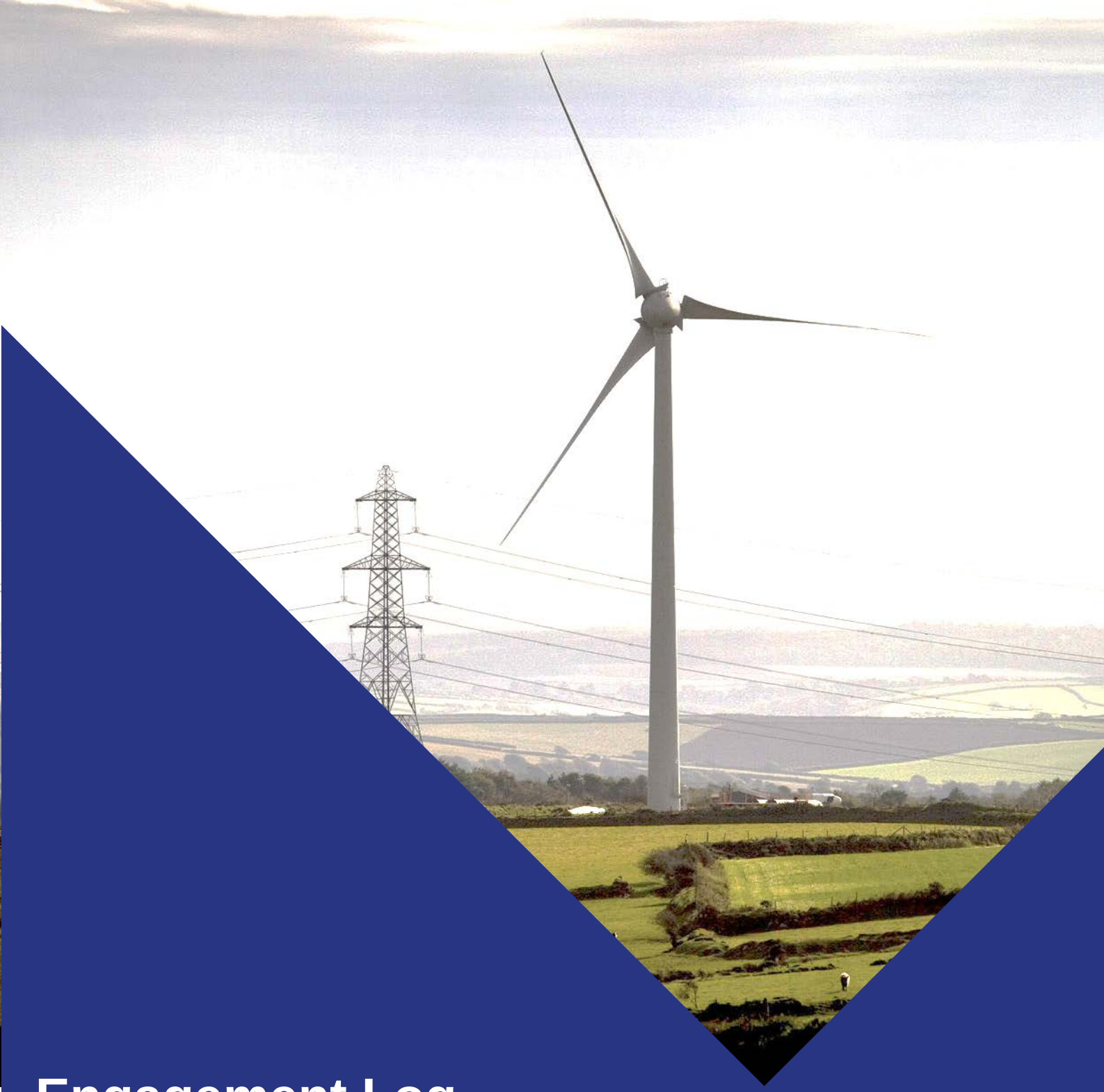


Engagement Log
NGET_A7.01_Engagement Log (Whole system - non-network company) December 2019

As a part of the NGET Business Plan Submission

nationalgrid

Section	Progress	Status
Pre-engagement	✓	Final
Post-engagement	✓	Final
Challenge & review	✓	Final
Conclusions	✓	Final

ENGAGEMENT LOG

Priority: Enable the ongoing transition to the energy system of the future

Topic: Whole system engagement with non-network companies

Author: Ivo Spreeuwenberg

Final Document Date: 28/11/19
Document Version Number: 4

CONTENTS

nationalgrid

EXECUTIVE SUMMARY

The engagement in this log, covering the **building of a whole system plan with non-network company stakeholders** topic area, primarily impacts on our plans within the stakeholder priority, *I want you to enable the ongoing transition to the energy system of the future* – Chapter 7 of the main business plan narrative. Through building a whole system plan with non-network companies we explored the current and future capabilities of flexibility providers (storage and demand side response – DSR), their ability to provide network capacity services and how we might be able to play a role in helping them come to market. We also engaged extensively with our customers, policy makers and multiple players across the transport sector to understand their challenges in decarbonising the economy at lowest cost to consumers, to ensure that the transmission network is not a blocker to achieving Net-Zero 2050 and to involve stakeholders in the development of potential solutions and deciding on the best way forward.

In planning engagement, considerable insight was gathered from publicly available documents published by stakeholders across a number of segments. The engagement approach was a mixture of *inform*, *involve* and *empower* (see Appendix 6.4) depending on the stakeholder type, mapping and specific focus area. The engagement plan in the table below was devised and delivered using key learnings from the engagement strand logged in A7-8.02_Engagement Log (Future of Transmission & Managing Uncertainty). Learning from each stage was also fed into future engagements across our plan to improve the approach (see Section 2.2).

Channel	Who	When (green = complete)
Flexibility provider engagement		
Initial session with DSR providers at ADE	New business models	26th Sept. 2018
Aurora storage and flexibility conference	New business models, large & small customers	11th Oct. 2018
Baringa future energy leader forum	New business models, large & small customers	6th Nov. 2018
Bilaterals with DSR and storage providers	New business models	Nov. 2018-June 2019
Bilateral with regulator about storage	Ofgem	30th Jan. 2019
Working session with ADE members	New business models	19th Feb. 2019
Aurora storage and flexibility conference	New business models, large & small customers	14th Oct. 2019
Engagement with customers (harmonic filtering)		
Harmonics NIA workshop	Networks, technical experts, consultants	20th Dec. 2018
Harmonics stakeholder workshop	Networks, large and small customers, technical experts, consultants	2nd Apr. 2019
Email follow-ups	Large customers and tech. experts	Aug. 2019
Engagement with cross-sector organisations		
Bilateral engagement	Governmental, networks, large and small customers, charging operators, supply chain, fuelling sector and vehicle manufacturers	From Jan 2018 (ongoing)
Conferences – speaking, panel debates and general attendance	Broad group of stakeholders across energy, transport, policy, investor communities	From Jan. 2018 (ongoing)
BEIS Commons Select Comm., Welsh Economy, Infrastructure & Skills Comm.	Governmental	27th Mar. 2018 and 5th Dec. 2018
UK Government EV Energy Task Force	Governmental, regulatory, networks, academics, consultants, large and small customers	From Sept. 2018 (ongoing)
Industry Working Groups e.g. ENA Low Carbon Tech. WG and EnergyUK EV WG	Governmental, regulatory, networks, large and small customers	Ongoing
International knowledge share eg Norway, California and Netherlands EV visits	Governmental, academics, networks, communities, transport sector, small customers	9th Nov. 2018, 8th Feb. 2019 + 15th May 2019
Consumer engagement		
Consumer acceptability testing	Domestic and non-domestic consumers	October 2019

A summary of this engagement and the outcomes, replicated in Chapter 7, Section 3 of the main business plan narrative, is shown in the table, below. This strand has not resulted in any additional proposed expenditure in our business plan for the T2 period, but has led to a commitment and the proposal of options to help enable Net-Zero. These outcomes were reviewed by Frontier Economics in September 2019.

<table>
<tr><td>  </td><td colspan="2">a) Engagement to build a whole system plan with non-network companies</td></tr>
<tr><td></td><td>Flexibility provider engagement</td><td>Customers and cross-sector engagement</td></tr>
<tr><td>Purpose</td><td>Through attending conferences, bilateral conversations and hosting workshops, we engaged flexibility providers and storage developers to:
a) seek to understand their current and future capabilities
b) inform them of the potential opportunities in providing network capacity services (as opposed to ancillary services)
c) understand if we can play a role in helping them come to market.</td><td>Through workshops, bilateral conversations, industry round tables and conferences we have been engaging customers, stakeholders across sectors, experts and policy makers on facilitating more renewable energy and the decarbonisation of transport to:
a) listen to fully understand their challenges in decarbonising the economy at lowest cost to consumers
b) ensure transmission is not a blocker
c) involve stakeholders in the development of potential solutions.
d) empower stakeholders to decide on a way forward.</td></tr>
<tr><td>What stakeholders told us</td><td>Flexibility providers and storage developers told us:
• the potential for flexibility is sometimes underestimated – especially for portfolios
• there are technical challenges for both flexibility and network companies to overcome to realise the potential
• greater visibility of network issues and their characteristics is needed
• greater acceptance of the services that can be provided is needed
• considerable uncertainty over future opportunities and revenue streams exists
• flexibility solutions can add consumer value by supplementing network solutions; opportunity to replace network capacity altogether limited in the short to medium term.</td><td>Experts and customers told us that:
• an aggregated approach, where the regulated network owner invests in harmonic filtering equipment, could reduce the overall requirement for filters and lower costs for consumers
• a change in approach to the charging methodology may be required to accommodate this development
• a strategic/anticipatory approach to connecting large volumes of offshore wind on the east coast could accelerate their connection, lower costs for consumers and minimise disruption for those communities affected.
Stakeholders in other sectors and policy makers have told us that:
• range anxiety is a challenge to the Government's ambitions to decarbonise transport
• existing vehicle charging market structures at motorway services are complex and participants do not have enough certainty of affordable infrastructure or utilisation
• solutions must be robust to adapt to future uncertainty; a whole system approach is required that optimises between transmission and distribution.</td></tr>
<tr><td>What consumers told us</td><td colspan="2">As set out in the strands of engagement, above, consumers showed strong support for investments that enabled decarbonisation. Through all strands of our consumer engagement, we also sought to test the appetite for investment ahead of clear need. Our proposed solution to overcome range anxiety had 85% support for the principle through our acceptability testing, with 51% also supportive of the potential bill impact. This result was discussed and corroborated through the focus groups.
Willingness to pay for investment ahead of need was the highest across all of our plan categories with domestic consumers at over £11 (per consumer per year) and was middle of the pack with non-domestic consumers at over £30. When asked what approach we should take to decarbonising energy, 58% of respondents using our slider tool indicated that we should invest now to meet potential demand or once the general direction is known.</td></tr>
<tr><td>Key trade-offs and how engagement influenced our plans</td><td colspan="2">As highlighted in engagement strand (a), we have opted to play a proactive role in enabling the energy transition as a result of our engagement. We have worked closely with non-network companies and undertaken our own detailed analysis to jointly develop solutions to decarbonisation challenges.
Flexibility providers thought it was worth continuing to explore a potential role for TOs in helping them come to market, whilst the ESO pointed out that they also had this role, and expressed some concerns about TOs doing so. Our proposal has evolved to commit to continue to seek opportunities to work with flexibility providers as well as working closer with the ESO should opportunities arise.
Due to a lack of stakeholder support, we have removed the proposal to invest £2m to develop an economic modelling capability to better inform our NOA submissions.</td></tr>
<tr><td>How we've responded to the Independent Stakeholder Group/ Challenge Group</td><td colspan="2">The Independent Stakeholder Group challenged the breadth of our thinking on decarbonisation challenges, initially focused on ensuring transmission is not a blocker to a rapid EV roll-out and providing solutions to overcome range anxiety. As a result, we have also considered the challenges of connecting increasing amounts of wind generation; putting forward proposals for harmonic filtering and a strategic approach to connecting offshore wind on the east coast.
The Challenge Group challenged us to consider non-network solutions and expand our whole system thinking beyond network companies. This strand of engagement and the proposals we are putting forward in this chapter and annex NGET_A7-8.03 Whole System address that challenge.</td></tr>
</table>

1. PRE-ENGAGEMENT

1.1 WHAT IS THE TOPIC AND WHY IS IT BEING ENGAGED ON?

The **stakeholder priority, *I want you to enable the ongoing transition to the energy system of the future*** *(Chapter 7 of main business plan narrative)*, is comprised of several topic areas as illustrated in Figure 1. This priority is what the electricity transmission network will need to do over the RIIO-T2 period in order to facilitate the ongoing transformation of the energy industry due to the trends of decarbonisation, decentralisation and digitisation and to minimise this cost of this transformation for consumers.

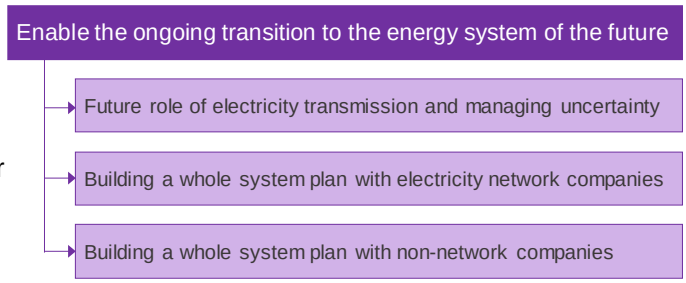


Figure 1 – Stakeholder priority and associated topics

This log is focussed on the ***building a whole system plan with non-network companies*** topic area. Whilst the outcomes of engagement on this topic area primarily influence *Chapter 7 – Enable the ongoing transition to the energy system of the future*, they also have a material impact on *Chapter 8 – Easy to connect and use the network*.

Our proposals for the T2 period in these areas are influenced through a combination of (i) our licence obligations, annual processes and ongoing stakeholder engagement, as well as (ii) bespoke engagements undertaken in building our T2 business plan.

Many of our proposals across the *enable the transition* stakeholder priority are either heavily or exclusively influenced by our licence obligations, evolving annual processes run by the ESO and together with DNOs as well as ongoing stakeholder engagement, as shown in Figure 2. Our licence obligations and the industry code framework set out how we must plan the network and interface with other licenced parties. We must design the network to maintain compliance with the Security and Quality of Supply Standards, adhere to the procedures and requirements across the ESO / TO interface in the SO-TO Code and work with the DNOs as set out in the Grid Code. These set the boundaries of engagement and where bespoke engagement can influence our T2 proposals. Nevertheless, if we are to meet the challenging targets of Net-Zero by 2050 at lowest cost to consumers it may be necessary to consider whether some of these boundaries are still appropriate. This engagement, more than any of the others shown in Figure 1, has involved considering how we might do things differently to rise the challenge.

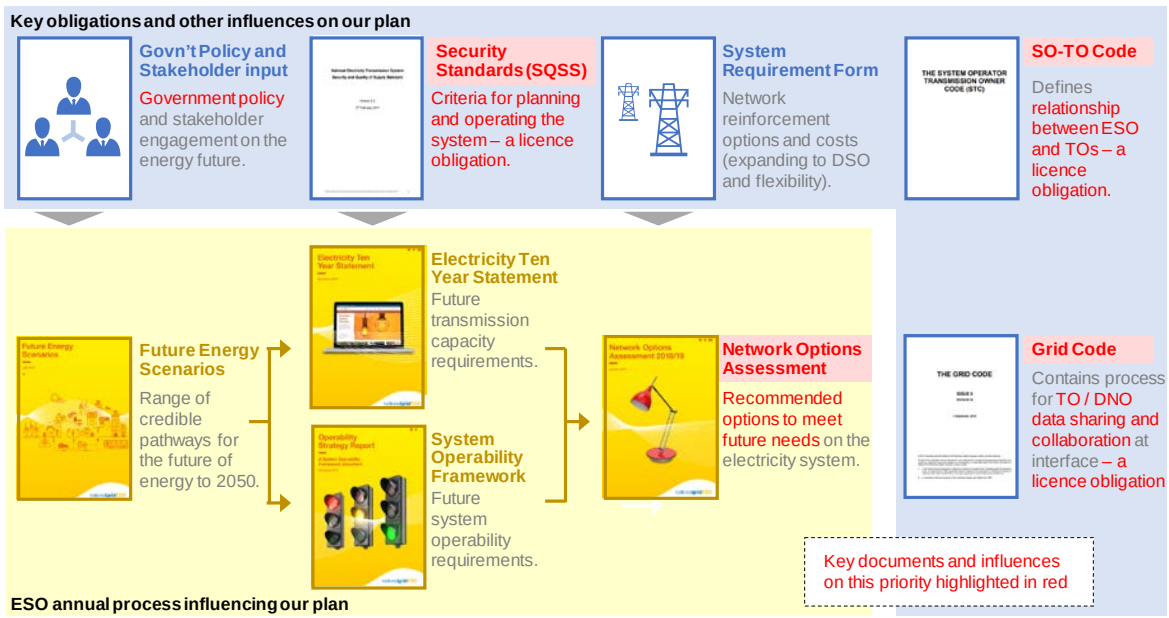


Figure 2 - Key obligations, processes and ongoing engagement influencing our proposals

Bespoke engagement on building a whole system plan with non-network companies is an area that involves engaging with stakeholders that are either on the periphery of the key obligations and annual process influencing our plan, shown in Figure 2, or that are completely new stakeholders that we have not historically

worked or engaged extensively with. As a result, this has required a combination of considerable effort to build the knowledge necessary in order to be able to engage effectively in some areas and more targeted engagement with certain stakeholder segments.

