Cost-benefit analysis tables 2022-23

Use *Bookmarks* function to navigate to the respective file, using the file names from the list below.

Cost-benefit analysis summaries associated with Annex 4 (Losses)

Northeast licence area:

- NE RRP 2022-23 11kV 300 cable CBA RIIO ED1
- NE RRP 2022-23 LV 300 wf cable CBA RIIO ED1
- NE RRP 2022-23 Pre-1958 transformers CBA RIIO ED1

Yorkshire licence area:

- YE RRP 2022-23 11kV 300 cable CBA RIIO ED1
- YE RRP 2022-23 LV 300 wf cable CBA RIIO ED1
- YE RRP 2022-23 Pre-1958 transformers CBA RIIO ED1

Cost-benefit analysis summaries associated with Annex 6 (Innovative Solutions)

- NPg RRP 2015-16 Table E6 CBA **(APRS)**
- NPg RRP 2015-16 Table E6 CBA **(LV technology)**
- NPg RRP 2015-16 Table E6 CBA **(PFT)**
- NPg RRP 2015-16 Table E6 CBA **(Telematics)**
- NPg RRP 2016-17 Table E6 CBA **(OilRegeneration)**

version number	use / purpose	date	changes made
Template CBA RIIO ED1 v1.xls	initial draft RIIO-GD1 model issued for demo purposes		-
Template CBA RIIO ED1 v2.xls	draft RIIO-ED1 model demonstrated during the CBA meeting held on the 19 March	19/03/2013	updated the model to reflect ED1 rather than GD1
Template CBA RIIO ED1 v3.xls	issued to DNOs to complete the 2 worked examples (leaking cable and QoS)	28/03/2013 03/04/2013	updated to reflect discussions at the CBA meeting including straight line depreciation assumption for ED1, addition of fixed parameter assumptions for non-monetary items re-issued on 3 April to correct CI/CML fixed data transpose error
Template CBA RIIO ED1 v4.xls	final version of CBA spreadsheet to take into account worked examples	16/04/2013	updated to reflect DNO feedback following completion of worked examples main changes include: - included baseline scenario worksheet - removed VOLL as CI/CML method of monetising loss of supply was viewed as robust method - amended the CO2 conversion factor associated with losses to take into account assumptions regarding future decarbonisation of electricity - updated fixed data parameters to 2012/13 prices
		29/04/2013	removed '~~do minimum~~' text in cell B9 of *Option summary* worksheet
		10/01/2014	Inserted clarification comment in cell C9 of the *Option 1* worksheet.
		10/01/2014	Clarified text in cell B1 of *Option summary* worksheet.
		10/01/2014	Clarified text in cell F26 of *Option summary* worksheet.

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).

Costs should be entered as negative values.

Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying dat
Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

To quantify loss savings between 185mm2 and 300mm2 Triplex for 11kV cables (from second leg of feeder downstream)

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment
"do minimum" option	Existing design policy of using 185mm2 for 11kV feeders from second leg downstream. (300mm2 for first leg from Primary S/S).
Using 300mm2 11kV Cable	Using 300mm2 for all 11kV feeder sections

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					5 years	10 years	30 years	45 years	DNO view
1	300mm2 for all 11kV network feeders	Adopted	To be considered as a adesign policy change as appears to be cost effective	Not reported directly in BDPT pack. These CBAs were used to quantify options for the Losses Strategy paper. Not licence specific	-£0.17	-£0.25	£0.03	£0.18	
2									
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to
		2012/13
Convert from	**2003/04**	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00	95.00
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07	102.63
Losses (£/MWh)	£48.42																		
CI (£s per interruption)	£10.47																		
CML (£s per minute lost)	£0.26																		
Cost per fatality (£m)[2]	£1.79																		
Cost per major injury (£m)[2]	£0.03																		
Cost per litre oil (£/litre)	£36																		
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271	0.256

	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	31 2046	32 2047	33 2048	34 2049	35 2050	36 2051
Traded carbon price (£/t 2010/11)[1]	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00
traded carbon price (£/t 2012/13 prices)	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68
Electricity GHG conversion factor (tonnes per MWh)[3]	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010

	37 2052	38 2053	39 2054	40 2055	41 2056	42 2057	43 2058	44 2059	45 2060	46 2061	47 2062	48 2063	49 2064	50 2065	51 2066	52 2067
Traded carbon price (£/t 2010/11)[1]	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

Decarbonisation of electricity assumption:
Power sector emissions are anticipated to reduce to 10g/kWh by 2050
assume a linear decarbonisation pathway from 2009/10 until 2050

Power sector emissions reduce by 14.5 g/kWh p.a. between now and 2030.
Beyond 2050 keep emissions at 10g/kWh

		g CO2e per kWh	
1,000 kg = 1 tonne	2009/10	589.82	(Defra)
1,000 kWh = 1 MWh	2010/11	575.32	
1 kg = 1,000g	2011/12	560.83	
	2012/13	546.33	
	2013/14	531.84	
	2014/15	517.34	
	2015/16	502.85	
	2016/17	488.35	
	2017/18	473.86	
	2018/19	459.36	
	2019/20	444.87	
	2012/21	430.37	
	2021/22	415.87	
	2022/23	401.38	
	2023/24	386.88	
	2024/25	372.39	
	2025/26	357.89	
	2026/27	343.40	
	2027/28	328.90	
	2028/29	314.41	
	2029/30	299.91	
	2030/31	285.41	
	2031/32	270.92	
	2032/33	256.42	
	2033/34	241.93	
	2034/35	227.43	
	2035/36	212.94	
	2036/37	198.44	
	2037/38	183.95	
	2038/39	169.45	
	2039/40	154.96	
	2040/41	140.46	
	2041/42	125.96	
	2042/43	111.47	
	2043/44	96.97	
	2044/45	82.48	
	2045/46	67.98	
	2046/47	53.49	
	2047/48	38.99	
	2048/49	24.50	
	2049/50	10.00	
	check	10.00	assumption; power sector should reduce to 10 g CO2e/kWh

14.50 p.a. reduction in carbon intensity

CBA Option 1 — **300mm2 for all 11kV network feeders**

Term (years from first out flow)	NPV (£m)
5	-£0.17
10	-£0.25
30	£0.03
45	£0.18
first year of investment out flow	1

			RIIO-ED1								RIIO-ED2								RIIO-ED3								RIIO-ED4								RIIO-ED5								RIIO-ED6								RIIO-ED7			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Investment																																																							
Asset Replacement		£m	(0.06)	(0.16)	(0.05)	(0.22)	(0.23)	(0.15)	(0.14)	(0.27)																																										
Please specify		£m																																																		
Please specify		£m																																																		
Please specify		£m																																																		
Please specify		£m																																																		
Total investment		£m	(0.06)	(0.16)	(0.05)	(0.22)	(0.23)	(0.15)	(0.14)	(0.27)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Avoided DNO costs																																																							
Inspections & Maintenance		£m																																																		
Asset Replacement		£m																																																		
Please specify		£m																																																		
Please specify		£m																																																		
Please specify		£m																																																		
Please specify		£m																																																		
Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	(0.06)	(0.16)	(0.05)	(0.22)	(0.23)	(0.15)	(0.14)	(0.27)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	(2)	%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%							
Capitalised investment	(3)=(1)x(2)	£m	(0.04)	(0.11)	(0.03)	(0.16)	(0.17)	(0.11)	(0.10)	(0.19)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Investment to be expensed	(4)=(1)-(3)	£m	(0.02)	(0.04)	(0.01)	(0.06)	(0.07)	(0.04)	(0.04)	(0.07)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Depreciation	(5)=∑(5)t	£m	-	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Cost of Capital	(6)=avg[(6^cl),(6^op)]xWACC	£m	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.02)**	**(0.05)**	**(0.02)**	**(0.08)**	**(0.09)**	**(0.07)**	**(0.08)**	**(0.12)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.03)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.01)**	**(0.01)**	**(0.01)**
Societal benefits (£m) i.e. costs avoided																																																							
Losses		£m	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	-	-	-	-	-	-	-
CO2e associated with losses		£m	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-
Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)		£m																																																		
Other 2 (specify)		£m																																																		
Other 3 (specify)		£m																																																		
Total societal net benefits		**£m**	**0.002**	**0.009**	**0.010**	**0.019**	**0.029**	**0.037**	**0.045**	**0.059**	**0.06**	**0.06**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.08**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**0.06**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits		**£m**	**(0.02)**	**(0.04)**	**(0.01)**	**(0.06)**	**(0.06)**	**(0.04)**	**(0.03)**	**(0.06)**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.03**	**0.03**	**0.03**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.04**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.01)**	**(0.01)**	**(0.01)**
Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits		£m	(0.01)	(0.04)	(0.01)	(0.05)	(0.05)	(0.03)	(0.03)	(0.05)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cumulative discounted net benefits		**£m**	**(0.01)**	**(0.05)**	**(0.06)**	**(0.11)**	**(0.17)**	**(0.20)**	**(0.22)**	**(0.2683)**	**(0.26)**	**(0.25)**	**(0.24)**	**(0.23)**	**(0.22)**	**(0.21)**	**(0.19)**	**(0.18)**	**(0.16)**	**(0.14)**	**(0.13)**	**(0.11)**	**(0.10)**	**(0.08)**	**(0.06)**	**(0.05)**	**(0.03)**	**(0.02)**	**(0.00)**	**0.01**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.09**	**0.10**	**0.11**	**0.12**	**0.13**	**0.14**	**0.15**	**0.16**	**0.17**	**0.1757**	**0.17**	**0.16**	**0.16**	**0.16**	**0.15**	**0.15**	**0.15**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Societal net benefits (impact relative to business as usual scenario)	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Reduced losses	MWh	44	165	200	367	544	659	765	969	974	979	984	989	994	998	1,003	1,009	1,014	1,019	1,024	1,028	1,034	1,039	1,044	1,050	1,055	1,060	1,065	1,071	1,076	1,082	1,087	1,092	1,098	1,103	1,109	1,114	1,120	1,126	1,131	1,137	1,143	1,148	1,154	1,160	1,166	-	-	-	-	-	-	-
Reduced emissions associated with losses	tCO2e	22.30	80.41	94.67	168.54	241.95	283.42	318.04	388.94	376.77	364.47	352.04	339.47	326.77	313.93	300.95	287.84	274.59	261.20	247.67	233.99	220.18	206.22	192.11	177.86	163.46	148.91	134.21	119.36	104.36	89.20	73.89	58.43	42.81	27.03	11.09	11.14	11.20	11.26	11.31	11.37	11.43	11.48	11.54	11.60	11.66	-	-	-	-	-	-	-
Reduced number of customers interrupted	no.																																																				
Reduced customer minutes lost	Mins																																																				
Reduced emissions (not associated with losses)[1]	tCO2e																																																				
Reduced probability of fatality[2]	%																																																				
Reduced probability of major injury[2]	%																																																				
Reduced oil leakage	Litres																																																				

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Please specify
Total investment
Connections
Diversions
Reinforcement
ESQCR
Asset Replacement
Refurbishment
Civil Works
Operational IT & Telecoms
Legal & Safety
QoS
High Value Projects
Flooding
BT21CN
Technical losses and other environmental
High impact Low Probability (HILP)
Critical National Infrastructure
Black Start
Rising Mains and Laterals
Undergrounding Within/ Outside designated areas
Worst Served Customers
Trouble Call / faults
ONIs
Inspections & Maintenance
Tree Cutting
NOC's Other
Network Design & Engineering
Project Management
Engineering Mgt & Clerical Support
System Mapping - Cartographical
Control Centre
Call Centre
Stores
Operational Training
Vehicles & Transport
Atypicals Non Sev Weather
Smart Meters
Network Policy
HR & Non-operational Training
Finance & Regulation
CEO
IT & Telecoms
Property Mgt
Non Op Capex

Workings / assumptions used for costing option 1
Use this sheet to provide details of assumptions and calculation methodology used in CBA model

1. Assumptions:

1) The losses calculations for the LV UG cables apply the square pyramidal rule, where the load is evenly distributed along the feeder.
The maximum demand of the feeder (at 0.95pf) is fixed at 79 kVA(114 Amps) for 50 customers, with an average length of 500 meters.
The number of evenly spaced sections along the feeder are fixed at 3, with 166.7 meters length per section, having an incremental reduction in load of 38.1 Amps.
This method is consistent with the Northern Powergrid Code of Practice for the Methodology of Assessing Losses
2) Only 80% of the cable volumes recorded are taken into acount in the losses assessment of oversizing the LV cables from 185mm2 Wf to 300mm2,
(while the remaining 20% have taken into consideration the existing proportion in plan at 300mm2 and the physical limitations of the cable installations due to the size of the 300mm2 cables (which includes bending radius)).
3) The load is balanced.
4) All cables have a Loss Load Factor (LLF) of 0.25.
5) Only variable losses are taken into account. Fixed losses are neglected in this assessment.
6) Annual reduction in losses is based on the 80% annual volumes of cables added and multiply with the constant value of annual per km of losses savings of 3.53 MWh (see cell C70).

