Energy Storage Growth Scenarios and Operating Modes

Consultation to assist future network modelling

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

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Contact Details

Email
wpdnetworkstrategy@westernpower.co.uk

Postal
Network Strategy Team
Western Power Distribution
Feeder Road
Bristol
BS2 0TB

Disclaimer

Photo credits

WPD would like to thank and credit *British Solar Renewables*, *BYD*, *Regen* and *National Grid* for use of their images and graphs.

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Figure 1 – WPD and British Solar Renewables storage project in Somerset

1 – Introduction & Objective of this Consultation

Introduction

Western Power Distribution (WPD) is the distribution network operator for the Midlands, South West England and South Wales, and is responsible for delivering electricity to approximately 7.8 million customers in the UK. .

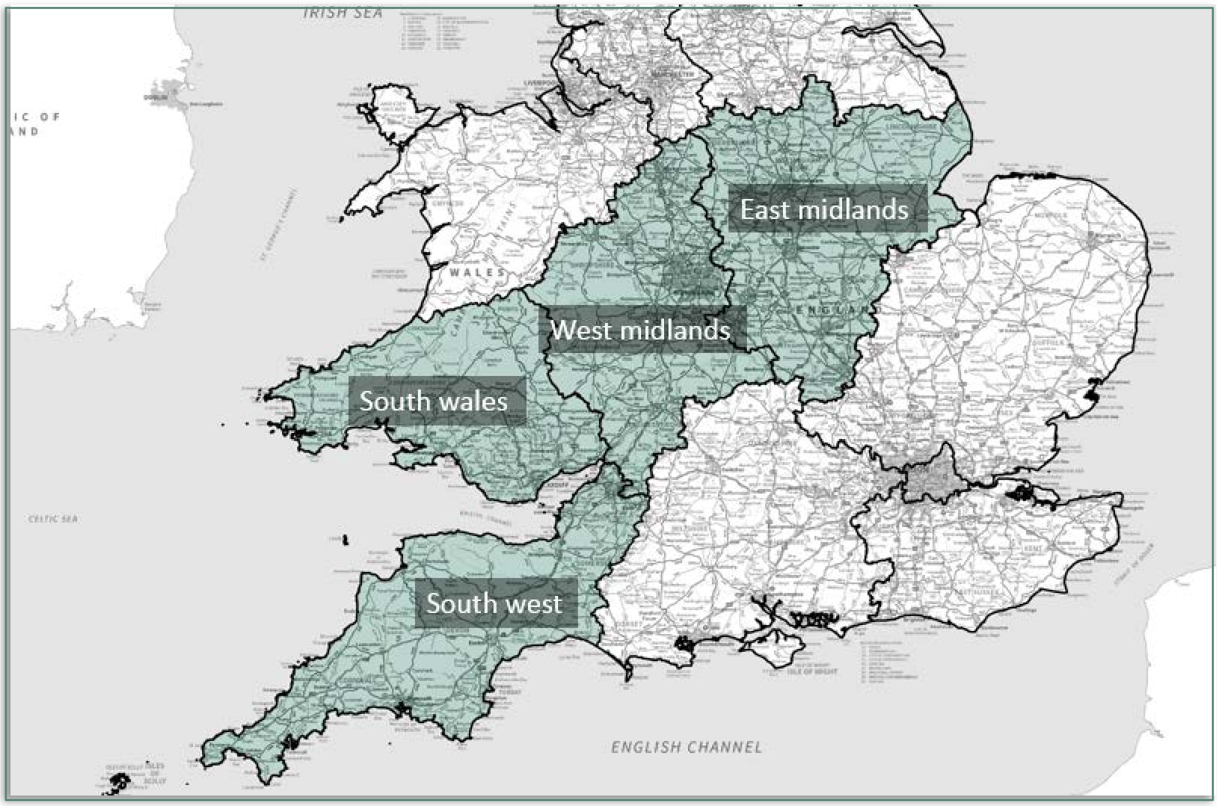


Figure 2 – Area map of WPD distribution, with our 4 supply areas

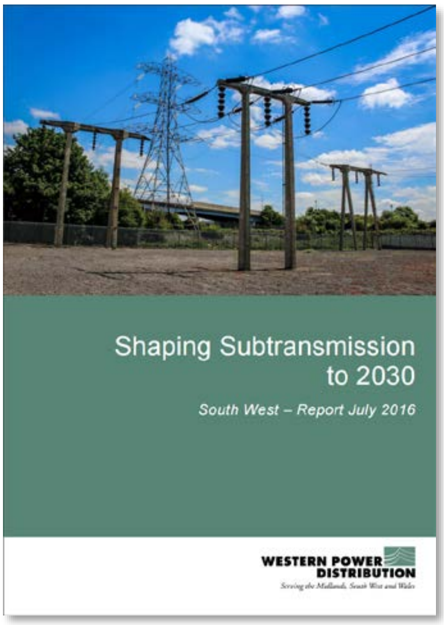
Over the last 18 months WPD has been undertaking analysis to better understand the potential growth in the connection of distributed generation (DG) and energy demand in all its licence areas, and how that future growth may impact on the network.