Our engagement activities within this strand are split across three key areas:

i. Engagement with flexibility providers (storage and demand-side response)
ii. Engagement with customers to minimise the cost of harmonic filtering (renewable generation)
iii. Cross-sector engagement to enable decarbonisation of transport (electric vehicle charging)

Engagement outcomes for this topic area have directly influenced our business plan for this stakeholder priority and, despite not leading directly to any proposals that require expenditure in our baseline plans, the options we put forward and commitments we make could eventually result in expenditure beyond our baseline proposals – i.e. through uncertainty mechanisms or a parallel funding mechanism for anticipatory investment. Therefore, this strand of engagement is deemed to have **high materiality**. The nature of the topic and the new stakeholders we have to engage makes it inherently complex, leading to a **low ease of engagement.**

1.2 WHAT ARE THE DESIRED OUTCOMES FOR THIS ENGAGEMENT?

The desired outcomes from this engagement are:

In our engagement with flexibility providers, to: (i) seek to understand their current and future capabilities, (ii) inform them of the potential opportunities in providing network capacity services (as opposed to ancillary services) and (iii) understand if we can play a role in helping them come to market.

With customers and cross-sector engagement: (i) listen to fully understand their challenges in decarbonising the economy at lowest cost to consumers, (ii) ensure transmission is not a blocker, (iii) involve stakeholders in the development of potential solutions, (iv) empower stakeholders to decide on a way forward.

Successful engagement on these topics will be measured by:

1. The Independent Stakeholder Group guidelines; expressed as the 18 engagement principles checklist (See Appendix 6.1 for details)
2. The AA10000 stakeholder engagement standard. In summary:
    - clearly defined scope
    - uses an agreed decision-making process
    - focus on issues material to the organisation and/or its stakeholders
    - creates opportunities for dialogue
    - is integral to organisational governance
    - is transparent
    - has a process appropriate to the stakeholders engaged
    - is timely
    - is flexible and responsive
    - adds value both for the organisation and its stakeholders

In addition, we will consider to what extent we have received quality feedback (input that genuinely shapes our plans and approach), we will consider to what extent we've increased our level of understanding of new business models, their needs of and impact on transmission and have confidence that we can build a plan that is ambitious from a whole systems perspective and maximises value for consumers and society.

1.3 WHAT EXISTING INSIGHT HAS BEEN UTILISED?

The ongoing transformation of the energy industry is a subject of much investigation, discussion and debate. As a result, **considerable insight is publicly available** indicating both the direction of travel and the views of many of our stakeholders. In addition to the FES[i], NOA[ii] and other ongoing processes referred to above, and set out in Figure 2, some examples of additional relevant insights considered for this work are:

Publicly available insights on the potential of flexibility solutions

Flexibility Providers

OVO Energy – *Flexibility First initiative*

The Flexibility First approach centres on 6 key principles:

1) Flexible services procured first
2) Targeting 'whole system' outcomes
3) Reward grid utilisation
4) Facilitating renewable energy adoption
5) Promoting entrepreneurialism
6) Continue to separate network operators from users

LINK TO DOCUMENT

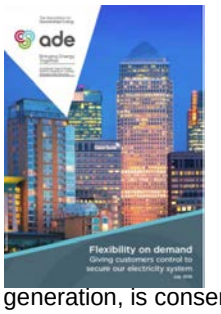
Flexibility Providers

OVO Energy and Imperial College – *Blueprint for a post-carbon society*

"OVO continues to call for the Government, regulators and the industry to work together and adapt to this new energy system where supply no longer has to match demand and flexibility makes energy cheaper for everyone. For the first time ever, Imperial College London have undertaken extensive modelling to demonstrate the value that ***residential flexibility*** will bring to a post-carbon society"

LINK TO DOCUMENT

Trade Associations



The ADE – *Flexibility on demand, giving customers control to secure our electricity supply*

The total potential ***DSR capacity across the industrial, commercial and public sectors***, including highly efficient CHP assets and on-site back-up generation, is conservatively estimated to be 9.8 GW by 2020. Including 2.8 GW from industrial demand flexibility, 1.7 GW from commercial and public sector demand flexibility, 2.3 GW in flexibility available from the 5.2 GW of current on-site CHP capacity and 3 GW of on-site back-up generation capacity (non-CHP)

LINK TO DOCUMENT

Government

HM Government – *Upgrading our Energy System; Smart Systems and Flexibility Plan*

This Plan shows how the Government and Ofgem are taking action alongside industry to deliver a smarter, more flexible energy system by:
Removing barriers to smart technologies, including storage; Enabling smart homes and businesses; and Making markets work for flexibility.

LINK TO DOCUMENT

Publicly available insights on potential customer and cross-sector solutions to net-zero

Academic

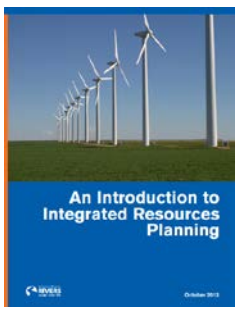
Imperial College for the CCC – *Analysis of Alternative Heat Decarbonisation Pathways*

The study focuses on 3 core heat decarbonisation pathways:

1) Hydrogen
2) Electric
3) Hybrid

LINK TO DOCUMENT

Think Tanks / NGOs

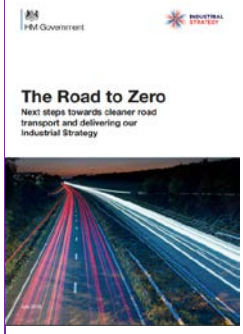


International Rivers – *An introduction to Integrated Resource Planning*

"Integrated Resource Planning (IRP) is a planning approach that has the potential to take a society-wide perspective, incorporate public participation in meaningful ways, and has a strong track record in creating plans that are low-cost, low risk, and with outcomes that minimize environmental and social impacts."

LINK TO DOCUMENT

Government



HM Government – *The Road to Zero*

Government sets out their next steps towards clean road transport and delivering this in line with the Industrial Strategy.

Government states that*: "A widespread public charge point network is important for drivers who do high mileage, travel long distances and/or have no access to charge points at home or work".* More public charge points *"will be needed to deliver one of the best EV charging networks in the world",* to address range anxiety, and to ensure that battery electric vehicles can be used on longer journeys.

The document set out the critical nature of, and challenges for, the strategic road network "*By their nature MSA tend to be in rural areas with a requirement for rapid charging which means that it can be expensive to provide the additional electrical capacity required to meet future demand. To continue the work of future proofing the Strategic Road Network, we will run a pilot working closely with Highways England to increase electrical capacity at a MSA in the RIS 1 period."*

The document outlines CCC research which states that *"to meet long distance en route rapid charging requirements, and maximise carbon emission reductions, the number of rapid chargers located near the major roads network needs to expand to 1,170 by 2030".* However, this was prior to the CCC Net Zero report and was modelling for 60% of new car sales to be electric by 2030.

LINK TO DOCUMENT

Regulatory

Ofgem – *Future Insights: Implications of the transition to Electric Vehicles*

Ofgem state that *"The regulations that govern the energy sector were not explicitly designed with the foresight of EV charging and bundled energy and transport services. Regulation will need to adapt to provide predictability to the EV market and protection to EV users. Given the scale of uncertainty around uptake and charging behaviours, alongside the blurring of typically separated sectoral boundaries (energy and transport), this represents a challenging prospect".*

The document states that while *"We cannot rely on current forecasts to inform the rate of uptake*", "*We can however ensure that we create a system that allows the uptake of EVs to happen without unnecessary barriers". "'there is a risk of overinvesting in infrastructure that may become underutilised in the face of the changing landscape. However, this must be balanced against the potential benefits of encouraging faster EV uptake by investing in infrastructure ahead of need*". "*Roll-out of charge point infrastructure is important to stimulate adoption"* but *"the charging infrastructure required for today's EVs is unlikely to be the same in even a few years' time".*

The document states "*Despite considerable growth, the limited distribution of charge points (particularly 'rapid' charge points) in some regions is likely to be a barrier to uptake*". "*In some areas, competitive pressures alone may not deliver socially desirable levels of charge point infrastructure"*.

LINK TO DOCUMENT

Other – Consultancy

McKinsey & Company – *The potential impact of electric vehicles on global energy systems*

Recent study uses Germany example to show EV growth not likely to cause large increase in power demand through 2030.

LINK TO SITE

Consumer Body

AA – *AA-Populus Driver Poll April 2019*

The AA's Driver Poll is the largest dedicated motoring opinion panel in Europe. The April poll of 19,350 drivers asked 'what would it take for you to choose a battery electric vehicle?':

- 35% – EVs cost the same (or less) than petrol/diesel
- 33% – Real world range > 250 miles on a single charge
- 27% – A lot more charging points where I park
- 25% – Hundreds of rapid chargers along strategic roads

LINK TO DOCUMENT

Government

CCC – *Net Zero: The UK's contribution to stopping global warming*

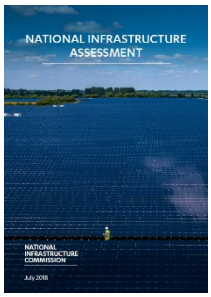
CCC urges that "*Government must continue to support strengthening charging infrastructure, including for drivers without access to off-street parking*", to enable all new cars sold to be electric by 2035 at the latest.

The document states that, *"as electric vehicles are likely to be cost-saving (to the UK economy) by 2030, it is important that grid capacity constraints do not impede their growth in the 2020s"* and that "*It will therefore be important either to make anticipatory investments to upgrade electricity networks and/or to re-open the allowed investment partway through".*

The document also proposes a net-zero scenario with: *"Extensive electrification, particularly of transport and heating, supported by a major expansion of renewable and other low-carbon power generation. The scenarios involve around a doubling of electricity demand, with all power produced from low-carbon sources (compared to 50% today). That* ***could for example require 75 GW of offshore wind in 2050, compared to 8 GW today*** *and 30 GW targeted by the Government's sector deal by 2030. 75 GW of offshore wind would require up to 7,500 turbines and could fit within 1-2% of the UK seabed, comparable to the area of sites already leased for wind projects by the Crown Estate."*

LINK TO DOCUMENT

Government



NIC – *National Infrastructure Assessment*

The NIC states that *"having a core network of visible, rapid chargers in place could significantly increase the pace of [EV] uptake. This network should provide both sufficient coverage, so that it is possible to find a charge point within a reasonable distance throughout most of the country, and enough power to fully recharge an electric vehicle within a reasonable timescale"* and that *"To enable close to 100 per cent of new car and van sales to be electric by 2030, the core network would need to be in place in the early 2020s*" to avoid inhibiting electric vehicle uptake".

The document suggests *"potential charge point providers may be put off by the uncertain cost of connecting new charging infrastructure to the electricity network"* and that *"Government, Ofgem and local authorities should enable the roll out of charging infrastructure sufficient to allow consumer demand to reach close to 100% electric new car and van sales by 2030"* and that *"The Commission recommends that Ofgem should commission electricity network operators to work with charge point providers to identify potential anticipatory investments required to accommodate public charging infrastructure".*

LINK TO DOCUMENT

1.4 WHAT IS THE ENGAGEMENT APPROACH?

The approach chosen to engaging with stakeholders is both topic and stakeholder specific. Stakeholder mapping across segments (see Section 6.3 for a full list) was undertaken to establish the overarching approach, as illustrated in Figure 3.

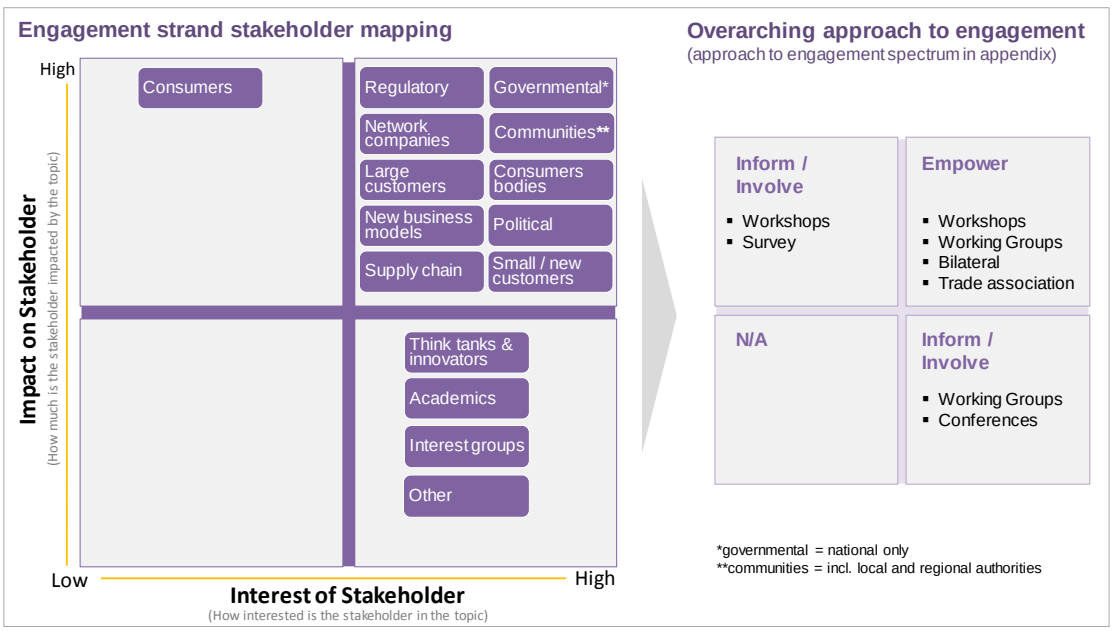


Figure 3 - Stakeholder mapping and engagement approach for overall priority

The mapping of stakeholders based on their interest in this strand of engagement and how much they are impacted by it allows the tailoring of our approach. The resulting 2 x 2 approach to engagement matrix sets out where on the spectrum of engagement the plan will aim and what channels will be used to achieve that aim. (see Appendix 6.4 – setting out the goals of engagement and promise to stakeholders for each part of the spectrum). Within certain stakeholder segments the approach may need to vary depending on the topic (e.g. flexibility providers will naturally have a much higher interest in our engagements directly related to them). As noted above, we will empower policy makers, and other key stakeholders, such as Ofgem and implement what they decide in many areas.

We used a combination of channels including workshops, working groups, bilateral discussions, conferences and consumer surveys to collect the necessary data that, alongside input from ongoing BAU engagement and direction from key stakeholders, allowed us to generate insights for our business planning and achieve the desired outcomes set out above. The table, below, outlines our specific engagements.

