ofgem Making a positive difference for energy consumers

Energy Not Supplied Working Group

RIIO-ET2 Price control

Cissie Liu
22 July 2019

Decisions

- Retain the ENS incentive as a financial reward/penalty ODI, and retain a Licence Obligation with a minimum performance standard for RIIO-ET2
- Continue to use the Value of Lost Load (VoLL) to set the incentive strength
- Retain MWh as the ENS baseline metric
- Update the definition of 'Exceptional Events' to include ESO requested load shedding

Upcoming Decisions

- *Determining a methodology for setting baseline targets and any necessary assumptions*
- Determining an appropriate Value of Lost Load (VoLL) value
- Confirming our working assumption around a 3% financial collar on penalties
- *Determining whether there is a proportionate methodology for accounting for embedded generation and any necessary assumptions*

Do you have any questions on the decisions we have made in the SSMD document?

Electricity Transmission

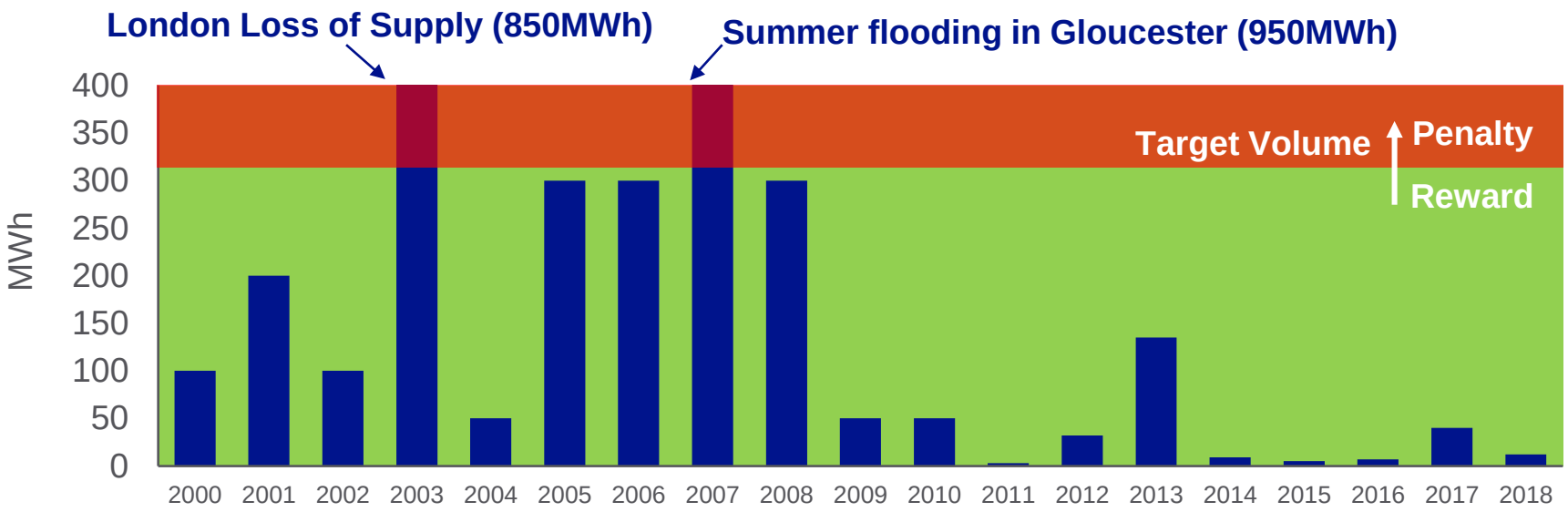
ENS Incentive RIIO-T2

OFGEM & TO Workshop

Monday 22nd July 2019

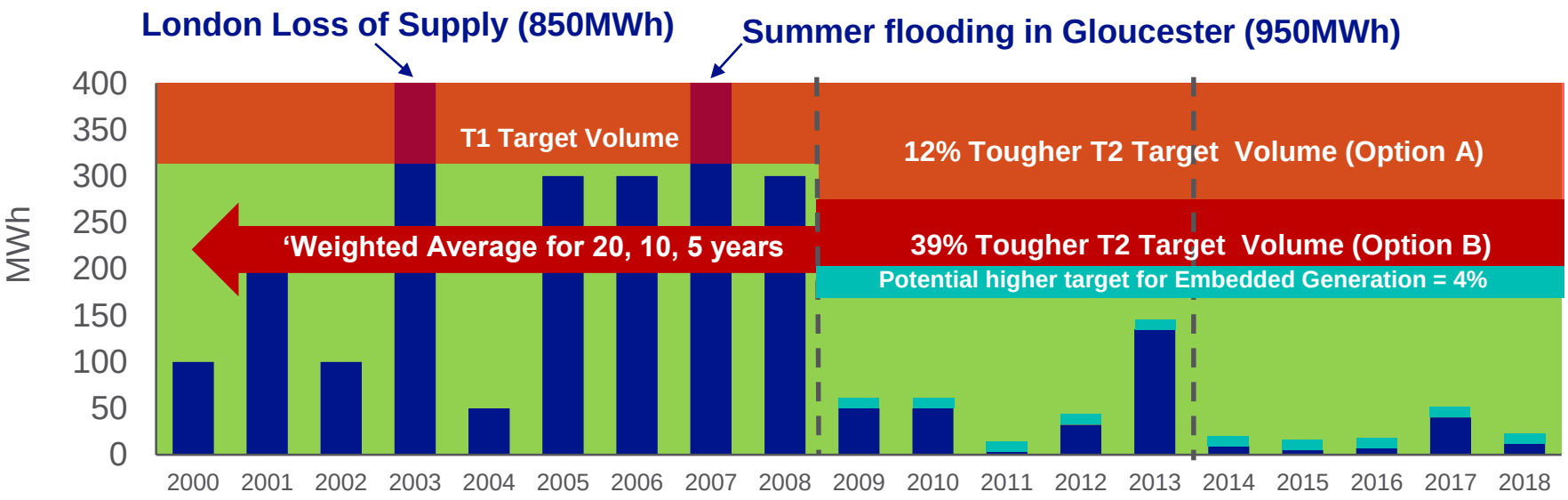
nationalgrid

1. Baseline – Same Methodology



- Current reliability is a function of long-term decisions
- T1 baseline currently looks back to 1990, and therefore includes some large incidents
- The 2007 summer flooding in Gloucester (Walham substation) and the 2003 London Loss of Supply are single events at a single location.

