

Environmental Impact
Annual Report 2014/15



Our Environmental Impact

Introduction

The purpose of this Environment Report is to provide a transparent account that our business activities have on the environment and our commitment to address these impacts. This report documents our carbon footprint and reports on greenhouse emission on the fuels we use in our buildings, for transportation, and for maintaining our assets.

Scottish and Southern Energy Power Distribution (SSEPD) is a British company. We are responsible for maintaining the electricity networks supplying over 3.7 million homes and businesses across central southern England and north of the Central Belt of Scotland. As well as the major towns and cities, we connect to most Scottish islands with over 100 subsea cable links. We also serve the Shetland Islands, which runs as a separate electrical system without a connection to the mainland.

We recognise the impact that our activities have on both the immediate and wider environment. We continuously look into innovative, lower carbon, ways to mitigate any such impact as we manage the challenges facing the distribution network in our two licensed areas, to ensure security of supply and value for money for our customers. Sustainability is one of our core values. This value underpins our decision and actions. Our target is to reduce CO₂ resulting from energy consumption across Carbon Reduction Commitment (CRC) qualifying sites by 15% by 2017.

In 2014/15, the combined total greenhouse gas emissions for SSEPD were 1.25 MtCO_{2e}. In the latest DECC's report, UK net emissions were provisionally estimated to be 520.5 million tonnes (Mt). This was 8.4% lower than the 2013/14 figure. The main decrease in carbon dioxide emissions was contributed by the energy supply sector. SSEPD accounts for approximately 0.24% of the total UK emission.

Of our carbon emissions, as Ofgem is aware, by far the largest contributor is electrical losses. This accounts for c.85% of SHEPD's and c.96% of SEPD's carbon emissions. The other activities that contribute from a SSEPD perspective to our environmental footprint are sulphur hexafluoride (SF₆), and the emissions resulting from our vehicle fleet and buildings' energy usage.

How do we work to achieve our goal?

Using Ofgem's guidance on Cost Benefit Analysis, we evaluate and replace traditional plant and equipment with lower loss equipment where environmental benefits are weighted against additional cost to customers' bill. We have identified two main assets where lower loss equipment is well justified from a CBA perspective. Through our procurement process, we ensure that all replacement of secondary transformers is at least 50kVA for pole mounted units and 500kVA for ground mounted units. Similarly, we increase the minimum size of cable through our replacement work stream. We continually work to be smarter at targeting loss reduction.

The next largest emission is from our vehicle fleet for the day to day operation of the business. Our fleet uses low emission cars and runs on diesel. We continue to look at the possibilities of increasing our use of biodiesel.



Our Environmental Impact

Innovation in this area, for example hybrid and electric vehicles, holds a lot of promise and we continue to monitor this as the technology develops and becomes more aligned with the demands of our fleet.

Similarly, on emissions from our buildings, we are part of an SSE- company wide target to reduce CO₂ from energy consumption by 15% by 2017. The initiative, War on Watts, started in 2011/12, focuses on the behavioural side of energy use and creates an energy efficient culture. Our Facilities Management Office rolls out a series of Carbon Cutting Investment Programmes. We expect to see our office and depots upgraded with suitable energy saving features such as solar thermal systems, grey water accumulators, lighting controls, sub metering and energy display.

Last year, as we revisited our processes and procedures, as part of a Data Assurance exercise, we found a number of areas where we could improve on, and we have now implemented those changes. For example, instead of reporting carbon emission, we have moved on to reporting carbon equivalent emissions which include Methane and Nitrous Oxide in the combustion of fuel. With losses, we have used the scope 3 conversion rate which is the factor associated with grid losses, i.e. the energy loss that occurs in getting the electricity from power plant to the organisations that purchase it. However, according to CRC reporting guidelines, as a Distribution Network Operator that owns the assets, we will use scope 2, the indirect emission factor. As a result of these changes, we are likely to see an increase in the reporting of carbon emission across the reporting categories, specifically in Losses.