Channel	Who	When (green = complete)
Flexibility provider engagement		
Initial session with DSR providers at ADE	New business models	26th Sept. 2018
Aurora battery storage and flexibility conference	New business models	11th Oct. 2018
Baringa future energy leader forum	Centrica Hive and DER, EdF Digital Innovation, Electron, etc.	6th Nov. 2018
Bilateral conversations with DSR and storage providers	New business models	Nov. 2018-June 2019
Bilateral conversation with regulator about storage	Ofgem	30th January
Follow-on working session with ADE flexibility members	New business models	19th Feb. 2019
Aurora battery storage and flexibility conference	New business models	14th Oct. 2019
Engagement with customers (harmonic filtering)		
Harmonics NIA workshop	Network companies, technical experts, consultants	20th Dec. 2018
Harmonics stakeholder workshop	Network companies, large customers, small customers, technical experts, consultants	2nd April 2019
Email follow-ups	Large customers and technical experts	August 2019
Engagement with cross-sector organisations on decarbonisation of transport		
Bilateral engagement	BEIS, OLEV, Welsh Government, network owners, large customers, small customers, charging operators, the charge point supply chain, fuelling sector including service station operators, vehicle manufactures etc.	From January 2018, onwards – this engagement is ongoing
Conferences – speaking, panel debates and attendance	Broad group of stakeholders across energy, transport, policy, investor communities	From Jan. 2018 (ongoing)
Evidence hearings e.g. BEIS Commons Select Comm., Welsh Economy, Infrastructure & Skills Comm.	Supporting BEIS and Welsh Government	27th March 2018 and 5th December 2018 respectively
UK Government EV Energy Task Force	Auto Council, BEAMA, BEIS, Cenex, ENA, ESC, EnergyUK, LowCVP, Ofgem, OLEV, Ricardo, SMMT, TechUK, Uni of Leeds, WMCA	From Sept. 2018 (ongoing)
Industry Working Groups e.g. ENA Low carbon Technologies	BEIS, Ofgem, Network Companies, Centrica, Delta EE, Drax Power, Ecotricity, E.ON, EDF Energy, ESB, Engie, National Grid, Npower, OVO	Ongoing

Working Group and EnergyUK EV Working Group	Energy, Scottish Power, SSE, UK Power Reserve etc.	
International knowledge share e.g. Norwegian EV Association visit, FCO California Electric Vehicle Delegation and Dutch Embassy Electric Vehicle Visit.	OLEV, University of Oxford, Innovate UK, UK Power Networks, REA, Octopus EV, University of Cambridge, Belfast City Council, OVO Energy, TfL, Urban Foresight, ESC, Drivenergy, North Somerset Council, Transport for Greater Manchester etc.	8th-9th November 2018, 4th-8th February 2019 and 13th-15th May 2019 respectively.
Consumer engagement		
Consumer acceptability testing	Domestic and non-domestic consumers	October 2019

……

2. POST-ENGAGEMENT

2.1 WHAT WERE THE ENGAGEMENT OUTCOMES AND HOW HAS THIS INFLUENCED OPTIONS?

Engagement outcomes are captured separately for the (i) engagement with flexibility providers, (ii) engagement with customers on harmonic filtering, (iii) engagement with cross sector organisations on the decarbonisation of transport, and consumer engagement.

i) Engagement with flexibility providers

We ran a similar type of session to that held with BEIS on the "Future role of electricity transmission topic" at the Association for Decentralised Energy (ADE), allowing us to deploy some of the methods that worked well to run a more engaging session (e.g. the mentimeter application for dynamic polling). This session covered the future role of electricity transmission, our business planning approach and explored potential opportunities for demand side response in resolving transmission issues.

Channel	Segmental analysis		Organisations	
Bespoke session (9 attendees)	New business models	3	ADE	Grid Beyond
	Large customer	3	Smartest Energy	Eon
	Small Customer	2	Centrica	EdF
	Other	1	Stark Energy	Flextricity
			Enel X (formerly Enernoc)	

In addition to this bespoke session at the ADE, we attended several conferences and events focussed on flexibility (some of which are highlighted in our engagement plan, above) and held several bilateral discussions with both DSR and storage developers with the aim of building a better understanding on both sides – i.e. of the potential transmission system requirements in the future and of the capability of flexibility services to deliver some of these requirements. Outcomes from the ADE in September 2018 relevant to this strand of engagement are shown in Figure 4, below.

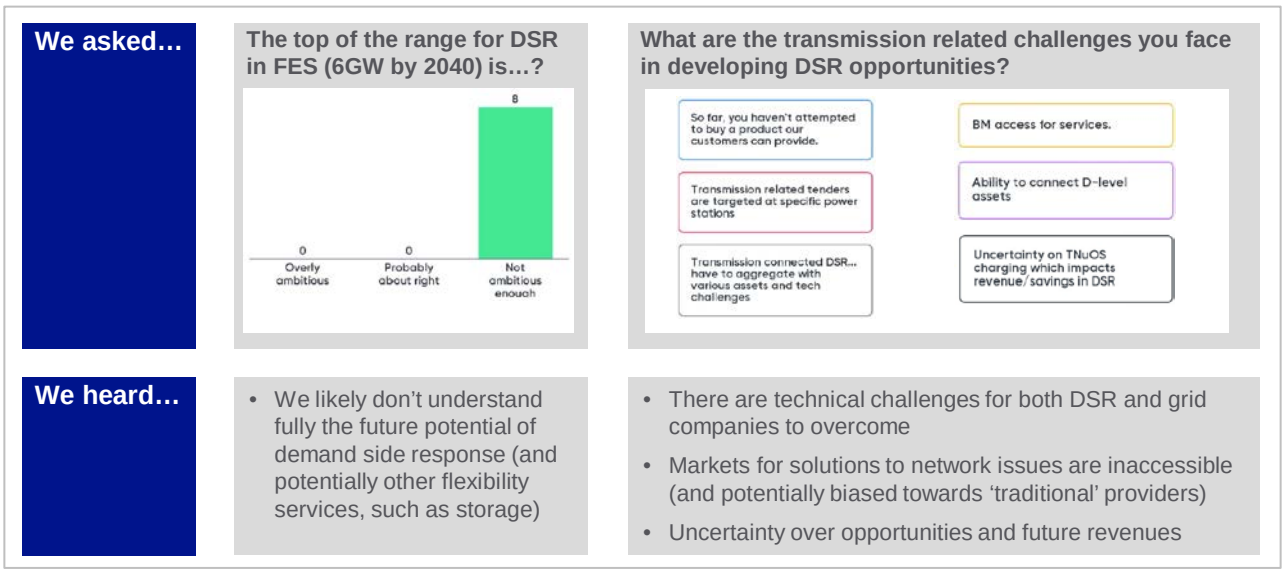


Figure 4 - Outputs from initial session with ADE members

From this first round of engagement with flexibility developers we were able to articulate a view of the potential for flexibility in providing solutions to network capacity issues in the T2 period. This view was further tested with stakeholders bilaterally, and is shown in Figure 5, below. We were able to use this view of potential over the T2 period to test whether alternative solutions to transmission network requirements may provide a better solution for consumers. This insight was also used in our engagement with DNOs and the ESO, set out in annex A7-8.01_Engagement Log (Whole system – DNO & ESO).

		not a TO cost		
Consumer value:	**Delay network investment at Tx / Dx interface**	**Reduce cost of secure system operation**	**Compliment network investment on wider network**	**Alternative to network investment on wider network**
Type of flexibility suitable:	Small, short-duration storage and small to medium aggregated portfolios of domestic + I&C DSR	Medium, short-duration storage and large aggregated portfolios domestic + I&C DSR	Large, aggregated and diversified portfolios of storage and DSR assets or single large storage assets	Large, aggregated and diversified portfolios of storage and DSR assets or single large storage assets
Relative T2 opportunity (2021—2026):				

Figure 5 - Potential for flexibility to resolve network issues in RIIO-T2

A further session was held at the ADE with a handful of interested members to explore where the blockers might be to developing a market for flexibility solutions to network capacity issues. In this session, we starting creating a 'Flexibility Roadmap', which includes consideration of the role of Transmission Owners in the context of all the other key parties. The output of this session is shown in Figure 6, below. Useful insights were gained into what actions need to be taken and by who to give flexibility providers a route to market for network capacity services.

This session was intended to be the start of an ongoing process of engagement with flexibility providers to help build out a plan with a mutual understanding of what is required.

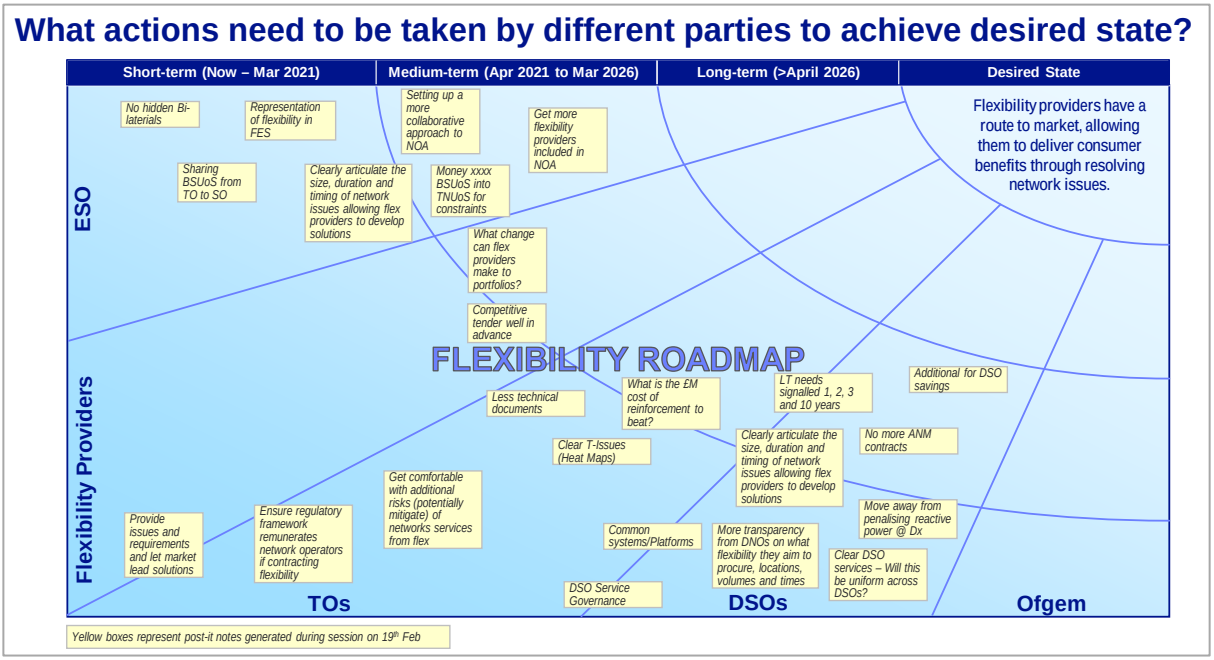


Figure 6 - Flexibility Roadmap

Some of the key actions highlighted through this process included:

- **ESO** – An expansion of the NOA process and transparent competitive processes
- **Flexibility providers** – Tailor portfolios and signal capabilities
- **Transmission owners** – Clear communication of transmission system issues well in advance, less technical documents, get comfortable with additional risks and influence regulatory framework
- **DSOs** – Common platforms and uniformity of services, clear communication of what type of service is needed where and when

Many of these actions require collaboration with other parties across the industry and will require time to complete. For the T2 period, we will need to ensure that our business plan allows us to continue to work with key stakeholders to help flexibility providers deliver network capacity services where this lowers costs for current and future consumers. Common with other areas in this strand of engagement, our engagement activities will continue.

ii) Engagement with customers (harmonic filtering)

All future energy scenarios show an increasing amount of wind, solar, storage and interconnectors connecting to the electricity system. Interfacing these technologies with the main, alternating current, system introduces distortions that can be damaging at certain frequencies, known as harmonics. Limits on harmonic distortion levels are placed on developers of these technologies, almost always requiring them to invest in harmonic filtering equipment. Together with experts, and alongside other network companies, we have been investigating the potential consumer benefits of aggregating filtering requirements to reduce the total number of filters required and make it easier to deploy renewable technologies in order to meet Net-Zero targets. We believe this could help reduce the cost of the transition to consumers and allow renewables to connect to the network with lower risk.

We have had positive views from stakeholders on the potential of this approach through ongoing engagement and bilateral conversations. This is consistent with the outcome of engagements held by Scottish Power Energy Networks on the same topic, where stakeholders indicated it could be better for networks to provide the solution to harmonic distortions (shown in box above).

We held an initial workshop in December 2018 with other Network Owners and technical experts to understand their views on examining options for a new approach to managing harmonic distortions. We began with this group of stakeholders on the basis that taking anything new forward would be unlikely without their support. In addition to the initial workshop, this conversation carried on in a series of face to face meetings between technical experts from the respective companies. Once this had progressed sufficiently we held a workshop

with broader stakeholders to discuss issues and options in more detail in April 2019.

A) WORKSHOP WITH STAKEHOLDERS

We invited representatives of stakeholders with an existing or potential future interest in this topic. A workshop was chosen as it's a channel which allows for face to face sharing of information and two-way discussion, and Birmingham was chosen as a central location with good transport links. A summary report of the topics covered and feedback received was also published on our website.

Channel	Segmental analysis		Organisations	
Workshop (17 attendees)	Network company	8	ABB	NIE Networks
	Other (consultants)	4	Atkins Global	PSC Consulting
	Large customer	3	Enotrac	StatKraft
	Supply chain	2	ESB	SP Energy Networks
			National Grid ESO	TNEI
			National Grid Ventures	UK Power Networks
			Network Rail	

Birmingham workshop

We structured the day around topic-specific sessions. Each session involved:

- a short presentation to provide enough context for all stakeholders to be able to discuss the subject area,
- an interactive question and answer session
- voting options (for 3 sessions) where stakeholders were asked to either rank or vote on their preferred options.

Six sessions were held in total and the outputs of each are summarised, below.

Session 1: Harmonics Compliance Process

We began the workshop with an overview of the current harmonic compliance process, the context of how the energy industry is changing as more generation causing harmonic distortions connects and the pros and cons of the current approach into the future for stakeholders.

Session 2: Technical Analysis carried out by National Grid

The next part of the workshop involved showing stakeholders the case studies we had carried out. The objectives and scope of the study were explained. Three case studies were shared, including a concentration of wind connections with harmoinc filters in the north west, a large numer of wind farm connections in the east and future connections in the south east and east.

We shared our conclusions of the study, which showed that an estimated reduction of 37% in the total number of harmonic filters could be achieved for an 8-year period from 2021 to 2029.

Stakeholders said:
- They were generally supportive of our approach and assumptions - Some believed that the harmonics process was one of the key blockers - They were keen to understand the compliance process and potential cost savings

Session 3: Technical Analysis carried out by Scottish Power Energy Networks

This session showed stakeholders the case studies carried out by Scottish Power Energy Networks (SPEN). Their progress to date in terms of designing standard filters and plans to deploy them in future in the south west of Scotland were described. The conclusion from SPEN's work was that a TO solution is more economic and efficient than placing the burden fully on customers in the cases they had investigated, but that connectees should maintain a responsibility for compliance at the connection point.

Stakeholders said:
- They wanted to know if this would be applied to existing connections retrospectively

- They wanted to know how distortions caused by users are defined
- They shared suggestions for other actions they believed TOs could take to help manage harmonics

Session 4: Harmonic Compliance International approaches

In this session, experts PSC Consulting explained how harmonic compliance is managed internationally. The material focussed on EirGrid in Ireland, Engerginet in Denmark and TenneT in the Netherlands as well as touching on experiences elsewhere, such as Canada and the United States.

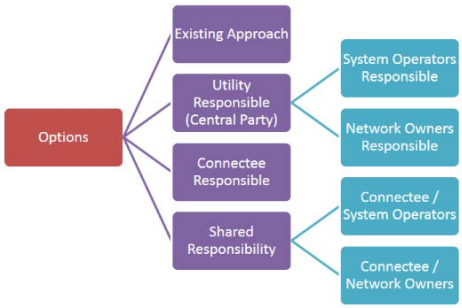
Stakeholders said:

- Some TOs have full responsibility for offshore transmission, which is not the model in the UK
- They were interested in who is responsible for conducting analysis in different countries
- They wanted to know if there were any obligations or regulatory requirements for network companies to bring the overall cost down in other countries

Session 5: Harmonic Compliance management alternative model

In the next session, PSC Consulting explained an alternative GB model for Harmonic Compliance, and that there was a potential opportunity for a more effective approach. Figure 7, summarises the options that they had considered and how these compared.

Options considered



Comparison

Activity	Utility Responsible	Connectee Responsible	Shared Responsibility
Existing System Measurements	Utility	Connectee	Utility
System Modelling and Studies	Utility	Connectee	Utility
Mitigation Specification	Utility	Connectee	Utility
Mitigation Responsibility	Utility	Connectee(s)	Connectee(s)
Monitoring	Utility	Connectee	Connectee

Figure 7 – Options for harmonic management

The session was summarised by the alternative approaches to responsibility for harmonic distortion management, the utility is responsible, connectee responsible, share responsibility or stay as is. Stakeholders were asked to rank their preferences and the results are shown in Figure 8. The majority of stakeholders ranked network companies (utility) being responsible as their first choice, followed by a preference for shared responsibility as their second choice.

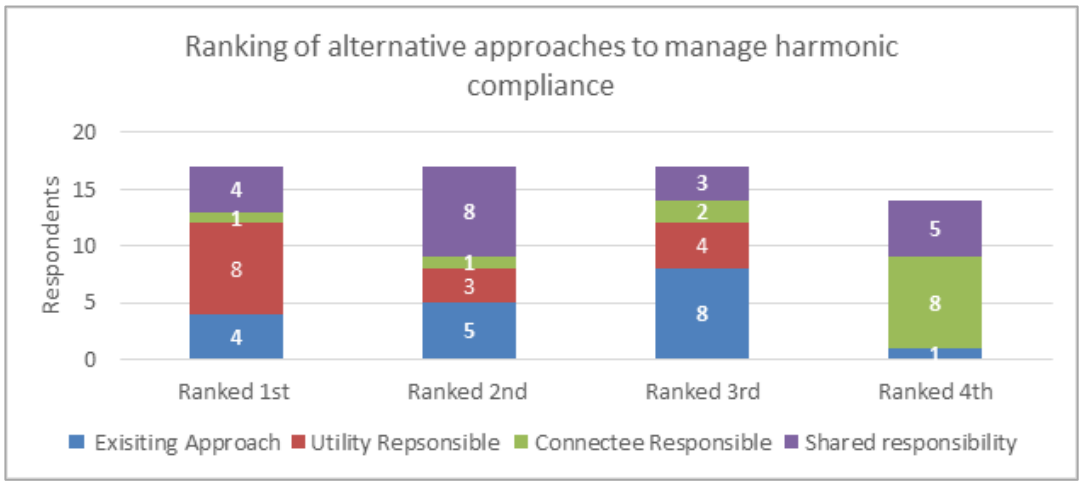
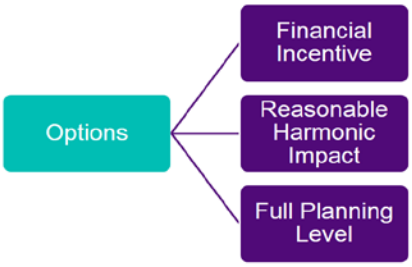


Figure 8 – Stakeholder preferences for approach to harmonic management

Session 6: Harmonic compliance incentivising connectees

In this session PSC Consulting explained options for incentivising connectees to consider their harmonic impact, which had been highlighted as an important consideration in engagement with stakeholders to date. PSC shared three proposals highlighted in Figure 9.

