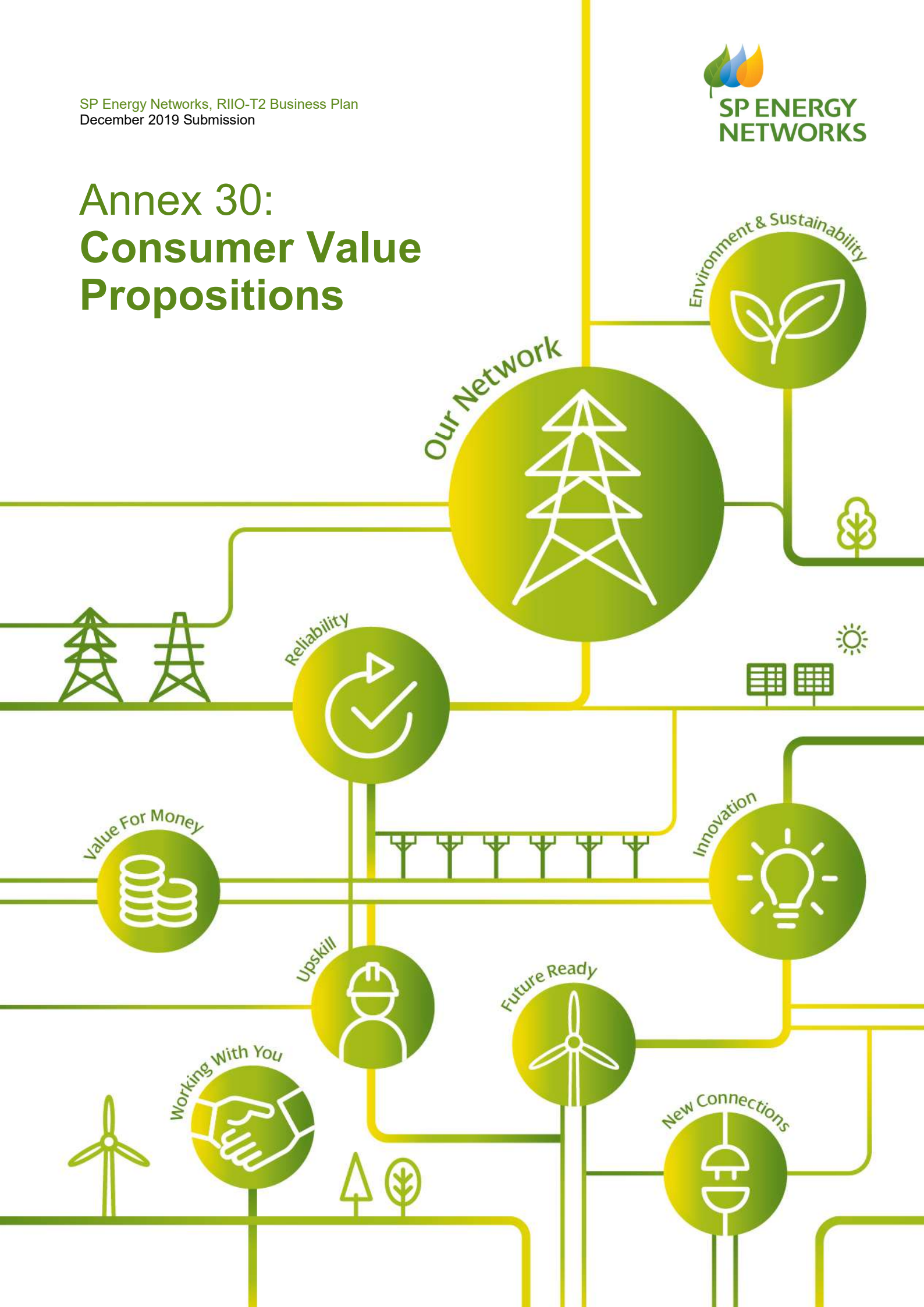
Annex 30: **Consumer Value Propositions**



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1.0 INTRODUCTION

We know that every investment decision we make has an associated bill impact as well as benefits to directly connected customers and end consumers. All our investment decisions are multifaceted and substantiated by rigorous modelling, cost-benefit analysis and thorough stakeholder engagement. To clearly demonstrate this to bill-payers across the UK, each applicable investment area of our plan has been summarised in a Consumer Value Proposition (CVP) figure or statement(s). You can find these CVP summaries at the start of each relevant chapter of our plan.

This annex provides further information on the assumptions which underpins the CVPs that have been included in our business plan. We have set out the assumptions that underpin the statements in this Annex.

