

GC0096 Energy Storage Technical Requirements

Agenda

- Introductions
- Understanding the background:
 - BEIS
 - Ofgem
 - The Electricity Storage Network
 - Elexon
 - National Grid
- What's the issue?
- What can we do about it?
- Have we missed anything?
- Wrap Up

Introductions

What's your name?

Who do you represent from?

What is your interest in the day?

From National Grid...

- Ryan Place – Chair/Facilitator
- Antony Johnson
- Richard Smith
- Adam Towl
- Richard Woodward

Objectives for the day

Define our GC0096 issue:

- Gather your insights on how Energy Storage technologies and schemes are evolving
- Determine how this relates to the Grid Code

Plan how any future work is managed:

- Form a proposal for what, if anything, needs to be developed under 'GC0096', and what that will look like
- Consider what wider industry engagement is needed to understand how any new technical requirements would link to other commercial and regulatory frameworks

Understanding the background – DBEIS/Ofgem

Understanding the background - Elexon

Understanding the background – The Electricity Storage Network

Understanding the background - 2016 Future Energy Scenarios

Key insights:

- FES 2016 has taken account of the evolving nature of Storage technologies and their rapid proliferation
- ‘Consumer Power’ scenario has **18.3 GW** of storage connected in 2040, the majority of this (13.2 GW) being connected to the distribution network
- There are minimal developments under ‘No Progression’, with only **3.6 GW** of storage in 2040



18.3 GW

Storage in 2040 for
Consumer Power

See more - Section 4.3

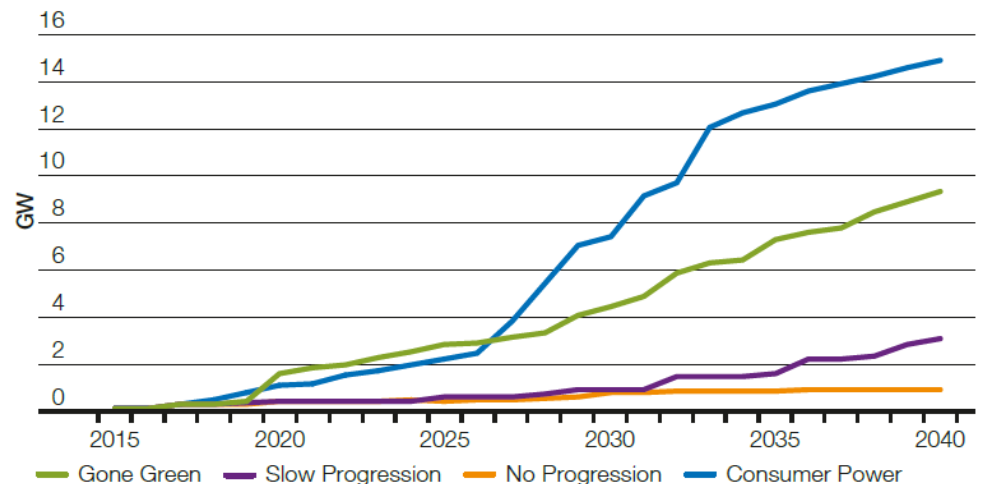
<http://fes.nationalgrid.com/>

Understanding the background - 2016 Future Energy Scenarios

*Table 4.3.1
Levels of storage connected in 2040 (GW)*

	Transmission-connected	Distribution-connected	Sub-1 MW	Total electricity storage
Gone Green	5.9	3.8	1.7	11.4
Slow Progression	3.9	2.3	0.2	6.4
No Progression	3.0	0.5	0.1	3.6
Consumer Power	4.1	13.2	1.0	18.3

