RIIO-ED1 RIGs Environment and Innovation Commentary, version 4.0

2017-18

Western Power Distribution

Contents

Summary – Information Required

One Commentary document is required per DNO Group. Respondents should ensure that comments are clearly marked to show whether they relate to all the DNOs in the group or to which DNO they relate.

Commentary is required in response to specific questions included in this document. DNO's may include supporting documentation where they consider it necessary to support their comments or where it may aid Ofgem's understanding. Please highlight in this document if additional information is provided.

The purpose of this commentary is to provide the opportunity for DNOs to set out further supporting information related to the data provided in the Environment and Innovation Reporting Pack. It also sets out supporting data submissions that DNOs must provide to us.

Worksheet by worksheet commentary

At a worksheet by worksheet level there is one standard question to address, where appropriate, as follows:

- **Allocation and estimation methodologies**: DNOs should detail estimates, allocations or apportionments used in reaching the numbers submitted in the worksheets.

  This is required for all individual worksheets (ie not an aggregate level), where relevant. Not all tables will have used allocation or estimation methods to reach the numbers. Where this is the case simply note "NA".

  Note: this concerns the methodology and assumptions and not about the systems in place to check their accuracy (that is for the NetDAR). This need to be completed for all worksheets, where an allocation or estimation technique was used.

In addition to the standard commentary questions, some questions specific to each worksheet are asked.

E1 – Visual Amenity

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.
N/A

Explanation of the increase or decrease in the total length of OHL inside designated areas for reasons other than those recorded in worksheet E1. For example, due to the expansion of an existing, or creation of a new, Designated Area.
N/A

E2 – Environmental Reporting

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.
N/A

DNOs must provide some analysis of any emerging trends in the environmental data and any areas of trade-off in performance.

Data for SF_6 emitted in 2015/16 and 2016/17 has been restated and added to the current RRP E2 and E3 tables for each WPD licence area. The data has been restated based on a revised methodology used to calculate the 2017/18 SF_6 emissions using the following data sources;

- SF_6 top-up figures as reported on our company asset database
- Scrapped units returned empty to our company plant centres
- Units returned empty to manufacturers
- GVR return programme

The methodology measures the amount of SF_6 emitted during installation, service and decommissioning. The revised methodology now includes the amount of SF_6 found to be "missing" from scrapped units returned to plant centres, manufacturers and the GVR return programme. The SF_6 may have been emitted over the life of the unit, rather than being attributable to a particular year.

The revised SF_6 emission data now included in the RRP Tables is set out below and tCO_{2e} calculated accordingly within the tables;

	WPD SF_6 emissions (kg)			
	Reported 15/16	**Revised 15/16**	Reported 16/17	**Revised 16/17**
East Midlands	45.17	**75.61**	35.47	**53.8**
West Midlands	163.58	**352.64**	51.97	**207.9**
South Wales	88.35	**93.9**	77.7	**88.3**
South West	99.65	**105.3**	63.4	**74.0**

Overall the level of leakage is reducing over time as older units are replaced with new units containing lower levels of SF_6. The oil leakage rate, i.e. Fluid Used to Top Up Cables as a percentage of volume in service, continues to be very low.

Where reported in the Regulatory Year under report, DNOs must provide discussion of the nature of any complaints relating to Noise Pollution and the nature of associated measures undertaken to resolve them.
During 2017-18, WPD investigated 18 noise complaints. For 7 of these, it was found that the noise was not associated with WPD equipment. Results are pending on a further 3. There were 8 noise complaints where our Noise Engineer recommended actions to be taken. In the West Midlands, a noise enclosure was fitted in year, with minor works carried out at another substation to reduce the noise in-year. One noise enclosure is due to be fitted in 2018/19. In 5 other instances, the transformer is due to be replaced and is scheduled within the next 2 regulatory years.

Where reported in the Regulatory Year under report, DNOs must provide details of any Non-Undergrounding Visual Amenity Schemes undertaken.
There is one Non-Undergrounding Visual Amenity Schemes within a Designated Area reported in E2 in East Midlands.

Any Undergrounding for Visual Amenity should be identified including details of the activity location, including whether it falls within a Designated Area.
N/A

Where reported in the Regulatory Year under report, DNOs must provide discussion of details of any reportable incidents or prosecutions associated with any of the activities reported in the worksheet.
WPD have received zero environmental prosecutions across all four licence areas for year April 2017 – March 2018. We do have on ongoing investigation by the Environment Agency with regards to a fluid filled cable leak in the West Midlands.

Where reported in the Regulatory Year under report, DNOs must provide discussion of details of any Environmental Management System (EMS) certified under ISO or other recognised accreditation scheme.
All four WPD licence areas are certified to ISO14001:2015 our certification body are Lloyds Registry of Quality Assurance (LRQA) and our current certificate expires May 2020.

DNOs must provide a brief description of any permitting, licencing, registrations and permissions, etc related to the activities reported in this worksheet that you have purchased or obtained during the Regulatory Year.
2 bespoke permits and 23 depot standard rules Environmental permits for the storage of >3000 litres of used transformer oil have been put in place in England. One installation and four standard rules permit for the storage of >1000 litres and associated waste activities are in place in Wales April 2017 – March 2018.