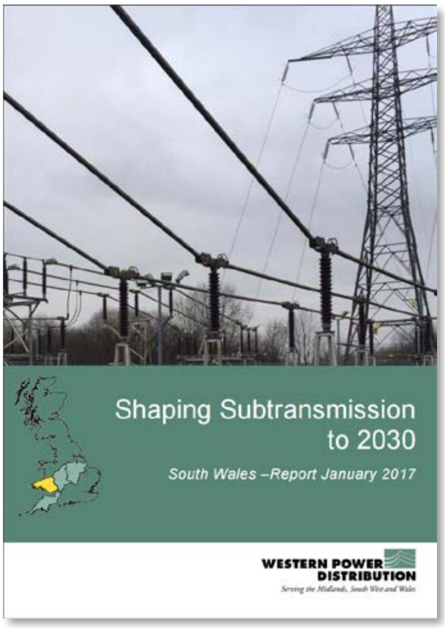
This future growth analysis, which looks out to 2030, has been used by WPD to inform its future network plans and to provide an evidence base to support future investment.

Some examples of how the analysis has been used, can be found in our recent publications:

Shaping Subtransmission to 2030 South West – Report July 2016
Available at: www.westernpower.co.uk/netstratswest2016

Shaping Subtransmission to 2030 South Wales – Report January 2017
Available at: www.westernpower.co.uk/netstratswales2017





While the analysis to date has focused on electricity demand and generation growth WPD recognises that energy storage, and other forms of flexibility including Demand Side Response (DSR), are expected to play an increasingly important and could potentially help to reduce system costs as well as providing a range of network services.

Energy storage, in the form of pumped hydro, has been a feature of the UK energy system for some time. In the last year however, WPD, in common with other UK network operators, has seen a significant growth in the number of connection agreement applications it has received for storage projects.

The number of connection applications, combined with the high level of development activity and investor interest, suggests that energy storage could grow rapidly in the next decade.

It is therefore important that WPD has as good an understanding as it can, not only of the rate of growth but also of how energy storage assets are likely to be used and their “mode of operation”; the profile of charge and discharge.

WPD are working with Regen to develop an approach to model the growth and operation of storage. This consultation is part of that modelling work, helping us to validate some of the key assumptions we have made in this modelling approach.

Objective of this Consultation

In undertaking this consultation, WPD is seeking to understand:

- *The potential scale of growth of energy storage within its distribution network*
- *The type of energy storage assets/projects that are likely to be deployed within its network and their business models*
- *The typical operating behaviour of storage assets, how they are likely to be used and their typical mode(s) of operation*

WPD will use the information gathered on the scale and operation of storage to inform its future network planning. WPD are not using this information to consider network constraints for individual projects, which will still be assessed through the existing connection application process. An increased understanding of storage models will help WPD design its connection process to further facilitate storage onto the network.

WPD wishes to consult with industry to establish whether the analysis and definitions we have arrived at around storage business models, project specifications and operating modes are appropriate and reflect how the sector currently views the likely deployment and operating behaviour of storage.

WPD hopes this consultation will provide an opportunity for storage developers to engage with its strategic network investments, to help WPD understand the growth of storage and the typical operation of storage systems in its licence areas.

This paper is intended to prompt response from all areas of the sector that have an interest or involvement in energy storage. We would welcome engagement and input from a wide range of organisations, with the potential to arrange follow-up phone interviews or face to face consultation, with those parties that would be interested to engage further.

Please can you email your completed PDF form to:
wpdnetworkstrategy@westernpower.co.uk

Or you can post physical copies of the consultation back to us at:
Network Strategy Team
Western Power Distribution
Feeder Road
Bristol
BS2 0TB

The closing date for this consultation is **21st June 2017**.

WPD will share the responses we receive with Regen. All information provided will be treated by WPD and Regen as confidential.

WPD will then publish an anonymised, aggregated summary of the responses shortly after this closing date.

WPD would like to thank you for your time responding to this consultation.

2 – An Introduction to Energy Storage

The value of flexibility

The UK energy system is undergoing significant change and the value of flexibility within the system has increased in line with this ongoing evolution of the system. In November 2016, BEIS and Ofgem issued a joint call for evidence around '*A Smart, Flexible Energy System*' and energy storage featured extensively throughout this call for evidence, as an area that could promote and increase the inherent flexibility in the energy system.

As part of the drive to improve the balancing of generation and consumption, maximise the use of low carbon energy generation and optimising the investment in infrastructure, flexibility technologies such as storage could be a key enabler.

The role of energy storage

Energy storage is a technology area that is well placed to support the needs of the changing energy system, specifically around flexibility and security of supply. As a concept energy storage is not new, with technologies such as pumped hydro, flywheels, heated water tanks and others storing energy for use on demand.

