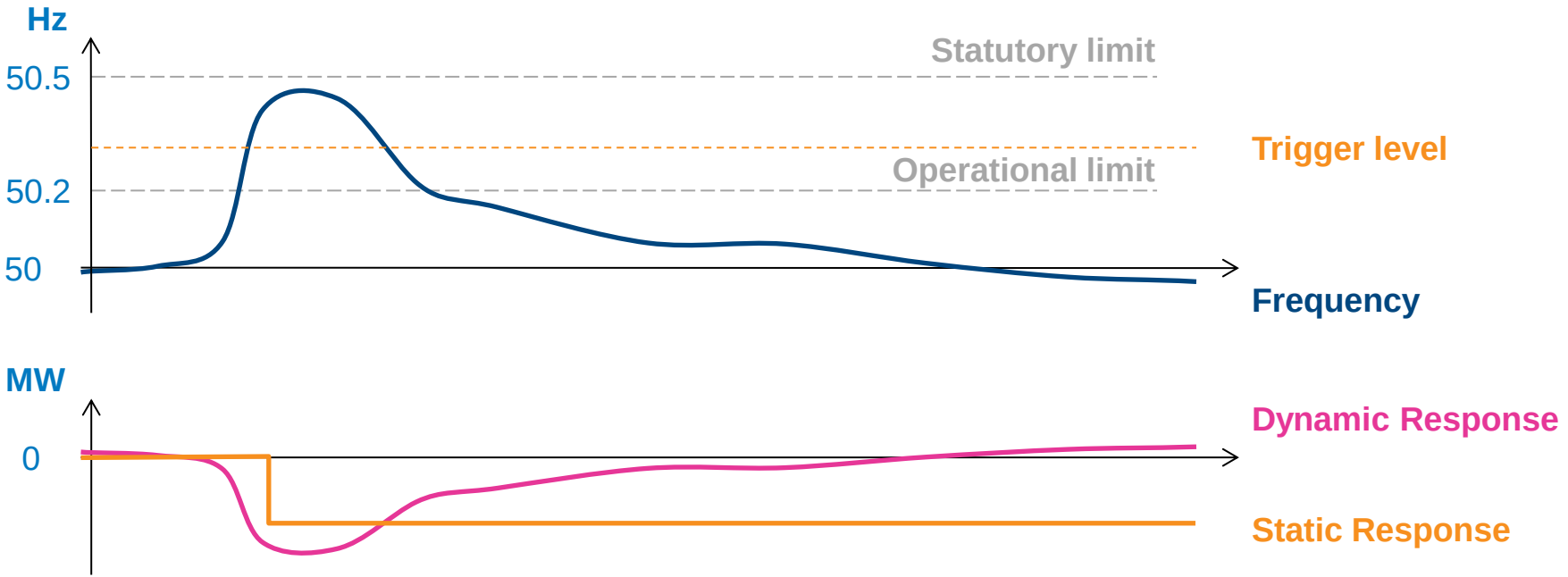
Frequency is observed to start falling

Dynamic frequency response services act to continuously regulate frequency.