1.1 Data sources

To ensure that the quoted benefits are consistent we have used a number of different sources for the calculated benefit:

- Ofgem cost benefit analysis model – this model has been developed by Ofgem with contributions from network operators. This model allows benefits including carbon savings to be calculated in a consistent manner.
- NARMS methodology – The benefits from our non-load programme have been determined in a consistent fashion to the NARMS methodology to ensure consistency and comparability.
- Innovation related data are derived from volumes in business plan pertaining to roll-out of one or more innovation projects.
- Innovation statistics derived from innovation project progress reports and annual summary reports.
- SP Energy Network Social Return on Investment Calculator – SIA Partners have developed a social return on investment (SROI) tool on behalf of SP Energy Networks that is based on a variety of independently verified sources. This tool allows us to quantify and forecast the costs and benefits of initiatives over time. The tool allows us to demonstrate, for each pound that we spend on a service, the net benefit created for our customers. SIA partners have experience of developing other organisations with a similar tool and have provided support based on industry best practice.

2.0 INNOVATION

We have detailed our innovation strategy and proposed costs associated with delivering the strategy. We are also embedding the learning from a wide range of innovation projects that were undertaken in RIIO-T1 by both ourselves and other network operators. Our CVPs highlight the benefits of these programmes, and also the wider societal benefit that is delivered from our investment in this area. These CVPs are summarised on page 26 of our business plan.

CVP 2.1 - *Our RIIO-T2 business plan will deliver benefits in excess of £30m from the roll-out of successful innovation projects on our network led by us in RIIO-T1 – 48% payback of the £61.92m RIIO-T1 innovation investment allocated to SP Transmission.*

Assumptions – The benefits are mainly constituted from roll-out of two of our flagship innovation projects FITNESS and Phoenix. The roll-out of FITNESS digital substations project on average creates a benefit of 6% in CAPEX costs for substations refurbishment and new-builds. This applied across the 5 potential sites for roll-out of digital substation technology in RIIO-T2 contribute to financial benefits of £9m. The roll-out of Phoenix hybrid and/or standalone synchronous compensator technology creates benefits of over £20m through reduction in load related costs. This constitutes of costs for increasing fault level through traditional reinforcement, and mitigating voltage related issues on the network using other technologies. There are also financial benefits of over £1m predicted through increased capacity on the network through integration of the wide area monitoring system with conventional energy management system at SPT control centre.

CVP 2.2 - *Through our innovation projects we partner with a wide range of third parties, SMEs and universities, investing the funding back into the wider economy and the next generation of researchers.*

Assumptions - On average 85-90% funding in each innovation project is allocated to 3rd parties such as vendors, contractors, SMEs and universities. Circa 5% of the innovation investment is also utilised for knowledge dissemination activities, and supporting research bodies such as CIGRE, IEEE, and EPRI for sharing best practices.

CVP 2.3 - *Through innovation directed at solving strategic energy system transition challenges in RIIO-T2, we aim to leverage a £18.65m investment to realise benefits in excess of £73m in RIIO-T3.*

Assumptions – The following assumptions have been used to create 4 CBAs for each innovation cluster and planned activities in RIIO-T2. The sources for the following assumptions have been obtained from previous load, non-load related projects, and CBAs for other innovation projects.

Assumption Description	Cost (£m)	MW/MWh	Quantity
Average Cost of building Substation	15		
Average Cost of a OHL route	20		
Average Cost of a Cable route	40		
Cost for enabling 50MW of connection	5		
Avoided costs of secondary systems, extensions, updates	1		
Average annual benefits due to improvement in asset life due to smart asset management	0.1		
Smart Asset Management Annual O&M Benefits	0.15		
Improvements in Engineering Design and Process	1		
Average Number of transmission Substations built or replaced per year			1.5
Annual average constraint cost savings by enabling additional flow of 50MW through the network	1		
Average Additional Capacity Created		50	
Average Loss reduction due to improved asset management each day		5	
Average number of days per year for asset use in full or close to full capacity			15
Average number of hours for asset use in full or close to full capacity			3
Annual Benefits to Customers/Prosumers through accelerated connection	5		
Annual Benefits to Customers/Prosumers through easier access to EV charging points	1		
Avoided annual risk of failure of asset through enhanced modelling	10		
Probability of power system oscillation interactions			0.005
Probability of power system cascading fault			0.001
Average Reserve Service Costs per annum for one generating plant	10		
Average Loss reduction due to improved used of DERs		100	
Number of Substations			130
Average site related costs saved through roll-out of digital substations	0.25		
Average number of protection system replaced per year			1
Number of Digital Substations RIIO-T3 onwards			14
Proxy for number of substations built or replaced across GB			20

3.0 AN ENVIRONMENTALLY SUSTAINABLE NETWORK

Our comprehensive, stakeholder-led plan for enhancing environmental sustainability in RIIO-T2 and the embedded costs associated with it is outlined in An Environmentally Sustainable Network in our Business Plan and within Annex 7: Environmental Action Plan. Our CVPs highlight the societal and consumer benefits which will be delivered by this plan, including greenhouse gas emission reduction, social benefit and biodiversity enhancement. These CVPs are summarised on page 36 of our business plan.