The role of energy storage is changing due to the changing market, technology costs, need for flexibility services and the development of more sophisticated control systems to integrate, aggregate and manage storage assets. There are a number of roles energy storage can play (such as backup mains supply), but the categories that we believe will see the biggest growth, are energy reserve services, response services and energy time/price shifting. See below summary of these services:

- ***Response:*** The ability to respond quickly (milliseconds – minutes) to grid, frequency and/or price signals. Potential applications include the provision of ancillary network services such as frequency response and voltage support.
- ***Reserve:*** The fundamental property of energy storage that enables the storage of energy to be used at a time when it is required. From a simple back-up capability for use as an alternative source of energy, to large scale capacity reserve and Short Term Operating Reserve (STOR).
- ***Price and time shift:*** The capability to shift energy from lower to higher price/cost periods. A more sophisticated application of both reserve and response functions, allowing energy users and suppliers to take advantage of price variance (price arbitrage), avoid peak transmission and distribution costs and/or to recover energy that would be lost due to network or other constraints.

As part of this consultation, we have taken these roles of storage and categorised them into a set of key emerging business models. A summary of these business models can be found on page 15 of this paper.

Growth of the energy storage market

The storage market has come up against a number of barriers to progress, ranging from technology constraints, high up front cost, uncertain revenue streams, potential for constrained connections and changing regulation. However, despite this inherent complexity, there is a strong consensus that energy storage could see rapid growth in the coming decades and become a critical part of the overall UK energy system.

The current growth in interest in energy storage has been driven by:

- The expected fall in storage costs, in particular, batteries
- The need for higher levels of flexibility and network ancillary services caused by the increased penetration of variable renewable generation and the closure of existing thermal plant
- The availability of revenue streams for balancing and ancillary services and the need for storage to play a key role in Demand Side Response (DSR)
- The parallel slowdown in development of renewable energy (onshore wind and solar PV), which means that resources and capital are available for new investment opportunities
- The emergence of new business models, which are discussed in more detail in the Regen report - *Energy Storage: Towards a Commercial Model*

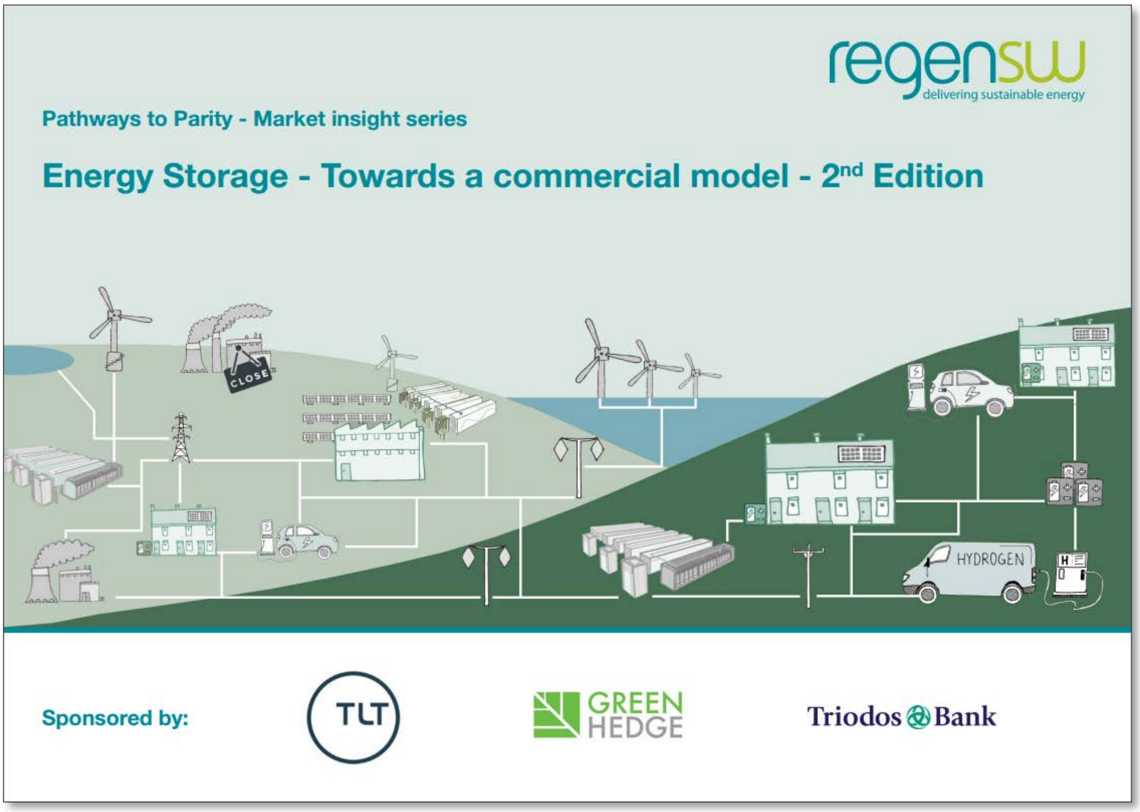


Figure 3 – Energy Storage - Towards a commercial model (2nd edition) available at https://www.regensw.co.uk/storage-towards-a-commercial-model *Credit: Regen, 2016*

Increasing interest in storage connections

WPD has received unprecedented interest in connecting storage assets. The volume of grid connection applications has significantly increased over recent years. As shown in Figure 4, a total of 2,354 MVA (across 139 sites) of connected, accepted and offered storage capacity is on our network.