Options considered



Comparison

Activity	Financial Incentive	Reasonable Harmonic Impact	Full Planning Level
Connectee System Data Upfront	Detailed	General	None
Connectee Harmonic Impact	No Restriction	Technology Based	Full Planning Level
Existing Background	Considered	Considered	Not Considered
Connectee Mitigation	None	Potentially	Unlikely
Connectee Fee	Proportional	Proportional	None

Figure 9 – Options for incentivising connectees

Stakeholders were then asked to rank their preference on the risk/liability framework. The majority of stakeholders ranked *Reasonable Harmonic Impact* as their first option, with *Financial Incentive* coming a close second, as shown in Figure 10.

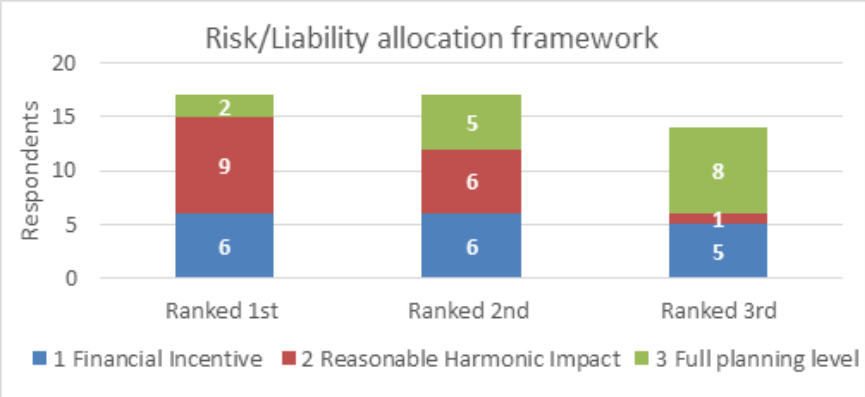


Figure 10 – Stakeholder preferences for incentivising conectees

Stakeholders said:

- Number 2 offers a reasonable risk/reward, number 3 is too complicated and number 1 would need to have a robust and transparent charging mechanism
- Reasonable harmonic impact is too open to interpretation. A financial incentive would need to consider how the fee structure works and split between connected/system users
- We should consider benefits to system and impact on equipment by reducing harmonic pollution
- TOs are responsible to plan and design a network that is operable.

SESSIONS 7 AND 8: EXISTING COST RECOVERY METHODS FOR HARMONIC MITIGATION AND IMPACT OF PROPOSED APPROACH ON DIFFERENT STAKEHOLDERS

In this session, AtkinsGlobal discussed the existing cost recovery methods for harmonic mitigation, followed by a session focussed on the impact of different charging approaches on different stakeholders.

Two options were discussed, compared and summarised:

1) Cost recovery via base transmission revenue (i.e. TNUoS)
2) Cost recovery via connection charges

Stakeholders were asked which of the two options they preferred and the results of the poll are shown in Figure 11.

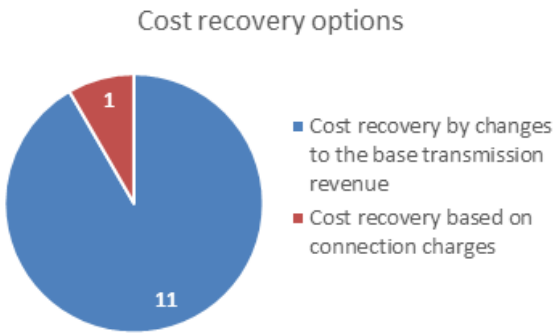


Figure 11 – Cost recovery options for a revised approach to harmonics management

Stakeholders said:
- If the transmission owner builds the asset not only for a specific customer, the costs should be socialised. - Connection charges will be very complex with multiple new connectee, particularly once you consider large numbers of smaller connections. - Charges to the transmission revenue will need to take into consideration some method to scrutinize the requirements for passive filters vs alternative approaches. - Recovery based on connection does not deliver efficiencies. Major risk for developed building assets in third party (TO) location

B) EMAIL FOLLOW-UP WITH CUSTOMERS MOST IMPACTED BY PROPOSALS

Reflecting on our workshop, we did not have confidence that we had fully captured the views of stakeholders that would be amongst the most impacted by any change in approach. In order to capture additional views from our customers, who would be most impacted, we solicited their feedback via email in July and August of 2019.

Channel	Segmental analysis		Organisations	
Email (6 respondees)	Large customer	6	EDF Innogy Orsted	SSE Renewables Uniper Vattenfall

To focus the feedback, we asked customers about our proposal to take a coordinated, whole system approach to managing harmonics and to recover the costs via Transmission Network Use of System (TNUoS) charges. Verbatim responses from stakeholders are shown in the table, below.

Stakeholder	Feedback
[redacted]	• It would be interesting to know the expected cost of this proposal to TNUoS payers. • Whilst you cannot always identify individual participants who create harmonics issues going forwards, it seems to me that you have identified categories of user who do. Therefore, wouldn't it be possible to aim the additional costs at them, or alternatively provide discounts for those who don't cause issues? This seems similar to issues around inertia where conventional transmission connected generators are not being recognised for the contribution they make. If this is brushed under the carpet, then either conventional plant could be expected to close quicker than you were expecting, the CM will be more expensive in order to retain them, or the ESO will need to put in place special arrangements to keep strategically important plant, presumably making balancing services more expensive? • Wouldn't existing projects which have already had to provide their own harmonic filter solutions be disadvantaged too? • If a number of new connecting projects were covered by one grid provided harmonic solution, would they be prevented from connecting until this had been completed?"
[redacted]	• In general, [redacted] supports this approach. However, the policy should also encourage 'efficient' User design with respect to harmonics – possibly by adoption and enforcement of a generic harmonic performance specification. The purpose of this

	would be to ensure that individual Users do not impose unnecessarily high levels of harmonic pollution (and associated costs) on the System. • [redacted] supports the proposal to socialise harmonic mitigation costs through TNUoS, so long as the factors giving rise to the need for mitigation (i.e. harmonic pollution) are properly controlled.
[redacted]	• In principle, I think that as a developer, we would support a centralised coordinated approach to harmonic filtering due to the potential benefits and I think that it is definitely worth exploring. Details would have to be understood, of course, in terms of risks and exact charging methodology
[redacted]	• We are supportive of the approach you described below and we are definitely in agreement that a more coordinated filter design will provide benefits for the network. We are alos supportive of charges being recovered by NGET via TNUoS charges and we believe these should be calculated on a zonal basis. • We are happy to be involved in discussions with NGET on this proposal, but to ensure we have the right level of expertise in the meeting, could you provide a bit more of details about what you'd like to discuss (more technical or more commercial for instance and what the key topics would be.
[redacted]	Fundamentally, [redacted] support the view that a coordinated approach to managing harmonics is a more economical and cost-effective way forward. This approach was proposed by the G5/4 WG at early stage by its members. Unfortunately, this proposal was rejected at that time due to various reasons. However, the industry has changed significantly in the last few years and it's now a good time to raise this proposal within the industry. [redacted] would like to seek further clarifications of the following points in order to get a clear understanding of this approach and give full support to the proposal. • NG expect to manage the risk associated with harmonics only for transmission connected generators and loads. How will NG address DNO connected generators and loads? Does NG expect DNOs to take the harmonic responsibility in the same way for onshore wind and PV connections? If this is the case what are the DNO's views on this approach? What is the NG approach of managing the harmonics of OFTO networks? If under OTSDUW Arrangements the Developer has to manage their harmonics within the OFTO network, then Innogy would not see significant advantage of this proposal for large offshore wind farms. • The current approach of, "the connectee is responsible for cleaning or minimising the distortion they create", encourages connectees to procure low polluting (in terms of harmonic emissions) wind generators and other equipment. The proposed approach may not encourage the installation of low polluting generators and equipment by new connectees. How do NG expect to encourage connectees to install low polluting generators? • NG expect to submit their next business plan for the RIIO-T2 period (2021-2026) including this proposal. If this is the case, what is the plan for changing the relevant codes and standards to accommodate this new proposal within this short period of time? The proposed ER G5/5 standard does not reflect this new proposal. • NG expect to undertake a coordinated system study to assess the harmonic mitigation requirement. Harmonic system studies require accurate network and harmonic information from generators and networks. Developers may not have the final accurate harmonic network data and harmonic data until the final detailed design stage of a project. How will NG mitigate this risk of not having accurate connection data in a timely manner to do the coordinated harmonic studies? • Can NG confirm large offshore windfarm connectees (including those utilising OTSDUW Arrangements) will not be required to perform any harmonic studies or assume these responsibilities if this proposal goes ahead? • Have National Grid performed an impact assessment? If so, will they share the expected delta this would cause on the residual element of the Wider TNUoS tariff?

	(the residual element of that tariff being the part socialised among *transmission system users).”*

We were able to address many of the concerns raised by stakeholders and develop a workable proposal through our engagement in this area. There was broad stakeholder support for our proposed approach and a number of issues were raised that need to be addressed in parallel with our proposals for the T2 period, including the charging methodology, how the right designs are incentivised to minimise pollution and how this will impact the connection process. In response to this, we will be working with the ESO and industry to progress associated CUSC and Grid Code changes. Engagement continues in this area.

iii) Engagement with cross-sector stakeholders on enabling the decarbonisation of transport

Facilitating the decarbonisation of transport is a key challenge for the industry in the coming decade. In order to (i) explore the role that National Grid Electricity Transmission might play in enabling the uptake of electric vehicles and (ii) understand the potential impact on our business plans of changes in electricity consumption as a result of a rapid EV roll-out, we have held bilateral conversations with 132 organisations since January 2018, as set out in the tables, below. These represent a broad range of stakeholder segments across both the energy and transport sectors.

Channel	Segmental analysis		Examples of organisations (non-exhaustive)
Predominately bilateral discussions	Communities	4	
	Consumer Bodies	8	
	Governmental	7	
	Interest Groups	5	
	Large Customers	2	
	Network Companies	6	
	New Business Models	21	
	Other	70	
	Political	1	
	Small / new customers	3	
	Supply Chain	5	
	Total	**132**	

Organisations engaged bilaterally			
ABB	Efacec	LeClanche	Shell
Accenture	Egnida	LEVC	Siemens
Allego	ENA	Moto	Society of motor manufacturers and traders
Arcadis	EnergyUK	National Express	Southern Electric
Atkins	Engenie	National Infrastructure Commission	Statkraft
Axa	EON	New Motion (Owned by Shell)	SWECO
Bain & Co	Extra	Nissan	Tesla
Baringa	EY	Northern Power Grid	TFL (Transport for London)
BEIS	Fastned	Octopus Energy	The EV Network
Bloomberg	Financial Times	Ofgem	The Guardian
BMW	Fully Charged	OLEV	HM Treasury
BP	G2Energy	Oliver Letwin MP	UK Power Networks
Burness Paul	Gemserv	Origami Energy	United Utilities
Burns McDonell	Gowling	Ovo Energy	Vattenfall
BYD	Greenlots	Pivot Power	Vinci
CBI	GridServe	Podpoint	Warwickshire and Coventry Local Enterprise Council
Chargemaster (owned by BP)	Highways England	PwC	WDP
ChargePoint	House of Lords	REA	Welcome Break
Citizen's Advice	HSBC	Renewable UK	Welsh Government
Committee on Climate Change	Infrastructure Planning Authority	Roadchef	Westminster Energy Forum
Cornwall Energy	Instavolt	Rolls Royce	Westmorland
Deliotte	Ionity	Royal Mail	ZapGo
Department for Transport	Jaguar Land Rover	Savills	ZapMap
DHL	KPMG	Scottish Government (Energy and Transport)	

Further details for segments 'New business model' and 'Other'			
New business model		**Other**	
Charge Point Network Operator	11	Management Consultancy	12
Renewable Energy Developer	3	Automotive OEM	8
Battery Storage Developer	2	Engineering Consultancy	7
Energy Asset Aggregator	2	Investment	5
Charge Point Manufacturer	1	Motorway Service Area Operator	5
Fleet Management	1	Media & Events	4
Smart Charging Software	1	NGO	4
Total	**21**	Consultancy	2
		Financial Services	2
		IT solutions	2
		Logistics	2
		Oil & Gas	2
		Petrol Forecourt Operator	2
		Retail	2
		Battery Manufacturer	1
		Digital Design	1
		Economics Consultancy	1
		Financial Analyst	1
		Infrastructure - Vertically Integrated	1
		Innovation Consultancy	1
		Law	1
		Political Engagement Consultancy	1
		Powertrain Manufacturer	1
		Public Transport Operator	1
		Risk Management and Quality Assurance	1
		Total	**70**

In considering how network companies can be an enabler of decarbonising transport, our stakeholder engagement, along with existing insight, identified that en-route charging on the Strategic Road Network was a key barrier to the adoption of EVs. Our engagement with charging operators, the charge point supply chain and Motorway Service Area (MSA) operators, has identified that: high network connection capital costs, high utilisation risk and a 5-to-10-year investment return focus, is preventing the private sector from delivering infrastructure at sites with high network connection costs. These engagements also revealed that when delivering charge points at these sites, connection capacity is being requested on an incremental basis which doesn't future proof the connection and thus leads to inefficient network investment.

We undertook analysis of potential solutions to these problems at motorway service areas. As part of this we identified 54 strategic charging locations, as shown in Figure 11, below. A future-proofed upfront network connection at these sites would enable high powered ultra-rapid chargers to be installed, which would enable 99% of drivers in England and Wales to be within 50 miles of an ultra-rapid charge point. This is in line with the Government's Road to Zero ambitions and the NIC's National Infrastructure Assessment. Our initial analysis set out a transmission solution and we have since been working with other networks to understand how this can be evolved into a whole networks solution.

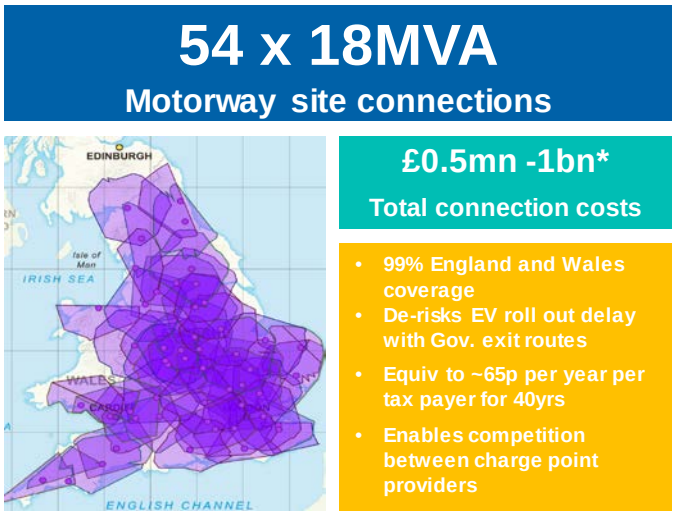


Figure 12 - Strategic network of rapid EV charging stations

Throughout our extensive market engagement over the last 24 months. Our three key objectives have been to:

1. understand and refine the market challenges;
2. test the feasibility of high level solutions and articulate the case for private and public section action;
3. co-create delivery options.

Key feedback included:

1. Whilst a small piece of an extensive charging ecosystem, en route charging is critical to overcoming range anxiety and unlocking the decarbonisation of transport. Currently, network connection costs vary across en-route sites and high costs can prevent projects from proceeding. The lack of a plentiful supply of energy to sites in the medium and long term is a key area of consideration.
2. Future proofing en-route charging as EV penetration, battery sizes and charging rates increase would require enough capacity at site to deliver ultra-rapid high powered charging (up to 350kW). There is clear appetite from industry to work jointly on developing infrastructure solutions to help facilitate an efficient consumer transition to electric vehicles by addressing these issues. However, there is a need for a strategic national plan to prepare for the deployment of ultra-rapid charging infrastructure, to help generate new markets.
3. By working together to develop a whole system solution, energy infrastructure providers can help to deliver the connection capacity at a lower total cost.