1. Baseline – Changing the Baseline Timeline



Option A – Same methodology as T1 (covers approx. 28 years), recent performance 'naturally' results in a tougher target.

316MWh in T1 and 278MWh in T2 = 12% tougher target

Option B – Use a 'weighted average' concept to take into account recent good performance, but recognise reliability is driven by long-term decisions.

(Concept shared – not true sampling method – Latin Hypercube)

50% = 20 year performance (301MWh x 0.5 = 150.5MWh)

30% = 10 year performance (112MWh x 0.3 = 33.6MWh)

20% = 5 year performance (45MWh x 0.2 = 9.2MWh)

Target in T2 could be ~ 200MWh = 39% tougher target

2. Using available data for Embedded Generation

This is a sample (for South-west) of the data type we receive via the SO from the DNO; as part of the week 24 process.

GSP	Technology	Number of Sites	Export Capacity (kVA)
Random S.G.P.	Hydro	5	586
	Mini CHP (<1MW)	1	70
	Mixed	9	705
	Onshore Wind	10	568
	Other Generation	4	857
	Photovoltaic	684	14,489
	To be confirmed	1	30

No.	Technology	Winter Peak	Summer Minimum AM	Summer Minimum PM
1.	Solar PV	0%	5.10%	84%
2.	CHP Waste	88%	85%	85%
3.	Hydro	84%	0%	0%
4.	Wind (Onshore)	70%	10%	50%
5.	Other	65%	30%	30%
6.	Battery	-100%	0%	100%

- This gives us an idea of what potential embedded generation is available (17MW at Random GSP @ 58% LF = 10MW)
- An application of a load factor for time of day, season, and generation type can be done, to get an indicative level of expected embedded generation per GSP.
- There is the opportunity to use 3 scenarios depending on the time of day of the loss of supply, which would take into account a different level of embedded generation
- This relatively simple approach acknowledges that there is an overstated loss, which will result in a tougher baseline by taking into account the national 2.3 GW of registered capacity of embedded generation
- Would need to be balanced with a higher target as current methodology doesn't take into account embedded generation
- Simple approach could be possible with 'average' loss increased by a %age.

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Baseline Target-Setting

RIIO-ET2 Price control

Baseline targets should:

- Be reflective of the capability of current and future network
- Should take into account high impact, low probability events
- Be challenging – equal exposure to risk and reward, and reflect performance improvements observed in T1
- The baseline target-setting methodology across TOs should be aligned

Policy questions to answer:

1. What is a challenging baseline?
2. What is a "fair" balance between risk and reward?
3. How to take into high impact, low probability events?

Do you agree with these policy principles?

Options development

Options*	Outcome
Average using RIIO-ET1 data	• Significantly lower baseline targets • Around 96%-70% reduction from ET1 baseline targets
Average using RIIO-ET1 data + 5 years of TPCR4 (2008/09) data	• Significantly lower baseline targets • Around 88%-84% reduction from ET1 baseline targets • Using this methodology, SHE-T would have a higher baseline target than RIIO-ET1. Is this appropriate?
Revenue neutral over: **i. RIIO-ET1** **ii. RIIO-ET1 data + 5 years of TPCR4** **iii. TPCR4 and RIIO-ET1**	• Principle that over the price control, penalties and rewards should be neutral. • Significantly lower baseline targets. Similar levels to using an average of RIIO-ET1 data. • Using methodology ii) and iii), SHE-T would have a higher baseline target than RIIO-ET1. Is this appropriate?
Percentage Reduction	• Straight percentage reduction across baseline

*options not necessarily limited to this list

1. **Do methodology proposals reflect current and future network capability?**
   - Using RIIO-ET1 data, 10-15 years, TPCR4 and RIIO-ET1
   - What is a better way to account for HILP events?

2. **Is the baseline challenging and reflects T1 performance improvements?**
   - Equal opportunity to outperform as underperform

3. **Does the baseline offer a fair balance between risk and reward?**
   - Why or why not?

4. **Does the methodology take into account high impact, low probability events?**
   - Longer timeframe
   - Probabilistic model

5. **What other methodologies/adjustments can we consider?**

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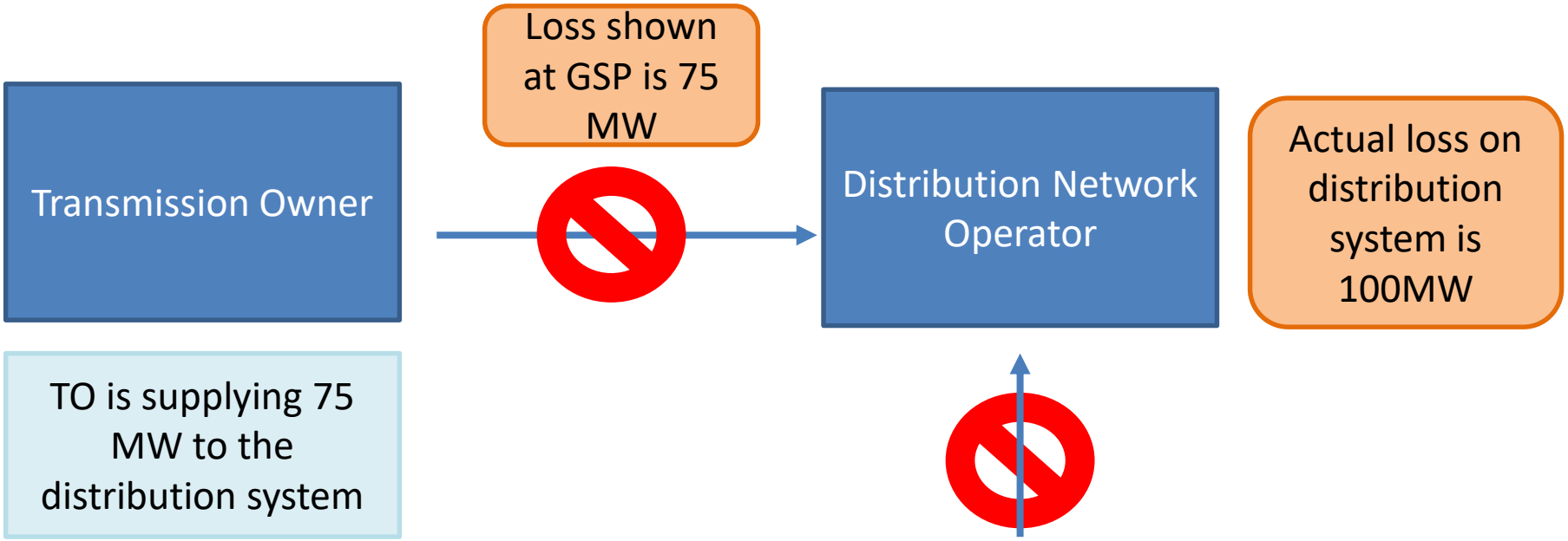
Accounting for Embedded Generation

