DS3 Auction Design Workshop – Apr 25, 2016

Michael Phelan - CEO

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Technology Leader in Smart Grid Optimisation

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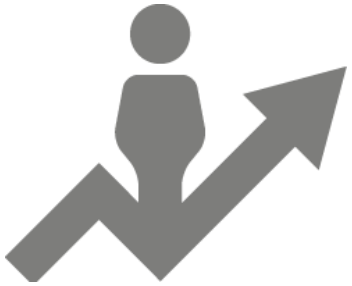
We enable intensive energy users to actively participate and earn lucrative recurring revenues from demand side response schemes.

Customers

- 200+ sites UK & Ireland



Foundations

- On-going investment in Development is what sets us apart

Team

- Experienced development team

Unique Platform

- 40 Man-years of development
- Innovation Awards

Approved

- Aggregator for Grid Operators in UK & Ireland
- Utility scale system services >35MWs in GB

Balancing Services
National Grid

Under the new plans, National Grid will be **relying on demand-side schemes for "well over 50%** of the time" by 2030

Duncan Burt
Head of Commercial Operations
National Grid

Auction Flexibility Required

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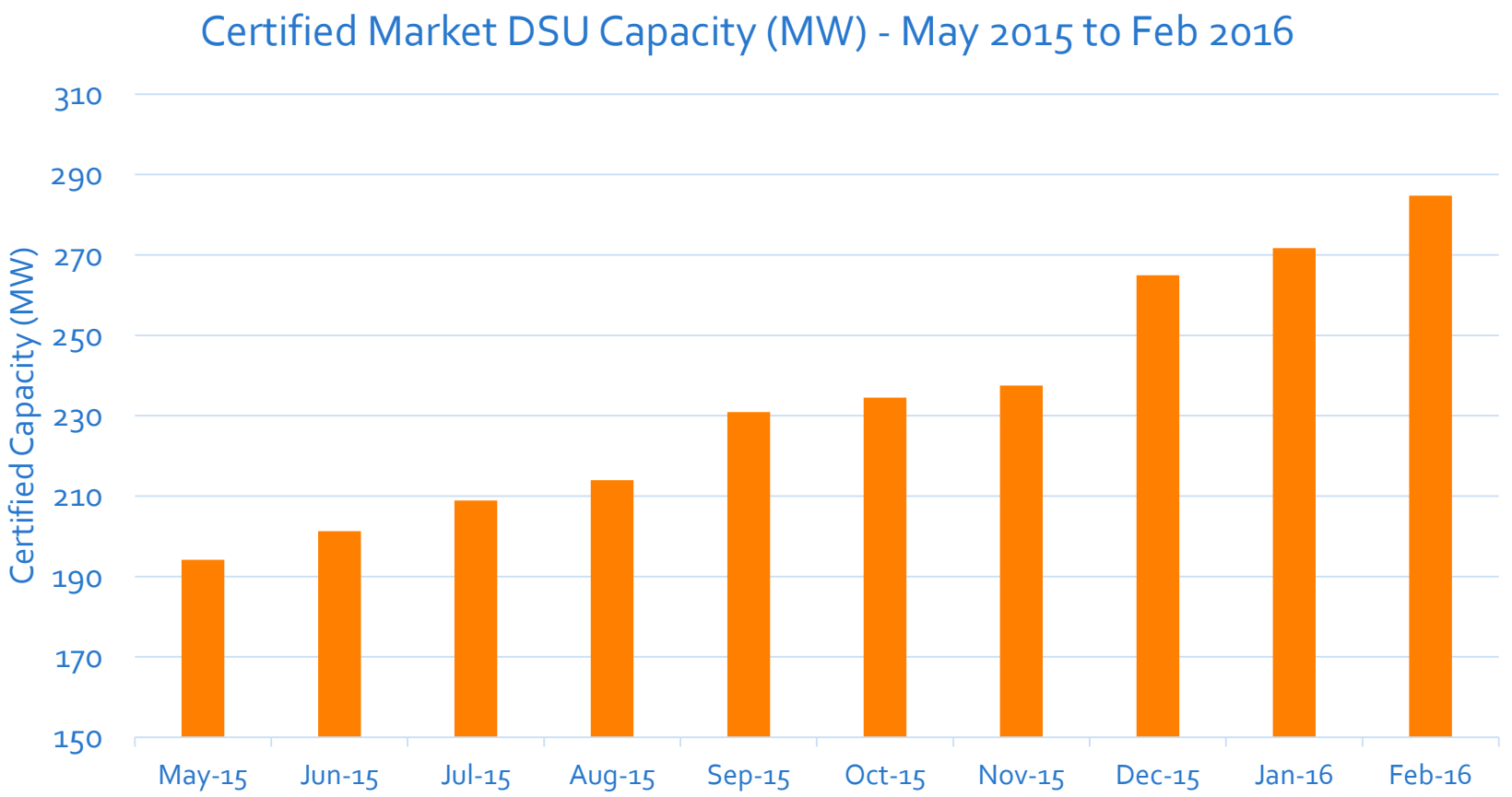
+ Auction flexibility is required to promote active Demand Side participation