2. Losses calculations

Colour code | User input

NPGY
2012

				Volumes																
Additions				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	
Asset	**Name**	**Voltage**	**Units**	DPCR4	DPCR5					RIIO-ED1									DPCR5	RIIO-ED1
Cable	LV Main (UG Consac)	LV	km		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cable	LV Main (UG Plastic)	LV	km							-	-	-								
Cable	LV Main (UG Paper)	LV	km		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NPGN
2012

				Volumes																
Additions				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	
Asset	**Name**	**Voltage**	**Units**	DPCR4	DPCR5					RIIO-ED1									DPCR5	RIIO-ED1
Cable	LV Main (UG Consac)	LV	km		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cable	LV Main (UG Plastic)	LV	km							93.920	42.850	45.000	109.000	99.000	77.000	134.000	101.000			**701.770**
Cable	LV Main (UG Paper)	LV	km		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total LV Main (NPGY + NPGN)	LV	km					**@**	**80%**	**75.1360**	**34.2800**	**36.0000**	**87.2000**	**79.2000**	**61.6000**	**107.2000**	**80.8000**	**-**		**561.4160**

Table 1. LV UG cable volumes

	2016	2017	2018	2019	2020	2021	2022	2023
Cost difference per year (based on volumes) in £m	**(0.188)**	**(0.086)**	**(0.090)**	**(0.218)**	**(0.198)**	**(0.154)**	**(0.268)**	**(0.202)**

Unit cost per km 185mm2 Wf (baseline)	105	£k/km
Unit cost per km 300mm2 Wf (proposed)	107.5	£k/km
Difference	2.5	£k/km
Assumed customers on LV feeder	50	Customers
Average Diversified Maximum Demand	1.5	kW
Maximum Demand on Feeder (at 0.95pf)	79	kVA
Current at 400/230V	114	Amps
Loss Load Factor	0.25	
Hours per year	8766	hours
Number of feeder sections (to distribute load)	3	
Average feeder length	500	metres
Incremental load reduction per section	38.1	Amps
Length Split/per section	166.7	metres
Square pyramidal number [(2n3 + 3n2 + n)/6] - defining total I2 increments for each section (Used to make calculation less computationally intensive when varying number of feeder sections to be considered)	*14*	
Resistance of 185mm2 Wf Cable (phase conductor)/km	0.205	Ohm/km
Resistance of 300mm2 Wf Cable (phase conductor)/km	0.126	Ohm/km
Resistance of 185mm2 Wf Cable (phase conductor)/section	0.034	Ohm
Resistance of 300mm2 Wf Cable (phase conductor)/section	0.021	Ohm
Losses on 185mm2 on feeder	4.574	MWh/feeder/yr
Losses on 300mm2 on feeder	2.812	MWh/feeder/yr
Losses on 185mm2 per km	9.15	MWh/km
Losses on 300mm2 per km	5.62	MWh/km
Reduction in losses	**3.53**	**MWh/km/year**

Table 2. Losses calculations for the LV UG cables.

3. Summary

	RIIO-ED1							
Year	1	2	3	4	5	6	7	8
Year	2016	2017	2018	2019	2020	2021	2022	2023
Estimated total cost for proposed option (£m)	8.08	3.69	3.87	9.37	8.51	6.62	11.524	8.69
Estimated distribution losses-justified cost (£m)	0.188	0.086	0.090	0.218	0.198	0.154	0.268	0.202
Reduction in losses MWh/year	264.90	120.86	126.92	307.43	279.23	217.18	377.94	284.87
ED1 Period - cumulative	264.898	385.755	512.677	820.108	1,099.334	1,316.510	1,694.453	1,979.32

	RIIO-ED2							
Year	9	10	11	12	13	14	15	16
Year	2024	2025	2026	2027	2028	2029	2030	2031
Estimated total cost for proposed option (£m)								
Estimated distribution losses-justified cost (£m)								
Reduction in losses MWh/year								
ED1 Period - cumulative	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32

	RIIO-ED3							
Year	17	18	19	20	21	22	23	24
Year	2032	2033	2034	2035	2036	2037	2038	2039
Estimated total cost for proposed option (£m)								
Estimated distribution losses-justified cost (£m)								
Reduction in losses MWh/year								
ED1 Period - cumulative	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32

	RIIO-ED4							
Year	25	26	27	28	29	30	31	32
Year	2040	2041	2042	2043	2044	2045	2046	2047
Estimated total cost for proposed option (£m)								
Estimated distribution losses-justified cost (£m)								
Reduction in losses MWh/year								
ED1 Period - cumulative	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32

	RIIO-ED5									
Year	33	34	35	36	37	38	39	40	41	42
Year	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
Estimated total cost for proposed option (£m)										
Estimated distribution losses-justified cost (£m)										
Reduction in losses MWh/year										
ED1 Period - cumulative	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32	1,979.32

Table 3. Summary of estimated losses values and costs

Term (years from the year of installation	NPV (£m)	NPV (£)
5	-£0.12	-£116,243.87
10	-£0.03	-£28,697.02
30	£0.90	£902,706.60
45	£1.25	£1,254,900.51
Breakeven Year		**2026**

Table 4. Net present values (NPV) and the breakeven year

RIIO-ED6		
43	44	45
2058	2059	2060
1,979.32	1,979.32	1,979.32

version number	use / purpose	date	changes made
Template CBA RIIO ED1 v1.xls	initial draft RIIO-GD1 model issued for demo purposes		-
Template CBA RIIO ED1 v2.xls	draft RIIO-ED1 model demonstrated during the CBA meeting held on the 19 March	19/03/2013	updated the model to reflect ED1 rather than GD1
Template CBA RIIO ED1 v3.xls	issued to DNOs to complete the 2 worked examples (leaking cable and QoS)	28/03/2013 03/04/2013	updated to reflect discussions at the CBA meeting including straight line depreciation assumption for ED1, addition of fixed parameter a items re-issued on 3 April to correct CI/CML fixed data transpose error
Template CBA RIIO ED1 v4.xls	final version of CBA spreadsheet to take into account worked examples	16/04/2013	updated to reflect DNO feedback following completion of worked examples main changes include: - included baseline scenario worksheet - removed VOLL as CI/CML method of monetising loss of supply was viewed as robust method - amended the CO2 conversion factor associated with losses to take into account assumptions regarding future decarbonisation of elect - updated fixed data parameters to 2012/13 prices
		29/04/2013	removed '~~do minimum~~' text in cell B9 of *Option summary* worksheet
		10/01/2014	Inserted clarification comment in cell C9 of the *Option 1* worksheet.
		10/01/2014	Clarified text in cell B1 of *Option summary* worksheet.
		10/01/2014	Clarified text in cell F26 of *Option summary* worksheet.

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business p
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).

Costs should be entered as negative values.

Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying dat
Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

To quantify losses savings of targeted replacement of pre-1958 distribution transformers.

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

Targeted replacement of pre-1958 distribution transformers with a Health Index of 3.

List below all options considered to meet the stated aim

Options considered / project name	Comment
"do minimum" option	Transformers replacement due to their condition (where the Health Index ≥ HI4) and/or as a consequence of other works at site, e.g. due to the condition of the LV board and/or HV switchgear and/or building and/or if it's closely coupled, i.e. where there are secondary drivers.
Targeted replacement of pre-1958 distribution transformers	Targeted/accelerated replacement of pre-1958 distribution transformers with a Health Index of 3 as part of the work programme selection criteria for the replacement of indoor and outdoor substations.

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods (£m)				
					5 years	10 years	20 years	45 years	DNO view
1	Targeted replacement of pre-1958 distribution transformers with a Health Index of 3.	Adopted	Adopted as a design policy due to payback period being within 10 years of investment.	Not reported directly in BDPT pack. These CBAs could be used to quantify options for the Losses Strategy. Not licence specific	#REF!	#REF!	#REF!	#REF!	
2									
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to **2012/13**
Convert from	**2003/04**	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	2012/13 prices	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05
Losses (£/MWh)	£48.42																										
CI (£s per interruption)	£10.47																										
CML (£s per minute lost)	£0.26																										
Cost per fatality (£m)[2]	£1.79																										
Cost per major injury (£m)[2]	£0.03																										
Cost per litre oil (£/litre)	£36																										
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Traded carbon price (£/t 2010/11)[1]	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

Decarbonisation of electricity assumption:
Power sector emissions are anticipated to reduce to 10g/kWh by 2050
assume a linear decarbonisation pathway from 2009/10 until 2050

Power sector emissions reduce by 14.5 g/kWh p.a. between now and 2030.
Beyond 2050 keep emissions at 10g/kWh

		g CO2e per kWh	
1,000 kg = 1 tonne	2009/10	589.82	(Defra)
1,000 kWh = 1 MWh	2010/11	575.32	
1 kg = 1,000g	2011/12	560.83	
	2012/13	546.33	
	2013/14	531.84	
	2014/15	517.34	
	2015/16	502.85	
	2016/17	488.35	
	2017/18	473.86	
	2018/19	459.36	
	2019/20	444.87	
	2012/21	430.37	
	2021/22	415.87	
	2022/23	401.38	
	2023/24	386.88	
	2024/25	372.39	
	2025/26	357.89	
	2026/27	343.40	
	2027/28	328.90	
	2028/29	314.41	
	2029/30	299.91	
	2030/31	285.41	
	2031/32	270.92	
	2032/33	256.42	
	2033/34	241.93	
	2034/35	227.43	
	2035/36	212.94	
	2036/37	198.44	
	2037/38	183.95	
	2038/39	169.45	
	2039/40	154.96	
	2040/41	140.46	
	2041/42	125.96	
	2042/43	111.47	
	2043/44	96.97	
	2044/45	82.48	
	2045/46	67.98	
	2046/47	53.49	
	2047/48	38.99	
	2048/49	24.50	
	2049/50	10.00	
	check	10.00	assumption; power sector should reduce to 10 g CO2e/kWh

14.50	p.a. reduction in carbon intensity

CBA Option 1 **Capitalised Cost Transformer**

Term (years from first out flow)	NPV (£m)
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
first year of investment out flow	#REF!

				RIIO-ED1								RIIO-ED2							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Investment	Asset Replacement		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!								
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total investment		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m																
	Asset Replacement		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m																
	Other 2 (specify)		£m																
	Other 3 (specify)		£m																
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82	0.81	0.80	0.79
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

				RIIO-ED3								RIIO-ED4							
				17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
		Calculation	Units	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Investment	Asset Replacement		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total investment		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m																
	Asset Replacement		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m																
	Other 2 (specify)		£m																
	Other 3 (specify)		£m																
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41	0.40	0.38	0.37	0.36	0.40	0.39
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

				RIIO-ED5								RIIO-ED6							
				33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
		Calculation	Units	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063
Investment	Asset Replacement		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total investment		£m	-	-	-	-	-	-	-	-	-	-	-	-	-			
Avoided DNO costs	Inspections & Maintenance		£m																
	Asset Replacement		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Please specify		£m																
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%			
	Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Depreciation	$(5)=\sum(5)_t$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m																
	Other 2 (specify)		£m																
	Other 3 (specify)		£m																
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.38	0.37	0.36	0.35	0.33	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.61	0.60	0.59	0.59	0.58	0.57	0.56	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

				RIIO-ED7			
				49	50	51	52
		Calculation	Units	2064	2065	2066	2067
Investment	Asset Replacement		£m				
	Please specify		£m				
	Please specify		£m				
	Please specify		£m				
	Please specify		£m				
	Total investment		£m				
Avoided DNO costs	Inspections & Maintenance		£m				
	Asset Replacement		£m				
	Please specify		£m				
	Please specify		£m				
	Please specify		£m				
	Please specify		£m				
	Total avoided DNO costs		£m	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-
	Capitalisation rates	(2)	%				
	Capitalised investment	(3)=(1)x(2)	£m				
	Investment to be expensed	(4)=(1)-(3)	£m				
	Depreciation	$(5)=\sum(5)_t$	£m	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-
	Fatality		£m	-	-	-	-
	Major injury		£m	-	-	-	-
	Oil leakage		£m	-	-	-	-
	Other 1 (specify)		£m				
	Other 2 (specify)		£m				
	Other 3 (specify)		£m				
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.23	0.23	0.22	0.22
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.48	0.48	0.47	0.46
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

			1–52 (2016–2067)
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh	#REF! (each year, 1–52)
	Reduced emissions associated with losses	tCO2e	#REF! (each year, 1–52)
	Reduced number of customers interrupted	no.	
	Reduced customer minutes lost	Mins	
	Reduced emissions (not associated with losses)[1]	tCO2e	
	Reduced probability of fatality[2]	%	
	Reduced probability of major injury[2]	%	
	Reduced oil leakage	Litres	

#REF!