RIIO-ET2 Price control

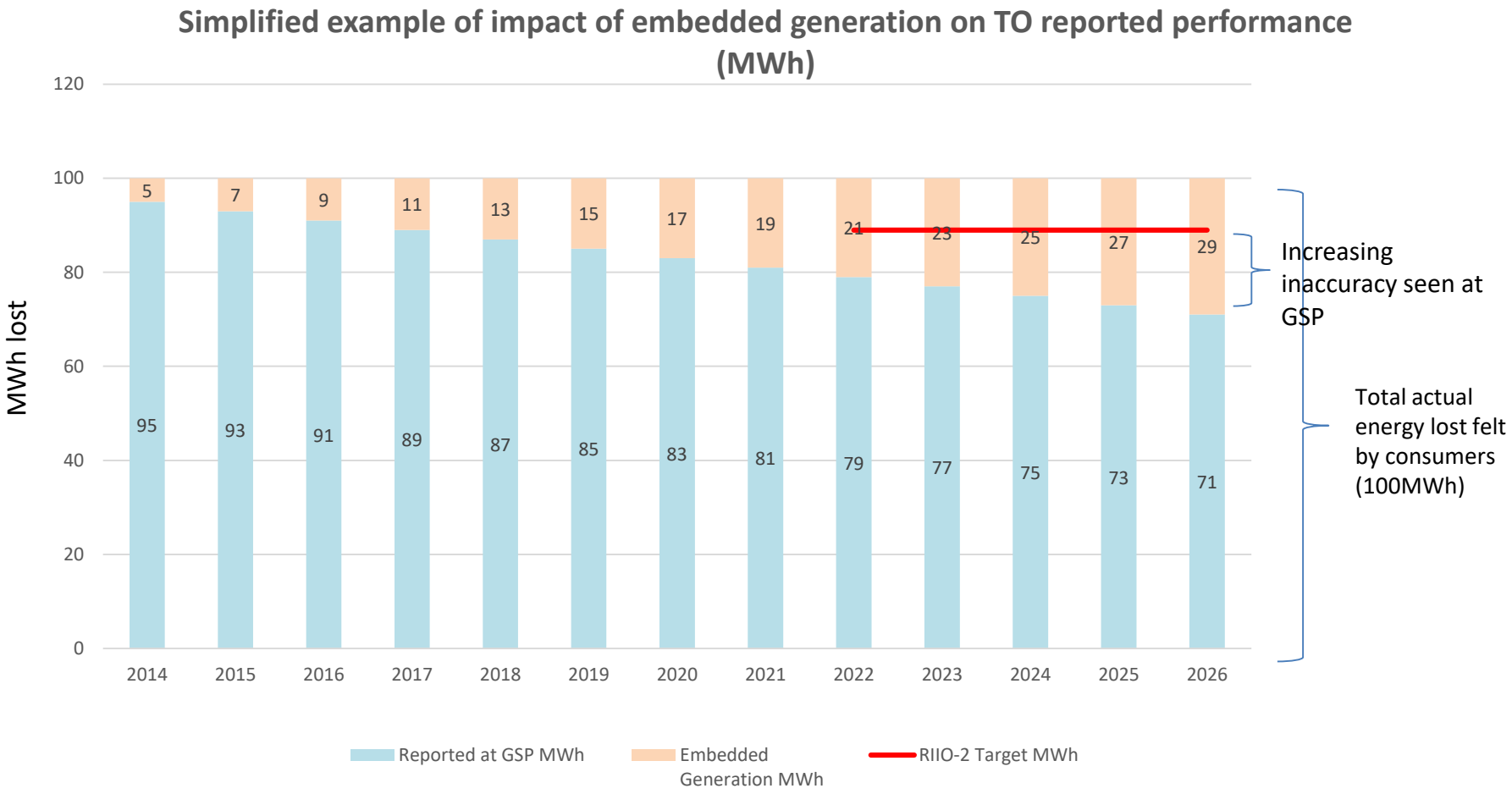
Cissie Liu

Reporting of lost load at GSPs



Fault on TO = Load lost at GSP will read 75 MW instead of 100 MW

Example of what this may look like



Note: This is a simplified example. It does not take into account the intermittent nature of embedded generation (eg weather conditions). It also assumes 100% nameplate capacity.

Why EG should be accounted for:

- To better reflect the actual lost load experienced by consumers
- To better understand load being produced by EG, and the growing impact of EG on the network
- To gather data which is more reflective of TO performance and baselines

Policy questions to answer:

1. Is the EG on the distribution network material enough?
2. What is a proportionate methodology to accounting for EG?
3. What are the associated cost and benefits to customers?

Do you agree with these policy principles?

Determining Materiality and proportionate method

We need a better understanding of the materiality of embedded generation (EG) to help determine if the benefits of accounting for EG in ENS measure outweigh the costs.