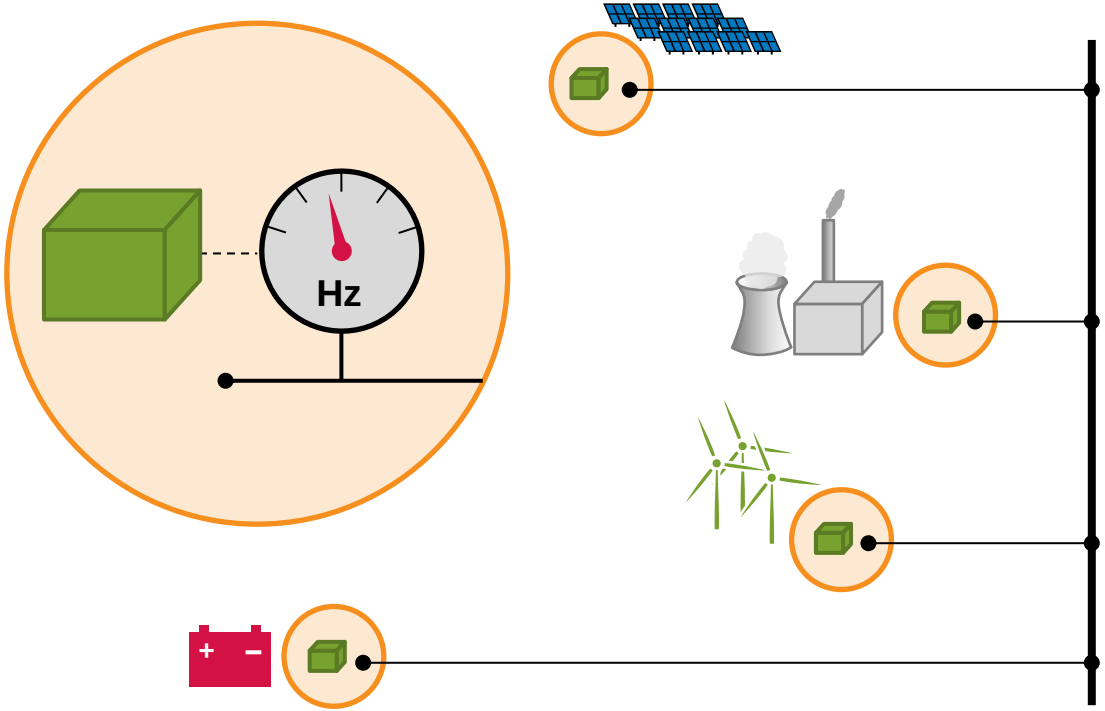
A BOA is sent to increase generation

Frequency Containment

When there is a large imbalance, static and dynamic response services act to contain frequency within statutory limits while reserves are activated.



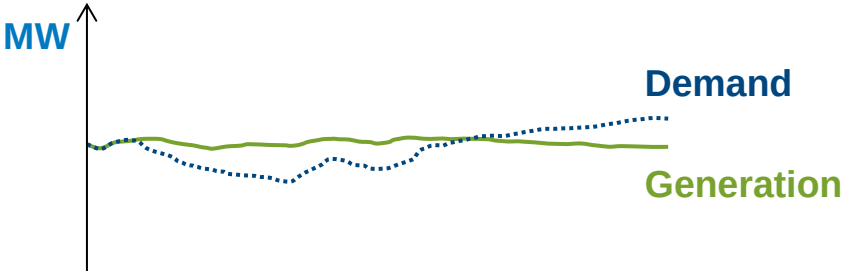
Frequency Response Control



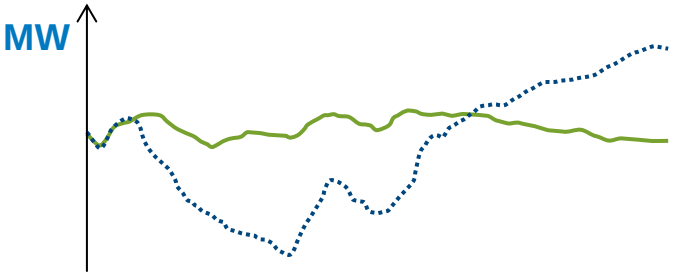
The control signal for frequency response is the system frequency itself.

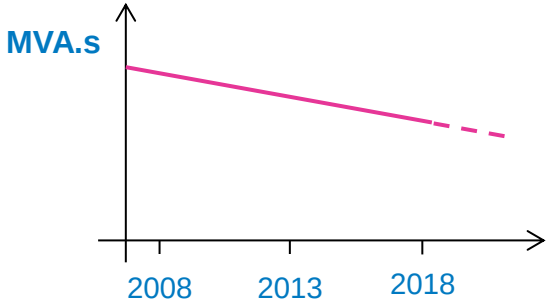
Frequency response services must sustain until reserves are activated and restore frequency to 50Hz.

System Evolution



Demand and generation are more variable.

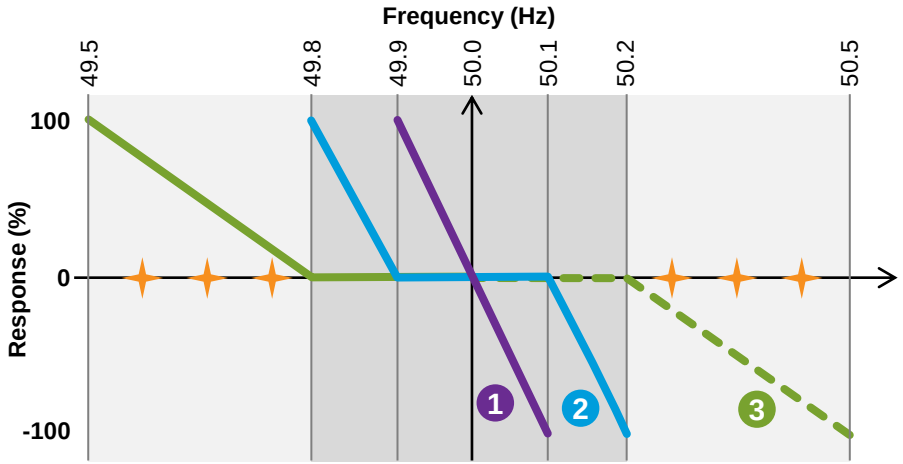




System inertia is falling.

The size and number of large infeed and outfeed risks are increasing.