DNOs must include a description of any SF6 and Oil Pollution Mitigation Schemes undertaken in the Regulatory Year including the cost and benefit implications and how these were assessed.
There was one SF_6 mitigation scheme reported which was in the South West for 17/18. Oil mitigation schemes reported for 17/18: East Midlands – 2 schemes of cable tagged with PFT South West – 2 schemes of cables tagged with PFT and oil leak bunds fitted at 3 operational sites (primary substations) South Wales – 8 schemes of cables tagged with PFT and oil leak bunds fitted at 8 sites operational sites (primary substations) West Midlands – no schemes reported We have assessed the CBAs for PFT application and normal payback, in terms of reduced leak rates and reduced excavation, is around 5 – 10 years

E3 –BCF

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.
A number of aspects of the BCF (as detailed below) have been apportioned according to the following allocation; • West Midlands 30% • East Midlands 30% • South Wales 15% • South West 25%

BCF reporting boundary and apportionment factor DNOs that are part of a larger corporate group must provide a brief introduction outlining the structure of the group, detailing which organisations are considered within the reporting boundary for the purpose of BCF reporting. Any apportionment of emissions across a corporate group to the DNO business units must be explained and, where the method for apportionment differs from the method proposed in the worksheet guidance, justified.
As required, and stated in the RIGs, the organisational boundary for this business carbon footprint has been defined using the operational control approach.

BCF process The reporting methodology for BCF must be compliant with the principles of the Greenhouse Gas Protocol.[1] Accounting approaches, inventory boundary and calculation methodology must be applied consistently over time. Where any processes are improved with time, DNOs should provide an explanation and assessment of the potential impact of the changes.

[1] Greenhouse gas protocol

The methodology utilised within the report follows UK Carbon Reporting guidance as provided by Defra / DECC and is compliant with the principles of the 'Greenhouse Gas Protocol' and the 2015 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting.

In line with these principles the data presented aims to meet the following criteria to ensure its continued validity and authenticity.

- Relevant: the report and commentary remains reflective of the substance and economic reality of the company's business relationships.
- Complete: all relevant emission sources are included (although in practice lack of data or cost of gathering must be noted as a limiting factor).
- Consistent: accounting approaches, inventory boundary and calculation methodology have been applied consistently over the reporting period.
- Transparent: information on the processes, procedures, assumptions and limitations of the BCF reporting are disclosed in a clear, factual, neutral and understandable manner, enabling internal and external verifiers to attest to its credibility.
- Accurate: GHG measurements, estimates or calculations should be systematically neither over nor under the actual emissions value, as far as can be judged, and that uncertainties be reduced as far as practicable.

The latest Defra GHG conversion factors (2017) have been used throughout in the calculation of WPD's 2017 – 2018 BCF. The E3 reporting summary sheet of Ofgem's RIGs requires a single GHG conversion factor to be reported for each DNO GHG emission activity. In some cases, however, more than one GHG conversion factor was used for each GHG emission activity (e.g. for business air travel conversion factors for domestic, international short haul and international long haul were used). In these instances, a weighted mean average of the conversion factors for each GHG emission activity was reported in the E3 summary sheet. These averaged conversion factors are for reporting purposes only and are not used for any part of WPD's BCF calculation. **See data table below;**

Weighted mean average conversion factors as reported on Table E3

	WPD Licence Area			
BCF Aspect	**W Midlands**	**E Midlands**	**S Wales**	**S West**
Building Energy Use				
Building Electricity	0.00035156	0.00035156	0.00035156	0.00035156
Building – Other fuels	0.00018416	0.00018416	0.00018416	0.00018416
Substations	0.00035156	0.00035156	0.00035156	0.00035156
Operational Transport				
Road	0.00260000	0.00260000	0.00260000	0.00260000
Rail	-	-	-	-
Sea	-	-	-	0.00005135
Air	0.00253888	0.00253888	0.00253888	0.00253888
Business Transport				
Road	0.00018109	0.00018109	0.00018109	0.00018109
Rail	0.00004678	0.00004678	0.00004678	0.00004678
Sea	0.00002186	0.00002186	0.00002186	0.00002186
Air	0.000214409	0.000214409	0.000214409	0.000214409
Fugitive Emissions				

SF6	22.8	22.8	22.8	22.8
Fuel Combustion				
Diesel	0.00295352	0.00295352	0.00295352	0.00295352
Gas Natural	-	-	-	-
Other	-	-	-	-
Losses	315.56	315.56	315.56	315.56
Contractor data				
Operational Transport				
Road	0.00179619	0.00192632	0.00110075	0.00169643
Fuel combustion				
Diesel	0.00253512	0.00295351	0.00295351	0.00295351
Natural Gas	0.00150785	0.00150815	0.00148148	-
Other	0.00220459	0.00253203	0.00262786	0.00219850

The data has been reviewed internally by the WPD Environment Team.

Commentary required for each category of BCF

For **each** category of BCF in the worksheet (ie Business Energy Usage, Operation Transport etc) DNOs must, where applicable, provide a description of the following information, ideally at the same level of granularity as the Defra conversion factors:

- the methodology used to calculate the values, outlining and explaining any specific assumptions or deviations from the Greenhouse Gas Protocol
- the data source and collection process
- the source of the emission conversion factor (this shall be Defra unless there is a compelling case for using another conversion factor. Justification should be included for any deviation from Defra factors.)
- the Scope of the emissions ie, Scope 1, 2 or 3
- whether the emissions have been measured or estimated and, if estimated the assumptions used and a description of the degree of estimation
- any decisions to exclude any sources of emissions, including any fugitive emissions which have not been calculated or estimated
- any tools used in the calculation
- where multiple conversion factors are required to calculate BCF (eg, due to use of both diesel and petrol vehicles), DNOs should describe their methodology in commentary
- where multiple units are required for calculation of volumes in a given BCF category (eg, a mixture of mileage and fuel volume for transport), DNOs should describe their methodology in commentary, including the relevant physical units, eg miles.

DNOs may provide any other relevant information here on BCF, such as commentary on the change in BCF, and should ensure the baseline year for reference in any description of targets or changes in BCF is the Regulatory Year 2014-15. DNOs should make clear any differences in the commentary that relate to DNO and contractor emissions.

SUMMARY

For 17/18 the overall BCF is down on the 14/15 reference year across the 4 DNOs.