Key questions:

1) What do we mean by materiality? → material if EG significantly reduces the measure of energy supplied at a GSP

2) Are we in a world where there are particular hot spots where EG masks the volume of ENS (in all three transmission networks)? Or is this a more general issue for any of the transmission networks?

To explore this issue we need data on the ratio of EG to demand at GSP covering both day/peak/night/season, and during faults.

Are there any other factors we should consider?

Half-hourly Data Option

Reporting Performance

At the time of fault, TOs will need to investigate affected sites

TOs to report (1) sites affected by fault and (2) time and duration of fault

Electralink to pull half-hourly data from their database based on TO reporting (generators with generating capacity greater than 30kW)

Assumptions need to be made on EG output

Adjusting Baseline Targets for RIIO-ET2

Undertake "Reporting Performance Exercise" retrospectively and re-calculate RIIO-ET1 performance

Adjust baseline targets for RIIO-ET2 using new performance data that includes EG

Considerations of Half-hourly Data Option

	Considerations
Quality/ reflectiveness of data	• Half Hourly data is collected by Electralink • Assumptions will need to be made, as half-hourly data is not collected in real time and transmission faults are usually short
Proportionality of HH methodology	• Low-medium effort for TOs – must investigate cause of fault and sites affected. This is already standard practice. • NGET will need to engage with DNOs to understand impact of transmission fault • Retrospective analysis for baseline setting could be more time consuming and resource intensive
Cost/value to consumers	• A contract between each TO and Electralink may be needed • Cost of contracts? • Understanding load being produced by EG and its growing role has benefits for identifying the impact of generation and network use, and for informing future network requirements and management

Discussion

1. **Is the embedded generation on the distribution network material enough?**
    - EG output on random day may be material in some areas, but not all. Is it representative?
    - How often would high EG output and ENS events coincide? How material are these events? Is it representative?
2. **What is a proportionate method to do so?**
    - What is the balance between complexity of HH method, costs and value to consumers?
3. **What are the associated cost and benefits to customers?**
    - What explicit benefit does it bring for consumers?

SP ENERGY NETWORKS

Ofgem Policy Workshop
22nd July 2019

Energy Not Supplied Incentive and Embedded Generation

Proposed agenda for the ENS working group

1. Baseline setting
   a. Discuss principles and options
2. Embedded generation
   a. Discuss principles
   b. SPT's proposal and evidence – Slide as follows
   c. Cissie to present other options considered to date
3. WTP/VoLL
   a. Would one of the companies be able to present on the WTP study that's been published?
4. AOB

Review of SSMD Energy not Supplied Decision

- **Ofgem recognise the incentive has worked well in RIIO-T1**

Para 2.174 We think that the ENS incentive has worked well so far in RIIO-ET1. TOs have reduced, and have sustained for several consecutive years, a level of ENS below that of the previous price control. Since the beginning of RIIO-ET1 there has been continuous improvement in how TOs manage their networks. We expect customer needs and patterns of use to change over time, and potentially increase as we move towards decarbonisation. We expect the reliability of the network to remain a high priority for consumers in RIIO-ET2.

- **Ofgem rightly explain the ENS incentive drives short term reliability measures whereas the NARMS incentive and SQSS design support the than the longer term reliability over our network.**

Para 2.172 Under RIIO-ET1 TOs are incentivised to reduce ENS on their networks, which means minimising interruptions to transmission system availability by managing shorter-term risk and the day-to-day operations of the transmission network.

Para 2.221The Safety and Quality of Supply Standard (SQSS) and Network Asset Risk Metrics (NARMs) include obligations and standards for TOs that play an important role in determining long-term reliability on the transmission network. Our view is that the ENS incentive encourages TOs to consider and prepare mitigation strategies for risks that may not be covered by the SQSS and NARMs.

Review of SSMD Energy not Supplied Decision

- **Ofgem recognise the interactions with stakeholder engagement and customer satisfaction incentives along with the NAP incentive.**

Para 2.227: TOs have shown that they are beginning to engage with their stakeholders to assess the value they attach to network reliability. We think that removing the reward aspect of the incentive could introduce a misalignment between TO behaviour and customer valuation of reliability. We continue to welcome further evidence from TOs on their engagement with their stakeholders. We expect customers' views of the value they place on reliability to inform and be reflected in the TOs' business plan development for RIIO-ET2.

- **Ofgem correctly identify that embedded generation is becoming an increasing factor in the calculation of ENS when a transmission fault interrupts supply to distribution networks**

2.247 Embedded generation is increasingly playing a larger role in supplying energy for consumers on the distribution network. We expect this role to continue and potentially increase in RIIO-ET2. Some GSPs export electricity to serve demand in other areas on the transmission system. In the event of a power cut embedded generation on the affected network will switch off, as protection and control processes begin to operate. Therefore, the loss of supply experienced by end consumers will be greater than that reported at a particular GSP that is being supplied by the transmission system.

Review of SSMD Energy not Supplied Decision

- **Ofgem see VoLL as the measure that captures the value of reliability to consumers:**

Para 2.240 We have decided that VoLL continues to be an appropriate measure of customer value and will continue to use an agreed VoLL to set the ENS incentive rate for RIIO-ET2.

- **Ofgem want to improve reliability for consumers in RIIO-T2**

2.217 Our decision is to retain the ENS incentive for RIIO-ET2 to continue to encourage TOs to provide a level of reliability that is valued by customers during RIIO-ET2. We have also decided to retain the ENS as a financial incentive, rather than move to a reputational incentive. We think that a reputational incentive may not be strong enough to focus improvements and embed efficient behaviour around ENS mitigation.