Our Business Carbon Footprint

This document details the total Green House Gas emissions produced by Scottish and Southern Power Distribution (SSEPD) in the financial year 2014/15.

SSEPD is comprised of Scottish Hydro-Electric Power Distribution (SHEPD) and Southern Electric Power Distribution (SEPD). In turn, SSEPD is part of the wider corporate group SSE plc, which includes generation, transmission, supply, retail, telecoms and contracting activities.

The reporting methodology is compliant with the principles of the Greenhouse Gas Protocol. In summary, this requires the BCF reporting to be:

- Relevant: the inventory must reflect the substance and economic reality of the company's business relationships, not merely its legal form
- Complete: all relevant emission sources must be included (although in practice lack of data or cost of gathering could be a limiting factor)
- Consistent: accounting approaches, inventory boundary and calculation methodology must be applied consistently over time
- Transparent: information on the processes, procedures, assumptions and limitations of the BCF reporting must be 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 must be systemically neither over nor under the actual emissions value, as far as can be judged, and that uncertainties be reduced as far as practicable

The classification of carbon sources in the tables follows the requirements of the industry regulator, Ofgem, for the purposes of reporting Business Carbon Footprint. We have been developing the capability to report our carbon footprint for several years, leading to more accurate identification of relevant equipment and their associated emissions. This piece of work satisfies the requirements of Business Carbon Footprint Rigs Standard Condition 46A.

Unless otherwise stated in this document, all conversion rates are extracted from specific annexes listed in the Defra/DECC Greenhouse Gas (GHG) Conversion Factors for Company Reporting template. The data for each respective source is set out in the detailed tables.



Detailed Tables

Summary

SHEPD Carbon Footprint

	2014/15 tonne CO _{2e}	2013/14 tonne CO _{2e}	% of change
Building Energy Usage	6,248	5,723	9.2%
Operational Transport	8,858	8,309	6.6%
Business Transport	664	605	9.7%
Fugitive Emissions	1,592	1,381	15.3%
Fuel Combustion	27,768	7,956	249%
Total	45,130	23,974	88%

SEPD Carbon Footprint

	2014/15 tonne CO _{2e}	2013/14 tonne CO _{2e}	% of change
Building Energy Usage	8,998	7,981	12.7%
Operational Transport	17,383	16,881	3%
Business Transport	1,249	1,281	-2.5%
Fugitive Emissions	7,254	7,434	-2.4%
Fuel Combustion	4,900	5,393	-9%
Total	39,784	38,970	2%

Note: Losses are excluded from this summary given their relative magnitude in the overall total.

Major factors contributing to increases in our emissions:

- The number of unmetered assets, such as CCTV cameras, flood lighting etc, we installed at substation has increased. This results in an increase in Building Energy usage.
- The number of Full Time Equivalent staff has increased, the majority falling within operational areas. This results in an increase in operational transport in both license areas.
- SHEPD experienced 3 severe weather events during the winter of 14/15. The mobilisations of manpower to restore network supply resulted in an increase of business transport emissions.
- SF6 leakage in SHEPD has gone up by 5kg compared to the previous year.
- Bowmore Diesel Generator was run for 6 months where it would normally be on standby for 12 weeks in a year. This was to supply Jura while the faulted subsea cable was maintained and operationally restored.



Detailed Tables

Building Energy Usage

All relevant distribution buildings have been identified using the same office/depot/store log provided to Ofgem's property consultants. Required systems have been implemented to allocate energy usage (both electricity and gas) within shared buildings, the apportionment follows our Corporate Recharge model that is consistent in all submissions to Ofgem¹. The 'Grid Rolling Average' conversion factor has been used to provide the buildings electricity section. The Gross Calorific Value has been applied consistently for the conversion of gas figures.

Consumption	2014/15			2013/14			% Change
	Electricity (kWh)	Gas (kWh)	tCO ₂	Electricity (kWh)	Gas (kWh)	tCO ₂	
SHEPD	1,980,080	117,144	1,000	2,323,785	59,036	1,040	-4%
SEPD	2,654,172	809,117	1,462	2,611,434	877,488	1,334	9.6%

Substation Energy

Substations have been separated into three categories for energy usage estimations.