New Frequency Response Services



Services activated in Operational Limits are symmetrical:

- Dynamic Regulation
- Dynamic Balancing

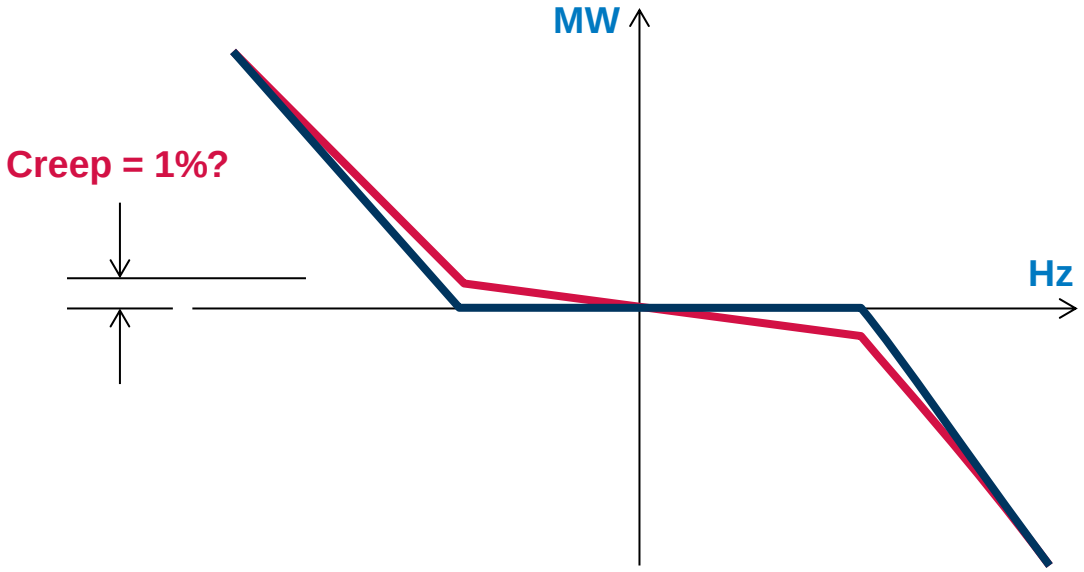
Services activated in Statutory Limits are asymmetrical:

- Dynamic Containment
- Static Containment

	LF Range *Hz (-ve dev.)*	HF Range *Hz (+ve dev.)*	Max Lag *s*	Max Ramp *s*	Duration *mins*
1 **Dynamic Regulation**	0.015 – 0.1		2	8	∞
2 **Dynamic Balancing**	0.1 – 0.2		0.5	0.5	20
3 **Dynamic Containment**	0.2 – 0.5	0.2 – 0.5	0.5	0.5	20
Static Containment	Various	Various	1	N/A	30

Draft

Design Variation: Creep



Services with wide deadbands have low duty cycles, reducing the cost of provision.

Creep provides a low duty demonstration of capability and provides confidence to the system operator, reducing uncertainty in real-time.

Survey Feedback

Lizzie Blaxland

Purpose of the Survey

Gather feedback and input on the new service designs

keep you informed

transparency

reasons for new designs

opportunity to suggest design improvements

technology neutral

not creating inadvertent barriers to market

Clarifications

Will the new services replace Primary, Secondary and High?

Will the new services have performance monitoring?

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

Why is inertia not part of these designs?

What about state of charge management?

Clarifications

Will the new services replace Primary, Secondary and High?

- To some extent as there is only one total response requirement.
- These new services will meet some of the overall requirement and so have an impact on future volumes bought through the MFR and FFR markets.
- The timing and extent will be discussed with industry and communication through the normal means.
- There will still be a requirement for slower response services that are potentially similar to FFR.

Will the new services have performance monitoring?

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

Why is inertia not part of these designs?

What about state of charge management?

Clarifications

Will the new services replace Primary, Secondary and High?

Will the new services have performance monitoring?

- We anticipate requiring real-time performance monitoring
- Reduces requirement for up-front testing

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

Why is inertia not part of these designs?

What about state of charge management?

Clarifications

Will the new services replace Primary, Secondary and High?

Will the new services have performance monitoring?

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

- Designing new services gives us an opportunity to go back to first principles and come up with solutions to our underlying requirements.
- The new services explicitly address our different needs for continuous regulation, occasional balancing support and event-based containment.

Why is inertia not part of these designs?

What about state of charge management?

Clarifications

Will the new services replace Primary, Secondary and High?

Will the new services have performance monitoring?

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

Why is inertia not part of these designs?

- This remains a topic under careful consideration.
- At this stage, we are not in the position where we think it would be appropriate to create an ancillary service for inertia.

What about state of charge management?

Clarifications

Will the new services replace Primary, Secondary and High?

Will the new services have performance monitoring?

Why doesn't National Grid just buy faster Primary, Secondary and High or more EFR?

Why is inertia not part of these designs?

What about state of charge management?

- This is a huge area of interest and we recognise the need for National Grid to address this issue.
- It will be considered further when designing the new products.


nationalgrid