Para 2.226 : Without a positive financial reward TOs may choose to only comply with the minimum requirement, rather than strive to consider potential improvements in ENS mitigation and network management to reduce ENS the lowest possible level valued by consumers

- **Ofgem has decided to achieve this mainly by tying to make the ENS calculation more accurate by updating company baseline targets, updating Voll and including Embedded generation in the calculation of ENS para 2.216 :**

1. **determining a methodology for setting baseline targets and any necessary assumptions**
2. **determining an appropriate Value of Lost Load (VoLL) value**
3. **confirming our working assumption around a 3% financial collar on penalties**
4. **determining a proportionate methodology for accounting for embedded generation and any necessary assumptions.**

Ofgem's Decision: Improve the Accuracy of ENS

Challenges to calculating the embedded generation values

An Exporting substation example

- **Glenlee/Tongland trip on 21st May which disrupted supplies to Earlstoun/Glenlee Primaries and Newton Stewart/Glenluce GSP's. We had no ENS penalty as a result of a net export of power (around 15MW) to transmission through embedded generation, despite having approx 25,000 customers off supply.**

- **The affected generators connected at 33kV with this event were as follows, including associated capacity:**
    1. **Newton Stewart GSP – Airies Windfarm (35MW)**
    2. **Glenluce GSP – North Rhins Windfarm (22MW), Glenchamber Windfarm (27.5MW), Barlockhart Moor Windfarm (8.2MW), Carscreugh Windfarm (15.3MW), Artfield Fell + Balmurrie Fell [Ext] (19.5MW + 9.1MW)**

- **All but one wind farm falls within the >30MW figure and therefore others are omitted, even though they would have had a contribution to the net export value at the time of this event.**

- **We estimate the demand lost as at least 15MW with a net export of 15MW to Transmission, which leaves a figure of 30MW to plug for distribution connected generation. However, if we only report on generators >30MW; this would be Airies WF which was only outputting 10MW, leaving 20MW unaccounted for (i.e. likely through the other embedded generators <30MW).**

- **There can be issues on the reliability of the analogue readings from these generator sites, i.e. comms, offscan, etc**

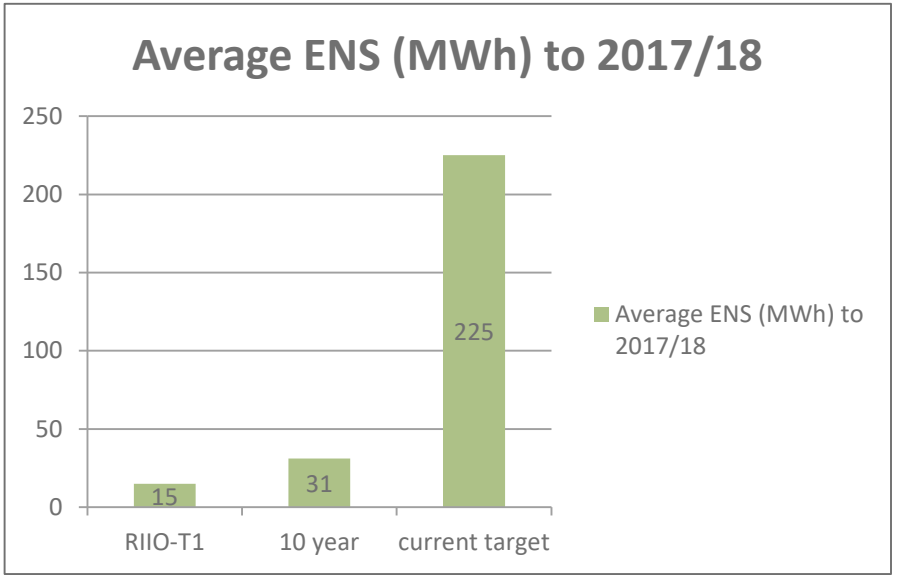
Ofgem's Decision: Improve the Accuracy of ENS

The Challenge to Calculate the Embedded Generation Values

- On our network we mainly have operational metering only for each individual 33kV connected "large" generator (sites).
- The term "large" is defined at 30MW and above in our area, 100MW in E&W, 10MW in SHET area. However, proposals are in flight to standardise this definition.
- Generation connected at 11kV down to 1MW may have some metering but is not obligated as a connection requirement as it can be too expensive to install in many situations.
- Smaller domestic level generation connected under "FiT" arrangements are not visible to network companies. Overall a large proportion of embedded generation is not able to be included in any calculation of ENS.
- For the generation that is available we can extract data from our real time reporting database for every site connected to a circuit that is affected by a loss of supply event.
- The level of generation of each site would then be aggregated and subtracted from the load flow at the source grid supply point that is used for the ENS calculation.

Ofgem's Decision: Improve the Accuracy of ENS

The Challenge of Setting New Baselines



Baseline Calculation Factors:

- The embedded generation impact on historical performance
- The forecasting of future network outage patterns and numbers
- The increasing volume of generation connecting and demand reducing

ENS calculation

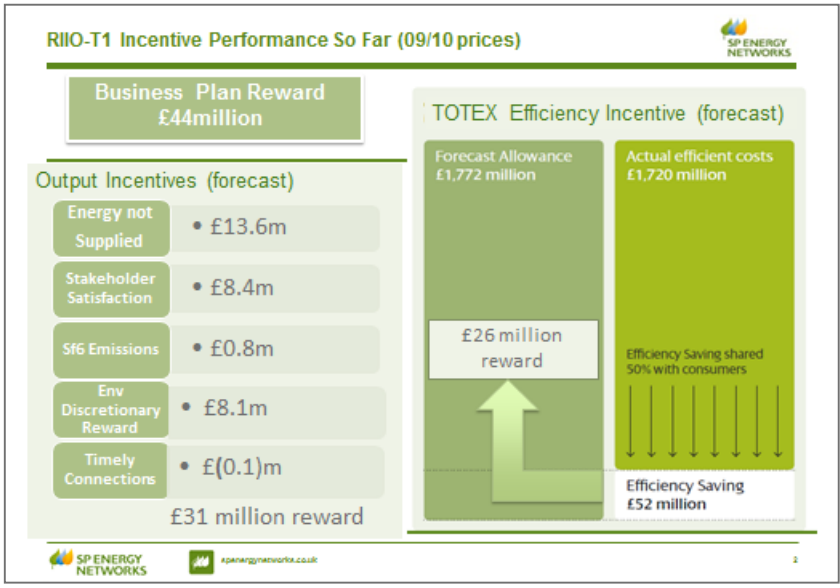
$$RI_t = \max\left[VOLL \times (ENST_{t-2} - ENSA_{t-2}) \times PTIS_{t-2}, -RIDPA \times \frac{BR_{t-2} + TIRG_{t-2}}{RPIA_{t-2}}\right] \times PVF_{t-2} \times PVF_{t-1} \times RPIF_t$$