HV: 6.6kV - 20kV,
 EHV: 22kV - 66kV,
 132kV (SEPD only), as 132kV is Transmission in Scotland

All substations in SSE's DNOs are registered as unmetered supplies. A best estimate framework for the energy consumption at these sites has been used. Principles and assumptions used in this estimation are detailed below:

Substation Numbers - The number of substations in each category is taken from our plant database (PLACAR). The numbers are split between DNOs to give figures for both SEPD and SHEPD. Out of area substations are excluded.

Estimating Principles - Electrical load in a substation is a combination of the following factors:

Space Heating: Based on multiples of 3kW off-peak heating ON for 4 hours per day, for 4 months of the year (only 4% of HV sites are heated).

Panel Heaters: Based on multiples of 0.07kW. On for 8 hours per day, for 4 months of year in the South; and 12 hours per day, for 12 months of a year in the North.

¹ This is externally audited as part of our EU Cross Subsidy Submission, Standard License Condition 44.



Detailed Tables

Lighting: Based on multiples of 0.2kW - ON for 10 days during the year.

Battery-Chargers & Tele-control equipment: Based on multiples of 0.5kW - continuous supply to DC standing loads.

Mains powered equipment: Based on 0.5kW - continuous supply.

Transformer Coolers: Based on cooler ratings of individual transformers.

Flood lighting: Based on 0.3kW, ON for 2.5 days in a year. (Only Designated Sites)

CCTV Cameras: Based on 0.002kW – continuous supply (Only Designated Sites)

Infra Red Illumination: Based on 0.014kW, ON for 12 hours per day for 12 months of a year. (Only Designated Sites)

Digital Video Recorders: Based on 0.125kW – continuous supply (Only Designated Sites)

Calculated Figures

Electrical load has been calculated for each substation, using the principles detailed above. These figures have been multiplied by the 'Grid Rolling Average' to calculate their equivalent CO₂ emissions.

	2014/15			2013/14				
<i>SHEPD</i>	<i>Number of Substations</i>	<i>Total Units (kWh)</i>	<i>tCO₂</i>	<i>Number of Substations</i>	<i>Total Units (kWh)</i>	<i>tCO₂</i>	<i>% Change (kWh)</i>	<i>% Change (tCO₂)</i>
HV	7,619	1,787,343	883	7,502	1,759,896	779	1.6%	13%
EHV	412	8,829,746	4,364	412	8,826,340	3,904	0.04%	12%
Total	8,031	10,617,090	5,248	7,914	10,586,236	4,683	0.3%	12%
<i>SEPD</i>	<i>Number of Substations</i>	<i>Total Units (kWh)</i>	<i>tCO₂</i>	<i>Number of Substations</i>	<i>Total Units (kWh)</i>	<i>tCO₂</i>	<i>% Change (kWh)</i>	<i>% Change (tCO₂)</i>
HV	28,511	5,203,451	2,572	28,361	5,176,075	2,290	0.5%	12%
EHV	501	7,283,471	3,600	490	7,107,025	3,144	2.5%	15%
132kV	106	2,761,659	1,365	106	2,742,503	1,213	0.7%	13%
Total	29,118	15,248,581	7,537	28,957	15,025,604	6,647	1.5%	13%



Detailed Tables

Operational Transport

Road

The volume of fuel (litres) consumed by operational vehicles is captured using fuel cards and is reported separately for SHEPD and SEPD. We do not report freight separately from passenger operational transport, so all operational travel has been reported under passenger transport. The appropriate conversion factor has been used to convert the volume of fuel consumed into tonnes of CO₂. The volume figures are shown below.

In addition, the transport spend from SSE Contracting has been converted into miles travelled using SSE's mileage rate of £0.35 per mile. This has then been converted into tonnes of CO₂ using the appropriate conversion factor.