Our forward plan of engagement in this area is focussed on ensuring the delivery of a fit for purpose and timely solution that enables the consumer transition to EV roll-out. We are working alongside the wider industry and with policy makers to further develop attractive deployment options.

iii) Consumer engagement

As part of developing our plans for RIIO-T2, we worked with a number of expert external agencies to undertake a programme of consumer research to test the willingness to pay and acceptability of our business plan. Details of this work are set out in Annexes *A6.04 Willingness to pay report*, *A6.05 Interactive online tool research report* and *A6.06 Acceptability testing reports*.

At the heart of our research was a quantitative survey that has measured the acceptability of the business plans; supported by qualitative research to ensure we have a rich and detailed understanding of consumers views on our proposals.

The acceptability testing research consisted of three key stages:

Stage 1 Qualitative research to understand consumer views in general on the energy industry, energy bills and National Grid; and to support the design and development of the quantitative survey of Stage 2;

Stage 2 Quantitative research to understand acceptability across a representative sample of consumers, including a pilot and main study; and

Stage 3 Qualitative research to drill down into the acceptability findings of Stage 2, and to explore in depth the key issues around acceptability and affordability.

We received the draft report summarising Stage 3 of the programme, which tested and validated the quantitative survey findings from Stage 2, giving a deeper understanding of consumer views on our business plans.

Summary of feedback:


Newport focus group

Quantitative acceptability testing showed strong support for investments needed to support future changes in electricity supply and demand (91% support for proposals). Planning the energy system of the future was ranked 3rd after only reliability and protecting the network.

The installation of ultra-rapid charging points for electric vehicles also had high support, 86%, but this was the lowest level across all the proposals tested (as shown in Figure 13). The number of consumers that believed the bill impact for this proposal was not acceptable was high relative to other proposals.

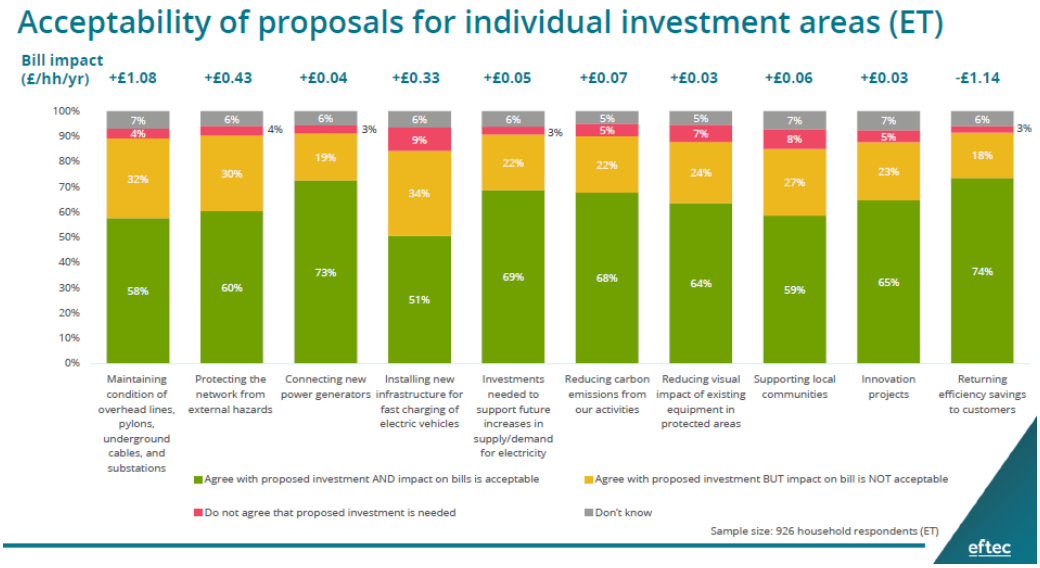


Figure 13 - Strategic network of rapid EV charging stations

This relative level of support remained when consumers were asked to also consider the impact on bills. Further qualitative testing, through focus groups, confirmed these results. We received some positive feedback on proposals for Electric Vehicle charging through the focus groups, shown below.

Some investments were subject to more discussion than others – most notably infrastructure for electric vehicle charging, efficiency savings, cyber security, and innovation projects:

- Electric vehicle charging infrastructure: all participants could see why this investment area had the lowest level of support, but regardless still thought that 85% of consumers supporting it was enough. The Edinburgh and Guildford groups also questioned who else would be able to provide the necessary infrastructure.

"If not them, then who? If they want the infrastructure, who else is going to do it?" (Edinburgh, ABC1 46+)

"They could be a pioneer in it, it could be a good market for them to get in to" (Guildford, C2DE 18-45)

As such, National Grid were seen as best placed to help facilitate the development of charging points and participants though it could be a catalyst for positive changes, increasing the likelihood people will choose to buy electric vehicles. The level of support from the survey results was well beyond the reasonable threshold needed, where around 75% was suggested as the threshold for support in Newport; 70% in Guildford.

"I think 85% is overwhelmingly positive, and I don't know why people wouldn't want these things" (Edinburgh, ABC1 46+)

"I tend to go more with the infrastructure for electric cards because at the moment they're trying to give you the cars to do it but there's not enough charging points. So, you might moan...its costing us more, but once it's in, I don't think anybody will be moaning" (Newport, C2DE 46+)

Whilst results differed across domestic and non-domestic consumers, both showed a strong willingness to pay for investments to accommodate renewable energy, even when ahead of definite need as shown in Figure 14. The willingness to pay for EV Charging infrastructure investment ahead of need was also relatively high.

Table 3: Recommended Domestic Electricity Willingness to Pay Values (£/consumer/year)

Attributes	WTP (£)
Risk of powercuts	
2 hours decrease in the hours of powercuts at a 1.5% probability	7.70
4 hours decrease in the hours of powercuts at a 1.5% probability	9.70
Every fewer day to recover from a blackout	3.58
Undergrounding Overhead Transmission Lines	
20 miles additional underground in National Parks etc.	6.87
20 miles additional underground in other areas	6.46
Improving visual amenity of Overhead Transmission Lines	
Additional visual impact work in National Parks etc.	4.14
Additional visual impact work in National Parks and other areas	4.81
Additional transmission site environment improved	
25 additional sites	8.92
45 additional sites	10.78
Investing in innovation projects	
Medium Scale Projects compared to Small Scale Projects	2.38
Large Scale Projects compared to Small Scale Projects	3.11
Supporting local communities	
Current level of community activities	8.26
Current level of community activities and additional funding to charities	8.46
Investing in EV Charging Infrastructure	
Invest before definite need	9.55
Investing in infrastructure to connect to renewable generation	
Invest before definite need	11.78

Source: NERA Analysis.

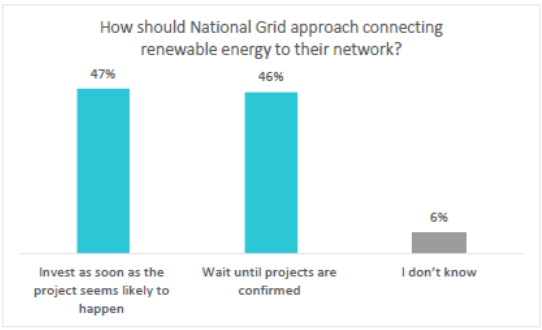
Table 6: Recommended Non-domestic Electricity Willingness to Pay values in Percentage (% bill/consumer/year) and Monetary Terms (£/consumer/year)

Attributes	WTP (%)	WTP (£)
Risk of powercuts		
2 hours decrease in the hours of powercuts at a 1.5% probability	1.20%	43.30
4 hours decrease in the hours of powercuts at a 1.5% probability	1.86%	66.95
Days to recover from a blackout		
2 fewer days to recover form a blackout	0.67%	24.15
Undergrounding Overhead Transmission Lines		
20 miles additional underground in National Parks etc.	1.25%	45.02
20 miles additional underground in other areas	1.27%	45.90
Improving visual amenity of Overhead Transmission Lines		
Additional visual impact work in National Parks etc.	0.76%	27.36
Additional visual impact work in National Parks and other areas	0.94%	33.68
Every additional transmission site environment improved	0.05%	1.68
Investing in innovation projects		
Medium Scale Projects	0.29%	10.56
Large Scale Projects	0.29%	10.56
Supporting local communities		
Current level of community activities	0.53%	19.23
Current level of community activities and additional funding to charities	0.53%	19.23
Investing in EV Charging Infrastructure		
Invest before definite need	0.90%	32.38
Investing in infrastructure to connect to renewable generation		
Invest before definite need	1.08%	38.89

Source: NERA Analysis.

Figure 14 – Results of willingness to pay study

The results of our online slider tool (Figure 15) was more divisive on this topic, with almost an even split between those favouring immediate action and those preferring to wait, with respect to investment to connect renewable energy to the network. Respondents in Wales and London were most supportive, whilst those in Scotland were significantly more likely to want to wait for project confirmation.



Moving to a greener economy and environmental impact

Respondents favoured ambitious targets for the decarbonisation of the economy with more than 6 in 10 hoping to see a carbon neutral National Grid by 2040 or earlier. Investment in carbon neutral construction, renewable technologies and green power to reduce emissions from National Grid sites all received majority support. Two thirds also felt that National Grid should be prioritising or solely connecting renewable electricity sources to the grid in the future.

However, respondents were divided over the comparative merit of investing in new technologies and infrastructure now to avoid delays along the road to a greener economy or waiting until there was a clearer direction to minimise risk. Further consumer communication and research may therefore be beneficial to inform decision making in this area.

Figure 15 – Results of slider tool question on investing ahead of definite need

Combined, the results from our consumer engagement suggest that we should continue to pursue investments that enable decarbonisation and that, in some areas, investment ahead of clear need is also supported by consumers. However, the responses to acceptability of bill impact indicate that the question of who should fund this investment and take any risk still need to be addressed.

2.2 WHAT WAS THE FEEDBACK ON THE ENGAGEMENT APPROACH?

Feedback has been collected for all engagements and acted upon in an iterative manner to improve the engagement approach as the programme of engagement for this topic area progressed. This section contains (i) specific channel feedback, (ii) the Truth assessment of engagement on this topic area and (iii) Frontier Economics assurance of how stakeholder engagement was reflected in our July business plan.

(i) Specific channel feedback

Key themes of feedback from stakeholders on our engagement approach were:

- Stakeholders were keen that we engaged them in a way that made this as easy as possible for them (e.g. through a trade association)
- Whilst stakeholders saw the value in multiple choice and ranking questions, they also highly valued the opportunity for free comments, giving them the opportunity to fully describe their views
- Through our bilateral engagements for decarbonisation of transport, stakeholders told us that they appreciated the time we took to speak to them directly and share our analysis and thinking in detail
- Where engaging multiple stakeholders at once (e.g. through a workshop) stakeholders indicated that they highly valued interactive session where they were able to interact with and listen to the views of other attendees

(ii) Truth assessment – November 2018

Truth was commissioned to provide a comprehensive appraisal and debrief of the relevant knowledge/ insights National Grid already holds on stakeholders and to assess the robustness of engagement being undertaken. This work was undertaken in advance of the bulk of bespoke engagement activities undertaken for this strand of engagement and therefore does not include a detailed assessment for this strand. The full report of their assessment is included in *Annex A6.03 Truth Reports.*

(iii) Frontier Economics assurance – September 2019

We commissioned Frontier Economics to carry out an assurance of how our stakeholder engagement was reflected in our July draft business plan. The aim of the work was to identify whether the proposed actions in our business plan are supported by the stakeholder evidence from the engagement that we carried out. Frontier Economics also assessed how well the logic between stakeholder evidence and business plan actions is documented, and identified any gaps or areas for improvement, either in the engagement logs or in the draft business plan.

In their key findings for our plan overall, Frontier noted:

Broadly we found that the stakeholder evidence supported the actions proposed in NGET's draft July business plan. There were a relatively small number of areas where we feel that the stakeholder evidence itself could be strengthened, but we did not find any material areas of discrepancy between stakeholder views and the proposals in the business plan.

There are some areas where we feel the documentation of the key messages received from stakeholder evidence, the link between the evidence and the actions, or the actions themselves, could be improved.

Key findings for this stakeholder priority and how we have addressed these in our business plan are shown in the table, below. The full report of their assessment is included in *Annex A6.07 Frontier Gold Thread Assessment.*

Frontier's key findings for this priority	How we have addressed this feedback
General:	
Overall the engagement logs and evidence support the actions that are being taken. There are some clearly defined and strong priorities that emerge in the conclusions of the engagement log. These conclusions can be mapped to multiple actions and where this happens the link between the evidence and the proposed action is clear and intuitive.	No action
The mapping between the structures of the various engagement logs and this chapter is complex. There are three different engagement logs that are relevant for the chapter and there are some cases where there is evidence referred to in the business plan, but this does not seem to be in the engagement log. In general this chapter could have greater clarity if there was some explicit cross referencing to the relevant engagement logs to provide clear evidence of support for actions.	We have restructured *Section 3 – What our stakeholders are telling us* of the business plan narrative and the content of the engagement logs to align around 3 main strands of engagement and made a much clearer link with *Section 4 – Our proposals for the T2 period.* We have also developed 'Golden Threads' for each stakeholder priority to clearly show the linkage between engagement and proposed outputs on a page. These are provided in Annex ET.01 Golden Thread summaries and the thread for this priority is replicated on page 39 of this log.
Some actions are driven by factors other than engagement and it may provide more clarity if the business plan chapter is more explicit about where certain actions are motivated by other factors (e.g. license obligation, existing liability, etc.).	We have added narrative to the start of *Section 3 – What our stakeholders are telling us* to clearly show that our proposals are a product of both (i) licence obligations, annual process and ongoing stakeholder engagement as well as (ii) bespoke engagements undertaken in building our T2 business plan to make this clear.
Specific improvements identified:	
One of the engagement logs supporting this chapter is still incomplete and whilst it provides a detailed set of initial conclusions it was not always clear on the detailed evidence supporting these initial conclusions. Once the engagement log is completed it should provide a better evidence base.	All engagement logs have been fully completed, aligned to one of three strands of engagement and more clearly linked to proposals in the main business plan narrative as well as in the Golden Thread Annex
Some actions clearly address stakeholder priorities but the business plan write up does not reference this. NGET may wish to consider clearly referencing for each action which stakeholder priorities are addressed.	Proposals have been re-ordered and more clearly linked to a stakeholder priority within *Section 4 – Our proposals for the T2 period.* *Section 5 – The justification of our proposals* also more clearly references where a proposal addresses other stakeholder priorities, such as the ESO's target to be able to operate a zero system by 2025.
There are a number of whole system actions proposed. However, DNOs were clear that they preferred the ESO to lead the whole systems assessment. It would be good to have some explanation addressing this feedback. Currently it is not clear how or if this feedback was addressed.	The business plan is now very clear on where the ESO will lead whole system assessments, predominately through its Network Options Assessment Pathfinder projects, and where the process will be more trilateral in nature. In hindsight, our conclusion from engagement with DNOs in July that they had a, "preference for a fully ESO led process" was not representative of what we heard from all DNOs. This conclusion was therefore re-worded to read that DNOs, "stated a preference for a strong ESO role in whole systems, particularly through NOA expansion, and agreed an interim approach to building T2 plans". We believe this is more representative of what we heard from this group of

	stakeholders. This is further addressed within Section 5.3 (ii) of our business plan narrative.
Optimise with the ESO - the engagement log and business plan are both clear that this is about offering services to the ESO which may enable it to save money. However, the write up in both the business plan and the engagement log may be able to offer additional clarity if there is documentation of the ESO having requested support in these areas.	We have improved both the business plan narrative and relevant engagement log to be more clear in this area. In the business plan, the start of *Section 3 – What our stakeholders are telling us* has been re-written to be much more clear on the key role of the ESO in the industry and the annual process run by the ESO strongly influencing our plan. This ESO process involves publishing of future system requirements through both the Electricity Ten Year Statement and the System Operability Framework. *Section 5 – The justification of our proposals* of our business plan now also directly references and links to relevant ESO documents supporting our proposals. In the engagement log, we note the bilateral engagements we have had with the ESO in building our plans.
The business plan references evidence that stakeholders are willing to pay for investments that may not be needed to support decarbonisation. However, this evidence doesn't seem to be in the engagement log and it is not clear what evidence is being referred to. It would be helpful if this evidence could be clearly referenced.	The reference in our July draft business plan was only based on initial results of the willingness to pay study and did not include the results of our online slider tool survey. As a result, it is not worded in an ideal manner, given the final results across all consumer research undertaken. This has been rectified in our final business plan to ensure that there is no ambiguity / chance of misinterpretation.