A number of initiatives have contributed to this reduction:

- Ongong energy efficiencies in our depots, for example installing LED lighting, motion sensors and upgrading air conditioning units
- Greater employee awareness through quarterly KPI energy use reporting
- Losses have reduced as a result of our losses strategy initiatives

WPD West Mids	**14/15**	**17/18**	
Total BCF (excl. losses)	**29,722.90**	25,243.05	tCO_{2e}
TOTAL BCF (incl. losses)	**685,107.10**	532,726.53	tCO_{2e}
WPD East Mids	**14/15**	**17/18**	
Total BCF (excl. losses)	**30,172.15**	24,856.03	tCO_{2e}
TOTAL BCF (incl. losses)	**712,358.19**	498,992.59	tCO_{2e}

WPD South Wales	14/15	17/18	
Total BCF (excl. losses)	**18,330.13**	14,420.49	tCO_{2e}
TOTAL BCF (incl. losses)	**282,383.62**	173,428.16	tCO_{2e}
WPD South West	**14/15**	**17/18**	
Total BCF (excl. losses)	**23,752.90**	19,009.32	tCO_{2e}
TOTAL BCF (incl. losses)	**328,769.91**	255,873.42	tCO_{2e}

BUILDING ENERGY USE (SCOPE 1 & 2)

Energy use for the following sites; WPD Avonbank, WPD Pegasus, WPD Lamby Way and WPD Tipton have been apportioned according to the following allocations;

- West Midlands 30%
- East Midlands 30%
- South Wales 15%
- South West 25%

Summary Statements – Buildings Energy Use (Scope 1 & 2)

WPD West Midlands		
Buildings – Electricity	1,630.28	tCO_{2e}
Buildings – Other Fuels	19.09	tCO_{2e}
Substations usage	6,194.20	tCO_{2e}
Total tCO_{2e}	**7,840.26**	**tCO_{2e}**
WPD East Midlands		
Buildings – Electricity	2,134.18	tCO_{2e}
Buildings – Other Fuels	133.07	tCO_{2e}
Substations usage	7,855.73	tCO_{2e}
Total tCO_{2e}	**10,118.94**	**tCO_{2e}**
WPD South Wales		
Buildings – Electricity	1,370.62	tCO_{2e}
Buildings – Other Fuels	49.51	tCO_{2e}
Substations usage	3,202.86	tCO_{2e}
Total tCO_{2e}	**4,625.91**	**tCO_{2e}**
WPD South West		

Buildings – Electricity	2,498.46	tCO_{2e}
Buildings – Other Fuels	18.52	tCO_{2e}
Substations usage	2,365.86	tCO_{2e}
Total tCO_{2e}	**4,884.97**	**tCO_{2e}**

Detailed data tables are provided below.

Buildings – Electricity (Scope 2)

The 2017/18 data presented is based upon actual SMART meter downloads from the WPD depots. Energy usage from all WPD SURF Telecom sites has been included in the 2017/18 Buildings – Electricity data (all regionalised).

The tCO_{2e} is determined using the current 2017 Guidelines to Defra/DECC GHG Conversion Factors for Company Reporting, Electricity one year grid rolling average 0.35156

Buildings - Other Fuel (Scope 1)

Gas Usage

2017/18 total tCO_{2e} gas use data presented is determined using the DEFRA Guidelines published conversion factor of 0.18416 (Gross CV)

Diesel Usage

Diesel is not currently used for Buildings Energy Use within the WPD regions.

LPG Usage

LPG is not currently used for Buildings Energy Use within WPD regions

Substation Usage (Scope 2)

Supplier invoices have been used to calculate the number of units used. The tCO_{2e} is determined using the current 2017 Guidelines to Defra/DECC GHG Conversion Factors for Company Reporting, Electricity one year grid rolling average 0.35156

OPERATIONAL TRANSPORT (Scope 2)

The following allocations have been used for WPD fleet emissions and helicopter charter and testing emissions;

- West Midlands 30%
- East Midlands 30%
- South Wales 15%
- South West 25%

Summary Statements – Operational Transport

WPD West Midlands		
Road	6,297.06	**tCO_{2e}**

Rail	0.00	**tCO_{2e}**
Sea	0.00	**tCO_{2e}**
Air	564.26	**tCO_{2e}**
Total	**6,861.32**	**tCO_{2e}**
WPD East Midlands		
Road	5,914.44	**tCO_{2e}**
Rail	0.00	**tCO_{2e}**
Sea	0.00	**tCO_{2e}**
Air	550.96	**tCO_{2e}**
Total	**6,465.40**	**tCO_{2e}**
WPD South Wales		
Road	3,851.37	**tCO_{2e}**
Rail	0.00	**tCO_{2e}**
Sea	0.00	**tCO_{2e}**
Air	387.86	**tCO_{2e}**
Total	**4,239.23**	**tCO_{2e}**
WPD South West		
Road	5,135.62	**tCO_{2e}**
Rail	0.00	**tCO_{2e}**
Sea	0.24	**tCO_{2e}**
Air	610.54	**tCO_{2e}**
Total	**5,746.40**	**tCO_{2e}**

Detailed data tables are provided below.

Operational Transport – Road

Operational road transport emissions currently take into account the following contributions:

- DNO own operational fleet vehicles.

Assumptions used in calculating operational transport road tCO_{2e}

Reliable data were available for fuel used in company vehicles and were therefore used in preference to estimating fuel use based on vehicle type and distance travelled. Fuel use was obtained through procurement records of fuel for onsite fuel pumps and fuel card data of fuel purchased from offsite fuel stations.

WPD fleet data based on actual fuel data analysis (fuel cards and on-site pumps) provided by the Transport Manager.

Type	Unit	Conversion Factor
Diesel	Litres	2.67193
Petrol	Litres	2.19835
Diesel (bio-blend)	Litres	2.60016

The current 2017 DECC/DEFRA published conversion factors have been used to calculate the $tCO_{2e;}$ Diesel (litres) 2.67193; Petrol (unleaded) (litres) 2.19835; Diesel (bio-blend) 2.60016.