	Battery Storage Capacity					
	Connected		Accepted		Offered	
WPD Supply Area	**Number of Sites**	**Capacity (MVA)**	**Number of Sites**	**Capacity (MVA)**	**Number of Sites**	**Capacity (MVA)**
West Midlands	1	3	41	704	17	299
East Midlands	0	0	20	229	20	399
South Wales	0	0	4	60	3	50
South West	0	0	15	201	20	410
TOTAL	**1**	**3**	**78**	**1,194**	**60**	**1,157**

Figure 4 – WPD Generation Capacity Register data for storage, dated 3rd May 2017

Connection agreement process for storage

In addition to the established connection application process for other technologies, the Energy Networks Association (ENA) have developed a form that captures specific technical information for the connection of their storage project.

This *Energy Storage Further Information Request* form is available at http://www.energynetworks.org/electricity/futures/energy-storage/energy-storage-further-information-request.html and is designed for any applicants that are considering the inclusion of storage as part of their connection application.

It asks a series of questions around the electrical specification of the applicant's Energy Storage System (ESS), ranging from specifying the storage technology and the co-located generation technology (if any), to requesting information around the operating modes or commercial service of the storage system.

WPD supports the use of this further information request form and would seek views on the questions it asks and the awareness of it, as part of the connection application process.

3 – Consultation Section 1: Storage Growth Scenarios & Business Models

About you

Tell us about yourself and what part of the sector you represent:

Full Name:

Organisation:

Main area you represent:

Storage project developer	☐
Storage hardware manufacturer	☐
Storage control system company	☐
Storage consultant	☐
Other factors (please specify below):	☐

Contact email address:

Contact phone number:

Are you happy for us to contact you separately? ***Yes*** ◯ ***No*** ◯

Date of submission:

Overall storage market growth scenarios to 2030

Many industry analysts are predicting a rapid market growth for electricity storage and other forms of flexibility in the next decade. In order for this rapid growth to materialise, there is a need for steps to be taken to facilitate market innovation, with an early focus on battery storage.

A number of market analyst's reports have projected energy storage growth scenarios, these include National Grid *Future Energy Scenarios*, Committee on Climate Change, Carbon Trust and UK Government.

As a starting point for WPD's modelling, we are proposing to take a:

- **High growth** scenario of **10-12 GW** and **24-44 GWh** of energy storage capacity installed across Great Britain by 2030.
- **Lower growth** scenario of **4-5 GW** and **6-15 GWh** across GB by 2030.

Note: these figures include 2.7GW of existing pumped hydro storage.

Question 1 - ***To what extent do you agree with the high and lower growth scenarios for storage we have identified above?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Question 2 - ***What energy storage technologies do you think will be deployed?***

	Storage Technology						
Timescale	**Batteries - Solid State** *(i.e. Lithium Ion)*	**Batteries - Flow State** *(i.e. Vanadium Redox)*	**Compressed Air Energy Storage (CAES)**	**Fly-wheels**	**Hydrogen**	**Pumped Hydro**	**Super-capacitors**
Within 18 months	☐	☐	☐	☐	☐	☐	☐
2-5 years	☐	☐	☐	☐	☐	☐	☐
Beyond 5 years	☐	☐	☐	☐	☐	☐	☐

Other technologies not listed, please specify:

Development of the energy storage market

The 2016 Enhanced Frequency Response (EFR) and T4 Capacity Market auctions jump-started the electricity storage market development in the UK and WPD has received unprecedented interest in connecting storage assets.

The first 'wave' of connected storage assets appear to be focussing on frequency response, Capacity Market, demand side response (DSR) and potentially other grid and network services. In a high growth scenario, WPD's analysis anticipates that future waves of energy storage projects will target commercial and industrial (C&I) applications, domestic and small scale energy storage and also co-location with generation and aggregation.

Wave 1 - Led by response services (Now-2020)

- Focus on grid and network services (including frequency response & DSR)
- First applications for C&I 'behind the meter' models and co-location
- Domestic and community scale early adopters.

Wave 2 - Co-location business models become viable (Early 2020's)

- Market for C&I high energy users/generators grows rapidly
- Co-location projects with solar PV and wind become viable
- The domestic and community storage market expands.

Wave 3 – Market expansion and new business models (Mid/Late 2020's)

- Price arbitrage and new trading platforms develop
- Storage enables local supply markets, private wire and virtual markets
- Domestic electricity storage becomes common
- Most new solar and wind farms now include electricity storage to harness low marginal cost energy and price arbitrage
- Heat storage and electricity storage are increasingly integrated.

Question 3 - *Assuming a high growth scenario, to what extent do you agree with the waves of deployment of storage we have outlined above?*

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
◯	◯	◯	◯	◯

Comments:

Location of energy storage projects

WPD's analysis of the grid connection applications suggests a number of factors which affect the location of energy storage projects. These include:

- ***Access to grid (specifically 132kV and 33 kV substations)***
- ***Proximity to C&I energy demand***
- ***Proximity to new and existing solar PV***
- ***Proximity to other existing generation plant***
- ***Availability of low cost and accessible land space***

These factors have tended to concentrate connections close to the high voltage (HV) network. We have also noted some storage projects wishing to connect to the low voltage (LV) network.