CVP 3.1 - *Our commitments to SF_6 reduction and alternatives will avoid 9,700kg of SF_6 being added to the network across the RIIO-T2 period, avoiding estimated emissions equivalent to over 1,200 tCO2e annually. This represents a value of £11.8m over the life of the assets.*

Assumptions – we have assumed an annual SF_6 leakage rate of 1% or 0.5% as relevant to the age of each SF6 asset being replaced by non-SF_6 technologies, in line with Ofgem guidelines. We have assumed an asset life of 45 years, starting in 2026. We have used an SF6 conversion factor of 23,500 in line with the factor quoted in Business Plan Data Table 6.5 to convert the kg leakage avoided into tCO2 equivalent. Finally, we have multiplied the tCO2e by an average of the non-traded carbon price from 2026 to 2071 from the Ofgem standard CBA template to arrive at our £ value over the life of the assets.

CVP 3.2 - *The network losses reduction initiatives contained within our Losses Strategy will result in the avoidance of 3,700 tCO2e annually. This represents a value of £36.1m over the life of the assets.*

Assumptions – we have assumed an asset life of 45 years, starting in 2026. We have used the 2019 Defra Conversion Factor to convert MWh losses avoided into tCO2 equivalent. Finally, we have multiplied the tCO2e by an average of the traded carbon price from 2026 to 2071 from the Ofgem standard CBA template to arrive at our £ value over the life of the assets.

CVP 3.3 - *Our commitment to implement energy efficiency measures at 48 substations will reduce energy consumption by more than 1,000MWh per year, enough to power the equivalent of 250 households and save over 250 tCO2e annually. This represents a value of £2.4m over the life of the assets.*

Assumptions – we have assumed an asset life of 45 years, starting in 2026. We have used the 2019 Defra Conversion Factor to convert MWh energy consumption avoided into tCO2 equivalent. Finally, we have multiplied the tCO2e by an average of the traded carbon price from 2026 to 2071 from the Ofgem standard CBA template to arrive at our £ value over the life of the assets.

CVP 3.4 - *Our commitment to replace 100% of our 72 cars and vans with electric alternatives by the end of RIIO-T2 will result in the avoidance of over 320 tCO2e emissions per year. This represents a value of £0.10m over the life of the assets.*

Assumptions – we have assumed an asset life of 4 years, based on the length of our fleet leases, starting in 2026. We have used our T1 actual fleet mileage by vehicle type to calculate the predicted kilometres driven by vehicle type for T2, taking account of actual and predicted network length. We have then used the 2019 Defra UK Electricity for EVs conversion factors to convert kilometres for each vehicle type into tCO2 equivalent and subtracted this from the upper bound emissions from total operational transport energy use from BPDT 4.4 to reach our annual tCO2e avoided figure. We have then multiplied this figure by the 4 year asset life. Finally, we have multiplied the tCO2e by an average of the non-traded carbon price over the asset life from the Ofgem standard CBA template (2026-2030) to arrive at our £ value over the life of the assets.

CVP 3.5 - *Our proposal to maximise environmental benefit from non-operational land will enable community groups to use the land for free to install upwards of 4MW of new renewable generation, enable c.1,200 tCO2e carbon savings annually and support biodiversity enhancements at up to 20 sites. This represents a value of £4.2m over the life of the projects.*

Assumptions – we have assumed an asset life of 25 years, based on the lifespan of a community solar project, starting in 2026. We have assumed an optimal community energy project size of 200kW and multiplied this by our 20 viable sites to reach an expected 4MW of generation. Although several of the viable sites could provide enough space for more than one solar project, we have assumed only one community energy project per site, recognising that there may not be more than one community energy group in each area. We have then used the Scottish Government Renewable Electricity Output Calculator[1] (accessed 03/12/2019) to compare the carbon impact of 4MW of solar generation against grid mix to reach our

[1] https://www2.gov.scot/Topics/Statistics/Browse/Business/Energy/onlinetools/ElecCalc

annual tCO2e carbon savings, multiplying by our assumed asset life. Finally, we have multiplied the tCO2e carbon savings by an average of the traded carbon price over the asset life from the Ofgem standard CBA template (2026-2051) to arrive at our £ value over the life of the assets.

CVP 3.6 - *Our Net Zero Fund will support the creation of jobs in our local communities as well as delivering significant carbon savings and supporting our communities in vulnerable circumstances. This will create wider socio-economic benefits and is estimated to deliver at least of £3 worth of social benefits for every £1 invested in the Net Zero Fund (Social Return on Investment). This represents £60m social value over the life of the fund projects.*

Assumptions – We have proposed a Net Zero fund of £20m across the full 5-year price control period. The SIA SROI tool was used to quantify the social benefits of the fund. This calculation was based on the types of projects that we would hope to see based on our proposed criteria for the Net Zero Fund. However, this is purely an estimate as it is difficult to predict what projects will be funded.