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Please specify
Total investment
Connections
Diversions
Reinforcement
ESQCR
Asset Replacement
Refurbishment
Civil Works
Operational IT & Telecoms
Legal & Safety
QoS
High Value Projects
Flooding
BT21CN
Technical losses and other environmental
High impact Low Probability (HILP)
Critical National Infrastructure
Black Start
Rising Mains and Laterals
Undergrounding Within/ Outside designated areas
Worst Served Customers
Trouble Call / faults
ONIs
Inspections & Maintenance
Tree Cutting
NOC's Other
Network Design & Engineering
Project Management
Engineering Mgt & Clerical Support
System Mapping - Cartographical
Control Centre
Call Centre
Stores
Operational Training
Vehicles & Transport
Atypicals Non Sev Weather
Smart Meters
Network Policy
HR & Non-operational Training
Finance & Regulation
CEO
IT & Telecoms
Property Mgt
Non Op Capex

version number	use / purpose	date	changes made
Template CBA RIIO ED1 v1.xls	initial draft RIIO-GD1 model issued for demo purposes		-
Template CBA RIIO ED1 v2.xls	draft RIIO-ED1 model demonstrated during the CBA meeting held on the 19 March	19/03/2013	updated the model to reflect ED1 rather than GD1
Template CBA RIIO ED1 v3.xls	issued to DNOs to complete the 2 worked examples (leaking cable and QoS)	28/03/2013 03/04/2013	updated to reflect discussions at the CBA meeting including straight line depreciation assumption for ED1, addition of fixed parameter a items re-issued on 3 April to correct CI/CML fixed data transpose error
Template CBA RIIO ED1 v4.xls	final version of CBA spreadsheet to take into account worked examples	16/04/2013	updated to reflect DNO feedback following completion of worked examples main changes include: - included baseline scenario worksheet - removed VOLL as CI/CML method of monetising loss of supply was viewed as robust method - amended the CO_2 conversion factor associated with losses to take into account assumptions regarding future decarbonisation of elect - updated fixed data parameters to 2012/13 prices
		29/04/2013	removed '~~do minimum~~' text in cell B9 of *Option summary* worksheet
		10/01/2014	Inserted clarification comment in cell C9 of the *Option 1* worksheet.
		10/01/2014	Clarified text in cell B1 of *Option summary* worksheet.
		10/01/2014	Clarified text in cell F26 of *Option summary* worksheet.

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business p
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).

Costs should be entered as negative values.

Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying dat
Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

To quantify loss savings between 185mm2 and 300mm2 Triplex for 11kV cables (from second leg of feeder downstream)

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment
"do minimum" option	Existing design policy of using 185mm2 for 11kV feeders from second leg downstream. (300mm2 for first leg from Primary S/S).
Using 300mm2 11kV Cable	Using 300mm2 for all 11kV feeder sections

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					5	10	30	45 years	DNO view
1	300mm2 for all 11kV network feeders	Adopted	To be considered as a adesign policy change as appears to be cost effective.	Not reported directly in BDPT pack. These CBAs were used to quantify options for the Losses Strategy paper. Not licence specific.	#REF!	#REF!	#REF!	#REF!	
2									
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to **2012/13**
Convert from	**2003/04**	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23
Losses (£/MWh)	£48.42													
CI (£s per interruption)	£10.47													
CML (£s per minute lost)	£0.26													
Cost per fatality (£m)[2]	£1.79													
Cost per major injury (£m)[2]	£0.03													
Cost per litre oil (£/litre)	£36													
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329

	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041
Traded carbon price (£/t 2010/11)[1]	68.94	75.65	81.00	88.00	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00
traded carbon price (£/t 2012/13 prices)	74.48	81.73	87.51	95.07	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05
Electricity GHG conversion factor (tonnes per MWh)[3]	0.314	0.300	0.285	0.271	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140

	27 2042	28 2043	29 2044	30 2045	31 2046	32 2047	33 2048	34 2049	35 2050	36 2051	37 2052	38 2053	39 2054
Traded carbon price (£/t 2010/11)[1]	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00	227.00	234.00	241.00
traded carbon price (£/t 2012/13 prices)	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68	245.24	252.80	260.37
Electricity GHG conversion factor (tonnes per MWh)[3]	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010	0.010	0.010	0.010

	40 2055	41 2056	42 2057	43 2058	44 2059	45 2060	46 2061	47 2062	48 2063	49 2064	50 2065	51 2066	52 2067
Traded carbon price (£/t 2010/11)[1]	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

Decarbonisation of electricity assumption:
Power sector emissions are anticipated to reduce to 10g/kWh by 2050
assume a linear decarbonisation pathway from 2009/10 until 2050

Power sector emissions reduce by 14.5 g/kWh p.a. between now and 2030.
Beyond 2050 keep emissions at 10g/kWh

		g CO2e per kWh	
1,000 kg = 1 tonne	2009/10	589.82	(Defra)
1,000 kWh = 1 MWh	2010/11	575.32	
1 kg = 1,000g	2011/12	560.83	
	2012/13	546.33	
	2013/14	531.84	
	2014/15	517.34	
	2015/16	502.85	
	2016/17	488.35	
	2017/18	473.86	
	2018/19	459.36	
	2019/20	444.87	
	2012/21	430.37	
	2021/22	415.87	
	2022/23	401.38	
	2023/24	386.88	
	2024/25	372.39	
	2025/26	357.89	
	2026/27	343.40	
	2027/28	328.90	
	2028/29	314.41	
	2029/30	299.91	
	2030/31	285.41	
	2031/32	270.92	
	2032/33	256.42	
	2033/34	241.93	
	2034/35	227.43	
	2035/36	212.94	
	2036/37	198.44	
	2037/38	183.95	
	2038/39	169.45	
	2039/40	154.96	
	2040/41	140.46	
	2041/42	125.96	
	2042/43	111.47	
	2043/44	96.97	
	2044/45	82.48	
	2045/46	67.98	
	2046/47	53.49	
	2047/48	38.99	
	2048/49	24.50	
	2049/50	10.00	
	check	10.00	assumption; power sector should reduce to 10 g CO2e/kWh

14.50 p.a. reduction in carbon intensity

CBA Option 1 — **300mm2 for all 11kV network feeders**

Term (years from first out flow)	NPV (£m)
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
first year of investment out flow	#REF!

				RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Asset Replacement		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!					
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total investment		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m													
	Asset Replacement		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Capitalisation rates	(2)	%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
	Capitalised investment	(3)=(1)x(2)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m													
	Other 2 (specify)		£m													
	Other 3 (specify)		£m													
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

	RIIO-ED2			RIIO-ED3								RIIO-ED4	
	14	15	16	17	18	19	20	21	22	23	24	25	26
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Inspections & Maintenance													
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Discount factor	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
Discount factor (safety)	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

	RIIO-ED4						RIIO-ED5						
	27	28	29	30	31	32	33	34	35	36	37	38	39
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Inspections & Maintenance													
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Discount factor	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
Discount factor (safety)	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

	RIIO-ED5	RIIO-ED6								RIIO-ED7			
	40	41	42	43	44	45	46	47	48	49	50	51	52
	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-							
Inspections & Maintenance													
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%							
Capitalised investment	-	-	-	-	-	-							
Investment to be expensed	-	-	-	-	-	-							
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	-	-	-	-	-	-	-
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Discount factor	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Societal net benefits (impact relative to business as usual scenario)		Units	1–45 (2016–2060)	46–52 (2061–2067)
	Reduced losses	MWh	#REF! (each year)	
	Reduced emissions associated with losses	tCO2e	#REF! (each year)	- (each year)
	Reduced number of customers interrupted	no.		
	Reduced customer minutes lost	Mins		
	Reduced emissions (not associated with losses)[1]	tCO2e		
	Reduced probability of fatality[2]	%		
	Reduced probability of major injury[2]	%		
	Reduced oil leakage	Litres		

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Please specify
Total investment
Connections
Diversions
Reinforcement
ESQCR
Asset Replacement
Refurbishment
Civil Works
Operational IT & Telecoms
Legal & Safety
QoS
High Value Projects
Flooding
BT21CN
Technical losses and other environmental
High impact Low Probability (HILP)
Critical National Infrastructure
Black Start
Rising Mains and Laterals
Undergrounding Within/ Outside designated areas
Worst Served Customers
Trouble Call / faults
ONIs
Inspections & Maintenance
Tree Cutting
NOC's Other
Network Design & Engineering
Project Management
Engineering Mgt & Clerical Support
System Mapping - Cartographical
Control Centre
Call Centre
Stores
Operational Training
Vehicles & Transport
Atypicals Non Sev Weather
Smart Meters
Network Policy
HR & Non-operational Training
Finance & Regulation
CEO
IT & Telecoms
Property Mgt
Non Op Capex

version number	use / purpose	date	changes made
Template CBA RIIO ED1 v1.xls	initial draft RIIO-GD1 model issued for demo purposes		-
Template CBA RIIO ED1 v2.xls	draft RIIO-ED1 model demonstrated during the CBA meeting held on the 19 March	19/03/2013	updated the model to reflect ED1 rather than GD1
Template CBA RIIO ED1 v3.xls	issued to DNOs to complete the 2 worked examples (leaking cable and QoS)	28/03/2013 03/04/2013	updated to reflect discussions at the CBA meeting including straight line depreciation assumption for ED1, addition of fixed parameter assumptions for non-monetary items re-issued on 3 April to correct CI/CML fixed data transpose error
Template CBA RIIO ED1 v4.xls	final version of CBA spreadsheet to take into account worked examples	16/04/2013	updated to reflect DNO feedback following completion of worked examples main changes include: - included baseline scenario worksheet - removed VOLL as CI/CML method of monetising loss of supply was viewed as robust method - amended the CO2 conversion factor associated with losses to take into account assumptions regarding future decarbonisation of electricity - updated fixed data parameters to 2012/13 prices
		29/04/2013	removed '~~do minimum~~' text in cell B9 of *Option summary* worksheet
		10/01/2014	Inserted clarification comment in cell C9 of the *Option 1* worksheet.
		10/01/2014	Clarified text in cell B1 of *Option summary* worksheet.
		10/01/2014	Clarified text in cell F26 of *Option summary* worksheet.

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).

Costs should be entered as negative values.

Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet* & *workings 1* for each CBA option and label these *option 2* & *workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying data you believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

To quantify loss savings between the existing LV design policy of oversizing LV cables and previous policy on sizing cables on minimum network parameters.

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment
"do minimum" option	Overlay old LV Cable with 185Wf Cable as per previous design policy.
Overlay with 300Wf	Overlay old LV Cable with 300Wf Cable as per exsiting design policy.

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					8	24 years	32 years	45 years	DNO view
1	Overlaying LV cable with 300mm2 Wf	Adopted	As per NPG Design Policy	Not reported directly in BDPT pack. These CBAs were used to quantify options for the Losses Strategy paper. Not licence specific.	#REF!	#REF!	#REF!	#REF!	
2									
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices
Traded carbon price (£/t 2010/11)[1]	
traded carbon price (£/t 2012/13 prices)	
Losses (£/MWh)	£48.42
CI (£s per interruption)	£10.47
CML (£s per minute lost)	£0.26
Cost per fatality (£m)[2]	£1.79
Cost per major injury (£m)[2]	£0.03
Cost per litre oil (£/litre)	£36
Electricity GHG conversion factor (tonnes per MWh)[3]	

	1	2	3	4	5	6	7	8	9	10	11	12	13
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Traded carbon price (£/t 2010/11)[1]	6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23
traded carbon price (£/t 2012/13 prices)	7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23
Electricity GHG conversion factor (tonnes per MWh)[3]	0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329

	14	15	16	17	18	19	20	21	22	23	24	25	26
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Traded carbon price (£/t 2010/11)[1]	68.94	75.65	81.00	88.00	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00
traded carbon price (£/t 2012/13 prices)	74.48	81.73	87.51	95.07	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05
Electricity GHG conversion factor (tonnes per MWh)[3]	0.314	0.300	0.285	0.271	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140

	27	28	29	30	31	32	33	34	35	36	37	38	39
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Traded carbon price (£/t 2010/11)[1]	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00	227.00	234.00	241.00
traded carbon price (£/t 2012/13 prices)	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68	245.24	252.80	260.37
Electricity GHG conversion factor (tonnes per MWh)[3]	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010	0.010	0.010	0.010

	40	41	42	43	44	45	46	47	48	49	50	51	52
	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Traded carbon price (£/t 2010/11)[1]	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012. 2031 onwards based on DECC carbon values published Oct 2011.

note: HSE values as at Q3 2003

note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting. 'new 2010' factor annex 3 table 3(c).