2.3 WHAT WERE THE INITIAL NATIONAL GRID CONCLUSIONS

Initial conclusions are as follows:

i) Engagement with flexibility providers

- The potential for flexibility is sometimes underestimated – especially for portfolios
- There are technical challenges for both flexibility and network companies to overcome
- Greater visibility of network issues and their characteristics is needed
- Greater acceptance of the services that can be provided is needed
- Considerable uncertainty over future opportunities and revenue streams
- Flexibility solutions can add considerable consumer value by supplementing network solutions
- The opportunity to replace network capacity altogether is limited in the short to medium term
- This ESO plays a key role
- We will commit to continue to engage with flexibility providers and the ESO

ii) Engagement with customers (harmonic filtering)

- Consumer benefits are evident
- Stakeholders are supportive of a revised coordinated approach to harmonic management
- The stakeholders have highlighted a number of issues ranging from the charging methodology, incentivisation of designs that minimise pollution and the impact on the connections process connections.
- We will be working with ESO and industry on addressing these points in parallel with proposals in our business plan
- As it is unclear how long it will take before we are able to implement this approach, we will not include any baseline expenditure in our business plan and will, instead, propose a within period determination to allocate additional funding when relevant to protect consumers.

iii) Engagement with cross-sector stakeholders on enabling the decarbonisation of transport

The key conclusions from our engagement and analysis to date are:

- range anxiety is a challenge in the Government's ambitions to decarbonise transport through EV uptake;
- an en route rapid charging network with high coverage of the strategic road network can help alleviate range anxiety when purchasing a car, with existing EV drivers valuing higher charging speeds at en route services;
- there are a number of market failures and market challenges which are delaying the deployment of a future proofed en route charging network with equitable coverage;
- the networks industry must be in solutions mode and enable the decarbonisation of transport through proactive measures;
- the network infrastructure to deliver en route charging can be delivered through a whole systems approach;
- further industry and policy maker engagement is needed in the short term to determine the attractiveness of different delivery models and the role of the public and private sectors such that this critical infrastructure may be delivered in a timely manner.
- we will not include any expenditure in our baseline plan for this and, due to the need for more whole system development with stakeholders and a policy decision on who should pay for the infrastructure, we propose that this be taken through the anticipatory investment process we have proposed.

iv) Consumer engagement

- Results from our consumer engagement suggest that we should continue to pursue investments that enable decarbonisation and that, in some areas, investment ahead of clear need is also supported by consumers.
- Responses to acceptability of bill impact for these types of investment indicate that the question of who should fund this investment and take any associated risk still need to be explored / addressed.

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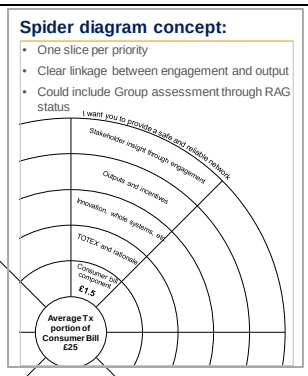
3. STAKEHOLDER GROUP CHALLENGE & REVIEW

3.1. WHAT POINTS OF CLARIFICATION AND INTEREST WERE RAISED?

We circulated version 1 of this engagement log in advance of the Stakeholder Group meeting on the 29th of November, 2018 and in advance of the meeting on the 20th of June 2019. Pre-meeting calls were held to collect feedback on the log and any points of clarification, as set out in Section 3.1. Each of these points of feedback was discussed in the meeting.

Group challenges were focussed on more specific aspects of our business plan, such as the clarity of our proposals on uncertainty mechanisms, our definition of whole systems, seeking further justification for why certain costs were included in our plans, how our plans can meet net-zero targets, and how an anticipatory investment approach could work.

Topic specific feedback and points of clarification		
Source	**Feedback**	**National Grid Response**
Pre-meeting calls	Engagement in early stages – when is the right time to come to the group?	• We did not initially anticipate bringing engagement logs to the Group this early in the process – some of our engagement plan is taking longer to deliver than we thought • We hope that feedback from the Group early in the process will improve our engagement activities and the quality of our stakeholder-led plans
Pre-meeting calls	Input from players with particular position in existing insights section – how do we unpick the information obtained from such players to get to the true independent evidence?	• The list of existing insights is intended to be illustrative of the sources of stakeholder views available; it is not exhaustive • Data gathered from engagement goes through a process to become actionable insight – all stakeholder views are valid and truly independent evidence gathered through the process is likely to be limited • The decision making framework discussed in SG2, with impact of topic on the stakeholder being a key differentiating factor, is being used to guide turning engagement outputs into business plan decisions

Pre-meeting calls	How do we map when engagement / outcome of our engagement translates into an output or bespoke incentive? (e.g. would we say output would have been set at output or target 'x' but as a result of feedback received it will now be set at 'y'?)	• This mapping should be included in the final version of the engagement logs when all sections have been completed (see standard table of contents for logs) • Whilst engagement continues throughout building our business plans we will be working with an interim hypothesis of what stakeholders want us to deliver • We have developed up the concept of the spider diagram shared at SG4 (right) and the golden thread shared at SG5 to more clearly show the link between engagement and outputs – we are currently working with Frontier Economics to expand this to include activities, costs and Ofgem's BP assessment criteria to help the Group; this approach will be used in SG7 and the template has been provided in the pre-read. 
Pre-meeting calls	Issue is which scenario to follow, albeit that is an issue for the whole industry	Key questions for this area are: • What is the right range of futures to plan business? • How should we set our baseline allowance? • Mechanism for anticipatory investment? Answers to these questions will be heavily influenced by the ongoing work across energy network companies to develop a 'common view of the future' for Ofgem's RIIO-2 Challenge Group – all companies have been asked to submit business plans based on this common view. We have also undertaken stakeholder engagement to inform our input into this process and the detail of our approach for England and Wales. Details contained in the following document.

Pre-meeting calls	Would like to see more on innovation. What are we doing about 3rd party ideas? How much is innovation embedded in the business?	• Innovation cuts across all topics in our business plan, but is also covered in our innovation stakeholder priority
		• For the "enable the ongoing energy transition" priority we are innovating and introducing 3rd party ideas to minimise cost through
		  • Working with suppliers and the ESO to introduce new technologies that deliver network capacity at lower cost (e.g. power flow controllers)
		  • Engaging with non-network providers (e.g. DSR and storage) to understand the solutions they can bring and our role in helping them come to market
		  • Engaging with DNOs to maximise consumer benefits across transmission and distribution
		  • Facilitating competition in networks

Pre-meeting calls	Where are the costed options?	• The ESO and other network companies are the most influential stakeholders for most of this priority • We are providing extensive costed options to the ESO into the Network Options Assessment process (discussed in SG3) and have also been speaking to each of the DNOs about costed transmission options to enable assessment of whole system solutions • Beyond the ESO and DNOs there is limited potential for providing costed options to broader stakeholders on the 'wider works' elements of this priority • "Connection" elements of our business plans – part of make it easy to connect and use the network" – do have an element of customer choice that involves costed options
Pre-meeting calls	Section 1.3 should be topic and stakeholder specific	• The log has been updated to try and make it clearer which topics and stakeholders are relevant for existing insights
Pre-meeting calls	What is the time horizon for the future engagement?	• Our initial plan was to have completed 80% of our engagement by April 2019 • Whilst we have made considerable progress, it looks like engagement activities that input help us build a stakeholder-led plan for RIIO-T2 will continue over the course of 2019 – we have tried to include an indication of the forward engagement plan in the log where possible • At this point we do not expect any significant changes to our business plan as a result of stakeholder engagement beyond our October submission milestone
Pre-meeting calls	Quotes are all positive - should this be more balanced?	• Where we have completed engagements, and had the opportunity to undertake a full write-up of outcomes we have sought to provide all the stakeholder feedback – both positive and negative – so the Group get the whole picture • As we enter the final phases of our engagement and engagement logs become fully populated this should become evident for all priorities
Pre-meeting calls	Decarbonisation of transport - engaged with 95 organisations over what time frame?	• Transport decarbonisation engagements set out in version 1 of the log took place over the course of 2018 • These engagements will continue throughout 2019

		• We offered to run a short session with the NG team leading in this area, but so far it has not been possible to find time with the Group to do so – we will make ourselves available to do this at the Group's convenience if wanted
Pre-meeting calls	Section 6.4, spectrum of engagement - not aligned with understanding of the terms i.e. should be co designing an idea and stakeholders being empowered to be part of the solution	• The spectrum of engagement set out in section 6.4 of all engagement logs comes from the Group's engagement principles (see section 6.1) • It originated from the International Association of Public Participation • We believe that the engagement goals and stakeholder promises articulated across the spectrum of inform, consult, involve, collaborate and empower are a good description of the different degrees of engagement with stakeholders and that the right degree of engagement will vary by topic (and the associated boundaries of engagement for that topic – e.g. our licence obligations)
Pre-meeting calls	Impact on end consumers. e.g. What would the infrastructure to support EV potentially look like? Would consumers be potentially charging at home or elsewhere. This detail is very important and helps to paint the picture of what the system of the future may look like.	• Infrastructure to support EVs will likely comprise of a whole ecosystem of home, destination and en-route charging to address customer needs and anxieties • We have developed a solution to help overcome range anxiety and are also investigating our potential role in destination charging (although the latter is not well developed) • The motorway service area proposition we are developing with stakeholders is set out in this log
Pre-meeting calls	More information required on heat. H21 launch took place last week; 400-page doc was issued. With regards to stakeholder engagement, very conscious that consumer may not have really thought of how they will heat their homes using electricity only. What are we doing in this space? Are we relying on customer choice or would it be imposed?	• The decarbonisation of heat is a considerable challenge for society and an important issue for policy makers, regulators and network companies to address • Our work through the ENA with other regulated network companies on a "common view of the future" has concluded that the decarbonisation of heat is unlikely to be an issue that impacts our business plan in the RIIO-T2 period – our own analysis has shown that any transmission network investment required to accommodate heat is likely to be low before 2026 • We will continue to work with policy makers and other stakeholders to ensure that the transmission network will not be a blocker • We are not proposing any investments for T2 to explicitly accommodate electrification of heat
Pre-meeting calls	Seems a lot of engagement has been done with the big organisations/ suppliers but not so much with the smaller suppliers. How do we manage that gap?	• Historically the majority of our customers have been large multi-national energy companies with considerable capacity for engagement • As our customers get smaller we are starting to tailor our approach to engaging with them – helping to enable their energy solutions and guiding them through our processes • Smaller suppliers can be as small as a single individual and have less capacity to engage on transmission / price control related issues – when reaching out to this customer segment we have found that they, understandably, prefer to focus on issues that are most relevant to them and tend to have the biggest impact on their businesses • Engagement in some areas, such as with flexibility providers, does naturally involve working with smaller suppliers and we are therefore speaking to them as part of building our business plans in these areas (BAU engagement tends to occur more between suppliers and the ESO as they do not connect to our network so we are less directly relevant for their business) • Regulatory issues that are of interest to smaller suppliers include charging predictability and transparency and we will be making proposals in our plans on both these topics that are informed by engagements with these stakeholders
Pre-meeting calls	It seems relationships with smaller suppliers is not great. Is NG more focussed on what it is delivering as opposed to whom it is delivering it to? Or is this the first-time NG is having to do this? Perhaps it was different for T1?	• Whilst suppliers pay network charges and rely on our network to allow the market to function, we do not generally provider services to them directly as a transmission owner and our interactions with them are limited • The exceptions to the above are on issues such as charging and transparency, where the regulatory arrangements and our process can have a material impact on suppliers – we will be making proposals in this area • Our proposals in the 'make it easy to connect and use the network' priority are also addressing this directly
Pre-meeting calls	Is part of the engagement plan when it comes to smaller suppliers to be more approachable? What support do we therefore intend to give new entrants to the market? What plan do we have?	• A consequence of the ongoing transition in the energy market is that our customers are becoming smaller and have less expertise in transmission – smaller suppliers are part of our Top Down – Net Promoter Score process • Our proposals in the 'make it easy to connect and use the network' priority are addressing this directly • We also think that maintaining a customer incentive on networks is important to continue to push increased service levels required by a changing customer base • Whilst suppliers pay network charges and rely on our network to allow the market to function, we do not generally provider services to them directly as a transmission owner

Pre-meeting calls	Stakeholder mapping – NG have suggested that Political interest in the topic is low. How do we validate that?	• Political (MP) interest in the energy transition is not low, as pointed out, and we have updated the engagement log to reflect this • Governmental interest was already mapped as high interest
Pre-meeting calls	Innovation: We talk about innovation to maximise capacity. How do we measure success on that?	• We have already made some successes in this area – our work with equipment suppliers to develop new power flow control devices was submitted to the ESOs Network Options Assessment process and was recommended to proceed in the 2018/19 document publish in February • This will be the first instance of this technology to be deployed on transmission anywhere in the world • Future success will be measure by our ability to work with equipment suppliers and the ESO to deploy this type of innovation and reduce costs for the consumer • We are strongly incentivised to do so in the RIIO framework through the TOTEX incentive mechanism and performance in this area is one measure
Pre-meeting calls	What is the financial impact of this to prioritise?	• The cost element of financial impact of this priority in RIIO-T1 is ~£1.2bn • The benefits of avoided constraint costs, as assessed by the ESO through the NOA process, are more difficult to quantify, but much higher than the cost of investments
Pre-meeting calls	There is a lot of talk about collaboration. How is this measured? What is the value of this collaboration/ how do you make sense of all the output received from this level of engagement. What is NG's role in this?	• We have tried to be more clear about this in the log and will continue to add further clarity as we add to the content and articulate our conclusions in future iterations • Our approach to making decisions from engagement activities and outputs is contained within the decision-making framework discussed in SG3 • Our role, versus that of others, on most topics within this priority is set through the obligations and industry processes in place (e.g. the security and quality of supply standards, the network options assessment process, the SO-TO code and the ENA's Open Networks project) – these are described briefly in section 1 of the log

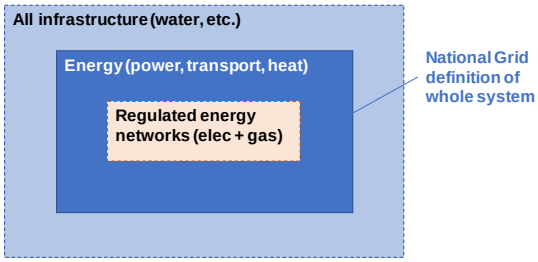
The following section sets out the challenges from the independent Stakeholder Group on the engagement and business plan proposals for the key stakeholder priority – *I want you to enable the ongoing transition to the energy system of the future*. These challenges, and the National Grid response, apply across all three strands of engagement relevant to this priority set out in Figure 1. Challenges and responses, including updates to our business plan proposals were discussed during meetings of the Stakeholder Group and/or during sessions with the sponsor and buddy for a given topic area. As we worked to address each of the Stakeholder Group's challenges through the iterative Enhanced Engagement process, these were either closed, where the Group had confidence in the action taken, or remained open where this was not the case.