Please note operational transport is now split between DNO and Contractors.

Operational Transport – Rail

There were no rail operational transport uses within the WPD area.

Operational Transport – Sea

Operational sea transportation is limited to the shipment of diesel fuel from the UK mainline to the Isles of Scilly. The tCO_{2e} has been determined using the current 2017 DECC/DEFRA published conversion factor for Freighting Goods - General Cargo - Average kg CO_2 / unit – 0.05135

Operational Transport – Air

Data is provided on the volume of aviation turbine fuel purchased and charged to each distribution licence area.

The current 2017 DECC/DEFRA published conversion factor for aviation turbine fuel 2.53888 Kg/litre has been used to calculate the tCO_{2e}.

- WPD usage extracted from Consortium usage figures.
    - The helicopters are owned / operated by a consortium of Scottish & Southern, UKPN, Midlands, South West and Wales. They are also used for a small percentage of charter work.
    - Figures include 'testing' and charter hours

BUSINESS TRANSPORT (SCOPE 3)

The following allocations have been used for WPD Business Mileage;

- West Midlands 30%
- East Midlands 30%
- South Wales 15%
- South West 25%

Summary Statement – Business Transport

WPD West Midlands		
Road	1,018.58	tCO_{2e}
Rail	6.55	tCO_{2e}
Sea	0.03	tCO_{2e}
Air	37.24	tCO_{2e}

Total	**1,062.41**	**tCO_{2e}**
WPD East Midlands		
Road	1,018.58	tCO_{2e}
Rail	6.55	tCO_{2e}
Sea	0.03	tCO_{2e}
Air	37.24	tCO_{2e}
Total	**1,062.41**	**tCO_{2e}**
WPD South Wales		
Road	509.29	tCO_{2e}
Rail	3.28	tCO_{2e}
Sea	0.02	tCO_{2e}
Air	18.62	tCO_{2e}
Total	**531.20**	**tCO_{2e}**
WPD South West		
Road	848.82	tCO_{2e}
Rail	5.46	tCO_{2e}
Sea	0.03	tCO_{2e}
Air	31.03	tCO_{2e}
Total	**885.34**	**tCO_{2e}**

Detailed data tables are provided below.

Business Transport – Road

Total mileage data presented includes all business mileage from company cars and private cars used on business based on mileage claims processed by Payroll.

The data does not include employee travel to and from work.

Assumptions used in calculating business transport road tCO_{2e}

The mileage claims system is unable to record fuel type for the miles claimed, however the latest Dept for Transport: Transport Statistics Great Britain 2016 (latest) state 40:59 diesel to petrol use (1% accounted for electric vehicles).

The following conversion factors have therefore been used:

Passenger Road transport – Average Car (Diesel) 0.17887 /km $kgCO_{2e}$

Passenger Road transport – Average Car (Petrol) 0.18568 /km $kgCO_{2e}$

Business Transport – Rail

Rail travel information has been provided by the travel booking company from their internal system. The current published DEFRA conversion factor– National Rail – 0.04678 $KgCO_2$ / km.

London Underground transport has not been included as journey distances are not recorded on tickets purchased.

Business Transport – Sea

Assumptions (Sea)

The current published DEFRA conversion factor– Ferry Car Passenger 0.02186 kg CO_2 / km has been used for the period 1 April 2017 to 31 March 2018.

Business Transport – Air

Data has been provided by Insurance and from the internal restricted card booking System for the procurement of air travel.

Assumptions (Air)

For 2017/18 'Without RF' conversion factors have been used to calculate business air travel emissions. Without RF factors include the distance uplift of 8% to compensate for planes not flying using the most direct route i.e. flying around international air space, stacking etc.

From the current published DECC/DEFRA guidance;

Domestic UK flights conversion factor - Average domestic (passenger km) – $KgCO_{2e}$- 0.14141

Short Haul European flights conversion factor - Average passenger (passenger km) – $KgCO_{2e}$- 0.08513

Long haul international conversion factor – Business Class (passenger km) $KgCO_{2e}$ – 0.23179

FUGITIVE EMISSIONS (Scope 1)

SF_6 – Sulphur Hexafluoride

For the purposes of this report only SF_6 fugitive emissions for the regulatory year (Apr 17 – Mar 18) have been included. These have been calculated by actual known occasions of topping up of equipment.

Gas lost to environment	Apr 17 – Mar 18 (kg)	tCO_{2e}
WPD West Midlands	186.96	**4262.69**
WPD East Midlands	56.96	**1298.69**
WPD South Wales	103.64	**2362.99**
WPD South West	121.28	**2765.18**

Above calculations based upon the global warming potential (GWP) of SF_6 = 22800 (i.e. 1kg of SF_6 is equivalent to 22800kg of CO_2) as per the current published DEFRA conversion factors.

Whilst the RIGs requirements prescribe the use of SF6 global warming potentials (GWP) provided in the most up to date version of Defra conversion factors, it should be noted that these are not the latest GWP available from the Intergovernmental Panel on Climate Change (IPCC). The latest (2013) IPCC GWP for SF6 is 23,500, whereas the SF6 GWP reported in the latest Defra

conversion factors is 22,800."

Data for SF_6 emitted in 2015/16 and 2016/17 has been restated and added to the current RRP E2 and E3 tables for each WPD licence area. The data has been restated based on a revised methodology used to calculate the 2017/18 SF_6 emissions using the following data sources;

- SF_6 top-up figures as reported on our company asset database
- Scrapped units returned empty to our company plant centres
- Units returned empty to manufacturers
- GVR return programme

The methodology measures the amount of SF_6 emitted during installation, service and decommissioning. The revised methodology now includes the amount of SF_6 found to be"missing" from scrapped units returned to plant centres, manufacturers and the GVR return programme. The SF_6 may have been emitted over the life of the unit, rather than being attributable to a particular year.