☐ Exclude societal benefits

Decarbonisation of electricity assumption:

Power sector emissions are anticipated to reduce to 10g/kWh by 2050

assume a linear decarbonisation pathway from 2009/10 until 2050

Power sector emissions reduce by 14.5 g/kWh p.a. between now and 2030.

Beyond 2050 keep emissions at 10g/kWh

		g CO2e per kWh	
1,000 kg = 1 tonne	2009/10	589.82	(Defra)
1,000 kWh = 1 MWh	2010/11	575.32	
1 kg = 1,000g	2011/12	560.83	
	2012/13	546.33	
	2013/14	531.84	
	2014/15	517.34	
	2015/16	502.85	
	2016/17	488.35	
	2017/18	473.86	
	2018/19	459.36	
	2019/20	444.87	
	2012/21	430.37	
	2021/22	415.87	
	2022/23	401.38	
	2023/24	386.88	
	2024/25	372.39	
	2025/26	357.89	
	2026/27	343.40	
	2027/28	328.90	
	2028/29	314.41	
	2029/30	299.91	
	2030/31	285.41	
	2031/32	270.92	
	2032/33	256.42	
	2033/34	241.93	
	2034/35	227.43	
	2035/36	212.94	
	2036/37	198.44	
	2037/38	183.95	
	2038/39	169.45	
	2039/40	154.96	
	2040/41	140.46	
	2041/42	125.96	
	2042/43	111.47	
	2043/44	96.97	
	2044/45	82.48	
	2045/46	67.98	
	2046/47	53.49	
	2047/48	38.99	
	2048/49	24.50	
	2049/50	10.00	
	check	10.00	assumption: power sector should reduce to 10 g CO2e/kWh

14.50 p.a. reduction in carbon intensity

CBA Option 1	Overlaying LV cable with 300mm2 Wf

Term (years from first out flow)	NPV (£m)
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
first year of investment out flow	#REF!

Section	Item	Calculation	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
				RIIO-ED1								RIIO-ED2								RIIO-ED3								RIIO-ED4	
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Investment	Please specify		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!																		
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Total investment		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m																										
	Asset Replacement		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
	Capitalised investment	(3)=(1)x(2)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Depreciation	(5)=∑(5)$_t$	£m	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	(6)=avg[(6^{cl}),(6^{op})]xWACC	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m																										
	Other 2 (specify)		£m																										
	Other 3 (specify)		£m																										
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

Section	Item	Calculation	Units	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
										RIIO-ED5								RIIO-ED6								RIIO-ED7			
		Calculation	Units	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Investment	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Total investment		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Avoided DNO costs	Inspections & Maintenance		£m																										
	Asset Replacement		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Please specify		£m																										
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%							
	Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
	Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
	Depreciation	(5)=∑(5)$_t$	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	(6)=avg[(6^{cl}),(6^{op})]xWACC	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m																										
	Other 2 (specify)		£m																										
	Other 3 (specify)		£m																										
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	-	-	-	-	-	-	-
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Section	Item	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Reduced emissions associated with losses	tCO2e	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Reduced number of customers interrupted	no.																										
	Reduced customer minutes lost	Mins																										
	Reduced emissions (not associated with losses)[1]	tCO2e																										
	Reduced probability of fatality[2]	%																										
	Reduced probability of major injury[2]	%																										
	Reduced oil leakage	Litres																										

Section	Item	Units	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!							
	Reduced emissions associated with losses	tCO2e	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-	-	-
	Reduced number of customers interrupted	no.																										
	Reduced customer minutes lost	Mins																										
	Reduced emissions (not associated with losses)[1]	tCO2e																										
	Reduced probability of fatality[2]	%																										
	Reduced probability of major injury[2]	%																										
	Reduced oil leakage	Litres																										

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors

http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.

All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Please specify
Total investment
Connections
Diversions
Reinforcement
ESQCR
Asset Replacement
Refurbishment
Civil Works
Operational IT & Telecoms
Legal & Safety
QoS
High Value Projects
Flooding
BT21CN
Technical losses and other environmental
High Impact Low Probability (HILP)
Critical National Infrastructure
Black Start
Rising Mains and Laterals
Undergrounding Within/ Outside designated areas
Worst Served Customers
Trouble Call / faults
ONIs
Inspections & Maintenance
Tree Cutting
NOC's Other
Network Design & Engineering
Project Management
Engineering Mgt & Clerical Support
System Mapping - Cartographical
Control Centre
Call Centre
Stores
Operational Training
Vehicles & Transport
Atypicals Non Sev Weather
Smart Meters
Network Policy
HR & Non-operational Training
Finance & Regulation
CEO
IT & Telecoms
Property Mgt
Non Op Capex

version number	use / purpose	date	changes made
Template CBA RIIO ED1 v1.xls	initial draft RIIO-GD1 model issued for demo purposes		-
Template CBA RIIO ED1 v2.xls	draft RIIO-ED1 model demonstrated during the CBA meeting held on the 19 March	19/03/2013	updated the model to reflect ED1 rather than GD1
Template CBA RIIO ED1 v3.xls	issued to DNOs to complete the 2 worked examples (leaking cable and QoS)	28/03/2013 03/04/2013	updated to reflect discussions at the CBA meeting including straight line depreciation assumption for ED1, addition of fixed parameter assumptions for non-monetary items re-issued on 3 April to correct CI/CML fixed data transpose error
Template CBA RIIO ED1 v4.xls	final version of CBA spreadsheet to take into account worked examples	16/04/2013	updated to reflect DNO feedback following completion of worked examples main changes include: - included baseline scenario worksheet - removed VOLL as CI/CML method of monetising loss of supply was viewed as robust method - amended the CO2 conversion factor associated with losses to take into account assumptions regarding future decarbonisation of electricity - updated fixed data parameters to 2012/13 prices
		29/04/2013	removed '~~do minimum~~' text in cell B9 of *Option summary* worksheet
		10/01/2014	Inserted clarification comment in cell C9 of the *Option 1* worksheet.
		10/01/2014	Clarified text in cell B1 of *Option summary* worksheet.
		10/01/2014	Clarified text in cell F26 of *Option summary* worksheet.

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business p
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).

Costs should be entered as negative values.

Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying dat
Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

To quantify losses savings of targeted replacement of pre-1958 distribution transformers.

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

Targeted replacement of pre-1958 distribution transformers with a Health Index of 3.

List below all options considered to meet the stated aim

Options considered / project name	Comment
"do minimum" option	Transformers replacement due to their condition (where the Health Index ≥ HI4) and/or as a consequence of other works at site, e.g. due to the condition of the LV board and/or HV switchgear and/or building and/or if it's closely coupled, i.e. where there are secondary drivers.
Targeted replacement of pre-1958 distribution transformers	Targeted/accelerated replacement of pre-1958 distribution transformers with a Health Index of 3 as part of the work programme selection criteria for the replacement of indoor and outdoor substations.

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods (£m)				
					5 years	10 years	20 years	45 years	DNO view
1	Targeted replacement of pre-1958 distribution transformers with a Health Index of 3.	Adopted	Adopted as a design policy due to payback period being within 10 years of investment.	Not reported directly in BDPT pack. These CBAs could be used to quantify options for the Losses Strategy. Not licence specific	#REF!	#REF!	#REF!	#REF!	
2									
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices
Traded carbon price (£/t 2010/11)[1]	
traded carbon price (£/t 2012/13 prices)	
Losses (£/MWh)	£48.42
CI (£s per interruption)	£10.47
CML (£s per minute lost)	£0.26
Cost per fatality (£m)[2]	£1.79
Cost per major injury (£m)[2]	£0.03
Cost per litre oil (£/litre)	£36
Electricity GHG conversion factor (tonnes per MWh)[3]	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Traded carbon price (£/t 2010/11)[1]	6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00	95.00
traded carbon price (£/t 2012/13 prices)	7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07	102.63
Electricity GHG conversion factor (tonnes per MWh)[3]	0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271	0.256

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Traded carbon price (£/t 2010/11)[1]	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00
traded carbon price (£/t 2012/13 prices)	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04
Electricity GHG conversion factor (tonnes per MWh)[3]	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010

	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Traded carbon price (£/t 2010/11)[1]	220.00	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	237.68	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

Decarbonisation of electricity assumption:
Power sector emissions are anticipated to reduce to 10g/kWh by 2050
assume a linear decarbonisation pathway from 2009/10 until 2050

Power sector emissions reduce by 14.5 g/kWh p.a. between now and 2030.
Beyond 2050 keep emissions at 10g/kWh

		g CO2e per kWh	
1,000 kg = 1 tonne	2009/10	589.82	(Defra)
1,000 kWh = 1 MWh	2010/11	575.32	
1 kg = 1,000g	2011/12	560.83	
	2012/13	546.33	
	2013/14	531.84	
	2014/15	517.34	
	2015/16	502.85	
	2016/17	488.35	
	2017/18	473.86	
	2018/19	459.36	
	2019/20	444.87	
	2020/21	430.37	
	2021/22	415.87	
	2022/23	401.38	
	2023/24	386.88	
	2024/25	372.39	
	2025/26	357.89	
	2026/27	343.40	
	2027/28	328.90	
	2028/29	314.41	
	2029/30	299.91	
	2030/31	285.41	
	2031/32	270.92	
	2032/33	256.42	
	2033/34	241.93	
	2034/35	227.43	
	2035/36	212.94	
	2036/37	198.44	
	2037/38	183.95	
	2038/39	169.45	
	2039/40	154.96	
	2040/41	140.46	
	2041/42	125.96	
	2042/43	111.47	
	2043/44	96.97	
	2044/45	82.48	
	2045/46	67.98	
	2046/47	53.49	
	2047/48	38.99	
	2048/49	24.50	
	2049/50	10.00	
	check	10.00	assumption: power sector should reduce to 10 g CO2e/kWh

14.50 g p.a. reduction in carbon intensity

CBA Option 1	Capitalised Cost Transformer

Term (years from first out flow)	NPV (£m)
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
#REF!	#REF!
first year of investment out flow	#REF!

				RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Asset Replacement		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!					
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total investment		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m													
	Asset Replacement		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]$xWACC	£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Societal benefits (£m) i.e. costs avoided	Losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	CO2e associated with losses		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m													
	Other 2 (specify)		£m													
	Other 3 (specify)		£m													
	Total societal net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Cumulative discounted net benefits		**£m**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

					RIIO-ED3								RIIO-ED4	
	14	15	16	17	18	19	20	21	22	23	24	25	26	
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Asset Replacement														
Please specify														
Please specify														
Please specify														
Please specify														
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-	
Inspections & Maintenance														
Asset Replacement														
Please specify														
Please specify														
Please specify														
Please specify														
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-	
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-	
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-	
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-	
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-	
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other 1 (specify)														
Other 2 (specify)														
Other 3 (specify)														
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	
Discount factor	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41	
Discount factor (safety)	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	

							RIIO-ED5						
	27	28	29	30	31	32	33	34	35	36	37	38	39
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Inspections & Maintenance													
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Discount factor	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
Discount factor (safety)	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

		RIIO-ED6								RIIO-ED7			
	40	41	42	43	44	45	46	47	48	49	50	51	52
	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-							
Inspections & Maintenance													
Asset Replacement													
Please specify													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
Capitalised investment	-	-	-	-	-	-							
Investment to be expensed	-	-	-	-	-	-							
Depreciation	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cost of Capital	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Net DNO benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
CO2e associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Discount factor	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Cumulative discounted net benefits	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Societal net benefits (impact relative to business as usual scenario)		Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
	Reduced losses	MWh	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Reduced emissions associated with losses	tCO2e	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
	Reduced number of customers interrupted	no.																										
	Reduced customer minutes lost	Mins																										
	Reduced emissions (not associated with losses)[1]	tCO2e																										
	Reduced probability of fatality[2]	%																										
	Reduced probability of major injury[2]	%																										
	Reduced oil leakage	Litres																										

	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Reduced losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Reduced emissions associated with losses	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Reduced number of customers interrupted																										
Reduced customer minutes lost																										
Reduced emissions (not associated with losses)[1]																										
Reduced probability of fatality[2]																										
Reduced probability of major injury[2]																										
Reduced oil leakage																										

#REF!