*Figure 4.3.1
New installed storage capacity (excluding pumped storage) (GW)*



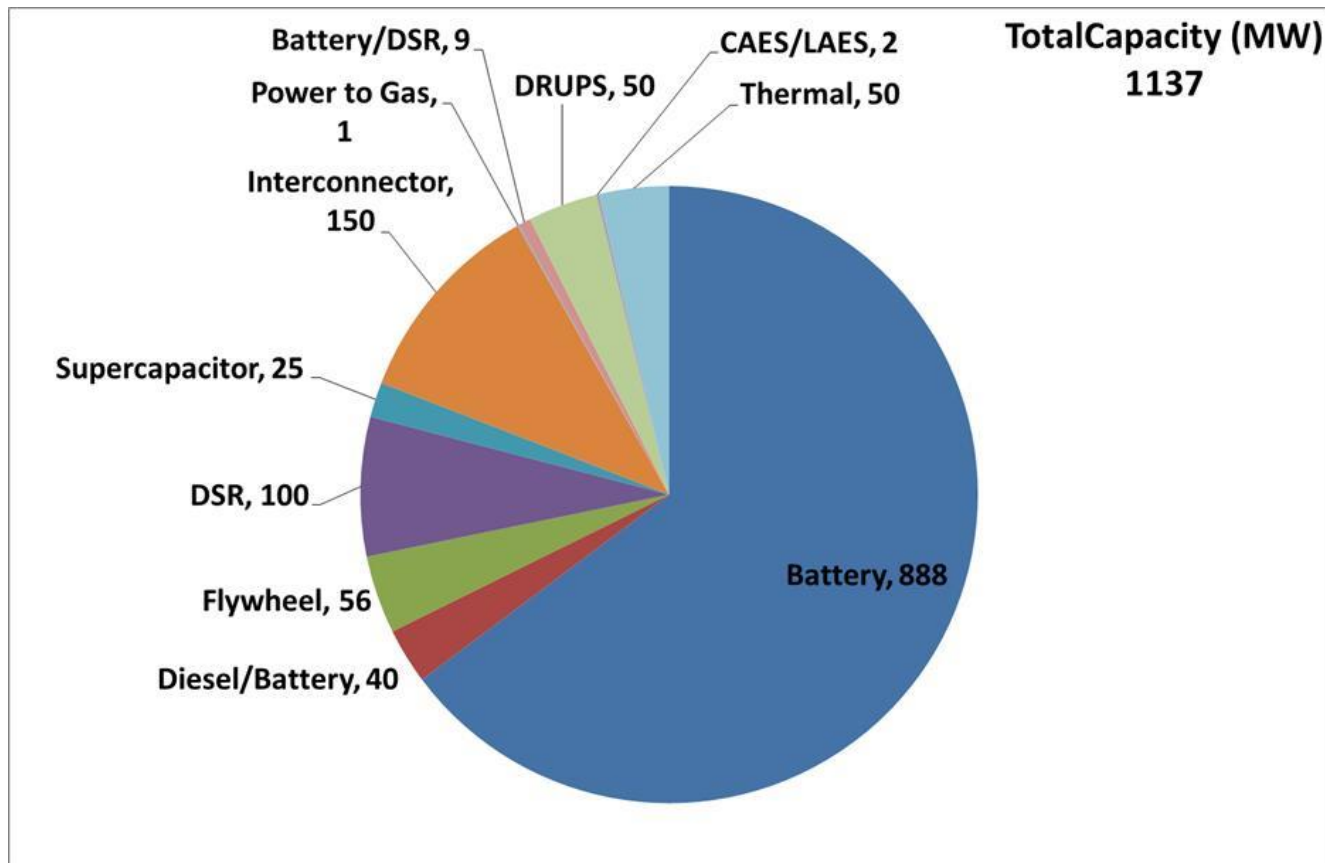
See more - Section 4.3
<http://fes.nationalgrid.com/>

Understanding the background - EFR

- Enhanced Frequency Response (EFR) is a new service being developed to improve management of the system frequency
- Providers must achieve 100% active power output at 1 second (or less) of registering a frequency deviation
- EFR differs from existing frequency response services of 'Primary' and 'High' which have timescales of 10 seconds, and Secondary which has timescales of 30 seconds
- National Grid is looking to procure a volume of enhanced frequency response through a tendering exercise, and will announce results in late August 2016