WPD Network Capacity Map

To assist storage and generation developers, WPD have now launched a new interactive online ***Network Capacity Map***, which is available at:
www.westernpower.co.uk/Connections/Generation/Network-Capacity-Map.aspx

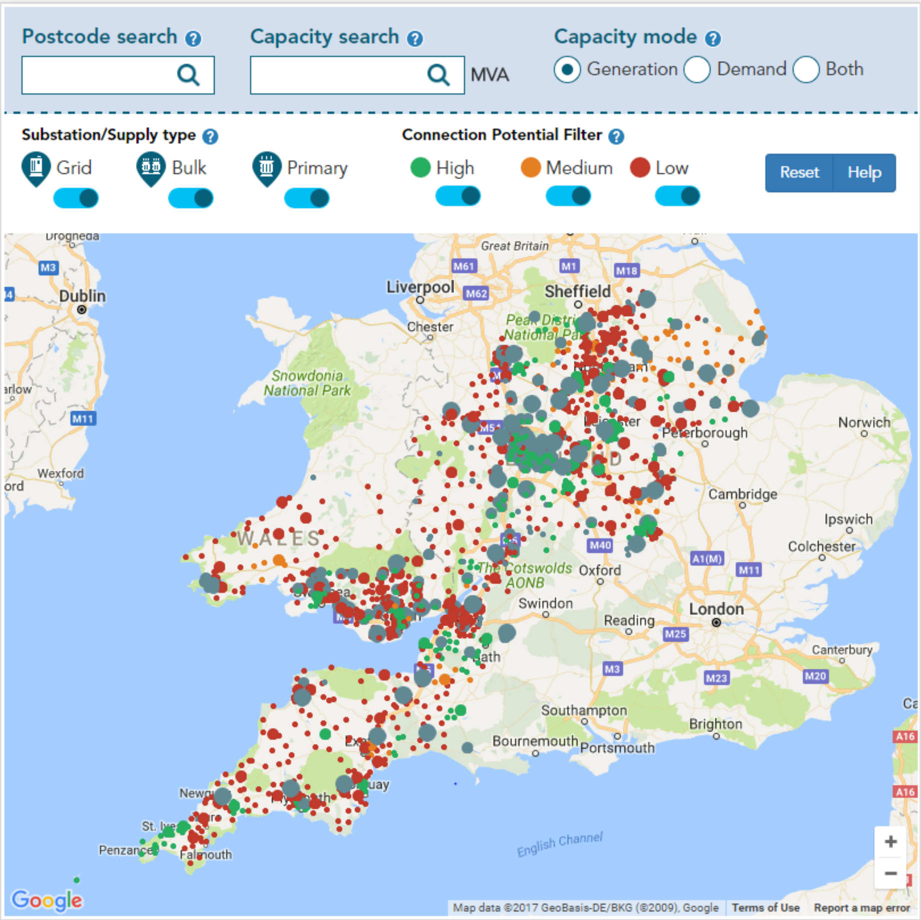


Figure 5 – WPD online Network Capacity Map

We would welcome any feedback on this new online tool.

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Question 4 - ***Based on the key factors determining the location storage projects we have identified on p.13, we have ranked these by importance. Would you rank these factors differently? If so, how?***

Access to grid connection point	1	
Proximity to energy demand	2	
Proximity to existing/new solar PV	3	
Proximity to other existing generation plant	4	
Availability of low cost and accessible land	5	

Any other key factors we have not identified:

Question 5 - ***Which network do you believe will see the most connected storage capacity?***

Transmission Network	Distribution Network
◯	◯

Comments:

Question 6 - ***Have you made use of WPD's new network capacity map? If so, have you found this online tool useful?***

Yes ◯ ***No*** ◯

Comments:

Question 7 - ***Do you think you might use this tool in the future? If so, how?***

Yes ◯ ***No*** ◯

Comments:

Energy storage business models and class of projects

The nature of energy storage is that it can be used in a very wide range of applications and can therefore access a number of revenue streams. The concept of revenue stacking, (putting together multiple benefits/income streams to create a viable business case), has led to a proliferation of potential business models.

To simplify and provide a basis for our analysis, WPD has grouped/classified energy storage assets into 5 main storage asset types, based on their core business models:

1. **Response Service -** Providing higher value ancillary services to transmission and distribution network operators, including frequency response
2. **Reserve Service -** Specifically aiming to provide short/medium term reserve capacity for network balancing services
3. **Commercial and Industrial -** Located with a higher energy user (with or without on-site generation) to avoid peak energy costs, and peak transmission and distribution network charges while providing energy continuity
4. **Domestic and Community -** Domestic, community or small commercial scale storage designed to maximise own use of generated electricity and avoid peak electricity costs
5. **Generation Co-location -** Storage co-located with variable energy generation in order to a) price/time shift or b) peak shave to avoid grid curtailment or reinforcement costs

We recognise that there are potentially other business models to which energy storage could be applied, including aggregation models, trading platforms, local supply and private wire (including virtual private wire) models.