SEM Demand Offers May-15 to Feb-16

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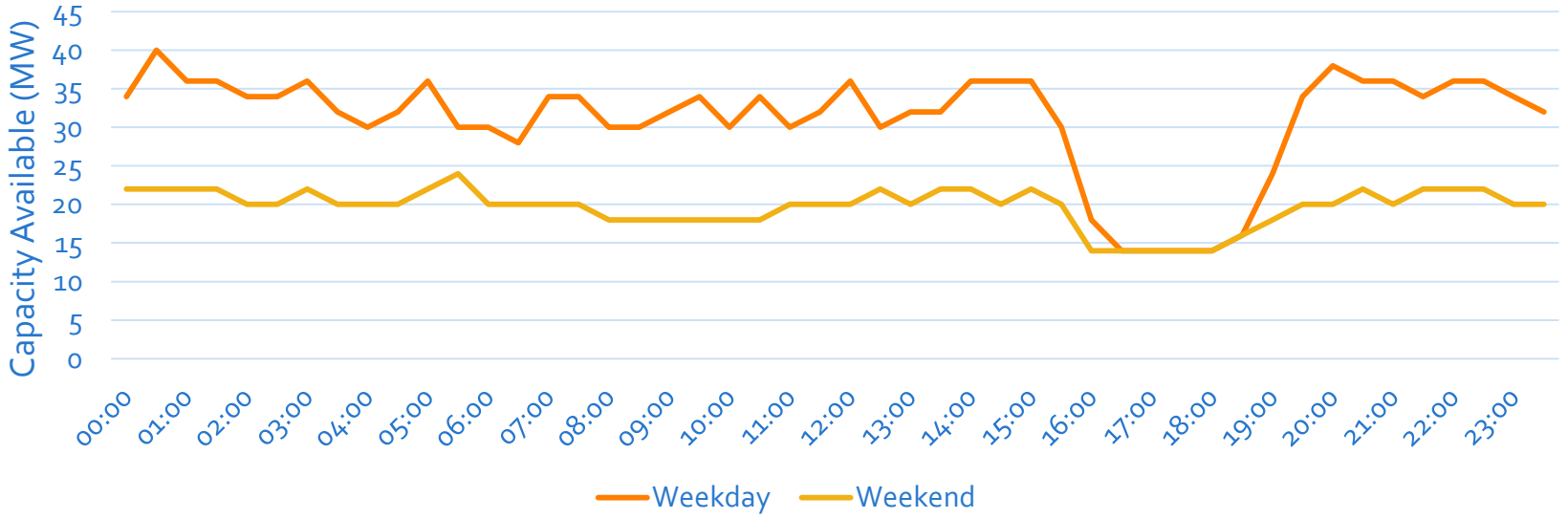
Challenges in Predicting Availability

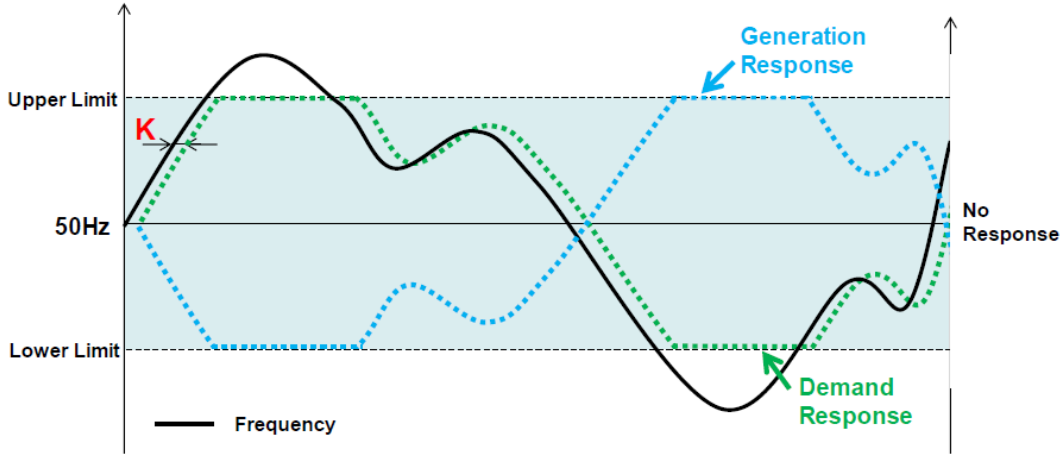
- Challenges in predicting availability for DSU Annually:
  - Changes in ambient conditions
  - Production schedules of IDS
  - Addition of IDS (individual demand sites) to unit
  - Removal of IDS to unit (e.g. IDS change or provider or shutdown)