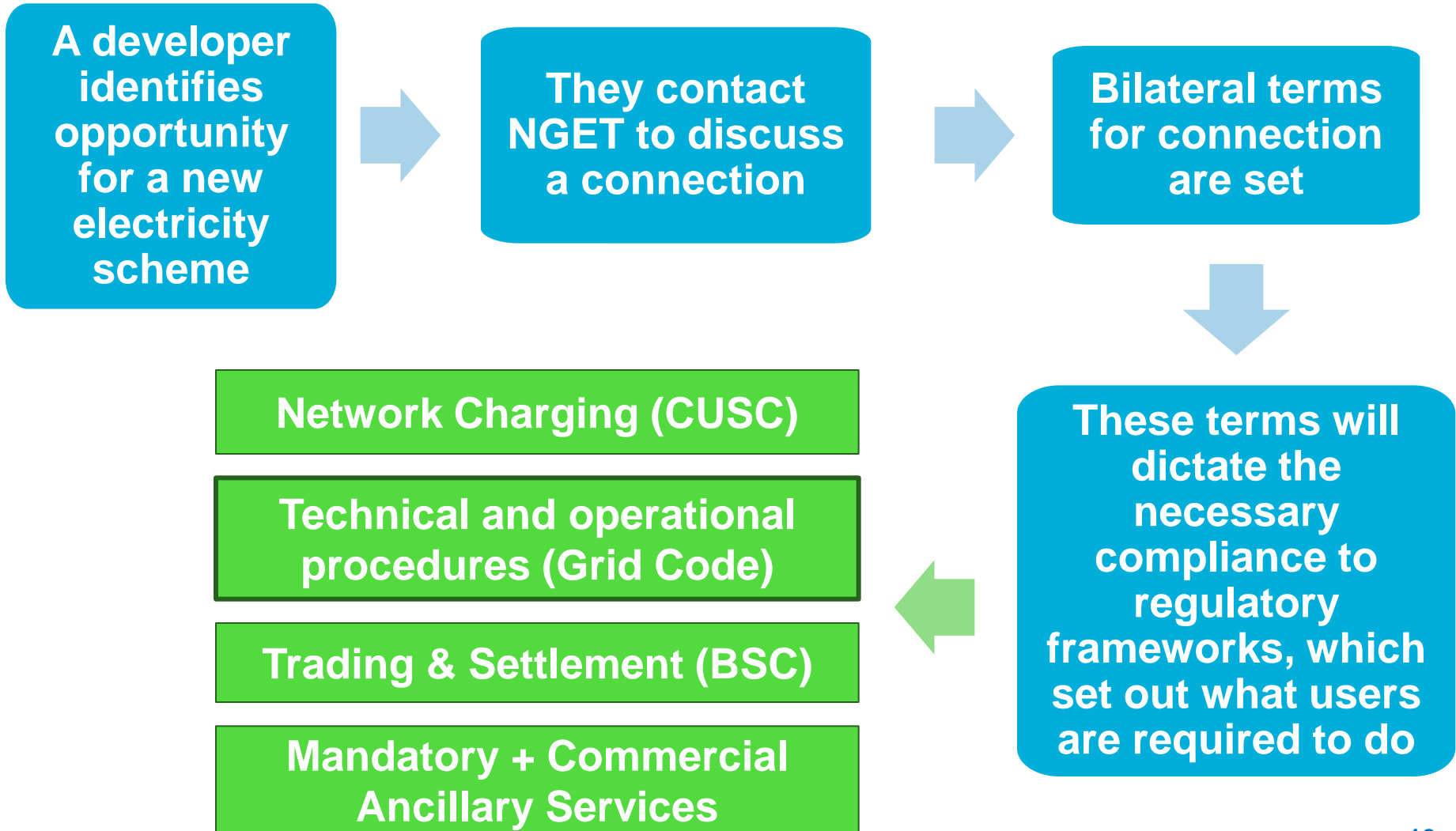
Understanding the background - EFR

- The majority of **pre-qualified** parties are Energy Storage technologies, with the majority from Battery:



Understanding the background – nationalgrid

Making a connection (Transmission User)



Understanding the background – nationalgrid

Making a connection

- Technical Requirements for users connecting to electricity systems are found in either the Grid Code or the Distribution Code (depending on the connection)
- Examples of typical Grid Code technical requirements:
 - Operational Frequency Ranges
 - Operational Voltage Ranges
 - Power Quality
 - Reactive Capability
 - Optional Black Start
 - Active and Reactive Power response
 - Frequency Response
 - Voltage Control
 - Fault Ride Through
 - Control / System Telephony
 - Operational Metering
 - Electronic Data Communication Facilities
 - Ancillary Services
- These will apply depending on the nature, scale and configuration of the connecting equipment...