Question 8 - ***To what extent do you agree with the 5 key business models for energy storage assets, that we have outlined above?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Question 9 - *Are there other core business models for storage that WPD should be considering, which would have a significant impact on the network?*

Please give an outline of these:

Any other comments around storage growth scenarios or business models that you would like to include:

4 – Consultation Section 2: Storage Asset Type - Generic Characteristics

WPD recognise that every storage project will be unique, but based on the business models and classifications, we have made some generic assumptions about the typical characteristics of storage assets.

The purpose of consulting on these characteristics, is to inform WPD in undertaking its high-level network modelling, it is not intended to be used to inform constraint analysis on any individual projects.

Power and Energy Ratios

The ratio of **storage power output (MW) to storage capacity (MWh)** is a key characteristic of a storage system and can vary depending on the business model that is driving the specification of the storage asset.

If storage is co-located with generation, we have also made some assumptions around the ratio of **storage power (MW) to generation power (MW)**, by technology. These ratios are only applicable to some of the business models

If storage is installed alongside demand, we have made some assumptions around the ratio of **storage power (MW) to peak demand (MW)**, at both domestic and C&I scale. Again, these ratios only apply to some business models.

The below tables outline the assumptions we have made around these ratios, showing storage power as the **reference value** and the ratio to storage energy (now and at 2030), generation power capacity and power demand, against the 5 business models:

Business model	Storage Power [MW]	Storage Energy [MWh]		Generation Capacity [MW]	Peak Power Demand [MW]
		Now-2020	By 2030		
1. Response service	1	*0.5*	*1*	--	--
2. Reserve service	1	*3*	*4*	--	--
3. Commercial & Industrial	1	*3*	*4*	--	*1*
4. Domestic & Community	1	*2*	*3*	*1*	*0.25*
5a Generation Co-Location Solar	1	*3*	*4*	*1*	--
5b Generation Co-Location Wind	1	*6*	*8*	*2*	--

Figure 6 – Table of assumed Power and Energy Ratios

Question 10 - ***To what extent do you agree with the ratios of power to energy (MW:MWh) that we have assumed for each of the business models both now-2020 and out to 2030, in Fig.6?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Question 11 - ***To what extent do you agree with the ratios of storage to generation power (MW:MW) we have assumed for the two co-located technologies in Fig.6?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Question 12 - ***To what extent do you agree with the ratios of storage to demand peak (MW:MW) we have assumed at domestic and C&I scale in Fig.6?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Energy Depth of Discharge

A key technical characteristic for storage assets, (specifically battery storage systems), is the amount of stored energy that can be drawn per operational cycle.

With regards to battery storage systems, this is referred to as Depth of Discharge (or DOD), and the level to which a battery system is discharged can heavily affect the number of charge-discharge cycles (i.e. cycle life) over time. The deeper the discharge level, the lower the cycle life (i.e. fewer number of cycles) a storage asset can achieve.

Depending on the nature of the storage assets and the business models they are operating under, some systems may look to discharge for longer (i.e. operate at a higher DOD), sacrificing longer term cycle life to maximise short term revenue. This would most likely be for high-value, rapid response programmes that require frequent charge/discharge behaviour (such as Enhanced Frequency Response).

For the purposes of modelling we have assumed a **DOD of 80%** (leaving 20% of the storage capacity in the battery on each cycle) for most storage assets. For storage assets specifically operating under the ***Response Service*** business model, the DOD could potentially be less, i.e. **30%-50%**, to enable more regular, short-term charge/discharge, responding to e.g. dynamic frequency changes.

Question 13 - ***To what extent do you agree with the typical Depth of Discharge values that we have outlined above?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
◯	◯	◯	◯	◯

Comments:

Question 14 - ***How do you foresee Depth of Discharge changing over time?***

Any other comments around storage business model asset characteristics:

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5 – Consultation Section 3: Storage Asset Operating Modes

Understanding the Operation of Storage Assets

As part of our modelling with Regen, WPD are using the term ‘operating mode’ to describe a generic or typical mode of operation. An operating mode will profile a storage system’s ‘charge’ and ‘discharge’ behaviour, over a 24-hour period.

It is important for WPD to understand the operating modes of storage systems, on a daily and seasonal basis. For other distributed generation, such as solar PV and onshore wind, there are known generation profiles across given days and times of the year based predominantly on known weather patterns. For storage however, the nature of demand (charge up) and generation (discharge) is less predictable and predominantly driven by other market factors such as:

- Price signals
- Generation and demand profiles
- Network events (*i.e. Capacity Market or STOR events etc.*)
- Network costs (*i.e. Triads, Duos-Red band charges etc.)*
- Contracted services (*i.e. frequency response, DSR etc.*)

Representative Days

As part of the analysis of the aggregated impact of storage systems on the network, WPD have identified a number of representative days, three of which are used to define how each of the class of storage asset may operate differently at certain times of the year. The three chosen representative days are:

- **A winter peak demand day** - high demand and low levels of DG
- **A summer ‘max generation’ day** - low demand with high levels of DG
- **A typical spring/autumn day** - when demand and generation are average

By using these representative days, WPD are not trying to model every possible scenario, but capturing the aggregated effect on typical days of significant generation and demand that might drive specific storage operating modes, that would have a significant effect on the network.