SSEPD

	2014/15					2013/14					% Change
	Petrol (l)	Diesel (l)	Gas Oil (l)	LPG(l)	tCO2	Petrol (l)	Diesel (l)	Gas Oil (l)	LPG(l)	tCO2	
SHEPD	13,399	1,922,505	4,779	5,253	5054	16,310	2,013,979	4,306	-	5,245	-3.6%
SEPD	35,757	3,470,465	338,009	129	10099	39,381	3,508,696	79,312	-	9,358	7.9%

Contractors

	2014/15		2013/14		% Change
	Miles	tCO2	Miles	tCO2	
SHEPD	8,998,851	3,634	7,231,429	2,899	25.4%
SEPD	17,923,552	7,238	18,311,429	7,341	-1.4%

Rail

Any operational rail journeys have been included in the business travel section of the report.

Sea

The use of sea travel is minimal, and considered negligible due to the scale of the emissions.



Detailed Tables

Air

Helicopters are required by SSEPD for operational purposes (mainly line patrols), hired at a day rate inclusive of fuel. Different helicopter operators are used for SHEPD and SEPD. The number of hours used was collected from the helicopter operators for the period 2014/15.

An average fuel consumption rate of 160 l/hr (single squirrel) and 212 l/hr (twin squirrel), and a petrol conversion factor has been used to convert the hours into mass of CO₂ emissions. These figures are shown below:

	2014/15			2013/14			
	Hours Hire	Fuel Consumed (litres)	tCO ₂	Hours Hire	Fuel Consumed (litres)	tCO ₂	% Change
SHEPD	389	74,969	170	399	73,807	164	4%
SEPD	93	20,372	46	373	82,016	182	-75%

Although the hours hire of helicopter has decreased in SHEPD compared to the previous year, the increased emissions in SHEPD licensed area is due to the increase in use of twin squirrel helicopters for line patrol. The hours on patrol equates to about 10,724km of line patrolled.



Detailed Tables

Business Transport

Road

Business transport miles are captured through our expenses department. The distance travelled by both petrol and diesel vehicles are used to calculate the relevant CO₂ emissions.

Rail

Journeys made for business travel by rail are recorded through our travel department. The distance travelled is used to calculate the relevant CO₂ emissions.

Sea

The use of sea travel has been minimal throughout most of DPCR5 and considered negligible due to the scale of the emissions. However in 2014/15, SHEPD experienced 3 major weather events during the winter period affecting the supply of those on the remote islands. Due to weather conditions and last minute arrangements, engineers travelled by ferries to restore supply. Therefore, we are seeing an increase in the km travelled by sea in this reporting year.

Air

Emissions for business travel by air are recorded and broken down into SEPD or SHEPD. Class of travel is not recorded. All flights taken between UK locations have been recorded as domestic, flights from the UK to Europe as Short-Haul International and flights from the UK to non-European destinations as Long Haul International. Internal flights in countries other than the UK have been recorded as domestic flights.

	2014/15					2013/14				
	<i>Road (miles)</i>	<i>Rail (km)</i>	<i>Air (km)</i>	<i>Sea (km)</i>	<i>tCO2</i>	<i>Road (miles)</i>	<i>Rail (km)</i>	<i>Air (km)</i>	<i>tCO2</i>	<i>% Change</i>
SHEPD	1,685,257	248,479	960,489	4,448	664	1,764,425	258,213	405,834	605	10%
SEPD	3,972,547	66,634	377,243	-	1,249	4,120,687	116,820	343,847	1,281	-3%



Detailed Tables

Fugitive Emissions

SF₆

Emissions of SF₆ are calculated by combining the volume of SF₆ used in routine maintenance and the volume used during fault repair. These figures are extracted from our Asset Management System which is recorded in accordance with ENA Engineering Recommendation S38. In addition, natural leakage is calculated using the aforementioned ER and a model produced by the ENA. The appropriate conversion factor is used to transform this combined figure of SF₆ lost to tCO₂.

We take any leakage of SF₆ extremely seriously and have detailed policies and procedures in place to manage our associated assets. This is an area where we are actively exploring the possibility of new, less hazardous, insulation materials.