The revised SF_6 emission data now included in the RRP Tables is set out below and tCO_{2e} calculated accordingly within the tables;

	WPD SF_6 emissions (kg)			
	Reported 15/16	**Revised 15/16**	Reported 16/17	**Revised 16/17**
East Midlands	45.17	**75.61**	35.47	**53.8**
West Midlands	163.58	**352.64**	51.97	**207.9**
South Wales	88.35	**93.9**	77.7	**88.3**
South West	99.65	**105.3**	63.4	**74.0**

Overall the level of leakage partly is reducing over time as older units are replaced with new units containing lower levels of SF_6.

Fugitive Emissions – Gases Other

Emission data for operating air conditioning units has been omitted due to the relatively small volumes of tCO_{2e} emitted from the units in comparison with the effort required to collect and collate the data accurately.

FUEL COMBUSTION (SCOPE 1 & 3)

Summary Statements – Fuel Combustion

WPD West Midlands		
Gas Oil	802.04	tCO_{2e}
Natural Gas	0.00	tCO_{2e}
Fuels Other	0.00	tCO_{2e}
Total	**802.04**	**tCO_{2e}**
WPD East Midlands		
Gas Oil	621.56	tCO_{2e}
Natural Gas	0.00	tCO_{2e}
Fuels Other	0.00	tCO_{2e}

Total	**621.56**	**tCO_{2e}**
WPD South Wales		
Gas Oil	388.12	tCO_{2e}
Natural Gas	0.00	tCO_{2e}
Fuels Other	0.00	tCO_{2e}
Total	**388.12**	**tCO_{2e}**
WPD South West		
Gas Oil	903.27	tCO_{2e}
Natural Gas	0.00	tCO_{2e}
Fuels Other	0.00	tCO_{2e}
Total	**903.27**	**tCO_{2e}**

Detailed data tables are provided below.

Gas Oil (red diesel) Combustion

Information is taken from gas oil delivery records and ESP fuel purchase information. The current published DEFRA conversion factor– Gas Oil (red diesel) 2.95351 ltr CO_2 / km has been used for the period 1 April 2017 to 31 March 2018.

Natural Gas Combustion

No natural gas usage has been reported April 2017 – March 2018

LPG

No LPG gas usage has been reported April 2017 – March 2018

Please note Fuel Combustion is now split between DNO and Contractors.

Contractors

When reporting BCF emissions due to contractors in the second half of the worksheet please:

- Explain, and justify, the exclusion of any contractors and any thresholds used for exclusion.
- Provide an indication of what proportion of contractors have been excluded. This figure could be calculated based on contract value.

Please provide a description of contractors' certified schemes for BCF where a breakdown of the calculation for their submitted values is not provided in the worksheet.

If a DNO's accredited contractor is unable to provide a breakdown of the calculation and has entered a dummy volume unit of '1' in the worksheet please provide details of the applicable accredited certification scheme which applies to the reported values.

The main contractors operating on the network have been included in the submission; these consist of the dig and lay contractors, tree trimming contractors, Major Projects' contractors, generator contractors, asset recovery contractors, logistics / transport contractors and waste management contractors. The approach was based on operational nature of the work performed on behalf of WPD and size of contract value.

Smaller value and services contracts have not been included in the submission, details of the contractors included can be found behind the E3 Table.

In terms of carbon emissions the contractors currently included within the BCF account for approximately 75% of all associated contracted emissions.

Additional contractors, approximately 25%, are currently excluded based on less significant emissions, current practicalities of gathering data and current expenditure.

Contractor data for the following aspects has been collected for the Business Carbon Footprint;

- Operational Transport
- Fuel Combustion

Summary Contractor data

	tCO_{2e}				
	East Mids	**West Mids**	**South Wales**	**South West**	**Total**
Operational Transport	4,354.99	3,506.23	1,623.21	2,646.55	12,130.98
Combustion	930.00	904.81	652.75	1,179.75	3,667.31
Total	5,284.99	4,411.04	2,275.96	3,826.30	15,798.29

Detailed tables are provided below;

	East Mids	**West Mids**	**South Wales**	**South West**	**Total**
Operational Transport					
litres	1,487,998.79	1,185,889.25	541,076.03	837,780.49	4,052,744.56
km	772779.07	766145.87	933561.72	722284.64	3,194,771.30
RRP Average cf	0.001926323	0.00179619	0.00110075	0.00169643	-
Fleet tCO_{2e}	4,354.99	3,506.23	1,623.21	2,646.55	12,130.98
Red Diesel (ltrs)	292153.92	294124.37	211121.39	391069.58	1188469.26
RRP average cf	0.00295351	0.00295351	0.00295351	0.00295351	-
tCO_{2e}	862.88	868.70	623.55	1155.03	3510.16
LPG*(m^3)	43503.76	10902.94	54.00	0.00	54460.70
RRP average cf	0.00150807	0.00150807	0.00150807	-	-
tCO_{2e}	65.61	16.44	0.08	0.00	82.13

Other**	596.36	8922.26	11085.79	11244.00	31848.41
RRP average cf	0.00253233	0.00220433	0.00262679	0.00219835	-
tCO_{2e}	1.51	19.67	29.12	24.72	75.02
Total tCO_{2e}	930.00	904.81	652.75	1179.75	3667.31

*Also includes Natural Gas
** Includes petrol and kerosene

Building energy usage
Natural gas, Diesel and other fuels are all categorised as fuel combustion and must be converted to tCO2e on either a Gross Calorific Value (Gross CV) or Net Calorific Value (Net CV) basis. The chosen approach should be explained, including whether it has been adapted over time.

Substation Electricity must be captured under Buildings Energy Usage. Please explain the basis on which energy supplied has been assessed.