Question 15 - ***To what extent do you agree with these 3 Representative Days, as a reflection of seasonal variation in operating behaviour of storage assets?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Operating modes

We have defined 9 key operating modes, as below. It should be noted that these modes have been chosen as typical/generic modes and do not account for every possible variation.

i) Network Auxiliary Services - Operating under direct contracted response services such as frequency response. This mode is for battery systems that are dedicated to being available for these response programmes 24hrs a day.

ii) Network Auxiliary Services and Network Peak – Similar to mode i), but reserving a small window of operation (2-4hrs) to discharge in peak network charge and high commodity price periods.

iii) Balancing Service Standby - Operating mode reflecting operation under balancing service contracts, effectively operating to be available for STOR, Fast Reserve, Capacity Market etc.

iv) Balancing Service and Network Peak - Operating under balancing services contracts as above, but also carving out a window of operation to discharge during peak network charge and high commodity price periods.

v) Network Peak Charge Avoider - A mode of operation designed predominantly for behind the meter classes of project, whereby a storage system has been implemented to supply a demand load during network peak charges. Storage system charging is during lowest price periods.

vi) Cost Sensitive Self-Use - A mode where a demand user with generation is using storage to increase self-consumption of on-site generation, but weighted towards high commodity/delivery charge periods. This could currently be a commercial and industrial (C&I) user with generation, subject to cost sensitivity or smaller users with Time of use Tariffs.

vii) Maximise Self-Use - A mode where a demand user with generation is using storage to maximise self-usage of on-site generation, but is not sensitive to high/low price thresholds (i.e. domestic solar with a flat electricity import tariff). Charging when solar is generating, discharge when energy is needed.

viii) Generation Time and Price Shift – Using energy storage co-located with generation to time shift energy from a low to a higher price period.

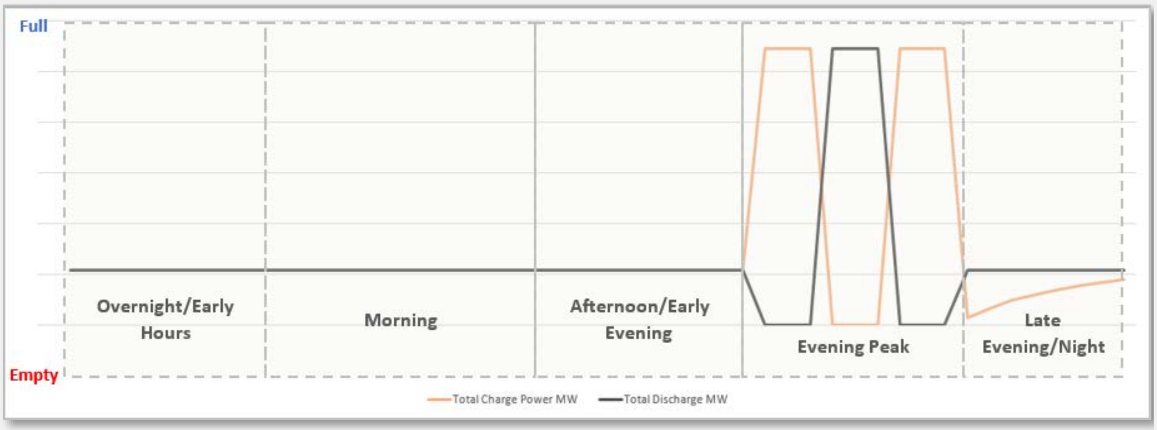
ix) Generation Peak Shaving – Using energy storage co-located with generation, but diverting a proportion of the generation into storage, so as to bypass grid export constraints. Likely to also discharge during high price periods.

Daily Operating Mode Profiles

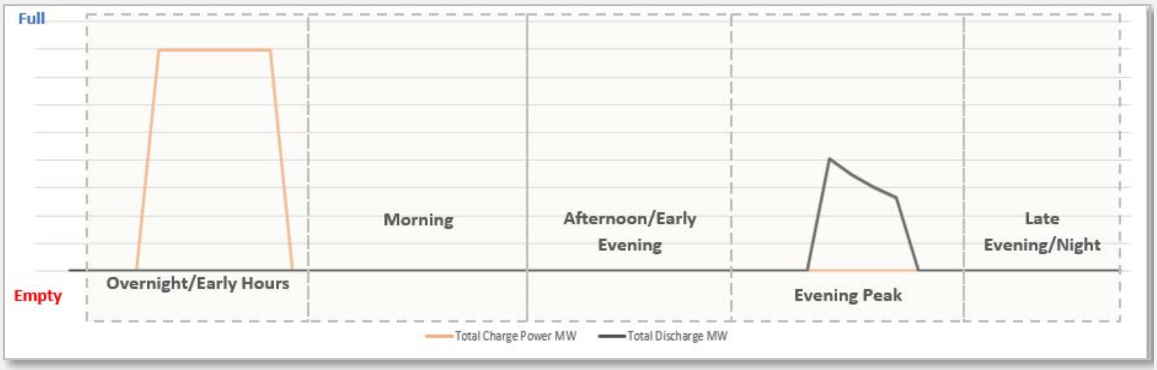
From the shortlist of 9 generic operating modes we have developed, we have generated indicative daily profiles of each operating mode. These are graphed visualisations and value profiles of daily energy charge/discharge trends, for a selection of the operating modes we have identified.