For example, we have not quantified any benefits to local economies, as we cannot reasonably measure this until we know what projects will be funded. We do believe, however, that there will be a number of unmeasured economic benefits resulting from the fund such as job creation and increases in household income through reduced energy bills. It is vital that this is kept in mind when reviewing the holistic consumer value of the fund.

For all social benefits, we assume an attribution of 5%. This is in line with our proposed criteria, which asks for 5% match funding. We have used SIA's financial proxy list to quantify the below benefits as part of the SROI calculation:

- There is a £1.46 benefit per person from an increase in wellbeing from a reduction in air pollution. We believe this is the type of benefit that a project could bring and have applied it to our full customer base.
- There is a £37 benefit per reduction in illness case because of comfortable and warm homes. The NZF aims to tackle vulnerable customers, part of this is customers who are fuel poor. 24.9% of people in Scotland are fuel poor according to Energy Action Scotland. Therefore we have applied this percentage to our customer base and estimated a 20% success rate.
- There is a £1.60 benefit, according to the Willingness to Pay research, associated with reducing environmental impact of network company activities. This is again in line with the type of project that could be funded by NZF. Therefore, we have applied this to our customer base with a 10% success rate.
- There is a £0.71 benefit per person associated with initiatives that attract young people to work in the energy sector, according to Willingness to Pay research. We have had some similar projects come forward through our Green Economy Fund and such projects could also be funded through NZF. We scale the number of 16-24 year olds to the SPT customer area and apply this benefit to that number.
- We assume that having the network ready for EVs provides a benefit of £2.45 per person, according to Willingness to Pay research. We scale the number of EVs that are expected to be on the roads by 2030 and scale this to the SPT area.
- From Willingness to Pay research, there is a £2.20 benefit associated with helping fuel poor customers by providing efficiency and switching advice. Our NZF has a focus on vulnerable customers and this is the type of associated benefit that could be attached to a project. 24.9% of people in Scotland are fuel poor according to Energy Action Scotland. Therefore we have applied this percentage to our customer base.
- The Willingness to Pay research places a value of £1.29 on engaging with CESs. We assume that there are 400 CESs in Scotland, according to Community Energy Scotland, and scale this down to the SPT area.
- There is a value of £23,413.64 for increasing quality of life of customers. We hope that by making sure NZF targets vulnerable customers and communities, that we will be able to improve quality of life. Excess winter mortality figures for 2018/19 in Scotland was 2,060, according to NRS. Taken this as a percentage of Scotland's population and multiplied by SPT customer number. Assuming a 20% success rate as difficult to quantify.
- Willingness to Pay research places a value of £1.85 on providing support to vulnerable customers who are also impacted by fuel poverty. We have applied this to 24.9% of our customer base in line with the fuel poverty rate in Scotland.

4.0 HEALTH AND SAFETY

Below are our CVPs for the Health and Safety section of our Business Plan. We believe that the CVPs we have presented here represent the additional consumer value from our efforts in this area that go beyond our minimum requirements. For example, providing educational programmes, training mental health first aiders and ensuring our health and safety efforts aim to avoid all accidents. These CVPs are summarised on page 49 of our business plan.

CVP 4.1 – *Using Willingness to Pay research, we estimate that our education programmes on electrical safety will have a consumer value of £380,000 over RIIO-T2.*

Assumptions – On average, we will deliver educational programmes to approximately 26,000 children and 22,000 adults annually over RIIO-T2 (based on current performance). Willingness to Pay research shows that the value of educating the general public on how to stay safe around electricity is £0.78 per annum and educating school children on safety is £1.86 per annum[2].

CVP 4.2 – *We aim to train 2% of our staff as mental first aiders. Reducing mental health problems within our workforce could have a consumer value of up to £3.3m over the RIIO-T2 period.*

Assumptions – We assume that the average number of FTEs in SPT over the RIIO-T2 period is 610. Centre for Mental Health estimates that mental health problems cost the economy £35bn annually. We use this with the total number of workers in the UK according to ONS to give the average cost of mental health problems per UK worker. This is multiplied by SPT FTEs

CVP 4.3- *Reduced incidents and absences will result in a more efficient workforce with high morale.*

CVP 4.4- *The health and safety of our workforce will have wider socioeconomic benefits for the area we serve. Ultimately, it will reduce impacts on our local NHS. The costs to the NHS for every short hospital stay is £3,894.*

Assumptions – Using NHS Reference Costs.