E4 – Losses Snapshot

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.

Cable volumes are reported from stores bookings to the South West/South Wales and East Midlands/West Midlands stores. They have been allocated to individual DNO licence areas based on the total asset length in each licence area.

To calculate the volume of cable which was uprated, the usage before the change was compared to the usage after the change. Reduced usage of small size assets was attributed to the change in policy.

Programme/Project Title
Please provide a brief summary and rationale for each of the activities in column C which you have reported against.

The cable items in column C all relate to the uprating of cables at the time of installation. At this stage the additional cost of the cable is minimal compared to the overall cost of installation.

The transformer items in column C follow the same logic with the exclusion of "pre-1958 transformers".

Primary driver of activity
If, in column E, you have selected 'Other' as the primary driver of the activity, please provide further explanation.

Other is the primary driver for all activities except "pre 1958 transformers" as the uprating of cables and transformers is not specifically attributed to reinforcement or replacement. The "pre 1958 transformers" item is shown as equipment to manage loss as the units are being replaced for the sole reason of loss reduction.

Baseline Scenario Please provide a brief description of the 'Baseline Scenario' inputted in column K for each activity.
WPD's Losses CBAs were constructed using a nil cost baseline scenario, with the Options constructed using incremental costs e.g. purchase price of larger asset. As the unit costs within the CBA should be used to populate table E4, both the Estimated unit cost of the activity in Column J and the Estimated Distribution Losses-Justified Cost have been populated with the incremental unit costs of the included programmes. For the same reason, there is nil cost in the Avoided DNO costs over 'Baseline Scenario' in column AV. CBAs were prepared on a WPD company wide basis, rather than specific to licence areas. This does not impact the unit costs entered into table E4, however this should be taken into consideration in relation to the data entered in the RIIO-ED1 CBA Tool summary from columns AT onwards.

Use of the RIIO-ED1 CBA Tool DNOs should use the latest version of the RIIO-ED1 CBA Tool for each of the activities reported in column C. Where the RIIO-ED1 CBA Tool cannot be used to justify an activity, DNOs should explain why and provide evidence for how they have derived the equivalent figures for the worksheet. The most up-to-date CBA for each activity reported in the Regulatory Year under report must be submitted.
CBA tool used

Changes to CBAs If, following an update to the CBA used to originally justify the activity in column C, the updated CBA shows: • a negative net benefit for an activity, but the DNO decides it is in the best interests of consumers to continue the activity, or • a substantively different NPV from that used to justify an activity that has already begun. the DNO should include an explanation of what has changed and why the DNO is continuing the activity. For example, where the carbon price used in the RIIO-ED1 CBA Tool has changed from that used to inform the decision such that the activity no longer has a positive NPV.
n/a

Cost benefit analysis additional information Please include a reference to the file name and location of any additional relevant evidence submitted to support the costs and benefits inputted into this worksheet. This should include the most recent CBA for each activity reported in column C in the Regulatory Year under report.
n/a

E5 – Smart Metering

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.
Many of the Smart Metering benefits will not be realised until a significant number of smart meters are installed. Avoided Loses to Network Operators will not be realised until time of use tariffs have been introduced to change customer behaviour. The reduction in CML derived from "last gasp" reporting and reduction in calls to fault lines will not be realised until SMETS2 meters are rolled out in significant volumes.

Actions to deliver benefits Detail what activities have been undertaken in the relevant regulatory year to produce benefits of smart metering where efficient and maximise benefits overall to consumers. At a minimum this should include: • A description of what the expenditure reported under Smart Meter Information Technology Costs is being used to procure and how it expects this to deliver benefits for consumers. • A description of the benefits expected from the non-elective data procured as part of the Smart Meter Communication Licensee Costs. The DNO should set out how it has used this data. • A description of the Elective Communication Services being procured, how it has used these services, and a description of the benefits the DNO expects to achieve.
None.

Calculation of benefits Explain how the benefits have been calculated, including all assumptions used and details of the counterfactual scenario against which the benefits are calculated.
Avoided Losses – requires evidence of TOU tariff changes to distribution demand profiles, so requires SMETS2 meters in large quantities. No date is forecast for this benefit Reduction in CMLs – requires 1/3rd of customers on a feeder to have SMETS2 meters to provide a robust indication. Current forecasts are that it will be 2019 before this level of penetration is seen Reduction in fault costs (better pinpointing) – requires SMETS2 meters to be fitted. For single customer faults this can occur once meters are fitted – 2018 onwards – but for network faults this requires 1/3rd of customers as above. Reduction in calls to fault lines - requires SMETS2 meters to be fitted. For single customer faults this can occur once meters are fitted – 2018 onwards Better informed investment decisions – requires over 80% of meters to be deployed and is likely to be after 2020. Avoided cost of voltage complaints – requires SMETS2 meters to be of a suitable accuracy that measurements can be used. It may be from 2018 onwards. Network Capacity Investment savings – requires over 80% of meters to be deployed and is likely to be after 2020.

Use of the RIIO-ED1 CBA Tool DNOs should use the latest version of the RIIO-ED1 CBA Tool for each solution reported in the worksheet in the Regulatory Year under report. Where the RIIO-ED1 CBA Tool cannot be used to justify a solution, DNOs should explain why and provide evidence for how they have derived the equivalent figures for the worksheet. The most up-to-date CBA for each activity reported in the Regulatory Year under report which are used to complete the worksheet must be submitted.
CBA used.

Cost benefit analysis additional information Please include a reference to the file name and location of any additional relevant evidence submitted to support the costs and benefits inputted into this worksheet. This should include the most recent CBA for each solution reported in the Regulatory Year under report.
n/a

E6 – Innovative Solutions

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.
Costs column Y – Reflects the total costs incurred on all accepted alternative connection schemes within the 2017/18 regulatory period, whether completed (energised) or not. The costs have been split by DNO upstream DUOS costs and the customer sole use and customer re-inforcement contribution costs. **MVA released column BX** – Reflects the total MVA capacity made available through all completed (energised) accepted alternative connection schemes within the 2017/18 regulatory period. **Estimated Gross Avoided Costs column DC** – Reflects the estimated total avoided reinforcement costs associated with the MVA released (column BX).