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Please specify
Total investment
Connections
Diversions
Reinforcement
ESQCR
Asset Replacement
Refurbishment
Civil Works
Operational IT & Telecoms
Legal & Safety
QoS
High Value Projects
Flooding
BT21CN
Technical losses and other environmental
High impact Low Probability (HILP)
Critical National Infrastructure
Black Start
Rising Mains and Laterals
Undergrounding Within/ Outside designated areas
Worst Served Customers
Trouble Call / faults
ONIs
Inspections & Maintenance
Tree Cutting
NOC's Other
Network Design & Engineering
Project Management
Engineering Mgt & Clerical Support
System Mapping - Cartographical
Control Centre
Call Centre
Stores
Operational Training
Vehicles & Transport
Atypicals Non Sev Weather
Smart Meters
Network Policy
HR & Non-operational Training
Finance & Regulation
CEO
IT & Telecoms
Property Mgt
Non Op Capex

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to me Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted follo business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the a intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest invest
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).
Costs should be entered as negative values.
Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submis

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minim

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an oppo
believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

Savings from investment in the automatic power restoration system (APRS)

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					16 years	24 years	32 years	45 years	DNO view
1	installing APRS	Adopted			£2.18	£1.90	£1.72	£1.54	
2					£0.00	£0.00	£0.00	£0.00	
3					£0.00	£0.00	£0.00	£0.00	
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices
Traded carbon price (£/t 2010/11)[1]	
traded carbon price (£/t 2012/13 prices)	
Losses (£/MWh)	£48.42
CI (£s per interruption)	£10.47
CML (£s per minute lost)	£0.26
Cost per fatality (£m)[2]	£1.79
Cost per major injury (£m)[2]	£0.03
Cost per litre oil (£/litre)	£36
Electricity GHG conversion factor (tonnes per MWh)[3]	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Traded carbon price (£/t 2010/11)[1]	6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00	95.00
traded carbon price (£/t 2012/13 prices)	7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07	102.63
Electricity GHG conversion factor (tonnes per MWh)[3]	0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271	0.256

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Traded carbon price (£/t 2010/11)[1]	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00
traded carbon price (£/t 2012/13 prices)	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04
Electricity GHG conversion factor (tonnes per MWh)[3]	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010

	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Traded carbon price (£/t 2010/11)[1]	220.00	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	237.68	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.

note: HSE values as at Q3 2003

note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

CBA Option 1

Automatic Power Restoration System (APRS)

Term (years from first out flow)	NPV (£m)
16	£2.18
24	£1.90
32	£1.72
45	£1.54
first year of investment out flow	1

Section	Item	Calculation	Units													
				RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Operational IT & Telecoms		£m	(1.80)												
	Please specify		£m		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)					
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total investment		£m	(1.80)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m													
	Asset Replacement		£m													
	Trouble Call / faults		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	(1.80)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	(1.26)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	(0.54)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	(0.02)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.56)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.08)**	**(0.08)**	**(0.08)**	**(0.08)**	**(0.08)**
Societal benefits (£m) i.e. costs avoided	Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)		£m	0.04	0.24	0.34	0.46	0.57	0.67	0.79	0.91	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	0.04	0.04	0.10	0.10	0.10	0.10	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m													
	Other 2 (specify)		£m													
	Other 3 (specify)		£m													
	Total societal net benefits		**£m**	**0.04**	**0.24**	**0.38**	**0.50**	**0.67**	**0.77**	**0.89**	**1.01**	**-**	**-**	**-**	**-**	**-**
	Net benefits		**£m**	**(0.52)**	**0.14**	**0.28**	**0.40**	**0.58**	**0.67**	**0.80**	**0.91**	**(0.08)**	**(0.08)**	**(0.08)**	**(0.08)**	**(0.08)**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	(0.50)	0.13	0.26	0.35	0.49	0.55	0.63	0.69	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)
	Cumulative discounted net benefits		**£m**	**(0.50)**	**(0.37)**	**(0.11)**	**0.24**	**0.72**	**1.27**	**1.90**	**2.59**	**2.53**	**2.47**	**2.41**	**2.36**	**2.31**

Item	Calculation	Units													
						RIIO-ED3								RIIO-ED4	
			14	15	16	17	18	19	20	21	22	23	24	25	26
	Calculation	Units	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Operational IT & Telecoms		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total investment		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Inspections & Maintenance		£m													
Asset Replacement		£m													
Trouble Call / faults		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	$(5)=\sum(5)_t$	£m	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.08)**	**(0.08)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.06)**	**(0.06)**	**(0.06)**
Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)		£m													
Other 2 (specify)		£m													
Other 3 (specify)		£m													
Total societal net benefits		**£m**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits		**£m**	**(0.08)**	**(0.08)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.07)**	**(0.06)**	**(0.06)**	**(0.06)**
Discount factor	=1/[(1+SRTP)^n]		0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
Discount factor (safety)	=1/[(1+PTPR)^n]		0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
Discounted net benefits		£m	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Cumulative discounted net benefits		**£m**	**2.26**	**2.22**	**2.18**	**2.14**	**2.10**	**2.06**	**2.03**	**1.99**	**1.96**	**1.93**	**1.90**	**1.88**	**1.85**

Item	Calculation	Units													
									RIIO-ED5						
			27	28	29	30	31	32	33	34	35	36	37	38	39
	Calculation	Units	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Operational IT & Telecoms		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total investment		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Inspections & Maintenance		£m													
Asset Replacement		£m													
Trouble Call / faults		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	$(5)=\sum(5)_t$	£m	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.06)**	**(0.06)**	**(0.06)**	**(0.06)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.04)**
Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)		£m													
Other 2 (specify)		£m													
Other 3 (specify)		£m													
Total societal net benefits		**£m**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits		**£m**	**(0.06)**	**(0.06)**	**(0.06)**	**(0.06)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.05)**	**(0.04)**
Discount factor	=1/[(1+SRTP)^n]		0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
Discount factor (safety)	=1/[(1+PTPR)^n]		0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
Discounted net benefits		£m	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Cumulative discounted net benefits		**£m**	**1.83**	**1.81**	**1.79**	**1.77**	**1.74**	**1.72**	**1.70**	**1.69**	**1.67**	**1.65**	**1.64**	**1.62**	**1.61**

Item	Calculation	Units													
				RIIO-ED6								RIIO-ED7			
			40	41	42	43	44	45	46	47	48	49	50	51	52
	Calculation	Units	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Operational IT & Telecoms		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total investment		£m	-	-	-	-	-	-							
Inspections & Maintenance		£m													
Asset Replacement		£m													
Trouble Call / faults		£m													
Please specify		£m													
Please specify		£m													
Please specify		£m													
Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
Capitalised investment	(3)=(1)x(2)	£m	-	-	-	-	-	-							
Investment to be expensed	(4)=(1)-(3)	£m	-	-	-	-	-	-							
Depreciation	$(5)=\sum(5)_t$	£m	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)		£m													
Other 2 (specify)		£m													
Other 3 (specify)		£m													
Total societal net benefits		**£m**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits		**£m**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.04)**	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Discount factor	=1/[(1+SRTP)^n]		0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	=1/[(1+PTPR)^n]		0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits		£m	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cumulative discounted net benefits		**£m**	**1.59**	**1.58**	**1.57**	**1.56**	**1.55**	**1.54**	**1.53**	**1.53**	**1.53**	**1.53**	**1.53**	**1.53**	**1.52**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Section	Item	Units	1	2	3	4	5	6	7	8	9	10	11	12	13
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh													
	Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduced number of customers interrupted	no.	3,888	22,632	32,004	43,668	54,637	64,009	75,672	86,641					
	Reduced customer minutes lost	Mins	-	-	159,637	159,637	388,790	388,790	388,790	388,790					
	Reduced emissions (not associated with losses)[1]	tCO2e													
	Reduced probability of fatality[2]	%													
	Reduced probability of major injury[2]	%													
	Reduced oil leakage	Litres													

Item	Units	14	15	16	17	18	19	20	21	22	23	24	25	26
Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	-	-	-	-	-

Item	Units	27	28	29	30	31	32	33	34	35	36	37	38	39
Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	-	-	-	-	-

Item	Units	40	41	42	43	44	45	46	47	48	49	50	51	52
Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to me Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted follo business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the a intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investi scenario
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).
Costs should be entered as negative values.
Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submis

Copy *Option 1 worksheet* & *workings 1* for each CBA option and label these *option 2* & *workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minim

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an oppo
believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

Savings from investment in the LV automatic reclosers

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					16 years	24 years	32 years	45 years	DNO view
1	installing APRS	Adopted			£2.70	£1.64	£0.94	£0.23	
2					£0.00	£0.00	£0.00	£0.00	
3					£0.00	£0.00	£0.00	£0.00	
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23
Losses (£/MWh)	£48.42													
CI (£s per interruption)	£10.47													
CML (£s per minute lost)	£0.26													
Cost per fatality (£m)[2]	£1.79													
Cost per major injury (£m)[2]	£0.03													
Cost per litre oil (£/litre)	£36													
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329

	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041
Traded carbon price (£/t 2010/11)[1]	68.94	75.65	81.00	88.00	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00
traded carbon price (£/t 2012/13 prices)	74.48	81.73	87.51	95.07	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05
Electricity GHG conversion factor (tonnes per MWh)[3]	0.314	0.300	0.285	0.271	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140

	27 2042	28 2043	29 2044	30 2045	31 2046	32 2047	33 2048	34 2049	35 2050	36 2051	37 2052	38 2053	39 2054
Traded carbon price (£/t 2010/11)[1]	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00	227.00	234.00	241.00
traded carbon price (£/t 2012/13 prices)	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68	245.24	252.80	260.37
Electricity GHG conversion factor (tonnes per MWh)[3]	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010	0.010	0.010	0.010

	40 2055	41 2056	42 2057	43 2058	44 2059	45 2060	46 2061	47 2062	48 2063	49 2064	50 2065	51 2066	52 2067
Traded carbon price (£/t 2010/11)[1]	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

CBA Option 1 **LV Auto-reclose devices**

Term (years from first out flow)	NPV (£m)
16	£2.70
24	£1.64
32	£0.94
45	£0.23

first year of investment out flow: 1

				RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Refurbishment		£m	(13.54)												
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total investment		£m	(13.54)	-	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Worst Served Customers	Avoided EGS2 failures	£m	0.17	0.23	0.23	0.23	0.23	0.23	0.23	0.23					
	Trouble Call / faults	Overtime savings	£m	0.20	0.27	0.28	0.29	0.29	0.30	0.31	0.32					
	Trouble Call / faults	Avoided annual maintenance cost	£m	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09					
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total avoided DNO costs		£m	0.44	0.58	0.59	0.59	0.60	0.61	0.62	0.63	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	(13.10)	0.58	0.59	0.59	0.60	0.61	0.62	0.63	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	(9.17)	0.40	0.41	0.42	0.42	0.43	0.44	0.44	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	(3.93)	0.17	0.18	0.18	0.18	0.18	0.19	0.19	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	(0.20)	(0.19)	(0.19)	(0.18)	(0.17)	(0.16)	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]\times WACC$	£m	(0.18)	(0.35)	(0.32)	(0.30)	(0.28)	(0.25)	(0.23)	(0.21)	(0.19)	(0.19)	(0.18)	(0.18)	(0.17)
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(4.11)**	**(0.38)**	**(0.34)**	**(0.31)**	**(0.27)**	**(0.23)**	**(0.20)**	**(0.16)**	**(0.33)**	**(0.32)**	**(0.32)**	**(0.31)**	**(0.31)**
Societal benefits (£m) i.e. costs avoided	Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)		£m	0.24	0.48	0.48	0.48	0.48	0.48	0.48	0.48	-	-	-	-	-
	Customer minutes lost (CML)		£m	0.54	1.07	1.07	1.07	1.07	1.07	1.07	1.07	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)		£m													
	Other 2 (specify)		£m													
	Other 3 (specify)		£m													
	Total societal net benefits		**£m**	**0.78**	**1.55**	**1.55**	**1.55**	**1.55**	**1.55**	**1.55**	**1.55**	**-**	**-**	**-**	**-**	**-**
	Net benefits		**£m**	**(3.33)**	**1.18**	**1.21**	**1.25**	**1.28**	**1.32**	**1.35**	**1.39**	**(0.33)**	**(0.32)**	**(0.32)**	**(0.31)**	**(0.31)**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	(3.22)	1.10	1.09	1.09	1.08	1.07	1.06	1.05	(0.24)	(0.23)	(0.22)	(0.21)	(0.20)
	Cumulative discounted net benefits		**£m**	**(3.22)**	**(2.12)**	**(1.03)**	**0.06**	**1.14**	**2.21**	**3.27**	**4.33**	**4.08**	**3.85**	**3.64**	**3.43**	**3.23**