3.2 WHAT WAS THE OUTCOME OF THE STAKEHOLDER GROUP CHALLENGE AND REVIEW?

Topic specific challenges from Stakeholder Group discussion					
ID	**Date**	**Meeting**	**Challenge**	**National Grid Response**	**Status**
4	07/18	SG1	How does NG set its approach in the context of relevant legal requirements, for example meeting the 4th and 5th carbon budgets?	Our 'baseline' business plan will be consistent with the common energy scenario, as stipulated by the RIIO2 Challenge Group. We propose that the funding to deliver this baseline will be adjusted by unit cost allowances, building on our experience of these mechanisms in T1. With the right funding mechanisms in place we are confident that our plans will ensure our business is ready to respond to facilitate the supply and demand impacts of the commitment to decarbonise. Combined with the development of a suitable anticipatory investment mechanism, our plan will allow us to proactively enable the more ambitious 'net zero' targets set out in the recent report by the Committee for Climate Change.	**Closed** (as per 5th June Sponsor report)
5	07/18	SG1	How does NG see its business plan supporting the big strategic decisions of the 3Ds?	See answer above. Our draft July business plan clearly sets out how we will support these trends.	**Closed** (as per 5th June Sponsor report)
13	07/18	SG2	Style, methods and accessibility of the stakeholder engagement activities to be clearly evidenced.	Presented to the group as part of SG3. These aspects are all logged within the relevant engagement log for each topic area.	**Closed** (as per 5th June

					Sponsor report)
14	07/18	SG2	The carbon gap between the non-climate change act scenarios (steady progression and consumer evolution) isn't quantified- but we should anticipate that government will intervene to ensure the CC act is met. If the TO wishes to invest to meet a non-CC Act scenario, it may be expensive to change course to meet the CC Act. NG should quantify this cost so we can assess how this may affect future customers.	With the right regulatory framework, we will be ready to facilitate the governments climate ambitions. However, we have a licence obligation to facilitate all changes to the energy market (those compliant and non-compliant with the climate change act). The Common Energy Scenario, against which Ofgem has required us to build our baseline plans for the T2 period is not compliant with 2050 net-zero targets. Automatic uncertainty mechanisms, building on the experience in T1, are therefore a critical aspect of our T2 plan to ensure we can facilitate net-zero targets. Provided these mechanisms are put in place for T2, our plan is capable of meeting targets. As a result, we do not currently have plans to calculate the cost / impact of not meeting them.	**Closed** (as per 5th June Sponsor report)
19	10/18	SG3	Ensure each chapter and outcome considers energy scenario / future	The reports submitted to the Stakeholder Group on the 3 priorities to covered in the 16th April 2019 meeting do include this consideration (see accompanying material). More information on how we use energy scenarios and plan to manage uncertainty in RIIO-T2 is available in our consultation document available HERE.	**Closed** (as per 5th June Sponsor report)
20	10/18	SG3	Need a systematic way to identify key trends/scenarios to test our BPs against	Our business planning team have undertaken analysis that led to our input into the work undertaken through the ENA across all energy networks to consider key trends and produce a "common view of the future". Ofgem's Challenge Group have been clear that they wish to see business plan submissions based on this common view. Our ongoing work to calculate Unit Cost Allowances for uncertainty mechanisms will utilise Monte Carlo analysis to test these allowances against thousands of possible future energy outcomes to ensure they are robust. (more information about how these mechanisms work and how Unit Cost Allowances are calculated is available from the briefing note put on huddle and from page 28 and 29 of the accompanying report on our plans for "enabling the transition")	**Closed** (as per 5th June Sponsor report)
21	10/18	SG3	Plug Stakeholder Engagement process into NOA process	Network Options Assessment is a process owned and run by the Electricity System Operator. We have provided this feedback to them. The role of the Network Options Assessment (NOA) process is to assess which network solutions that are the most economical and in considering what that process should be, considerable engagement does take place by the NOA committee. For specific projects the Network Owner does the engagement, examples of which National Grid took the Group through during the webinar on Investment Planning. For further information please refer to this link https://www.nationalgrideso.com/insights/network-options-assessment-noa.	**Closed** (as per 5th June Sponsor report)
22	10/18	SG3	More detail on what existing insights have been used (especially on consumer views)	The engagement log has been updated to provide even more details in this area. Whilst consumers generally do not have explicitly formed views on the future role of electricity transmission, their priorities and values can be ascertained and this insight does inform our thinking and direction. There were also a very small number of informed consumers who responded to our online consultation.	**Closed** (as per 5th June Sponsor report)
23	10/18	SG3	Need to identify why we have chosen a certain part of the engagement spectrum when mapping - approach to engagement	This has been updated in further iterations of the engagement log.	**Closed** (as per 5th June Sponsor report)
29	10/18	SG3	How do we map when engagement / outcome of our engagement translates into an output or bespoke incentive? (e.g. would we	During the meeting the Stakeholder Group were taken through the Spider Diagram Concept depicting the golden thread from the output from stakeholder engagement through to resulting outcomes, costs and impact on consumer bill. Concept agreed to in	**Closed** (as per 5th June

			say output would have been set at output or target 'x' but as a result of feedback received it will now be set at 'y'?)	principle subject to application/demonstration to business plan priorities. Next Steps: ET to apply to priorities. Now part of the 'Golden Thread' Annex.	Sponsor report)
30	11/18	SG4	Issue is which scenario to follow, albeit that is an issue for the whole industry	The following points were discussed with the Group: 1)What is the right range of futures to plan business? 2)How should we set our baseline allowance? 3)Mechanism for anticipatory investment? Further engagement undertaken on managing uncertainty directly addressed these questions with stakeholders and the relevant outcomes are reflected in the business plan.	**Closed** (as per 5th June Sponsor report)
31	11/18	SG4	Seems a lot of engagement has been done with the big organisations/ suppliers but not so much with the smaller suppliers. How do we manage that gap?	The Stakeholder Group was taken through the detail of which stakeholders were engaged across this topic area, which goes far beyond large organisations. Details are set out in Section 2 of the engagement log.	**Closed** (as per 5th June Sponsor report)
32	11/18	SG4	Innovation: We talk about innovation to maximise capacity. How do we measure success on that?	The innovations we've delivered in the T1 period (e.g. power flow controllers) are included in our T2 baseline plans and unit cost allowance calculations. The TOTEX incentive mechanism, part of the RIIO-T2 framework, will continue to incentive 'business as usual' innovation, which will result in lower costs to consumers.	**Closed** (as per 5th June Sponsor report)
88	04/19	SG7	Page 16 in the ongoing transition paper talks about £140m comprising £90m on wayleaves. At £18m per annum, there should be some assessment available of the areas of claim on injurious affection which this money was purported to be. The number of claims is likely to be low but individual claims of high value due to the cost of diverting 400kV assets. It would be helpful to know how much of the NG network is secured on wayleaves/easements to understand whether the £90m is proportionate to the outstanding risk.	The £90m included in the April draft of our business plan is for easements (i.e. not wayleaves). Our overhead line network is largely held on terminable wayleaves (just over 60%) posing a litigation risk which can be avoided by securing the assets voluntarily through the negotiation and acquisition of easements (permanent rights) with landowners for capital payments. The costs allocated in our plan are for the acquisition of easements over the T2 period and are consistent with the historic cost trend in T1.	**Closed** (as per 17th September Sponsor session)
91.1	04/19	SG7	The business plan should set out clear explanations of the uncertainty mechanisms that are proposed with respect to connection uncertainty.	Discussed 24/5/19 -- Our plan will be clear on these mechanisms for the entirety of the customer driven elements of our plan. We are currently undertaking detailed analysis to design, calibrate and test our proposed uncertainty mechanisms for RIIO T2. We are also participating in a specific series of Ofgem working groups on load-related uncertainty mechanisms (first meeting 22th May 2019). The July draft plan will provide a detailed description of our approach to working up these mechanisms. A full explanation will be included, along with results of our analyses, in future iterations of our business plan submission, upon completion of the on-gong empirical work. 1/7/19 Update shared with SG8 Pre-Read -- Chapter 7 + 8 - Section 7 'How we will manage risk and uncertainty (new table of mechanisms added to make it very clear what is being proposed) + detailed annex shared late on the 5th of June; the annex describes the detail of how we will go about calculating the unit cost allowances that underpin most of the uncertainty mechanisms over the coming months. 17/09/19 Sponsor/Buddy session deep dive into unit cost allowance calculations.	**Closed** (as per 17th September Sponsor session)
92.1	04/19	SG7	What is NGET's definition of Whole systems? What are the boundaries?	Our definition of whole systems includes power, transport and heat as we think this is required in order to deliver the government's ambition to rapidly decarbonise at lowest cost to the consumer. It is broader than Ofgem's narrow definition of 'Regulated gas and electricity networks', but more narrow than what some stakeholders	**Closed** (as per 5th June

				have called for (e.g. in response to Ofgem's RIIO-2 consultations) to include all infrastructure, such as water.  We envisage that our proposition for a strategic network of ultra-rapid charging points at motorway service areas to overcome range anxiety and unlock one of the barriers to decarbonising transport is best delivered by both the TO and DNOs. Our proposal identifies a network of 54 sites that ensure the majority of the population are within 50 miles of an ultra-rapid charging point. Of these 54 sites, 60% are near existing National Grid substations and may therefore be best delivered by us. We are still working across all our stakeholders to ensure that our solution to this challenge can be delivered in whole system manner. We are not requesting baseline funding for this proposition, but proposing that it would be a good candidate for an anticipatory investment process.	Sponsor report)
92.2	04/19	SG7	Justify why the TO should be bearing the cost of roll out of motorway service area plan as opposed to DNO.	We envisage that our proposition for a strategic network of ultra-rapid charging points at motorway service areas to overcome range anxiety and unlock one of the barriers to decarbonising transport is best delivered by both the TO and DNOs. Our proposal identifies a network of 54 sites that ensure the majority of the population are within 50 miles of an ultra-rapid charging point. Of these 54 sites, 60% are near existing National Grid substations and may therefore be best delivered by us. We are still working across all our stakeholders to ensure that our solution to this challenge can be delivered in whole system manner. We are not requesting baseline funding for this proposition, but proposing that it would be a good candidate for an anticipatory investment process.	**Closed** (as per Sponsor email 28th October, after review of responses)
94	04/19	SG7	Economic modelling – NGET to demonstrate that there is a need for these costs (£26 m).	Discussed 24/5/19 - Our draft business plan originally included £2m for economic modelling tools and capabilities (not £26m). We play an important role identifying network issues, designing solutions to resolve these issues and providing detailed information to the Electricity System Operator to allow them to carry out the NOA process. After separation from the ESO, we no longer have the tools and capability to undertake the economic modelling required to assess the detailed characteristics of network issues. This assessment would allow us to compare the consumer benefits of using our assets in more flexible and dynamic way with the potential cost of reduced asset life. We would be better able to propose whole system solutions that combine network assets and flexibility solutions in a way that delays the need to invest in additional capacity and reduces ongoing system operation costs. 1/7/19 Update shared with SG8 Pre-Read We understand from the ESO that a release of an economic assessment model for stakeholders is imminent. We have removed these costs from our draft plans.	**Closed** (as per 17th September Sponsor session)
121	08/19	SG9	NG to demonstrate how stakeholders will be involved to further elaborate on the strategy for anticipatory investment	We have drawn on existing stakeholder insights in pulling together our proposal for an Anticipatory Investment process in the T2 period (as opposed to requesting an allowance for specific investments). As well as the challenge and review from the independent Stakeholder Group, we have been undertaking further bilateral engagement with some key stakeholders to continue to evolve our proposals for the final submission of our business plan in December. Session have been held with Citizens Advice, Ofgem and policy makers.	**Closed** (as per Sponsor email 28th October, after review of responses)

				We envisage further stakeholder involvement, potentially coordinated by Ofgem, across the transmission and distribution sectors post the submission of our business plan in December to get this important area of policy for meeting net-zero at minimum cost to consumers right.	
122	08/19	SG9	NG to clearly articulate what they envisage their preparatory/ engineering and T2 costs may be and explain why network consumers should be paying for this.	Update provided 21/10/19 - We are not requesting any baseline funding for these activities in our T2 submission. We propose that the Anticipatory Investment process would assess the need, efficient cost and allow funding when required. Network consumers should fund these costs when they arise as part of the assessment process will require companies to demonstrate how consumers benefit from any investment (i.e. the net present value for network consumers of any investment would be positive).	**Closed** (as per Sponsor email 28th October, after review of responses)
123	08/19	SG9	In practice, due to the pace of cost reduction in electric vehicles and offshore wind, anticipatory investment may well be necessary during the T2 period. NG to demonstrate how its framework will respond to an earlier need for investment, reflecting the changing needs of consumers.	Update provided 21/10/19 - The juxtaposition of the strong incentive Ofgem has put in place for network companies to only put the most certain costs in their baseline submissions (i.e. the business plan incentive that exposes companies to a 10% additional penalty for any costs Ofgem deem as uncertain) and the challenge of meeting net-zero targets require that the regulatory framework is flexible enough to provide funding within the T2 period when investments that benefit consumers are required. In response to this challenge we are creating our vision of a roadmap to net-zero that will map out what is required in this space. The onus is on all stakeholders to come together and ensure the Anticipatory Investment process can deliver the best whole system solutions to net-zero challenges in an agile manner.	**Closed** (as per Sponsor email 28th October, after review of responses)
124	08/19	SG9	In the framework for Anticipatory Investment, NG to highlight how strategy, purpose, the framework for delivery and timing will be addressed	Update provided 21/10/19 - In response to this challenge we are creating our vision of a roadmap to net-zero for our final business plan submission. This will be comprised of an overarching road-map in the executive summary, supported by greater detail within each of the relevant chapters (including Chapter 7 - Enable the transition).	**Closed** (as per Sponsor email 28th October)
125	08/19	SG9	NG to ensure that proposals reflect what has been requested in Ofgem as per their August '19 letter.	Update provided 21/10/19 - Our October business plan does this on pages 55 to 57. This will be reflected more explicitly in our December plan -- i.e. within our proposed process. However, we will not be providing the full suite of evidence requested by Ofgem because we are not asking for any funding at this point.	**Open**
126	08/19	SG9	NG to be clear about their leadership role in whole systems	Update provided 21/10/19 This will be reflected in our December plan; see Challenge 124	**Closed** (as per Sponsor email 28th October
127	08/19	SG9	NG to demonstrate the contestability options with major projects.	Update provided 21/10/19 This is set out on pages 48 to 51 of the October business plan.	**Closed** (as per Sponsor email 28th October)

4 CONCLUSIONS

4.1 WHAT IMPACT HAS THIS ENGAGEMENT HAD ON NATIONAL GRID AND THE RIIO-T2 BUSINESS PLAN?

The engagement carried out through this strand on building a whole system plan with non-network stakeholders has had a material impact on our business plan, as noted throughout the log. The table below summarises the key impacts from across all aspects of the enhanced engagement process.

Key trade-offs and how engagement influenced our plans	As highlighted in engagement strand (a), we have opted to play a proactive role in enabling the energy transition as a result of our engagement. We have worked closely with non-network companies and undertaken our own detailed analysis to jointly develop solutions to decarbonisation challenges. Flexibility providers thought it was worth continuing to explore a potential role for TOs in helping them come to market, whilst the ESO pointed out that they also had this role, and expressed some concerns about TOs doing so. Our proposal has evolved to commit to continue to seek opportunities to work with flexibility providers as well as working closer with the ESO should opportunities arise. Due to a lack of stakeholder support, we have removed the proposal to invest £2m to develop an economic modelling capability to better inform our NOA submissions.
How we've responded to the Independent Stakeholder Group/ Challenge Group	The **Independent Stakeholder Group** challenged the breadth of our thinking on decarbonisation challenges, initially focused on ensuring transmission is not a blocker to a rapid EV roll-out and providing solutions to overcome range anxiety. As a result, we have also considered the challenges of connecting increasing amounts of wind generation; putting forward proposals for harmonic filtering and a strategic approach to connecting offshore wind on the east coast. The **Challenge Group** challenged us to consider non-network solutions and expand our whole system thinking beyond network companies. This strand of engagement and the proposals we are putting forward in this chapter and annex NGET_A7-8.03 Whole System address that challenge.

The table below outlines how what our stakeholders have told us through this strand of engagement links to the proposals we are making to enable the ongoing transition to the energy system of the future and the consumer benefits – relevant proposals are highlighted.

Stakeholder feedback	Proposals for the T2 period	Output type	Consumer benefit
1) Provide a network that enables the transition to net-zero by 2050 at lowest cost to consumers	Innovate and invest in the network reinforcement to facilitate a changing energy market and keep costs down	PCD	Decarbonised economy Lower system operation costs
	Invest in protection and control coordination studies, changes required to maintain security of supply and identify future requirements for zero-carbon operation by 2025	PCD	Decarbonised economy Reliable supply
	Invest to facilitate closure of conventional generation and secure easements to maintain access and minimise costs	PCD	Decarbonised economy Lower network costs
2) Facilitate competition and new business models to minimise costs	Facilitate competition by highlighting projects meeting contestability criteria, consenting contestable projects and protecting consumers in incumbent delivery	PCD	Lower network costs Lower system operation costs
	Innovate by facilitating non-network solutions	Commitment	
3) Deliver electricity whole system solutions across network companies	Optimise with the ESO through a new mechanism to reduce whole system costs and installation of system monitoring to allow for zero- carbon operation by 2025	LO	Decarbonised economy Lower network costs
	Optimise with DNOs by identifying whole system opportunities, establishing an ongoing process and investing in [redacted] reactor units	ODI PCD	
What stakeholders are telling us	**Proposals**	**Output type**	**Consumer benefit**
4) Enable all energy whole system solutions	Seek to implement a suitable anticipatory investment mechanism that allows solutions to unlock rapid decarbonisation to net-zero 2050.	Commitment	Decarbonised economy Lower network costs and barriers to entry Clean air
	Provide strategic network options that have the potential to help overcome some of the challenges of decarbonising at lowest cost to consumers.	N/A	

4.2 HOW DO BUSINESS PLAN PROPOSALS AND OUTPUTS ALIGN TO STAKEHOLDER ENGAGEMENT OUTCOMES?

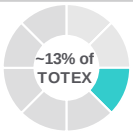
The golden thread concept was developed with our independent stakeholder group to help stakeholders understand the engagement we have undertaken, the outcomes of that engagement and how this translates into outputs we will deliver in the T2 period. Full golden threads for our plan are included in the Annex ET.01 Golden Thread Summaries. The relevant golden thread for this stakeholder priority is shown, below.