Understanding the background – nationalgrid

Making a connection

- The Grid Code defines the significance of schemes connecting to the system in three categories – Small, Medium and Large
- It is important to note that technical requirements are not assigned Connection Entry Capacity (CEC) or Transmission Entry Capacity (TEC), or any other commercial product

Power Station Size:	England & Wales	South Scotland	North Scotland
Small	<50MW	<30MW	<10MW
Medium	50-100MW	N/A	N/A
Large	>100MW	>30MW	>10MW

What's the issue?

- **However...!** The Grid Code does not currently define Energy Storage, or specify technical requirements for Storage technologies (Pump Storage aside)
- Nor does it envisage Storage being configured as part of an existing generation or demand scheme
- National Grid is receiving an increasing number of connection applications from Storage developers
- When we prepare these offers appropriate technical requirements are derived from either Generation or HVDC requirements
- This process does not necessarily reflect the nature of the technology, and is inefficient for all concerned...

What's our key issue?

Richard's starter for ten...

“Energy Storage is not defined in the Grid Code. This causes confusion for developers and National Grid when new connections are requested. What should be done to resolve this problem?”

Do we agree this is the key issue to address?

Group discussion + feedback observations

Don't try to come up with solutions at this stage!

What's our issue?

- [Final issue statement(s)]

What can we do about
our issue?



Scoping a possible solution

- If we are agreed that the gap in the Grid Code requires solving, then we need to consider what a code change looks like
- This is not easy – given the many and varied Storage technologies and deployments
- The following slides provide your insights on this topic – we also have time for more input today
- Using this information we can try and determine what a Grid Code change might look like, which allows us to steer how any future work will be managed

Knowledge share:

Types of Storage technologies

- [Responses to Storage technology info request]

Knowledge share:

Types of Storage configurations

- [Responses to Storage configurations info request]

Storage requirements specifications

Given what we now know about Storage technologies and how they can be deployed - what are the possible options for constructing a set of 'Storage' technical requirements?

- By technology
- By configuration
- By capacity thresholds (e.g. Small/Medium/Large)
- By 'Running regime' (i.e. Import / Export Cycles)
- **By ... what else?**

Storage requirements specifications

**Are there any additional other specifications
for a set of 'Storage' technical
requirements?**

Do you agree with our list?

Group discussion + feedback observations

Storage requirements criteria

What criteria should we use to assess the most appropriate method for allocating Storage technical requirements?

- Any GC0096 work requires minimal industry and NGET resource
- The changes to the Grid Code are made with simplicity and rapid implementation in mind
- The requirements are developed to be as future proof as possible
- They are consistent – either/or between Storage technologies or other Transmission system users
- **What else?**

Storage requirements criteria

Are there additional criteria we might use to assess the most appropriate method for constructing Grid Code Storage technical requirements?

Do you agree with our list?

Group discussion + feedback observations

Weighting criteria

What weighting should we give to the different criteria?

- 5 = very important
- 0 = not important at all

Group discussion + feedback rankings

Forming our way forward [Discussion]

Specification	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	TOTAL
1.						
2.						
3.						
4.						
5.						

What's our proposed approach to develop a solution?

- [Solution statements]

Have we missed anything?



Other Factors [Discussion]

- Our focus so far has been Grid Code technical requirements for connections
- How do we consider other important Grid Code requirements for operations, such as:
 - Modelling and data provision
 - Operational metering and forecast data
- Can we adequately set technical requirements without considering Aggregation?
- Which parties or technology providers have not been represented in our discussions?

Wrap up



Wrap up – Next steps for GC0096

- **Thank you for your participation today!**
- We will write up all the key points, actions and decisions from today and circulate to the GC0096 circulation list
- We will review this and gather more insights in our additional workshop on 31st August
- National Grid (Richard) will take an updated GC0096 issue paper to the **Grid Code Review Panel** in September setting out:
 - Our defined issue(s)
 - Our proposal for how to manage these issues, including what a Grid Code change may look like

Any other business?



How can we improve?

- This is the first time we have tried a workshop in this format and also the first time a lot of you have attended a Grid Code meeting.
- We are continuously trying to improve the services that we provide and how we engage with you.
- Please take the time to provide us with the valuable feedback which will allow us to do so.

Contact us

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