General For each of the solutions please explain: • In detail what the solution is, linking to external documents where necessary. • How this is being used, and how it is delivering benefits. • What the volume unit is and what you have counted as a single unit. • How each of the impacts have been calculated, including what assumptions have been relied upon.
(1) Alternative Connection Offers - within the 2017-18 period, WPD offered 4 types of Alternative Connection options; these can benefit generation customers where a conventional firm offer would prove financially unviable in areas where high levels of network reinforcement are required. These 4 alternative options include; **Active Network Management** - connection offered on the basis that the generator will join a 'last in first out' queue for forced curtailment at times of peak constraint.

Soft Intertrip - connection offered on the basis that the generator will be forced offline at times of peak constraint

Timed - connection offered on the basis that the generator will only operate within a fixed time period.

Export Limiting - connection offered on the basis that the export from the customers site into the wider WPD network is capped not to exceed an agreed value, which could be at zero net output.

More detail can be found at
http://www.westernpower.co.uk/Connections/Generation/Alternative-Connections.aspx

Units – cost per MVA made available to customers has been used for all three options and the baseline scenario. A single unit is 1 MVA.

(2) New for 2018/19 - MOD 1151 11 kV Voltage Reduction – following on from the Low Carbon Networks LV Templates project in South Wales, and the subsequent LV Monitoring projects it was found that the network was operating towards the higher end of statutory voltage bands and that this could be lowered. A target voltage of 11300V and a bandwidth of +/- 165V (i.e. +/- 1.5%) is to be implemented as standard when sites are visited for maintenance during the next three years.. The tap-change control settings at every 132/11kV, 66kV/11kV and 33/11kV substation that feeds more than one customer will be reviewed and changedThe initiative is being rolled out initially in South Wales and then across the other areas aiming to complete by 2020.

There is no additional cost to this policy as it is set as a task to be completed at next maintenance of the controlling protection. Changing the settings is a small part of the normal task.

Progress to date:

DNO	Total Sites	Complete Sites	Outstanding Sites	Percent complete
South Wales	359	306	53	85%
South West	566	218	348	39%
East Midlands	774	149	625	19%
West Midlands	465	303	162	65%

DNO	GWh supplied 2017	Saving	Total Potential GWh Saved	**Actual GWh saved**
South Wales	11,424	1.13%	129	**110**
South West	14,041	1.13%	159	**61**
East Midlands	21,017	1.13%	237	**46**
West Midlands	24,598	1.13%	278	**181**

This impact of this is reduced energy consumption on the network so is measured in MWhs.

Calculation methodology. The LV Templates and LV monitoring projects demonstrated that this reduction reduces energy consumption by 1.13%. This figure is used as the multiplier for the GWhs supplied across each network from balancing and settlements. This figure is further reduced by applying the percentage of sites completed.

Use of the RIIO-ED1 CBA Tool DNOs should use the latest version of the RIIO-ED1 CBA Tool for each solution reported in the Regulatory Year under report. Where the RIIO-ED1 CBA Tool cannot be used to justify a solution, DNOs should explain why and provide evidence for how they have derived the equivalent figures for the worksheet. The most up-to-date CBA for each solution reported in the Regulatory Year under report which are used to complete the worksheet must be submitted.
Swansea North ANM CBA attached. The CBA contrasts the conventional reinforcement approach against the ANM scheme. The Swansea North ANM CBA is the only one attached as only schemes relating to the Swansea North ANM were energised over the period. The other alternative connection schemes; Timed, Intertrip and Export limiting have no associated significant costs as they largely rely on the customer self curtailing.

Changes to CBAs If, following an update to the CBA used to originally justify the activity in column C, the updated CBA shows a negative net benefit for an activity, but the DNO decides it is in the best interests of consumers to continue the activity, the DNO should include an explanation of what has changed and why the DNO is continuing the activity.
N/A

Calculation of benefits Explain how the benefits have been calculated, including all assumptions used and details of the counterfactual scenario against which the benefits are calculated.
Scenario – alternative connections can be applied for across the entirety of WPDs networks and cost savings per MVA can vary widely dependent upon the constraints on the local network, BSP or GSP. Any generic alternative conections costs per MVA can be grossly misleading, and given the low numbers of alternative connections schemes energised over the period, this has simply been done on an individual basis. A CBA anlaysis on the Swansea North ANM scheme has been attached, and is done on the following basis: **Workings Baseline column G** - Approximate costs of the conventional reinforcement work does not include any common costs such as switchgear costs as these are a requirement for all connections regardless of MVA connecting or whether connection is a conventional or alternative. **Workings Sheets 1 column G** – Additional approximate costs for each scheme do not include switchgear costs as these are a requirement for all connections regardless of MVA connecting or whether connection is a conventional or alternative.

Workings Sheets 1 column J – The number of customers connecting is based on an assumption that each connection is 5MVA, so the capacity made available, and assumed to be utilised, is simply divided by 5MVA.

Workings Sheets 1 columns H & I - For the purposes of this CBA we have not implemented the £200/kW rule for cost apportioned reinforcement. An average 90/10 apportionment used.

Workings Option 1 column K & L – sole user and annual user costs taken from charging methodology document for the Swansea ANM Zone.

Cost benefit analysis additional information
Please include a reference to the file name and location of any additional relevant evidence submitted to support the costs and benefits inputted into this worksheet. This should include the most recent CBA for each solution reported in the Regulatory Year under report.