CVP 4.5- *The HSE has published a value of £8,400 for every Non-fatal injury in the workplace. If we were to apply this across our workforce this would equate to a loss of £5.6m. The HSE states that one fatal injury would cost society £1.7m. We cannot place a value on the safety of our staff. We will always strive to achieve zero harm.*

Assumptions – Using the HSE figures and average number of FTEs in SPT during RIIO-T2.

5.0 LOAD RELATED EXPENDITURE

Our Load related plans provide connecting customers with the access to the network that they require, however this creates a wider societal benefit from this. By connecting a customer, that customer will achieve a benefit from being able to sell their energy to the market, but in our CVPs we have calculated the carbon and other benefits that society realises from this being enabled in the form of lower carbon emissions and reduced constraint costs. This is also similar for the additional demand that we have ensured we can cater for. The uptake of electric vehicles and other demands have been catered for in our plan which creates further carbon savings which society will ultimately benefit from. These CVPs are summarised on page 64 of our business plan.

CVP 5.1 - *Our baseline plan will directly connect 889MW of renewable generation, create capacity for 800MW of embedded generation and increase the capacity for additional renewable generation to be transferred across Scotland and Great Britain by 800MW. Reducing emissions by 1.6Mt p.a. with a value of £81m p.a.*

Assumptions- Our business plan enables renewable generation across Scotland, in three main categories (also see Table 1 below):

1. 888.7MW of generation is included in our baseline plan as direct transmission connections. Note that significantly more generation is likely to connect in the RIIO-T2 period, but we are less certain about where and when it will connect and has not been included in this analysis.

[2] Accent, SECV Social Value Research

2. In our demand connections projects, we are working with SP Distribution to increase the capacity at a number of substations as well as creating two new grid supply points. In total we estimate this to create the capacity for a further 800MW of generation to connect to the wider electricity system. We do not use the full 800MW in our analysis but have assumed that our projects will accelerate embedded connections and that 429MW of embedded renewables will be added to the distribution system during RIIO-T2.
3. In addition to this, we are upgrading the network boundaries that we share with SHET and NGET. These upgrades allow more renewable power to be transported across our network. In our analysis, we consider only an estimate of the additional energy that could be transported across our network due to the constraints that have been reduced. In our CVP analysis, we have considered only the avoided carbon emissions due to constraints relieved by boundary upgrades (the constraint costs themselves, i.e. balancing market costs, are considered in CVP2; see Table 4).

Table 1. Carbon savings enabled by our baseline plan.

	Source	Capacity (MW)	Renewable MWh Enabled	Avoided CO_2 Emissions (t)	Avoided CO_2 Cost (£m)
1	Baseline transmission-connected renewables	888.7	2,097,282	592,089	29.97
2	Embedded renewables enabled and connected	429.0	1,012,416	285,818	14.47
3	Boundary constraints relieved (renewables outside SPT area) *.	-	2,525,802	713,066	36.09
	Total			1,590,973	80.52

* See CVP4.2 (Table 4)

Our baseline plan only includes generation connection projects with a very high level of certainty and we expect to connect additional renewable generation, although the exact location and timing is less certain. If we connect the renewable generation forecast by each scenario, the carbon savings are significantly higher as shown in Table 2 below.

Table 2. Carbon savings by scenario.

Scenario	Community Renewables	Two Degrees	Steady Progression	Consumer Evolution
Avoided CO2 Emissions (t)	3,433,581	4,139,762	3,035,551	2,446,302
Avoided CO2 Cost (£m)	173.8	209.5	153.6	123.8

Table 3. Assumed conversion factors and carbon cost.

Assumption	Source	Factor
Assumed renewable load factor for onshore wind generators (LF).	Renewables UK (Renewable UK Data)	26.94%
Electricity GHG conversion factor (t/MWh) for 2026 (GF)	Ofgem CBA	0.2823
Traded carbon price (£/t) for 2026 (CP)	Ofgem CBA	50.61

The carbon savings have been determined by (also see Table 3):

1. Load factors taken from Renewables UK (Renewable UK Data) and multiplied by the additional capacity and number of hours in a year to give the total energy which would reasonably be expected from this generation.
2. The carbon intensity of the generation across Great Britain and GHG conversion factor (tCO_2/MWh) is detailed in Ofgem's CBA model. This is then applied to the MWh calculated in step 1 to provide the mass of carbon saved per annum. The year 2026 was assumed as the benchmark year, as this is the point at which the generation capacity will have been completed.
3. To convert avoided constraints to equivalent tCO_2 avoided, we have converted an expected annual constraint cost to MWh constrained by assuming an average constraint cost of £60/MWh. The annual constrained energy is then converted to tCO_2 as described above.

CVP 5.2 - *Reducing the annual constraint costs the ESO would incur by £152m by the end of RIIO-T2 as a result of our boundary upgrades we are completing in the period.*

The NOA process compares the cost of a network investment to the cost of network constraints that would be incurred if the investment were not made. This is a complex calculation carried out by the ESO using specialised software. The ESO has provided us with an estimated range of the total constraint savings that will be realised by upgrades on our northern boundary, which we have used as the basis for this CVP analysis.