			RIIO-ED3								RIIO-ED4		
	14	15	16	17	18	19	20	21	22	23	24	25	26
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Refurbishment													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Worst Served Customers													
Trouble Call / faults													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Cost of Capital	(0.16)	(0.16)	(0.15)	(0.15)	(0.14)	(0.14)	(0.13)	(0.13)	(0.12)	(0.12)	(0.11)	(0.11)	(0.10)
Total Net DNO benefits	**(0.30)**	**(0.30)**	**(0.29)**	**(0.29)**	**(0.28)**	**(0.28)**	**(0.27)**	**(0.26)**	**(0.26)**	**(0.25)**	**(0.25)**	**(0.24)**	**(0.24)**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits	**(0.30)**	**(0.30)**	**(0.29)**	**(0.29)**	**(0.28)**	**(0.28)**	**(0.27)**	**(0.26)**	**(0.26)**	**(0.25)**	**(0.25)**	**(0.24)**	**(0.24)**
Discount factor	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
Discount factor (safety)	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
Discounted net benefits	(0.19)	(0.18)	(0.17)	(0.16)	(0.15)	(0.14)	(0.14)	(0.13)	(0.12)	(0.12)	(0.11)	(0.10)	(0.10)
Cumulative discounted net benefits	**3.05**	**2.87**	**2.70**	**2.54**	**2.39**	**2.25**	**2.11**	**1.98**	**1.86**	**1.75**	**1.64**	**1.53**	**1.44**

							RIIO-ED5						
	27	28	29	30	31	32	33	34	35	36	37	38	39
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Refurbishment													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Worst Served Customers													
Trouble Call / faults													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Cost of Capital	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	(0.06)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)
Total Net DNO benefits	**(0.23)**	**(0.23)**	**(0.22)**	**(0.22)**	**(0.21)**	**(0.21)**	**(0.20)**	**(0.19)**	**(0.19)**	**(0.18)**	**(0.18)**	**(0.17)**	**(0.17)**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits	**(0.23)**	**(0.23)**	**(0.22)**	**(0.22)**	**(0.21)**	**(0.21)**	**(0.20)**	**(0.19)**	**(0.19)**	**(0.18)**	**(0.18)**	**(0.17)**	**(0.17)**
Discount factor	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
Discount factor (safety)	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
Discounted net benefits	(0.09)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)	(0.05)
Cumulative discounted net benefits	**1.34**	**1.26**	**1.18**	**1.10**	**1.02**	**0.94**	**0.86**	**0.79**	**0.72**	**0.66**	**0.60**	**0.54**	**0.49**

		RIIO-ED6							RIIO-ED7				
	40	41	42	43	44	45	46	47	48	49	50	51	52
	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Refurbishment													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-							
Worst Served Customers													
Trouble Call / faults													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
Capitalised investment	-	-	-	-	-	-							
Investment to be expensed	-	-	-	-	-	-							
Depreciation	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	0.07	0.06	0.05	0.04	0.03	0.02
Cost of Capital	(0.02)	(0.02)	(0.01)	(0.01)	(0.00)	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Total Net DNO benefits	**(0.16)**	**(0.16)**	**(0.15)**	**(0.15)**	**(0.14)**	**(0.14)**	**(0.13)**	**0.07**	**0.06**	**0.05**	**0.04**	**0.03**	**0.02**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Net benefits	**(0.16)**	**(0.16)**	**(0.15)**	**(0.15)**	**(0.14)**	**(0.14)**	**(0.13)**	**0.07**	**0.06**	**0.05**	**0.04**	**0.03**	**0.02**
Discount factor	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	0.02	0.02	0.01	0.01	0.01	0.00
Cumulative discounted net benefits	**0.44**	**0.39**	**0.35**	**0.31**	**0.27**	**0.23**	**0.20**	**0.22**	**0.23**	**0.25**	**0.26**	**0.26**	**0.27**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

			1	2	3	4	5	6	7	8	9–52
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh									
	Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	- (each year)
	Reduced number of customers interrupted	no.	23,011	46,022	46,022	46,022	46,022	46,022	46,022	46,022	
	Reduced customer minutes lost	Mins	2,057,801	4,115,602	4,115,602	4,115,602	4,115,602	4,115,602	4,115,602	4,115,602	
	Reduced emissions (not associated with losses)[1]	tCO2e									
	Reduced probability of fatality[2]	%									
	Reduced probability of major injury[2]	%									
	Reduced oil leakage	Litres									

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to me Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted follo business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the a intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest invest
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).
Costs should be entered as negative values.
Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submi

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minim

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an oppo
believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

Savings from investment in the pro-active use of PFT to locate fluid cable leaks (i.e. a programme of fluid exchange)

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					16 years	24 years	32 years	45 years	DNO view
1	PFT fluid exchange	Adopted			£0.05	£0.05	£0.05	£0.05	
2					£0.00	£0.00	£0.00	£0.00	
3					£0.00	£0.00	£0.00	£0.00	
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309

Prices

	2012/13 prices	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23
Losses (£/MWh)	£48.42													
CI (£s per interruption)	£10.47													
CML (£s per minute lost)	£0.26													
Cost per fatality (£m)[2]	£1.79													
Cost per major injury (£m)[2]	£0.03													
Cost per litre oil (£/litre)	£36													
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329

	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041
Traded carbon price (£/t 2010/11)[1]	68.94	75.65	81.00	88.00	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00
traded carbon price (£/t 2012/13 prices)	74.48	81.73	87.51	95.07	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05
Electricity GHG conversion factor (tonnes per MWh)[3]	0.314	0.300	0.285	0.271	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140

	27 2042	28 2043	29 2044	30 2045	31 2046	32 2047	33 2048	34 2049	35 2050	36 2051	37 2052	38 2053	39 2054
Traded carbon price (£/t 2010/11)[1]	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00	220.00	227.00	234.00	241.00
traded carbon price (£/t 2012/13 prices)	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04	237.68	245.24	252.80	260.37
Electricity GHG conversion factor (tonnes per MWh)[3]	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010	0.010	0.010	0.010	0.010

	40 2055	41 2056	42 2057	43 2058	44 2059	45 2060	46 2061	47 2062	48 2063	49 2064	50 2065	51 2066	52 2067
Traded carbon price (£/t 2010/11)[1]	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm
[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.
note: HSE values as at Q3 2003
note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

Exclude societal benefits

CBA Option 1	PFT fluid cable leak location

Term (years from first out flow)	NPV (£m)
16	£0.05
24	£0.05
32	£0.05
45	£0.05
first year of investment out flow	1

Section	Item	Calculation	Units	RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Refurbishment	PFT fluid exchange (Average cost/cct)	£m	(0.06)												
	Trouble Call / faults	PFT survey (£30k each)	£m		(0.03)				(0.03)				(0.03)			
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total investment		£m	(0.06)	(0.03)	-	-	-	(0.03)	-	-	-	(0.03)	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m													
	Asset Replacement		£m													
	Trouble Call / faults	Dig & freeze (£33k average)	£m		0.033				0.033				0.033			
	Please specify		£m													
	Please specify		£m													
	Please specify		£m													
	Total avoided DNO costs		£m	-	0.03	-	-	-	0.03	-	-	-	0.03	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	(0.06)	0.00	-	-	-	0.00	-	-	-	0.00	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	(0.04)	0.00	-	-	-	0.00	-	-	-	0.00	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	(0.02)	0.00	-	-	-	0.00	-	-	-	0.00	-	-	-
	Depreciation	(5)=∑(3)i	£m	-	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Cost of Capital	(6)=avg[(6'),(6'')]xWACC	£m	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Societal benefits (£m) i.e. costs avoided	Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage		£m	-	0.027	-	-	-	0.027	-	-	-	0.027	-	-	-
	Other 1 (specify)		£m													
	Other 2 (specify)		£m													
	Other 3 (specify)		£m													
	Total societal net benefits		**£m**	**-**	**0.03**	**-**	**-**	**-**	**0.03**	**-**	**-**	**-**	**0.03**	**-**	**-**	**-**
	Net benefits		**£m**	**(0.02)**	**0.03**	**(0.00)**	**(0.00)**	**(0.00)**	**0.03**	**(0.00)**	**(0.00)**	**(0.00)**	**0.03**	**(0.00)**	**(0.00)**	**(0.00)**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	(0.02)	0.02	(0.00)	(0.00)	(0.00)	0.02	(0.00)	(0.00)	(0.00)	0.02	(0.00)	(0.00)	(0.00)
	Cumulative discounted net benefits		**£m**	**(0.02)**	**0.01**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**0.02**	**0.04**	**0.03**	**0.03**	**0.03**

Section	Item	RIIO-ED2			RIIO-ED3								RIIO-ED4	
		14	15	16	17	18	19	20	21	22	23	24	25	26
		2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Investment	Refurbishment													
	Trouble Call / faults	(0.03)						(0.03)						
	Please specify													
	Please specify													
	Please specify													
	Total investment	(0.03)	-	-	-	-	-	(0.03)	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance													
	Asset Replacement													
	Trouble Call / faults	0.033						0.03						
	Please specify													
	Please specify													
	Please specify													
	Total avoided DNO costs	0.03	-	-	-	-	-	0.03	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	0.00	-	-	-	-	-	0.00	-	-	-	-	-	-
	Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	0.00	-	-	-	-	-	0.00	-	-	-	-	-	-
	Investment to be expensed	0.00	-	-	-	-	-	0.00	-	-	-	-	-	-
	Depreciation	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Cost of Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Total Net DNO benefits	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Societal benefits (£m) i.e. costs avoided	Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage	0.027	-	-	-	-	-	0.03	-	-	-	-	-	-
	Other 1 (specify)													
	Other 2 (specify)													
	Other 3 (specify)													
	Total societal net benefits	**0.03**	**-**	**-**	**-**	**-**	**-**	**0.03**	**-**	**-**	**-**	**-**	**-**	**-**
	Net benefits	**0.03**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.03**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
	Discount factor	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
	Discount factor (safety)	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
	Discounted net benefits	0.02	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.01	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Cumulative discounted net benefits	**0.05**	**0.05**	**0.05**	**0.05**	**0.04**	**0.04**	**0.06**	**0.06**	**0.06**	**0.06**	**0.05**	**0.05**	**0.05**

Section	Item	RIIO-ED4						RIIO-ED5						
		27	28	29	30	31	32	33	34	35	36	37	38	39
		2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Investment	Refurbishment													
	Trouble Call / faults													
	Please specify													
	Please specify													
	Please specify													
	Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance													
	Asset Replacement													
	Trouble Call / faults													
	Please specify													
	Please specify													
	Please specify													
	Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
	Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
	Depreciation	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Cost of Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Total Net DNO benefits	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Societal benefits (£m) i.e. costs avoided	Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)													
	Other 2 (specify)													
	Other 3 (specify)													
	Total societal net benefits	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Net benefits	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
	Discount factor	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
	Discount factor (safety)	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
	Discounted net benefits	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Cumulative discounted net benefits	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**

Section	Item	RIIO-ED5	RIIO-ED6								RIIO-ED7			
		40	41	42	43	44	45	46	47	48	49	50	51	52
		2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Investment	Refurbishment													
	Trouble Call / faults													
	Please specify													
	Please specify													
	Please specify													
	Total investment	-	-	-	-	-	-							
Avoided DNO costs	Inspections & Maintenance													
	Asset Replacement													
	Trouble Call / faults													
	Please specify													
	Please specify													
	Please specify													
	Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
	Capitalised investment	-	-	-	-	-	-							
	Investment to be expensed	-	-	-	-	-	-							
	Depreciation	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	0.00
	Cost of Capital	(0.00)	(0.00)	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Net DNO benefits	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Societal benefits (£m) i.e. costs avoided	Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
	Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other 1 (specify)													
	Other 2 (specify)													
	Other 3 (specify)													
	Total societal net benefits	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Net benefits	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Discount factor	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
	Discount factor (safety)	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
	Discounted net benefits	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	0.00
	Cumulative discounted net benefits	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Section	Item	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Societal net benefits (impact relative to business as usual scenario)	Reduced losses	MWh													
	Reduced emissions associated with losses	tCO2e	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduced number of customers interrupted	no.													
	Reduced customer minutes lost	Mins													
	Reduced emissions (not associated with losses)[1]	tCO2e													
	Reduced probability of fatality[2]	%													
	Reduced probability of major injury[2]	%													
	Reduced oil leakage	Litres		750.00				750.00				750.00			

Section	Item	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Societal net benefits (impact relative to business as usual scenario)	Reduced losses													
	Reduced emissions associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduced number of customers interrupted													
	Reduced customer minutes lost													
	Reduced emissions (not associated with losses)[1]													
	Reduced probability of fatality[2]													
	Reduced probability of major injury[2]													
	Reduced oil leakage	750.00						750.00						