Supporting Documents:
As only schemes relating to the Swansea North ANM were energised over the period, only the Swansea Charging methodology and CBA has been attached.


South Wales ANM Charging Methodolog


Alternative Connections CBA_20

E7 – LCTs

Allocation and estimation methodologies: detail any estimations, allocations or apportionments to calculate the numbers submitted.

Heatpumps – This dataset has been collated using the aggregated data publically released by Ofgem under the domestic RHI. The non-domestic RHI for ASHPs and GSPs did not provide sufficient detail to determine location. The volumes are insignificant though.

Electric Vehicles – this dataset has been collated using the electric vehicles notification process under the IET Code of Practice and referenced in OLEVs guidance for installers. It includes only details of EV charge points notified directly to WPD or through the ENA. Slow charge has assumed rates of 16A/phase and below. Fast charge encompasses anything above 16A/phase

G83 PVs Non-PV G83s and G59 generation has been collated using the standard reporting methodologies.

LCT – Processes used to report data

(i) Please explain processes used to calculate or estimate the number and size of each type of LCT.
(ii) If any assumptions have been made in calculating or estimating either of these values, these must be noted and explained.

For Heatpumps, the Ofgem RHI domestic data has been used to calculate the installation volumes and capacity.
Location of heat pumps has been broadly matched using the council regions compared to WPD's regulatory patches.

Electric Vehicles are notified to us on a per MPAN basis, and full installation details are provided. This has been used to calculate the installation volumes and capacity.

G83 PVs Non-PV G83s and G59 generation has been collated using the standard reporting methodologies.

LCT - Uptake

Please explain how the level of LCT uptake experienced compares to the forecast in your RIIO-ED1 Business Plan and the DECC low carbon scenarios. This must also include any expectation of changes in the trajectory for each LCT over the next Regulatory Year in comparison to actuals to date.

The number of secondary heatpumps installed have been much lower than anticipated, with the exception of South West, which has a higher proportion of off-gas network domestic housing. The installation sizes are also lower than anticipated, indicating smaller equipment is being chosen to be installed.

EV Chargepoints installed on the secondary network have been lower than anticipated both in 2016 and 2017, hence the undershoot of the ED1 estimates. A change in the grant incentive for the installations have reduced the numbers. Most chargepoints installed are of the fast variety.

G83 PV installs have been significantly reduced this year by the changes to the incentives. The installed capacity has also dropped in line as customers chose smaller installs.

Other G59 DG installs have slightly reduced on the secondary network, but increased on the primary network, reflecting an increase of capacity on the primary system due to completion of a number of reinforcement schemes. Both measures have seen much greater volumes than our ED1 estimates.

			2018-19 Forecast			
			EMID	**WMID**	**SWALES**	**SWEST**
Secondary	Heat Pumps	Number	1257	806	549	1540
	EV slow charge	Number	2384	2151	405	1683
	EV fast charge	Number	7549	6812	1283	5330
	PVs (G83)	Number	3765	3616	1678	6457
	Other DG (G83)	Number	9	8	4	6
	DG (non G83)	Number				

	Total		**14964**	**13393**	**3919**	**15016**
Primary	Heat Pumps	Number				
	EV slow charge	Number				
	EV fast charge	Number				
	PVs (G83)	Number				
	Other DG (G83)	Number				
	DG (non G83)	Number	79	168	64	24
	Total		**79**	**168**	**64**	**24**
Secondary	Heat Pumps		7.16	4.59	3.20	8.78
	EV slow charge	MW	8.58	7.74	1.46	6.06
	EV fast charge	MW	55.87	50.41	9.49	39.44
	PVs (G83)	MW	16	15	7.13	27.44
	Other DG (G83)	MW	0.04	0.03	0.02	0.02
	DG (non G83)	MW				
	Total		**87.65**	**78.15**	**21.30**	**81.74**
Primary	Heat Pumps	MW				
	EV slow charge	MW				
	EV fast charge	MW				
	PVs (G83)	MW				
	Other DG (G83)	MW				
	DG (non G83)	MW	95.00	90.74	293.71	33.41
	Total		**95.00**	**90.74**	**293.71**	**33.41**

Commentary on 2018-19 Forecasts:

Heat Pumps

We have used Regen data for all 4 licensed areas.
Low awareness and high costs has led to lower deployment rates.
Our forecast decrease reflects the Select Committee on Climate Change's 5th Carbon Budget which decreased the heat pump target for 2030.
The Growth scenario used is between 'Consumer Power' and 'Slow Progression'.
The government's Clean Growth Strategy on phasing out high carbon heating for 'off-gas' properties has been reflected in future forecasts.
Comparison of the increase in heat pump connections with the Ofgem RHI figures suggest under reporting (ie. not all installations being reported to WPD).

Electric Vehicles

We have used data from the Regen growth scenario reports for East Midlands, South Wales & South West. West Midlands figures scaled from East Midlands forecast.
Slow Charge assumed as 1/3 and Fast Charge as 2/3 of total. Slow Charge

assumed as 3kW and Fast Charge as 7kW (as in previous forecast).
The Growth scenario used is between 'Consumer Power' and 'Slow Progression'.

PVs (G83)
We have used data from the Regen growth scenario reports for all 4 licensed areas.
Slow Charge assumed as 24% and Fast Charge as 76% of total. Slow Charge assumed as 3.6kW and Fast Charge as 7.4kW per installation.
The Growth scenario used is between 'Consumer Power' and 'Slow Progression'.
Although the current uptake is low, investment by government and manufacturers globally may mean we are nearing a tipping point of high growth with EV costs expected to fall into the 2020s.

Other DG (including non G83 PV)
We have used Regen data for all 4 licensed areas based upon a growth forecast between 'Consumer Power' and 'Slow Progresssion'.
The majority of onshore windfarms are forecast in South Wales to reflect the change in planning policy for England.
This category includes Battery Storage