Table 4. Avoided boundary constraints and associated carbon emissions.

		Minimum	Maximum	Average
1.	Total constraint cost avoided by boundary investment over the asset life (£m)	2,707	4,251	3,503
2.	Annual constraint cost avoided by boundary investment (£m)	117.11	183.91	151.55
3.	Estimated annual energy constraints relieved (MWh)	1,951,854	3,065,139	2,525,802 *
4.	Estimated annual CO_2 emissions avoided (t) (Assuming that all constrained plant is renewable)	551,033	865,328	713,066 *
5.	Estimated cost of avoided CO2 emissions (£m)	27.89	43.80	36.09 *

* Used in CVP4.1

Assumptions-

1. We have assumed that our boundary upgrades are likely to lead to savings of £3,503m over 40 years (the average case in Table 4), based on information obtained from the ESO.
2. Using an assumed discount rate of 3% over 40 years, this equates to £152m per year.
3. Table 4 also shows estimated energy constraint avoided every year, based on an assumed cost of constraints of £60/MWh.
4. The avoided constrained energy allows us to quantify the CO_2 savings from our boundary investment, by assuming that all the constrained energy would be from renewable generation.
5. Finally, using the carbon cost from Table 3, we can calculate the value of the avoided CO_2 emissions.

CVP 5.3 - *Ensuring transmission network capacity for the connection of 130,000 new electric vehicles which we anticipate could require to be charged through the network by the end of RIIO-T2. In doing so, we will contribute £3.7m per year in value by the end of RIIO-T2.*

Assumptions- We estimate that by the start of RIIO-T2, there will be 28,305 EVs in the SPT area and that a further 129,626 will connect by the end of the price control period, bringing the total to 157,931. By providing network capacity for these EVs to charge, we contribute to a number of societal benefits as outlined in Table 5 below.

Table 5. SPT contribution to consumer value from EVs.

	Social Benefit	Value
1.	Annual contribution to health benefits from reduced pollution levels by the end of RIIO-T2	£22,484
2.	Annual contribution to fuel costs saved by EV owners at the end of RIIO-T2	£1,037,008
3.	Annual contribution to consumer benefit from ensuring sufficient network capacity for EV charging.	£96,733
4.	Annual contribution to CO_2 savings	£2,591,402
	Total annual consumer value by the end of RIIO-T2	£3,747,627

1. There were 2.9 million vehicles licensed for use on the roads in Scotland in 2015, of which 84% were cars (Transport Scotland). Based on the SPT Scenarios, 157931 of these change to EVs, proportionally reducing pollution levels. Most EVs will be in urban areas with NO_2 pollution levels of around 40µg/m^3. A proportional reduction due to EVs in the SPT area would be 2.2µg/m^3, which we have assumed will accrue to the 3.5m people in the central belt.

   Public Health England estimates that a 1µg/m^3 reduction in pollution levels would avoid £1.46 per person in NHS and social care costs every year. Therefore, a 2.2µg/m^3 reduction in pollution levels has an annual value of £3.21 per person. Assuming an attribution rate of 99% and a success rate of 20%, the annual value of the increase in human wellbeing that we have created is £22.5k.

2. Next, we considered fuel cost savings. We have assumed EV running costs of £4/100mi covered. For petrol, the assumed cost is £14/100mi. Therefore, by changing to an EV, each owner saves around £10/100mi. This represents an annual cost saving of £800 if the vehicle covers 8000mi/year. For the additional 129,626 vehicle owners (assuming an attribution rate of 99% and a success rate of 100%), this represents additional value of £1.0m per year.
3. Increasing the capacity of the existing network in anticipation of EV uptake is estimated to be worth £2.45 per consumer every year (UKPN, WPD and Accent). We assume that 75% of this value is attributable to others, while all 157,931 EV owners are impacted. Therefore, we estimate that ensuring sufficient network capacity for EV charging represents additional value of £96.7k per year.
4. Finally, we consider the carbon savings from changing petrol or diesel vehicles to EVs. On average, diesel and petrol cars emit 2.88t and 2.99t of CO_2 respectively per 10,000mi travelled (Carbon Footprint). We assume an average of 2.935 for all vehicles. Each EV has CO_2 emissions of 0.96t per 10,000mi as not all electricity generation is renewable. Therefore, each EV saves 1.975t of CO_2 per 10,000mi. For 8,000mi, as assumed above, the saving is 1.58t. Assume a traded carbon price (£/t) for 2026 of £50.61. Then the CO_2 savings are £79.96 per year per EV. For 129,626 vehicles (assuming an attribution rate of 75% and a success rate of 100%), this represents added value of £2.6m per year. Note that the total annual carbon emission reduction is 256,011t.