Please see three examples below for operating modes **ii)**, **v)** and **ix)**:

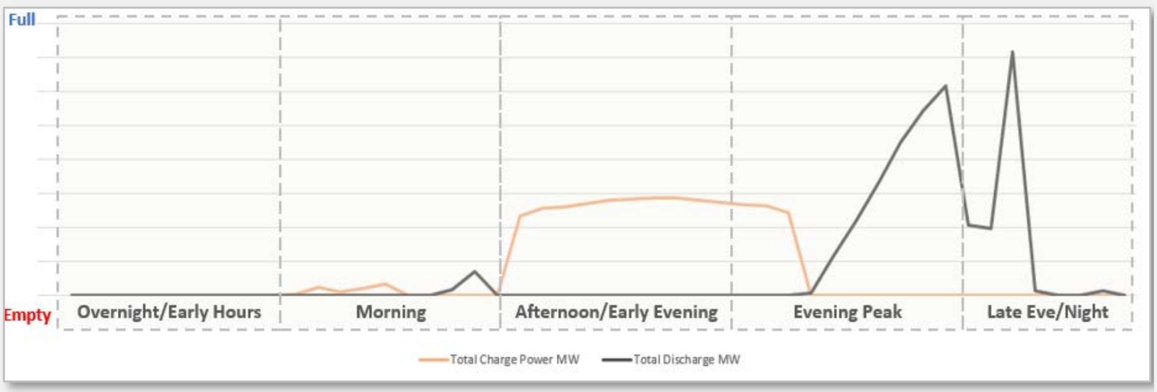
Example 1: Operating Mode ii) Network Auxiliary Services + Network Peak



Example 2: Operating Mode v) Network Peak Charge Avoider



Example 3: Operating Mode ix) Generation Peak Shaving (Solar PV)



Question 16 - ***To what extent do you agree with the nine generic operating modes we have identified on page 21, and their operating behaviour?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
◯	◯	◯	◯	◯

Comments:

Question 17 - ***Are there any generic operating modes we have not included?***
Please could you provide some details

Comments:

Question 18 - ***During which periods of the day do you believe storage assets will be predominantly charging (causing spikes in demand) and discharging (causing spikes in generation)?***

	Overnight/ Early Hours	Morning	Afternoon / Early Eve	Evening Peak	Late Eve/Night
Mainly Charging *(Demand spike)*	☐	☐	☐	☐	☐
Mainly Discharging *(Generation spike)*	☐	☐	☐	☐	☐

Comments:

Question 19 - ***Which of the 9 generic operating modes we have identified do you believe will be operating on the 3 main Representative Days, that we have described on page 20?***

Operating Mode	Winter Peak Demand Day	Summer Max Generation Day	Typical Spring / Autumn Day
i) Network Auxiliary Services	☐	☐	☐
ii) Network Auxiliary Services and Network Peak	☐	☐	☐
iii) Balancing Service Standby	☐	☐	☐
iv) Balancing Service and Network Peak	☐	☐	☐
v) Network Peak Charge Avoider	☐	☐	☐
vi) Cost Sensitive Self-Use	☐	☐	☐
vii) Maximisation of Self-Use	☐	☐	☐
viii) Generation Time and Price Shift	☐	☐	☐
ix) Generation Peak Shaving	☐	☐	☐

Question 20 - ***To what extent do you agree with the three example daily operating mode profile graphs we have included on page 22?***

Completely Agree	Mostly Agree	Neither Agree/ Disagree	Mostly Disagree	Completely Disagree
○	○	○	○	○

Comments:

Any other comments around storage asset operating modes:

Many thanks for taking the time to respond to these consultation questions.

6 – Next Steps

Consultation process

As we stated at the start of this paper, in undertaking this consultation, WPD is interesting in understanding:

- *The potential scale of growth of energy storage within its distribution network*
- *The type of energy storage assets/projects that are likely to be deployed within its network*
- *The operating behaviour of storage assets, how they are likely to be used and their typical mode(s) of operation*

WPD will use the information we gather on the scale and operation of storage to inform its future network planning.

We value all feedback and information we receive through this consultation and we would be grateful to follow up with you on some of the specific areas we have covered in the consultation questions.

The closing date for this consultation is **21st June 2017**.

WPD will share the responses we receive with Regen. All information provided will be treated by WPD and Regen as confidential.

WPD will then publish an anonymised, aggregated summary of the responses shortly after this closing date.

Many thanks for taking the time to fill in this consultation, you can send completed forms to us electronically or physical copies to us on the details below. If you have any questions regarding this consultation, please feel free to contact us on on these same details:

Email

wpdnetworkstrategy@westernpower.co.uk

Postal

Network Strategy Team
Western Power Distribution
Feeder Road
Bristol
BS2 0TB