Example of Aggregated Demand Side Unit Availability Profile (Weekday Vs Weekend)

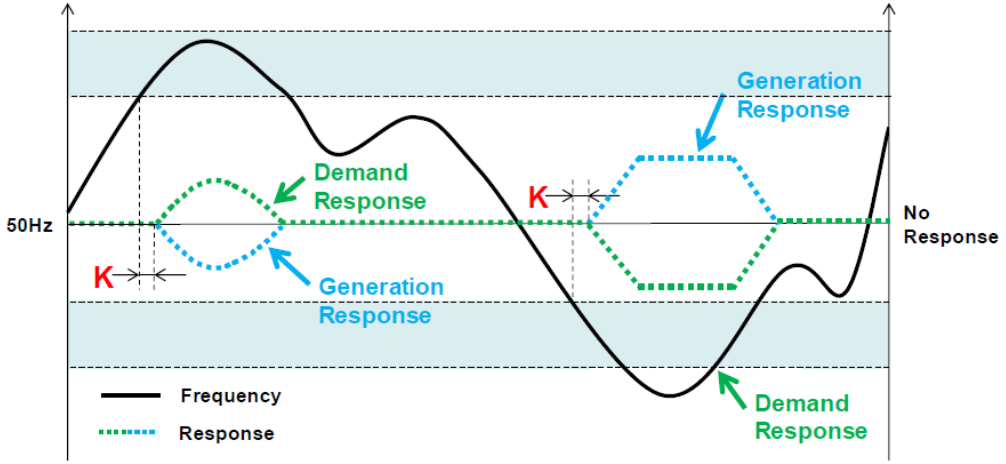


GB NG Dynamic Frequency Response – Up side as well as Down Side Response

+ Dynamic FFR: Fully Dynamic Frequency Response:



+ Dynamic FFR: Partial Dynamic Frequency Response:



High side response to reduce wind curtailment and facilitate renewable integration:

- Hour ahead notice to provide response
- 10 sec high side fast frequency response
- Load up of assets such as cold stores
- Back-off of embedded generation

Flexible in approach to load and storage:

Flexible Contracts – Paramount Importance to Demand Side

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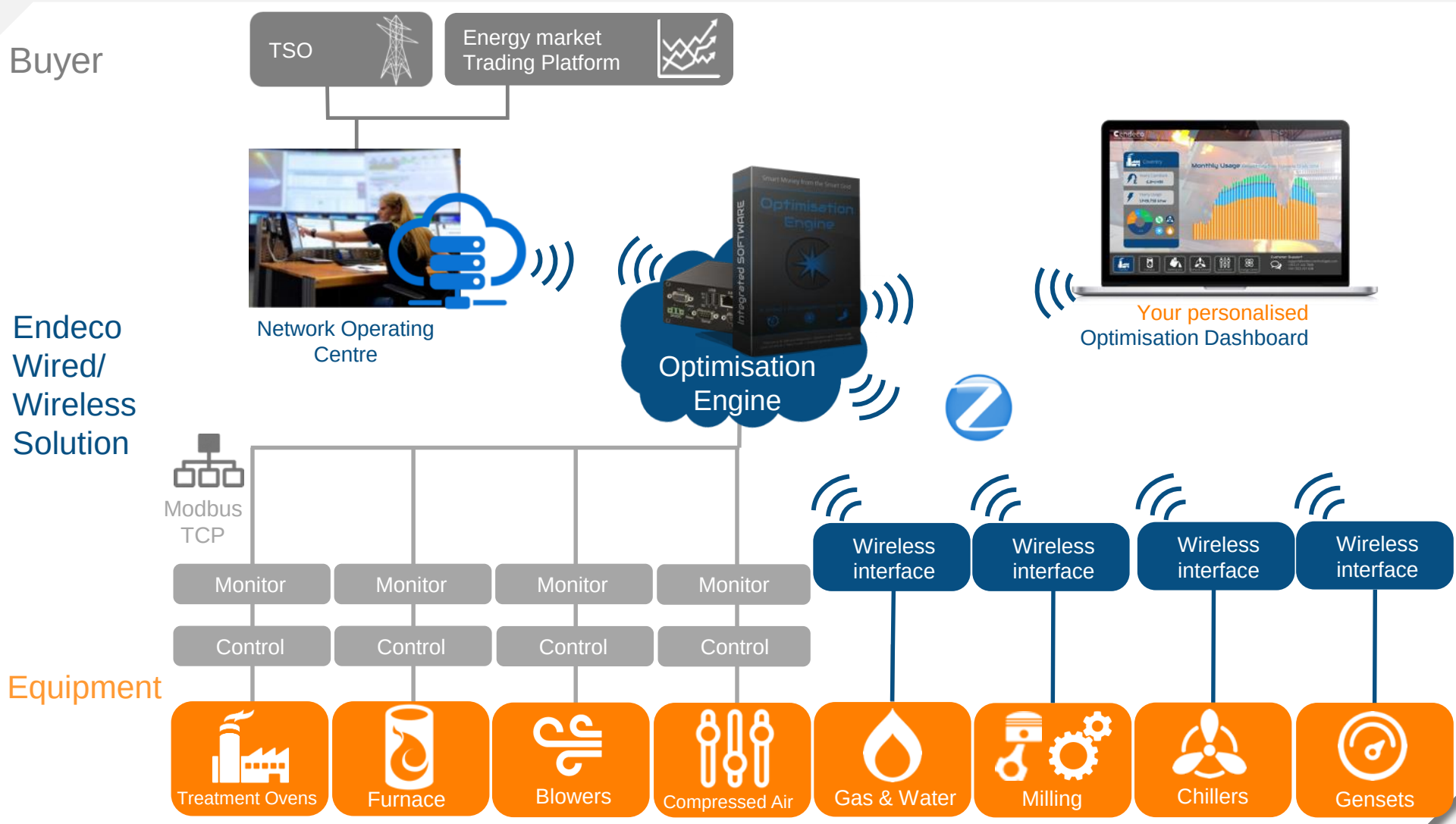
+ Demand Side Units Growing all the time
+ Irrespective of growth, availability is variable
+ Demand Side should not be disenfranchised on pricing because of flexible or shorter term contracts
+ No - commitment model favored as other models would impede the growth of demand side

Flexible Frequency Response – Active in GB for Demand Side

+ Providers tender pricing month ahead
+ Nominate availability week ahead currently (daily has been mooted)
+ Demand Side offers greatest accuracy – closer to real time
+ > 98% accuracy week ahead currently

Pragmatic approach to measurement of events with sub 1 second event trace



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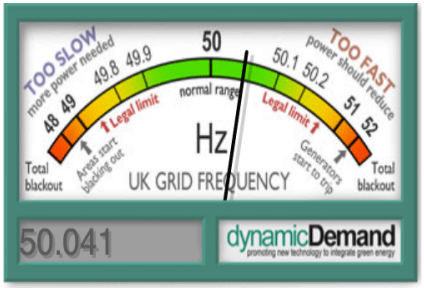
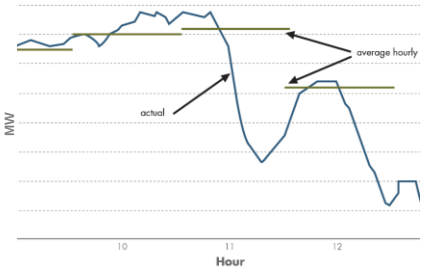
DEMAND Side Market Development GB

1. Recognize that DSM and storage solves curtailment as well as Grid stability.
    1. Store energy when wind blows
    2. Manage stability by fitting both sides of frequency balancing equation



+ Open and bilateral contracts to build up storage and demand side

+ Actively favor DSM and storage over other methods as they find them the best solutions for balancing grid while minimising wind and solar curtailment.



+ Little or no carbon impact (where provision through demand for low side and through embedded generation for high side is concerned)

+ A distributed service response across the market jurisdiction

+ No single point of unit delivery failure

+ Opportunity for the end consumer to benefit directly as well as the Grid System as a whole.


Thank you
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