In the above analysis, we assume that most of the societal benefit is attributable to others, e.g. EV manufacturers or the distribution network operator. If such attribution is ignored, the full societal benefit is £141.6m, i.e. SPT only contributes about 2.6% of the total benefit.

6.0 NON-LOAD RELATED EXPENDITURE

Non-load related expenditure represents the investments necessary to maintain world-leading levels of reliability and asset resilience. By effectively managing the condition and risk of the asset base, we provide a secure platform for the transition to Net Zero. The CVPs represent the additional value derived from the detailed condition assessment and knowledge of the asset base, detailed planning and design. Additional value is also derived from the consideration of the wider network impacts of elements of our plan and the close co-operation with the ESO to produce the overall most economical and efficient solution. These CVPs are summarised on page 86 of our business plan.

CVP 6.1 - *Network users and consumers benefit by reduced network risk as a result of our plan. The benefit is £1.6bn higher than if we had deferred the investments.*

Assumptions – We have used the standard CBA and Longer Term Risk Benefit templates issued by Ofgem to determine the net present values (NPV) of our investments in lead assets. The baseline option for these investments is to defer the projects to RIIO-T3. The preferred options for projects included in the RIIO-T2 business plan have higher NPVs than the baseline. The sum of the difference between the NPVs for the preferred options and the respective baselines is £1566m.

CVP 6.2 - *By using advanced modelling of asset condition, we have maximised the economic lives of our assets, avoiding £81m of investment in RIIO-T2.*

Assumptions – We have undertaken a significant programme of condition assessments to determine the condition issues affecting our assets as the starting point for the creation of the business plan. When undertaking a risk-based prioritisation and optimisation of the plan, some investments were identified that, while intervention would be justified in RIIO-T2, the detailed assessment of asset condition (crucially including non-lead assets) would permit them to be de-prioritised. The de-prioritisation required careful consideration of the site-specific consequences of failure and contingency plans in the event of asset failure. This was only possible due to the condition assessments and the detailed engineering exercise to determine bespoke scopes of work for each project. The total cost of the schemes which have been deferred is £80.73m.

CVP 6.3 - *By doing detailed designs and extensive planning, we have generated a net benefit of up to £5.7m of avoided network constraint costs.*

Assumptions – When developing the options for the management of asset risk at Windyhill 275kV substation, we identified that the short-list of practical options would result in different levels of network constraint costs.

1. Option 1 is an on-line bay-by-bay rebuild which would require extensive network outages but has the lowest capital costs.
2. Option 2 is an off-line build which would be based on GIS given the space limitations on site. This option has higher capital costs but the outage requirements are significantly reduced.
3. Option 3 differs from option 2 only by the use of Gas Insulated Busbar employing an alternative to SF_6.

We engaged with the Electricity System Operator to obtain forecast constraint costs. We provided them with a detailed series of capabilities for major system boundary B5 derived from our stage-by-stage construction plans. This allowed them to use their economic models – as used in the NOA process – to generate constraint forecasts for each of the Future Energy Scenarios. The Cost Benefit Analysis shows that the net present value (NPV) of Option 3 (which is preferred is) £5.71m higher than the NPV of the lowest capex option (Option 1).

7.0 OUTPUT INCENTIVE PROPOSAL

We have used measurable data where possible to quantify the output incentive CVPs (e.g. carbon savings, avoided constraint costs). However, where this is not possible, we have used Willingness to Pay research findings as financial proxies for the value that stakeholders have said that they place on an output. We have used the below CVPs to inform our social return on investment (SROI) presented in the Output Incentive Proposals chapter of the main business plan (Table 6). The SROI tool is still in development stage, however we believe it represents a relatable way to present the benefits of our output incentive proposals to our stakeholders.

The CVPs presented below are those that have a financial reward attached. We have chosen to present a CVP for each of these incentives as they represent areas in which we are going beyond the minimum requirements and beyond the functions typically undertaken by an energy networks company. These CVPs are summarised on page 148 of our business plan.

Table 6: Social Return on Investment

Category	**SROI**
Meeting the Needs of Consumers	£3.43
Maintaining a Safe and Reliable Network	£4.19
Delivering an Environmentally Sustainable Network	£2.00
	£9.62

CVP 7.1- *Connections Incentive: Using Willingness to Pay research conducted by Accent, we estimate a consumer value of £9.5m per annum for our connections incentive.*

Assumptions: Our connections incentive is made up of three sections: Quality of Connection Survey, Quality of Engagement Survey and Timely Connections Offers. Although we have approximately 100 connections offers per annum, we believe that this incentive will benefit all our customers (and all connected customers in GB). We also assume that all our 2m consumers will benefit from this incentive.