Section	Item	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Societal net benefits (impact relative to business as usual scenario)	Reduced losses													
	Reduced emissions associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduced number of customers interrupted													
	Reduced customer minutes lost													
	Reduced emissions (not associated with losses)[1]													
	Reduced probability of fatality[2]													
	Reduced probability of major injury[2]													
	Reduced oil leakage													

Section	Item	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Societal net benefits (impact relative to business as usual scenario)	Reduced losses													
	Reduced emissions associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reduced number of customers interrupted													
	Reduced customer minutes lost													
	Reduced emissions (not associated with losses)[1]													
	Reduced probability of fatality[2]													
	Reduced probability of major injury[2]													
	Reduced oil leakage													

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to me Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted follo business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the a intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investi scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).
Costs should be entered as negative values.
Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submis

Copy *Option 1 worksheet & workings 1* for each CBA option and label these *option 2 & workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minim

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an oppo
believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the primary driver of the investment decision

Vehicle Telematics

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

List below all options considered to meet the stated aim

Options considered / project name	Comment

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	For the chosen option only, provide detail of where CBA expenditure included in this CBA is reported in the BPDT pack. e.g. LV swtichgear BPDT CV3 rows 15 to 22.	NPVs based on payback periods				
					16 years	24 years	32 years	45 years	DNO view
1	Telematics	Adopted			£0.49	£0.62	£0.71	£0.80	
2					£0.00	£0.00	£0.00	£0.00	
3					£0.00	£0.00	£0.00	£0.00	
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	3.9%	*enter DNO specific pre-tax WACC figure*
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to 2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

	2012/13 prices	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07
Losses (£/MWh)	£48.42																	
CI (£s per interruption)	£10.47																	
CML (£s per minute lost)	£0.26																	
Cost per fatality (£m)[2]	£1.79																	
Cost per major injury (£m)[2]	£0.03																	
Cost per litre oil (£/litre)	£36																	
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271

	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	31 2046	32 2047	33 2048	34 2049	35 2050
Traded carbon price (£/t 2010/11)[1]	95.00	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00
traded carbon price (£/t 2012/13 prices)	102.63	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04
Electricity GHG conversion factor (tonnes per MWh)[3]	0.256	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010

	36 2051	37 2052	38 2053	39 2054	40 2055	41 2056	42 2057	43 2058	44 2059	45 2060	46 2061	47 2062	48 2063	49 2064	50 2065	51 2066	52 2067
Traded carbon price (£/t 2010/11)[1]	220.00	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	237.68	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/

note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012, 2031 onwards based on DECC carbon values published Oct 2011.

note: HSE values as at Q3 2003

note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting, 'new 2010' factor annex 3 table 3(c).

■ Exclude societal benefits

CBA Option 1 **Vehicle Telematics**

Term (years from first out flow)	NPV (£m)
16	£0.49
24	£0.62
32	£0.71
45	£0.80
first year of investment out flow	1

Section	Item	Calculation	Units	RIIO-ED1								RIIO-ED2				
				1	2	3	4	5	6	7	8	9	10	11	12	13
		Calculation	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Investment	Vehicles & Transport		£m	(0.29)	(0.30)											
Investment	Please specify		£m													
Investment	Please specify		£m													
Investment	Please specify		£m													
Investment	Please specify		£m													
Investment	Total investment		£m	(0.29)	(0.30)	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Vehicles & Transport	Fuel cost savings	£m		0.07	0.14	0.14	0.14	0.14	0.14	0.14					
Avoided DNO costs	Vehicles & Transport	Accident / Claims reductions	£m		0.05	0.09	0.09	0.09	0.09	0.09	0.09					
Avoided DNO costs	Trouble Call / faults		£m													
Avoided DNO costs	Please specify		£m													
Avoided DNO costs	Please specify		£m													
Avoided DNO costs	Please specify		£m													
Avoided DNO costs	Total avoided DNO costs		£m	-	0.12	0.24	0.24	0.24	0.24	0.24	0.24	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	(0.29)	(0.18)	0.24	0.24	0.24	0.24	0.24	0.24	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	(0.20)	(0.13)	0.16	0.16	0.16	0.16	0.16	0.16	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	(0.09)	(0.05)	0.07	0.07	0.07	0.07	0.07	0.07	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	(0.00)	(0.01)	(0.00)	(0.00)	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	(0.00)	(0.01)	(0.01)	(0.00)	0.00	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**(0.09)**	**(0.07)**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.10**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**
Societal benefits (£m) i.e. costs avoided	Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	CO2 reductions associated with fleet vehicles		£m	0.004	0.004	0.005	0.005	0.005	0.010	0.014	0.018					
Societal benefits (£m) i.e. costs avoided	Other 2 (specify)		£m													
Societal benefits (£m) i.e. costs avoided	Other 3 (specify)		£m													
Societal benefits (£m) i.e. costs avoided	**Total societal net benefits**		**£m**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.02**	-	-	-	-	-
	Net benefits		**£m**	**(0.09)**	**(0.07)**	**0.06**	**0.07**	**0.08**	**0.09**	**0.11**	**0.12**	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82
	Discounted net benefits		£m	(0.08)	(0.06)	0.05	0.06	0.07	0.08	0.09	0.09	0.03	0.03	0.03	0.03	0.02
	Cumulative discounted net benefits		**£m**	**(0.08)**	**(0.14)**	**(0.09)**	**(0.03)**	**0.04**	**0.11**	**0.20**	**0.29**	**0.32**	**0.35**	**0.37**	**0.40**	**0.42**

Item				RIIO-ED3								RIIO-ED4	
	14	15	16	17	18	19	20	21	22	23	24	25	26
	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Vehicles & Transport													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicles & Transport													
Vehicles & Transport													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cost of Capital	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total Net DNO benefits	**0.04**	**0.04**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2 reductions associated with fleet vehicles													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	-	-	-	-	-	-	-	-	-	-	-	-	-
Net benefits	**0.04**	**0.04**	**0.04**	**0.04**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**
Discount factor	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41
Discount factor (safety)	0.81	0.80	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68
Discounted net benefits	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Cumulative discounted net benefits	**0.45**	**0.47**	**0.49**	**0.51**	**0.53**	**0.54**	**0.56**	**0.58**	**0.59**	**0.61**	**0.62**	**0.63**	**0.65**

Item							RIIO-ED5						
	27	28	29	30	31	32	33	34	35	36	37	38	39
	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Vehicles & Transport													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicles & Transport													
Vehicles & Transport													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cost of Capital	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Net DNO benefits	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2 reductions associated with fleet vehicles													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	-	-	-	-	-	-	-	-	-	-	-	-	-
Net benefits	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
Discount factor	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35	0.33	0.33	0.32
Discount factor (safety)	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58	0.57	0.56
Discounted net benefits	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cumulative discounted net benefits	**0.66**	**0.67**	**0.68**	**0.69**	**0.70**	**0.71**	**0.72**	**0.73**	**0.74**	**0.75**	**0.75**	**0.76**	**0.77**

Item		RIIO-ED6								RIIO-ED7			
	40	41	42	43	44	45	46	47	48	49	50	51	52
	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Vehicles & Transport													
Please specify													
Please specify													
Please specify													
Please specify													
Total investment	-	-	-	-	-	-							
Vehicles & Transport													
Vehicles & Transport													
Trouble Call / faults													
Please specify													
Please specify													
Please specify													
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
Capitalised investment	-	-	-	-	-	-							
Investment to be expensed	-	-	-	-	-	-							
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
Cost of Capital	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Net DNO benefits	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.01**	**0.01**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2 reductions associated with fleet vehicles													
Other 2 (specify)													
Other 3 (specify)													
Total societal net benefits	-	-	-	-	-	-	-	-	-	-	-	-	-
Net benefits	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.01**	**0.01**
Discount factor	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Cumulative discounted net benefits	**0.78**	**0.78**	**0.79**	**0.79**	**0.80**	**0.80**	**0.81**	**0.82**	**0.82**	**0.83**	**0.83**	**0.83**	**0.83**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Societal net benefits (impact relative to business as usual scenario)

Item	Units	1–52 (2016–2067)
Reduced losses	MWh	
Reduced emissions associated with losses	tCO2e	- (each year, 2016–2067)
Reduced number of customers interrupted	no.	
Reduced customer minutes lost	Mins	
Reduced emissions (not associated with losses)[1]	tCO2e	
Reduced probability of fatality[2]	%	
Reduced probability of major injury[2]	%	
Reduced oil leakage	Litres	

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.
[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm

Guidance for CBA spreadsheet model

Tab	Instructions
Option summary	Provide a description of the stated aim / investment decision contained within this CBA analysis workbook, along with a list of options considered to meet the aim. Also include here the short list of options contained within this workbook which have been fully costed and specify which option has been adopted following CBA and included in your business plan submission.
Fixed data	Enter pre-tax WACC and prices consistent with your business plan
Baseline scenario	Enter costs and benefits associated with the baseline scenario. The baseline scenario represents status quo; that is the cost of business as usual in the absence of any investment intervention. Where business as usual is not an option i.e. an investment intervention of some kind is required DNOs should chose the option with the lowest investment to represent the baseline scenario.
Working baseline	Show any calculation used to derive the values in your baseline scenario
Option 1	Enter costs and benefits *over and above the baseline scenario* i.e. the marginal or incremental costs / benefits of the option being considered. Enter capitalisation rates consistent with your business plan.
Working 1	Show any calculation used to derive the values in your CBA

Colour code:

User populated cells
Fixed data
Summation formula
Other formula

The user should populate the light blue cells. All other cells are either fixed or auto-populated.

Enter costs / benefits in 2012/13 prices (£m).
Costs should be entered as negative values.
Benefits (i.e. avoided costs) should be entered a positive values.

Costs entered should correspond to values set out in company business plans i.e. should exclude RPEs and include ongoing efficiencies consistent with assumptions contained in your business plan submission.

Copy *Option 1 worksheet* & *workings 1* for each CBA option and label these *option 2* & *workings 2* etc.

Where a 'do minimum option' exists, Option 1 should represent your 'do minimum' or 'reference scenario' e.g. do nothing, ongoing maintenance of existing asset or the option which requires the minimum investment .

Use the relevant *Workings worksheet* to demonstrate any calculation/information that can support the costs and benefits you have entered for each option. This is free fill and provides you with an opportunity to show additional underlying data you believe will assist Ofgem in evaluating/understanding your CBA.

Please highlight your chosen option by colouring the worksheet tab yellow.

Purpose of CBA: describe the stated aim of the investment decision

To determine the cost/benefit of undertaking regeneration of power transformer insualting oil to extend the serviceable life of the transformer.

If investment is to replace an existing asset / asset class, please state the condition of the asset / asset class (HI / CI etc.)

The HI of the identified subset of power transformers ranges from HI2 to HI4.

List below all options considered to meet the stated aim

Options considered	Comment
Oil regeneration undertaken	This is the only option that meets the stated aim.

List below the short list of those options which have been costed within this CBA workbook

Option no.	Options considered	Decision	Comment	Spend area (from Table C1) (relevant only to adopted option)	NPVs based on payback periods				
					16 years	24 years	32 years	45 years	DNO view
1	No oil regeneration undertaken				-£8.03	-£13.15	-£16.71	-£20.50	
2	Oil regeneration undertaken		This is the selected option.	CV9	-£1.44	-£5.15	-£10.73	-£15.59	
3									
4									
5									

If more options are costed, please copy *Option 1* and *workings 1* worksheets and add detail to the short list table above.