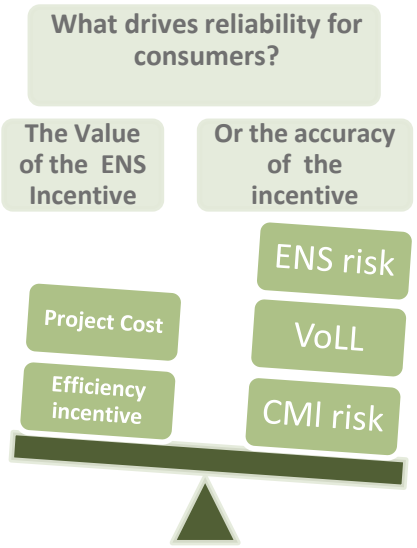
$ENSA_{t-2}$	is the sum of the volumes of energy not supplied in all Incentivised Loss of Supply Events in Relevant Year t-2, as reported by the licensee in accordance with Standard Condition B15 (Regulatory Instructions and Guidance).
$ENST_{t-2}$	is the incentivised loss of supply volume target in Relevant Year t-2, and has the value of 225 MWh for each Relevant Year.
VOLL	is the value of lost load which has the value £16,000 per MWh in (2009/10 prices).
RIDPA	is the maximum downside percentage adjustment, and will be set at 3 per cent.

Our Bespoke ODI Proposal

Ofgem's proposed approach is limited:

- **In RIIO-T1 our ENS mitigation is not explicitly funded. Any additional costs come out of the delivery projects budget that required the network outage.**
- **These projects are subject to the efficiency incentive so a business decision is made as to the extent of the risk weighed against the cost of delivering the ENS mitigation based on the ENS, CML & CI reward/penalty that may arise, and the reputational impact and duration of the no supply.**
- **Consumers share this risk and in RIIO-T1 this has approach has resulted in outstanding service to our consumers with ENS levels exceeding our targets which were based on historic performance. The ENS incentive has been effective and we want to build on this for RIIO-T2.**
- **Marinating the current risk/reward proposition is under threat**
- **Moving to a ring-fenced targeted, capped, accountable. Transparent approach may be better for consumers,**





Our Bespoke ODI Proposal

Better Metrics

SP Transmission	Energy Not Supplied Analysis						
Year	13/14	14/15	15/16	16/17	17/18	Average	Total
ENS (MWh)	42.3	2.8	13.9	10.3	3.0	14	72
Numer of Transmission Events	7	3	4	5	2	4	21
Number Effecting Distribution	5	3	3	4	1	3	16
Distribution Customers	107,158	10,913	70,263	90,405	31,927	62,133	310,666
Minutes of Energy not supply	134	51	36	88	12	64	321

Willingness To Pay Survey

Consumers prepared to pay £3.85 per annum extra, to reduce the length of a power cut should it happen.

£3.85

Most transmission events on our network interrupt distribution customers

These metrics represent effective measures of reliability experienced by both transmission and distribution consumers

We are proposing a funding value of £1.14m per annum to invest in short term mitigation measures to reduce the risk of now supply - capping charges to just a few pence per year on the average bill.

Our Bespoke ODI Proposal

We can have half a million consumers at "single circuit risk" every week due to our system outage requirements. We will build mitigation for these consumers into our business plan submission as far as is practical. However, the level of design and development of a particular project, and significantly, the changing system background, requires constant review and development of mitigation actions throughout the life-cycle of a project.

We are therefore proposing an additional funding mechanism that will ensure appropriate mitigation can be provided throughout the price control period for specific outage situation that could not have been predicated at the time of our price control development.

This funding mechanism will be based on the mechanism provided for system outages in Special Condition 8B "Services treated as Excluded Services" part C Para ES5; Outage Changes. This will provide a limited, affordable, accountable, legitimate and effective route to fund mitigation that reduces the risk of unplanned loss of supply to consumers.

To support this we are proposing to document and define our approach to mitigating the risk of ENS and submit this to Ofgem for approval. We will also produce a publicly available report annually, presenting our ENS, CML and CI impact for every transmission fault. We will include an explanation of how we have complied with our policy and highlight the most significant mitigation actions taken.

Energy Not Supplied Mitigation

Baseline Funding

As part of our business plan submission projects are identified that risk ENS and mitigation options incorporated in our costs.

In Period Funding

Extending existing funding mechanism for system outages and provide up to £1.14 million annually to reduce risk of ENS

Annual Reporting and KPIs

Input to support Stakeholder Engagement performance assessment

Ofgem's approach vs Our Approach

Conclusions

- **Ofgem's approach to improving ENS accuracy is merited and incorporating the calculation of embedded generation and VoLL is logical. But it may not improve reliability as it undermines the risk/reward proposition by reducing the baseline targets**

- **The baseline target set on T1 performance or 10 year average would be very difficult to improve on and achieve any reward making the incentive effectively a penalty only mechanism effectively. We would also have to recalculate performance to include the embedded generation factor.**

- **The calculation of ENS will always be an assumption as the data is not available and the actual energy flow would varies over the duration of the no supply event so we don't really know what ENS would have been lost.**

- **We want to change the risk/reward proposition to a direct funding approach. Supplementing this with better reporting, will improve transparency, accountability, and bring together stakeholder engagement, customer satisfaction and network reliability performance together.**