Engagement

Consumer Priorities

I want an affordable energy bill | I want to use energy as and when I want it | I want a sustainable energy system

Stakeholder priority and context



I WANT YOU TO ENABLE THE ONGOING TRANSITION TOWARDS THE ENERGY SYSTEM OF THE FUTURE

T2 Total £936m*

*excl. contestable projects

Topics	Provide a network that enables transition to net-zero 2050 at lowest cost to consumers	Facilitate competition/ new business models	Delivery electricity whole system solutions with network companies	Enable all energy whole system solutions
Obligations	• Facilitate aims of government energy policy • Compliance with industry codes and standards including CUSC, SQSS and STC • Plan and operate an economic and efficient system and implement ESO NOA recommendations			
Stakeholders	Stakeholders with an outsized impact on our plans within this priority: The Government(s), the Electricity System Operator, Distribution Network Operators and Ofgem Other stakeholders: High impact and interest - : political, network companies, large customers, new business models (e.g. flexibility & storage developers), supply chain High impact or interest: Academics, think tanks and innovators, interest groups, consumer bodies, small/new customers, transport, and communities (directly affected)			
Approach	Government, ESO & DNOs = **empower**; High impact and high interest stakeholders = **collaborate**; high impact or high interest = **consult or involve**			
What we've heard	***Engagement on long-term role of transmission and managing uncertainty*** • Need for transmission in long-term clear, despite uncertainty • We should play an active role in enabling the transition • Delivering whole system solutions is important • We should undertake timely reinforcement where required • Our approach to setting an E&W scenario is reasonable • Appropriate to review existing uncertainty mechanisms and consider new ones, especially targeted at whole systems • Merit in developing an anticipatory investment mechanism	***Engagement to build a whole system plan with electricity network companies*** • Work to agree a Common Energy Scenario for RIIO-T2 • Agreed E&W view of EV growth and heating electrification • DNO data submissions should inform investments at interface • Voltage issues have large potential for whole system solutions • ESO should play key role in whole system collaboration; particularly through the expanded NOA process • Unanimous support for development of uncertainty mechanisms that allow for whole system solutions during T2	***Engagement to build a whole system plan with non-network companies*** • Technical challenges to overcome to realise full potential of flexibility in solving network issues • Flexibility can delay Tx/Dx interface investment and complement boundary capability, but limited T2 opportunity to replace network capacity altogether • We should think broadly about where we could provide solutions to net-zero challenges • A whole system approach is required to minimise costs • We should set out a roadmap to achieving net-zero	
Key trade-offs and how engagement influence our plans	• Provided confidence in extending T1 approach to managing uncertainty and shaped future energy assumptions • Concluded on a pro-active approach to enabling transition • Expanded suite of uncertainty mechanisms and approach to their development in response to challenge	• Removed reactor costs from baseline (~£184m) and developed an uncertainty mechanism to allow whole system solutions to be identified and delivered within the T2 period • Proposals based on a whole system approach involving ESO, DNOs and TOs	• Removed proposal to invest £2m to develop an economic modelling capability • Expanded whole system thinking beyond network companies and broadened solutions to net-zero challenges	

Outputs

Measure	Innovate and invest in network reinforcement Type: PCD Target: Deliver 22.5GW boundary capability Incentive: TIM	Enable ESO zero carbon operation by 2025 Type: PCD Target: Complete modelling & identify future requirements Incentive: TIM	Invest to maintain access and minimise costs Type: PCD Target: Separate sites and secure easements Incentive: TIM	Facilitate competition and new business models Type: PCD Target: Deliver 4 consented projects + commitment Incentive: TIM	Electricity whole system optimisation with DNOs Type: PCD Target: MVar reactive capability Incentive: TIM, CAM	Electricity whole system optimisation with ESO Type: LO, PCD Target: Deliver STC requirements Incentive: TIM	Enable whole system solutions to net-zero challenges Type: Commitment Target: N/A Incentive: N/A
	Deliver 22.5 GW of boundary capability recommended by ESO through the NOA process	Model secondary systems, identify future requirements and change settings where required	Proactively secure essential services at shared sites and convert wayleaves to easements	Deliver large (>£100m) consented projects ready for competition and work with flexibility providers to identify opportunities	Work with ESO/ DNOs to provide optimal solutions to network issues	Deliver STC system monitoring obligation ESO/TO optimisation mechanism	Process to facilitate investment ahead of clear need and options to overcome net-zero challenges
Comparison to T1	12.4 GW boundary capability	N/A	Work spans across multiple price controls	3 projects >£500m (T1 threshold) consented	[redacted] reactors delivered	Minimal system monitoring in T1	New measure

Costs

Cost at T1 (annual average)	£77m (excl. Western HVDC)	N/A (not a T1 activity)	£26m	£12m (projects >£500m)	£16m	£3m	N/A (not a T1 activity)
Work needed	• Uprate circuits, network reconfiguration, etc. to enhance boundary capacity by 22.5 GW • Respond to NOA recommendations and maintain compliance with SQSS	• Build model of all secondary systems • Undertake analysis to understand impact of low fault levels + inertia • Change settings • Identify future requirements (subject to determination)	• Continuation of programmes started before T1 period • Secure permanent easements to maintain access • Deliver site separations to allow conventional power station closures and continue site operation	• Help develop an early competition model • In lieu of a model for early competition, progress large (>£100m) projects with a NOA proceed signal to consents – ready for late competition • Work with flexibility providers to identify opportunities	• Work with DNOs and the ESO to deliver whole system opportunities • Invest in [redacted] reactor units for £31m to reduce system operation costs • New reactive uncertainty mechanism	• Offer range of flexibility services to ESO for market testing at no cost • Install system monitoring equipment required to comply with STC • New reactive uncertainty mechanism	• Extensive collaboration across stakeholders to continue to establish and participate in an anticipatory investment process • Continued development of potential solutions to net-zero challenges
Cost at T2 (total and annual)	**Total: £507m** **Annual: £101m**	**Total: £31m** **Annual: £6m**	**Total: £135m** **Annual: £27m**	**Total: £182m** **Annual: £36m**	**Total: £31m** **Annual: £6m**	**Total: £48m** **Annual: £10m**	**No expenditure proposed**
Approach to uncertainty	Boundary capacity unit cost allowance	Within period determination	(No volume uncertainty)	Consented route length unit cost allowance	Static reactive unit cost allowance	Dynamic reactive unit cost allowance	Anticipatory process and harmonic filter within period determination
Consumer benefit	• Facilitate decarbonisation of power, transport and heat – net-zero 2050 • Minimise cost of operating network and reduce wholesale energy costs by at least £250m/annum			• Minimise the cost of networks in RIIO-T2 period and beyond	• Facilitate decarbonisation of power • Minimise network costs		• Facilitate decarbonisation of power, transport and heat – net-zero 2050

nationalgrid

5. DOCUMENT CHANGE CONTROL

Version Number	Date Updated	Updated by	Comments
0	10/08/18	Charon Balrey	Template updated post SG2 comments and to include iterative nature of engagement
0.5	13/09/2018	Ivo Spreeuwenberg	Template update to align flow of Exec Summary and body + add standard Appendices
1	09/11/18	Ivo Spreeuwenberg	First draft of log
2	29/03/19	Ivo Spreeuwenberg	Second draft of log including updated engagement plans, progress and initial conclusions
3	13/06/10	Ivo Spreeuwenberg	Third draft of log to include updated challenges and additional detail on EV engagement
4	28/11/19	Ivo Spreeuwenberg	Re-align log with key strands of engagement for this priority in response to Frontier Economics feedback and add latest engagement activities and conclusions ready for submission

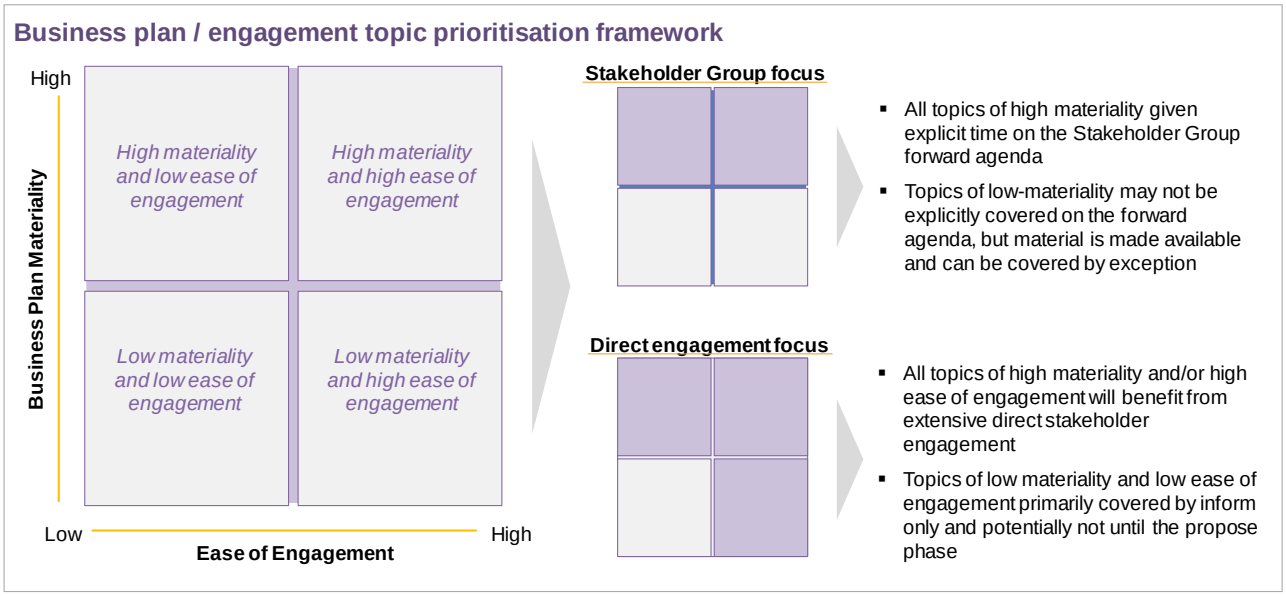
6. APPENDIX

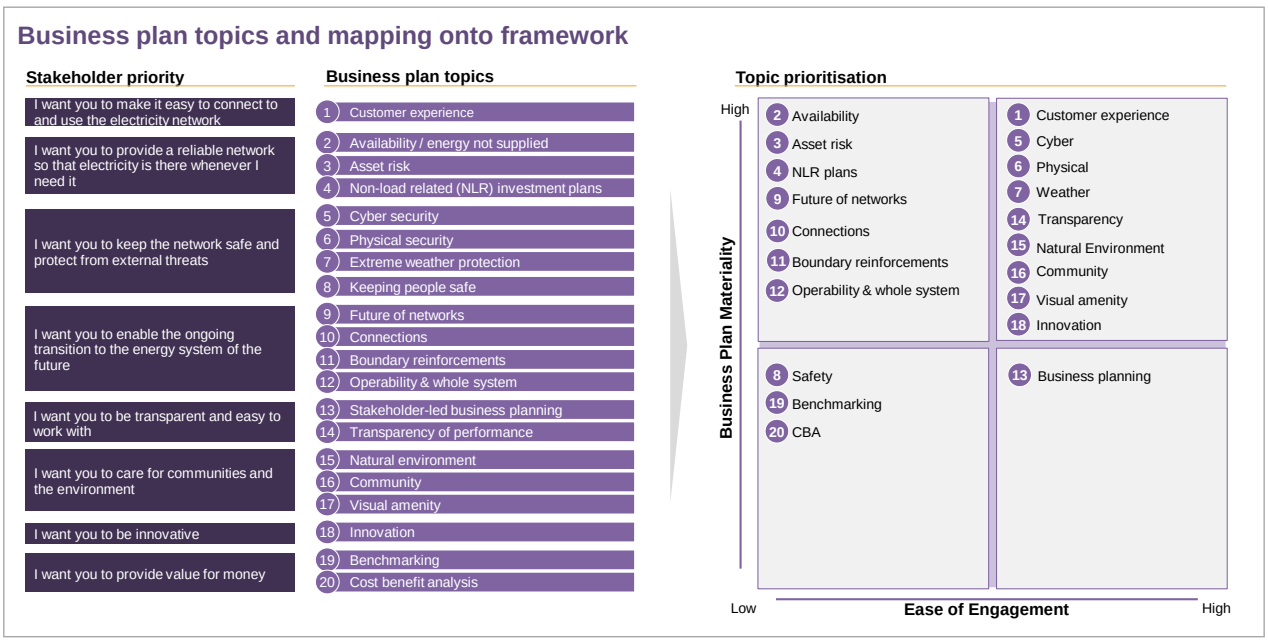
6.1 ENGAGEMENT PRINCIPLES CHECKLIST

Principle		Check
1	Define and map your stakeholders - anyone who believes they are affected by your decisions. Recognising the different threads of the public interest – stakeholders, customers, consumers, citizens, communities (geographical and interest)	
2	Be clear what you want to achieve with “engagement” – have clear policy objectives and measures of impact; (incl. where you most need to engage)	
3	Understand the “spectrum of participation” and difference between each part of that spectrum: inform, consult, involve, collaborate, empower	
4	Engage early in the process, review and improve throughout	
5	Leadership – effective stakeholder engagement must be led from the top of the organisation	
6	Commitment – to listen to stakeholders’ views and act on or respond to them	
7	Objectivity – an open approach to obtaining stakeholders’ views and to interpreting them. Seek to understand views on a range of topics and on all aspects of the business plan, rather than pre-determining their priorities or seeking to endorse your own priorities	
8	Transparency – to build stakeholder trust and show that you take their views seriously (incl. how we’ve considered views, weighted and managed trade-offs)	
9	Be inclusive: work with stakeholder groups to gather the fullest range of interests. Understand and balance the differences between different segments. Understand and balance the differences between existing and future stakeholders	
10	Be aware that those who often participate i.e. the “usual suspects” are not always representative	
11	Be accessible to all (e.g. in consideration of the tasks, timelines, contact person, tech., locations, challenges of communication, etc.)	
12	Use targeted approaches to tailor engagement to suit the knowledge and awareness of different groups	
13	An ongoing process that is embedded across the business – not just a stand-alone business planning/price control review exercise.	
14	Evidence based – use a full range of available sources of info to identify priorities, views and challenges (e.g. operational insight, bespoke research,	

15	Gather evidence through a range of methodologies and tools including willingness to pay, qualitative research, surveys, complaints intelligence, market data	
16	Be responsive – seek to adopt a flexible process to engagement, responding to the information revealed as the process progresses	
17	Demonstrate impact of engagement – ensure that the engagement design process plans for and allows evaluation of success	
18	Innovation – trying new and innovative ways of engaging	

6.2 BUSINESS PLAN / ENGAGEMENT TOPIC PRIORITISATION FRAMEWORK





6.3 STAKEHOLDER SEGMENTS

Stakeholder Segments – Electricity

Segment	Description	Example organisations
Political	Elected officials and advisors; Westminster + Cardiff	MPs, SpAds, Assembly Members
Governmental	Civil service and committees	BEIS, DEFRA, NIC, CCC
Regulatory	Energy and safety regulators	Ofgem, HSE
Consumers	Members of the public, commercial & industrial	Members of public and businesses
Consumers bodies	Members of the public, commercial & industrial	Citizen's Advice, NEA, Which?, MEUC, CBI
Communities	Local councils, community representatives	Greater London Authority, Anglesey County Council
Large customers	Large, often vertically integrated and international	Big 6, Drax, Orsted, Network Rail
Small / new customers	Small, often specialist organisations or non-energy	OVO Energy, Robin Hood Energy, JLR
Network companies	Other regulated energy network companies	UKPN, WPD, NPG, ENW, SPEN, SSEN
New business models	New business exploiting the '3 Ds'	Pivot Power, Limejump
Think tanks & innovators	Elected officials and advisors; Westminster + Cardiff	Energy Systems Catapult, IET, EIC
Interest groups	Groups representing special interests	Green Alliance, Sustainability First,
Academics	Energy specialists and researchers in academia	Imperial College, Exeter Uni., Newcastle Uni.
Supply chain	Developers and suppliers of network assets	Siemens, ABB, Prysmian
Other	Stakeholders not defined in other segments	Media, Consultants, EU bodies, etc.

6.4 ENGAGEMENT APPROACH – SPECTRUM

Approach to engagement – spectrum

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
STAKEHOLDER ENGAGEMENT GOAL	To provide stakeholders with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions	To obtain stakeholder feedback on analysis, alternatives and/or decisions	To obtain public feedback on analysis, alternatives and/or decisions	To partner with stakeholders in each aspect of the decision including development of alternatives and the identification of the preferred solution	To place final decision making in the hands of the stakeholder
PROMISE TO THE STAKEHOLDER	We will: ▪ keep you informed	We will: ▪ Keep you informed ▪ Listen to and acknowledge concerns and aspirations ▪ Provide feedback on how you have influenced our decision ▪ Seek feedback on drafts and proposals	We will: ▪ Work with you to ensure that your concerns and aspirations are directly reflected in alternatives developed ▪ Provide feedback on how you have influenced our decisions	We will: ▪ Work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible	We will: ▪ Implement what you decide

Adapted from the International Association of Public Participation – Public Participation Spectrum, 2007