Parameters

pre-tax WACC	4.2%	enter DNO specific pre-tax WACC figure
Discount Rate <= 30 years	3.5%	
Discount Rate > 30 years	3.0%	
Discount rate for safety	1.5%	
Assumed Asset Life (Years)	45	

RPI INDICES

Using yearly averages (April to March)

Index		convert to
		2012/13
Convert from	2003/04	1.3409
	2004/05	1.3004
	2005/06	1.2670
	2006/07	1.2214
	2007/08	1.1730
	2008/09	1.1392
	2009/10	1.1340
	2010/11	1.0804
	2011/12	1.0309
	2012/13	1.0000

Prices

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2012/13 prices	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Traded carbon price (£/t 2010/11)[1]		6.76	7.10	7.55	8.03	8.55	15.26	21.97	28.68	35.39	42.10	48.81	55.52	62.23	68.94	75.65	81.00	88.00	95.00
traded carbon price (£/t 2012/13 prices)		7.30	7.67	8.16	8.68	9.24	16.49	23.74	30.98	38.23	45.48	52.73	59.98	67.23	74.48	81.73	87.51	95.07	102.63
Losses (£/MWh)	£48.42																		
CI (£s per interruption)	£10.47																		
CML (£s per minute lost)	£0.26																		
Cost per fatality (£m)[2]	£1.79																		
Cost per major injury (£m)[2]	£0.03																		
Cost per litre oil (£/litre)	£36																		
Electricity GHG conversion factor (tonnes per MWh)[3]		0.503	0.488	0.474	0.459	0.445	0.430	0.416	0.401	0.387	0.372	0.358	0.343	0.329	0.314	0.300	0.285	0.271	0.256

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Traded carbon price (£/t 2010/11)[1]	102.00	109.00	116.00	122.00	129.00	136.00	143.00	150.00	157.00	164.00	171.00	178.00	184.00	191.00	198.00	205.00	212.00
traded carbon price (£/t 2012/13 prices)	110.20	117.76	125.32	131.80	139.37	146.93	154.49	162.05	169.62	177.18	184.74	192.30	198.79	206.35	213.91	221.47	229.04
Electricity GHG conversion factor (tonnes per MWh)[3]	0.242	0.227	0.213	0.198	0.184	0.169	0.155	0.140	0.126	0.111	0.097	0.082	0.068	0.053	0.039	0.024	0.010

	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Traded carbon price (£/t 2010/11)[1]	220.00	227.00	234.00	241.00	248.00	256.00	262.00	269.00	276.00	282.00	287.00	292.00	297.00	301.00	305.00	309.00	312.00
traded carbon price (£/t 2012/13 prices)	237.68	245.24	252.80	260.37	267.93	276.57	283.05	290.62	298.18	304.66	310.06	315.47	320.87	325.19	329.51	333.83	337.07
Electricity GHG conversion factor (tonnes per MWh)[3]	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

[1] https://www.gov.uk/carbon-valuation — note: 2016 to 2030 DECC's updated traded sector carbon values published Oct 2012. 2031 onwards based on DECC carbon values published Oct 2011.

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm — note: HSE values as at Q3 2003

[3] http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/ — note: figures taken from 2012 Guideline to Defra / DECC's GHG conversion factors for company reporting 'new 2011ff factor annex 3 table 3(c)

Exclude societal benefits

CBA Option 2 - Option 2 | **Oil regeneration undertaken**

Term (years from first out flow)	NPV (£m)
16	-£1.44
24	-£5.15
32	-£10.73
45	-£15.59
first year of investment out flow	2

		Calculation	Units	RIIO-ED1								RIIO-ED2								RIIO-ED3	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Investment	Asset Replacement		£m																		
Investment	Legal & Safety		£m																		
Investment	Refurbishment		£m		(0.15)	(0.45)	(0.45)	(0.45)	(0.45)	(0.40)											
Investment	Please specify		£m																		
Investment	Please specify		£m																		
Investment	Total investment		£m	-	(0.15)	(0.45)	(0.45)	(0.45)	(0.45)	(0.40)	-	-	-	-	-	-	-	-	-	-	-
Avoided DNO costs	Inspections & Maintenance		£m																		
Avoided DNO costs	Asset Replacement		£m																		
Avoided DNO costs	Please specify		£m																		
Avoided DNO costs	Please specify		£m																		
Avoided DNO costs	Please specify		£m																		
Avoided DNO costs	Please specify		£m																		
Avoided DNO costs	Total avoided DNO costs		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total DNO net benefits before capitalisation	(1) = investment + DNO benefits	£m	-	(0.15)	(0.45)	(0.45)	(0.45)	(0.45)	(0.40)	-	-	-	-	-	-	-	-	-	-	-
	Capitalisation rates	(2)	%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
	Capitalised investment	(3)=(1)x(2)	£m	-	(0.11)	(0.32)	(0.32)	(0.32)	(0.32)	(0.28)	-	-	-	-	-	-	-	-	-	-	-
	Investment to be expensed	(4)=(1)-(3)	£m	-	(0.05)	(0.14)	(0.14)	(0.14)	(0.14)	(0.12)	-	-	-	-	-	-	-	-	-	-	-
	Depreciation	$(5)=\sum(5)_t$	£m	-	-	(0.00)	(0.01)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Cost of Capital	$(6)=avg[(6^{cl}),(6^{op})]xWACC$	£m	-	(0.00)	(0.01)	(0.02)	(0.04)	(0.05)	(0.06)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
	Total Net DNO benefits	**(7)=(4)+(5)+(6)**	**£m**	**-**	**(0.05)**	**(0.15)**	**(0.17)**	**(0.19)**	**(0.21)**	**(0.21)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**
Societal benefits (£m) i.e. costs avoided	Losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	CO2e associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Customer interruptions (CI)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Customer minutes lost (CML)		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Other GHG emissions (CO2e) i.e. not associated with losses		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Fatality		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Major injury		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Oil leakage		£m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Societal benefits (£m) i.e. costs avoided	Other 1 (specify)		£m																		
Societal benefits (£m) i.e. costs avoided	Other 2 (specify)		£m																		
Societal benefits (£m) i.e. costs avoided	Other 3 (specify)		£m																		
Societal benefits (£m) i.e. costs avoided	**Total societal net benefits**		**£m**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Net benefits		**£m**	**-**	**(0.05)**	**(0.15)**	**(0.17)**	**(0.19)**	**(0.21)**	**(0.21)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.09)**
	Discount factor	=1/[(1+SRTP)^n]		0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54
	Discount factor (safety)	=1/[(1+PTPR)^n]		0.99	0.97	0.96	0.94	0.93	0.91	0.90	0.89	0.87	0.86	0.85	0.84	0.82	0.81	0.80	0.79	0.78	0.76
	Discounted net benefits		£m	-	(0.04)	(0.13)	(0.15)	(0.16)	(0.17)	(0.17)	(0.08)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)
	Cumulative discounted net benefits		**£m**	**-**	**(0.04)**	**(0.18)**	**(0.32)**	**(0.48)**	**(0.65)**	**(0.82)**	**(0.90)**	**(0.97)**	**(1.04)**	**(1.11)**	**(1.17)**	**(1.23)**	**(1.29)**	**(1.34)**	**(1.39)**	**(1.44)**	**(1.49)**

							RIIO-ED4								RIIO-ED5			
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Asset Replacement				(2.10)	(6.30)	(6.30)	(6.30)	(6.30)	(5.10)									
Legal & Safety																		
Refurbishment																		
Please specify																		
Please specify																		
Total investment	-	-	-	(2.10)	(6.30)	(6.30)	(6.30)	(6.30)	(5.10)	-	-	-	-	-	-	-	-	-
Inspections & Maintenance																		
Asset Replacement																		
Please specify																		
Please specify																		
Please specify																		
Please specify																		
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	(2.10)	(6.30)	(6.30)	(6.30)	(6.30)	(5.10)	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Capitalised investment	-	-	-	(1.47)	(4.41)	(4.41)	(4.41)	(4.41)	(3.57)	-	-	-	-	-	-	-	-	-
Investment to be expensed	-	-	-	(0.63)	(1.89)	(1.89)	(1.89)	(1.89)	(1.53)	-	-	-	-	-	-	-	-	-
Depreciation	(0.04)	(0.04)	(0.04)	(0.04)	(0.07)	(0.17)	(0.27)	(0.36)	(0.46)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)
Cost of Capital	(0.05)	(0.05)	(0.05)	(0.07)	(0.20)	(0.38)	(0.56)	(0.73)	(0.88)	(0.94)	(0.91)	(0.89)	(0.87)	(0.84)	(0.82)	(0.80)	(0.78)	(0.75)
Total Net DNO benefits	**(0.08)**	**(0.08)**	**(0.08)**	**(0.74)**	**(2.16)**	**(2.44)**	**(2.71)**	**(2.98)**	**(2.87)**	**(1.48)**	**(1.45)**	**(1.43)**	**(1.41)**	**(1.38)**	**(1.36)**	**(1.34)**	**(1.32)**	**(1.29)**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)																		
Other 2 (specify)																		
Other 3 (specify)																		
Total societal net benefits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net benefits	**(0.08)**	**(0.08)**	**(0.08)**	**(0.74)**	**(2.16)**	**(2.44)**	**(2.71)**	**(2.98)**	**(2.87)**	**(1.48)**	**(1.45)**	**(1.43)**	**(1.41)**	**(1.38)**	**(1.36)**	**(1.34)**	**(1.32)**	**(1.29)**
Discount factor	0.52	0.50	0.49	0.47	0.45	0.44	0.42	0.41	0.40	0.38	0.37	0.36	0.40	0.39	0.38	0.37	0.36	0.35
Discount factor (safety)	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59
Discounted net benefits	(0.04)	(0.04)	(0.04)	(0.35)	(0.98)	(1.07)	(1.15)	(1.22)	(1.13)	(0.56)	(0.54)	(0.51)	(0.56)	(0.54)	(0.51)	(0.49)	(0.47)	(0.45)
Cumulative discounted net benefits	**(1.53)**	**(1.57)**	**(1.61)**	**(1.96)**	**(2.94)**	**(4.01)**	**(5.15)**	**(6.37)**	**(7.51)**	**(8.07)**	**(8.61)**	**(9.12)**	**(9.68)**	**(10.22)**	**(10.73)**	**(11.22)**	**(11.69)**	**(12.14)**

					RIIO-ED6								RIIO-ED7			
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Asset Replacement																
Legal & Safety																
Refurbishment																
Please specify																
Please specify																
Total investment	-	-	-	-	-	-	-	-	-							
Inspections & Maintenance																
Asset Replacement																
Please specify																
Please specify																
Please specify																
Please specify																
Total avoided DNO costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DNO net benefits before capitalisation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalisation rates	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%							
Capitalised investment	-	-	-	-	-	-	-	-	-							
Investment to be expensed	-	-	-	-	-	-	-	-	-							
Depreciation	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.54)	(0.53)	(0.52)	(0.52)	(0.51)
Cost of Capital	(0.73)	(0.71)	(0.68)	(0.66)	(0.64)	(0.62)	(0.59)	(0.57)	(0.55)	(0.52)	(0.50)	(0.48)	(0.46)	(0.43)	(0.41)	(0.39)
Total Net DNO benefits	**(1.27)**	**(1.25)**	**(1.22)**	**(1.20)**	**(1.18)**	**(1.16)**	**(1.13)**	**(1.11)**	**(1.09)**	**(1.06)**	**(1.04)**	**(1.02)**	**(0.99)**	**(0.96)**	**(0.93)**	**(0.90)**
Losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2e associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer interruptions (CI)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Customer minutes lost (CML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other GHG emissions (CO2e) i.e. not associated with losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major injury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil leakage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other 1 (specify)																
Other 2 (specify)																
Other 3 (specify)																
Total societal net benefits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net benefits	**(1.27)**	**(1.25)**	**(1.22)**	**(1.20)**	**(1.18)**	**(1.16)**	**(1.13)**	**(1.11)**	**(1.09)**	**(1.06)**	**(1.04)**	**(1.02)**	**(0.99)**	**(0.96)**	**(0.93)**	**(0.90)**
Discount factor	0.33	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.22
Discount factor (safety)	0.58	0.57	0.56	0.55	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.48	0.48	0.47	0.46
Discounted net benefits	(0.43)	(0.41)	(0.39)	(0.37)	(0.35)	(0.33)	(0.32)	(0.30)	(0.29)	(0.27)	(0.26)	(0.25)	(0.23)	(0.22)	(0.21)	(0.19)
Cumulative discounted net benefits	**(12.56)**	**(12.97)**	**(13.35)**	**(13.72)**	**(14.07)**	**(14.41)**	**(14.72)**	**(15.03)**	**(15.31)**	**(15.59)**	**(15.85)**	**(16.09)**	**(16.32)**	**(16.54)**	**(16.75)**	**(16.94)**

Non-DNO (eg societal) benefits

Enter values as increments (delta) relative to your reference scenario. If this is your reference scenario enter 0. Reductions are entered as positive numbers and increases as negative numbers.

Societal net benefits (impact relative to business as usual scenario)

Item	Units	2016–2067 (years 1–52)
Reduced losses	MWh	
Reduced emissions associated with losses	tCO2e	- (each of the 52 years)
Reduced number of customers interrupted	no.	
Reduced customer minutes lost	Mins	
Reduced emissions (not associated with losses)[1]	tCO2e	
Reduced probability of fatality[2]	%	
Reduced probability of major injury[2]	%	
Reduced oil leakage	Litres	

[1] Includes all GHG not associated with losses e.g. SF6 converted to tCO2e using Defra conversion factors
http://www.defra.gov.uk/publications/2012/05/30/pb13773-2012-ghg-conversion/
Where losses are entered in terms of MWh, the CO2e associated with those losses will be calculated based on an assumed GHG conversion factor. The tCO2e are monetised using DECC traded carbon values.
All other GHG emissions not associated with losses should be entered in row 90 to avoid double counting.

[2] http://www.hse.gov.uk/risk/theory/alarpcheck.htm