- **We need to act quickly to be able to inform our Business Plan Submissions**

Scottish & Southern Electricity Networks

TRANSMISSION

Your Plan, Our Future: RIIO-T2

www.ssen-transmission.co.uk

WILLINGNESS TO PAY

22 July 2019

BACKGROUND

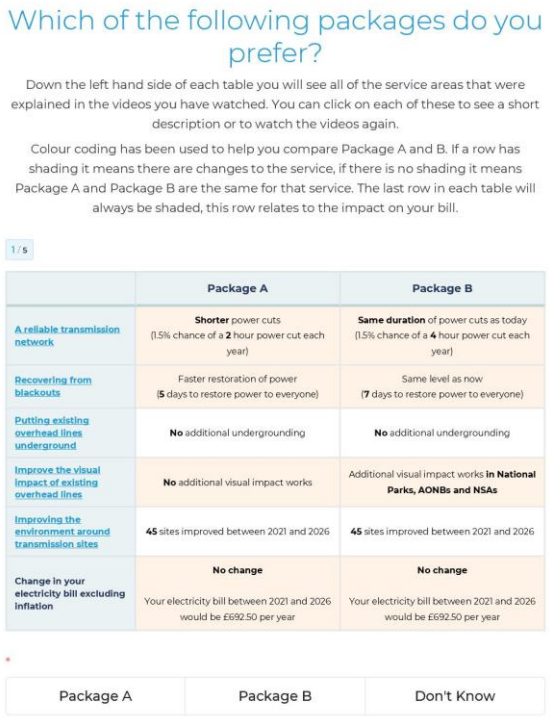
- A consumer WtP study is a minimum but important requirement in gathering evidence as part of the RIIO-T2 business plan development process
- Joint study of three electricity transmissions operators and the NGGT
- Contract awarded to NERA (analysis) and Explain market research (fieldwork) following a competitive tender process
- Study time-frame: November 2018 to June 2019

WHAT IS A WILLINGNESS TO PAY STUDY?

- A means of measuring the value consumers place on different products/service levels ("service attributes")
- This is measured by a utility function - welfare/satisfaction derived from the consumption of goods & services
- As welfare/satisfaction from the consumption of goods/services is abstract, economists seek to measure utility in terms of preferences
  - assume consumers are rationale and make decisions to maximise their utility
- Do so using **Stated Preference (SP) techniques** - ask respondents to rank, rate & choose between different hypothetical product/service scenarios

Scottish & Southern Electricity Networks
TRANSMISSION

CHOICE CARD: SP TECHNIQUE AND ONLINE SURVEY



Which of the following packages do you prefer?

Down the left hand side of each table you will see all of the service areas that were explained in the videos you have watched. You can click on each of these to see a short description or to watch the videos again.

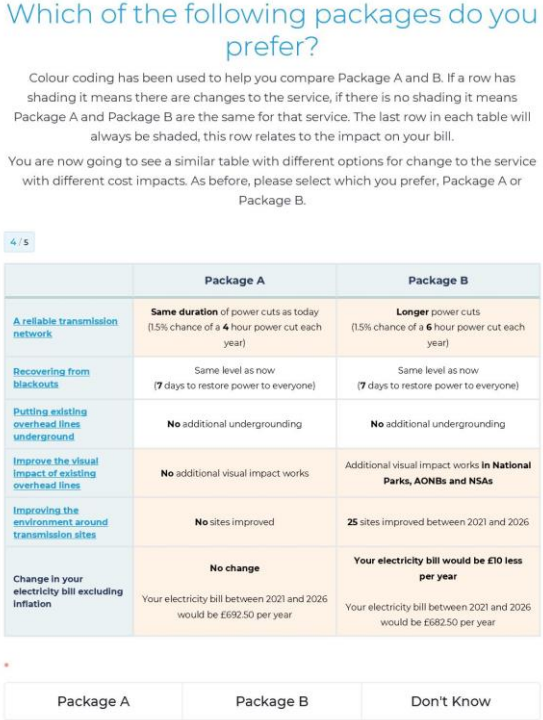
Colour coding has been used to help you compare Package A and B. If a row has shading it means there are changes to the service, if there is no shading it means Package A and Package B are the same for that service. The last row in each table will always be shaded, this row relates to the impact on your bill.

1 / 5

	Package A	Package B
A reliable transmission network	**Shorter** power cuts (1.5% chance of a **2** hour power cut each year)	**Same duration** of power cuts as today (1.5% chance of a **4** hour power cut each year)
Recovering from blackouts	Faster restoration of power (**5** days to restore power to everyone)	Same level as now (**7** days to restore power to everyone)
Putting existing overhead lines underground	**No** additional undergrounding	**No** additional undergrounding
Improve the visual impact of existing overhead lines	**No** additional visual impact works	Additional visual impact works **in National Parks, AONBs and NSAs**
Improving the environment around transmission sites	**45** sites improved between 2021 and 2026	**45** sites improved between 2021 and 2026
Change in your electricity bill excluding inflation	**No change** Your electricity bill between 2021 and 2026 would be £692.50 per year	**No change** Your electricity bill between 2021 and 2026 would be £692.50 per year

*

Package A | Package B | Don't Know



Which of the following packages do you prefer?

Colour coding has been used to help you compare Package A and B. If a row has shading it means there are changes to the service, if there is no shading it means Package A and Package B are the same for that service. The last row in each table will always be shaded, this row relates to the impact on your bill.

You are now going to see a similar table with different options for change to the service with different cost impacts. As before, please select which you prefer, Package A or Package B.

4 / 5

	Package A	Package B
A reliable transmission network	**Same duration** of power cuts as today (1.5% chance of a **4** hour power cut each year)	**Longer** power cuts (1.5% chance of a **6** hour power cut each year)
Recovering from blackouts	Same level as now (**7** days to restore power to everyone)	Same level as now (**7** days to restore power to everyone)
Putting existing overhead lines underground	**No** additional undergrounding	**No** additional undergrounding
Improve the visual impact of existing overhead lines	**No** additional visual impact works	Additional visual impact works **in National Parks, AONBs and NSAs**
Improving the environment around transmission sites	**No** sites improved	**25** sites improved between 2021 and 2026
Change in your electricity bill excluding inflation	**No change** Your electricity bill between 2021 and 2026 would be £692.50 per year	**Your electricity bill would be £10 less per year** Your electricity bill between 2021 and 2026 would be £682.50 per year