Table 7: Accent Willingness to Pay

Attribute	Value
Make it easier for customers to connect to the networks. Do this by providing information on the network.	£1.58
Providing customers with access to information quickly and easily, in a range of formats.	£3.20

CVP 7.2- *Our Stakeholder Engagement Plus Incentive has a consumer value of £3.4m per annum for each of the three outputs we are proposing.*

Assumptions: Our Stakeholder Engagement Plus incentive is divided into three output categories. The first is Black Start Resilience of Communities in Vulnerable Circumstances. This incentive aims to help communities that are remote and most at risk if a Black Start instance occurred. We have used Explain willingness to pay results to inform this CVP calculation (Table 8). We have assumed that 17% of the total Scottish population are classed as 'remote' (based on Scottish Government figures) and therefore vulnerable by this definition. We also assume that there are 2m customers in our licence areas that will benefit from this incentive.

The second part of the incentive is Community Energy Schemes Capability. We are aiming to help three community energy schemes per year. We have used Accent Willingness to Pay research to inform this part of the CVP (see Table 9) We also assume that there are 2m customers in our licence areas that will benefit from this incentive.

The third part of the incentive is Stakeholder Engagement Performance Levels. Again, we use Accent Willingness to Pay research to inform this (see Table 9). We also assume that there are 2m customers in our licence areas that will benefit from this incentive.

Table 8: Explain Willingness to Pay Research

Attribute	Value
Recovering more quickly from blackouts	£0.71

Table 9: Accent Willingness to Pay Research

Attribute	Value
Engage with a range of community energy schemes looking to connect localised, small scale renewable energy onto the network.	£1.29
Engage stakeholders such as local authorities and developers with their future planning by helping them understand our short and long-term investment plans.	£0.30

CVP 7.3- *Our Network Availability Incentive has a consumer value of up to £6.5m per annum.*

Assumptions- The first part of this incentive is Energy Not Supplied (ENS). For this, we assume a Value of Lost Load (VoLL) that is in line with RIIO-T1 (i.e. £16,000 per MWh). We also assume a baseline of 178MWh of ENS each year, which is the average of our 18-year rolling ENS performance and our current ENS target (225MWh) (see Output Incentive Proposals section of the Business Plan).

The second part of the incentive is Optimising Network Availability for Connected Generation. We assume that 2,560 GWh of renewable energy per year is potentially affected by constraints. We have used the data below to calculate the avoided CO2 cost.

Table 10: Assumed Carbon Costs

Assumption	Source	Factor
Electricity GHG conversion factor (t/MWh) for 2026 (GF)	Ofgem CBA	0.2823
Traded carbon price (£/t) for 2026 (CP)	Ofgem CBA	50.61

CVP 7.4- *Our proposed incentive on Whole System ESO-TO Constraint Mitigation equates to a consumer value of up to £21m per annum.*

Assumptions: We assume that there will be £210m of constraint costs annually based on the ESO monthly reports. Our ESO-TO constraint mitigation incentive has the aim to reduce these by approximately 10%.

Table 11: Balancing Services Summary, March 2019 (from ESO monthly reports)

	Total (18/19, £m)
BM Constraints Scotland	91.14
BM Constraints Cheviot	118.74

CVP 7.5- *Our proposed incentive of 'Additional Contribution to the Low Carbon Transition' equates to a consumer value of £3.16m*

Assumptions: Our Additional Contribution to the Low Carbon Transition incentive has three elements. The first is maximising supply chain sustainability. The benefits of this are difficult to quantify at this stage. However, a recent life cycle assessment pilot suggested that activities in our supply chain may represent over 70% of the total carbon impact of our network and operations, and so the carbon savings from this incentive could be substantial. We also know from the PAS2080 standard for reducing embodied carbon that our ability to influence the carbon embodied in our infrastructure is greatest at the beginning of the investment process and diminishes through design and construction phases. This means that if we can get our supply chain involved in proposing novel solutions earlier in the process than they currently can, we stand to make bigger reductions in embodied carbon. Due to the difficulty in quantifying this benefit at this time, we have used willingness to pay findings from Accent (Table 12). We put a 70% weight on this and assume it benefits the 2m customers in our licence area.

The second element is Accelerating Adoption of Low Carbon Fleet. You can find our CVP for this initiative within 'An Environmentally Sustainable Network' chapter within this annex.

The third element is Delivering Biodiversity Net Gain Initiatives. For this we use Explain willingness to pay research (Table 13). We assume that this will benefit the 2m customers in our licence area.

Table 12: Accent Willingness to Pay Research

Attribute	**Value**
Develop Initiatives to Reduce the Environmental Impact of Network Companies Activities	£1.60

Table 13: Explain Willingness to Pay Research

Attribute	**Value**
Improving the environment at transmission sites	£0.45

Please see CVP7.1 in our Environmentally Sustainable Network chapter in this annex for our CVP on our SF6 strategy.