*

Package A | Package B | Don't Know

- **The choices made by consumers can be used to infer how they value different attributes**
- Focusing on more than one topic, consumers were able to think more holistically about their bill and make trade offs
- To ensure theory is grounded in reality respondents were reminded of the bill impact and that:
  - higher energy bills mean they will have less money to spend on other thing
  - Bills increase with inflation
  - Other bills could go up or down
  - Household income might change
  - Any money for these improvements will not be available for other things
  - Any changes are permanent changes – beyond 2026

Scottish & Southern Electricity Networks
TRANSMISSION

STUDY DESIGN

STAGE 1: SET UP AND DESIGN

- Defining service attributes
- Designing & building the survey
- Selecting SP technique

STAGE 2: SURVEY TESTING AND PILOTING

- Cognitive interviews
- Pilot fieldwork (128 samples)
- Analysis of pilot results
- Peer review

STAGE 3: FIELDWORK

- Online surveys
  - Dom = 786
  - Non-Dom = 609
- Face-to-face interviews
  - Dom = 267
- Total = 1,662
- Survey length = 35 mins

STAGE 4: ANALYSIS AND REPORTING

- Quantitative analysis
- Sensitivity analysis & robustness checks
- Reporting
- Peer review
- Integration into business plan

SERVICE ATTRIBUTES

	Risk of power cuts	Recovering from blackouts	Undergrounding OHLs	Improving visual amenity of OHLs	Improving environment around transmission sites	Investing in innovation projects to create future benefits for consumers	Supporting local communities	Investing to make sure the network is ready for electric vehicle charging	Investing to make sure the network is ready to connect renewable generation
Level 1 (low service)	Longer power cuts (1.5% chance of a 6 hour power cut each year)	Same level as now (7 days to restore power to everyone)	No additional undergrounding	No additional visual impact works	No sites improved	Small scale innovation projects focused on improving the way we do things	No community activities	Do not invest before there is a definite need for electric vehicle charging connections	Do not invest before there is a definite need for new renewable generation connections
Level 2 (mid service)	Same duration of power cuts as today (1.5% chance of a 4 hour power cut each year)	Faster restoration of power (5 days to restore power to everyone)	Up to 20 miles of additional undergrounding in National Parks, AONBs & NSAs	Additional visual impact works in National Parks, AONBs & NSAs	25 sites improved between 2021 & 2026	Medium scale innovation projects which aim to deliver benefit in up to 10 years but which come with a level of uncertainty & risk	Maintain current level of community activities	Invest before there is a definite need for electric vehicle charging connections	Invest before there is a definite need for new renewable generation connections
Level 3 (high service)	Shorter power cuts (1.5% chance of a 2 hour power cut each year)	N/A	Up to 20 miles of additional undergrounding in other areas (i.e. areas which are not National Parks, AONBs & NSAs)	Additional visual impact works in National Parks, AONBs & NSAs, as well as other rural & urban areas	45 sites improved between 2021 & 2026	Large scale, longer-term innovation projects which are more transformational & focus on creating benefit for the broader energy industry &/or wider community, but also carry a level of uncertainty & risk	Maintain current level of community activities & provide additional funding to charities & other organisations to support consumers	N/A	N/A

WILLINGNESS TO PAY (£/customer/year)

Electricity transmission networks costs £37 of typical annual energy bill (SHE Transmission is £4.50 of that)
27.2m households in GB

	£		£
Risk of power cuts		**Additional transmission site environment improved**	
2 hour decrease in the duration of power cuts at a 1.5% probability	7.70	25 additional sites	8.92
4 hour decrease in the duration of power cuts at a 1.5% probability	9.70	45 additional sites	10.78
Days to recover from a blackout		**Investing in innovation projects**	
Every fewer day to recover from a blackout	3.58	Medium scale projects compared to small scale projects	2.38
Undergrounding overhead transmission lines		Large scale projects compared to small scale projects	3.11
20 miles additional underground in National Parks etc.	6.87	**Supporting local communities**	
20 miles additional underground in other areas	6.46	Current level of community activities	8.26
Improving visual amenity of overhead transmission lines		Current level of community activities & additional funding to charities	8.46
Additional visual impact works in National Parks etc.	4.14	**Investing before definite need**	
Additional visual impact works in other areas	4.81	Investing in EV charging infrastructure	9.55
		Investing to connect renewable generation	11.78

- **Positive and statistically significant WtP figures for all service attributes**
- Figures as high but not inconsistent with previous GB studies or European studies
- Consistent with the in-depth but smaller scale stakeholder workshop events – these service attributes are valued

USE AND LIMITATIONS

- One important piece of our stakeholder engagement, reaching c1,700 bill payers
- Qualitative rather than quantitative use: to triangulate our policy decisions and positioning, not a tool to be used for making investment decisions on its own
- Upper limit of consumer tolerances, testing (at a high level) support and prioritisation of areas within draft Business Plans
- Consideration in our strategic optioneering (e.g. undergrounding)
- Reference point in calibrating incentives
- Not be used as direct input to Cost Benefit Analysis (CBAs) or set levels of expenditure

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USE FOR VOLL

study was not a VoLL study

- VOLL which can be inferred through the study range from c£450,000 to £550,000 MWh*
- Use in ENS?
  - *Methodology comparisons need to be made with other VoLL studies
  - Customers place significant value on being on reliability and security of supply
  - Support an increase in the T1 ENS VoLL estimates

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AOB

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APPENDICES

Baseline Targets for RIIO-ET1		
NGET	SPT	SHE-T
316 MWh	225 MWh	120 MWh

Company	RIIO-ET1 average over-performance against baseline	RIIO-ET1 + TPCR 4 average over-performance against baseline
NGET	88%	52%
SPT	94%	80%
SHE-T	72%	15%

ofgem Making a positive difference for energy consumers

Our core purpose is to ensure that all consumers can get good value and service from the energy market. In support of this we favour market solutions where practical, incentive regulation for monopolies and an approach that seeks to enable innovation and beneficial change whilst protecting consumers.

We will ensure that Ofgem will operate as an efficient organisation, driven by skilled and empowered staff, that will act quickly, predictably and effectively in the consumer interest, based on independent and transparent insight into consumers' experiences and the operation of energy systems and markets.

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