	2014/15		2013/14		% Change
	SF6 (kg)	tCO ₂	SF6 (kg)	tCO ₂	
SHEPD	67	1,592	58	1,381	15.3%
SEPD	304	7,254	311	7,434	-2.4%



Detailed Tables

Fuel Combustion

We record the volume of fuel used to provide generation on our distribution networks.

Mobile Generation

Mobile generation is primarily required as backup to ensure continuity of supply when works requiring a network outage are taking place. Diesel fuel is used in SHEPD while, in SEPD, a combination of diesel and gas oil are combusted.

Fixed Generation (Diesel)

Our fixed (embedded) generation is primarily required as a backup in the event of network faults. Our 7 fixed sites are located on the islands off the North of Scotland. No fixed generation sites are located in SEPD's area.

There has been a 300% increase in fixed diesel used during 14/15 and this is attributed to a single subsea cable fault that affected the supply to Jura. To restore supply, we have run our diesel generators at an extended period of 6 months.

	2014/15				2013/14				
	Mobile Diesel (l)	Mobile Gas Oil (l)	Fixed Diesel (l)	tCO2	Mobile Diesel (l)	Mobile Gas Oil (l)	Fixed Diesel (l)	tCO2	% Change
SHEPD	548,619	-	10,121,533	27,768	580,758	-	2,522,689	7,956	249%
SEPD	218,280	1,480,472	-	4,900	242,185	1,747,301	-	5,393	-9%



Detailed Tables

Losses

Figures for network losses are not the final audited figures for Ofgem, as these have a two year lag, but an estimate is produced at the end of the reporting year and converted to tCO₂. These figures are shown below. Losses in MWh had decreased in 14/15 as there had been a drop in energy demand. As mentioned at the beginning of this report, there had been a change of conversion factor. We have reset 13/14 tCO₂ with scope 2 conversion factor used in the year to allow a valid comparison between reporting years.

	2014/15		2013/14		% Change (MWh)	% Change (tCO ₂ e)
	MWh	tCO ₂ e	MWh	tCO ₂ e		
SHEPD	536,883	265,360	599,059	260,329	-9%	2%
SEPD	1,821,351	900,221	1,868,393	819,892	-2%	10%

Note the increase in conversion factor from 13/14 to 14/15 published by DEFRA is larger than the reduction in MWh in both license areas; therefore, there has been an increase in tonnes of carbon emitted.



Detailed Tables

Visual Amenity

Each DNO is given a defined Capex funding for undergrounding of overhead lines in protected landscapes, specifically in areas of outstanding natural beauty and national parks, and for distribution voltages of LV, 11kV, 33kV, 132kV. The funding limit is determined by a survey of Great Britain customer willingness to pay and was limited to a maximum of £9m for SSEPD across the DPCR5 period in 07/08 prices.

We target our investment on areas that will benefit more people and be the most cost effective. Using a Visual Amenity Impact scoring model, we prioritise nominated schemes to ensure consistency in assessment across SSEPD areas. The focus is therefore on HV overhead lines that have a high visual impact on the landscape, which have a dominant impact for many viewers. We have co-ordinated the undergrounding works with other network investment and maintenance works to reduce impact on land owners and costs.

We have a total 16,084 km of overhead lines within designated areas at the year end of 14/15 in both DNO areas. At the end of DPCR5, our AONB programme spent approximately £2.3m, and we have laid 1km of LV Cable; 22km of HV cable and 9km of EHV Cable. Breakdown by designated areas as below:

SSEPD

	Undergrounding inside of Designated Areas under undergrounding scheme - OHL - km removed during year			Undergrounding inside of Designated Areas under undergrounding scheme -		
	LV	HV	33kV & 66kV	LV	HV	33kV & 66kV
Dorset	0.72	4.27	-	0.72	6.13	-
Cranborne Chase & West Wiltshire Downs	0.16	0.31	-	0.16	0.27	-
Cotswolds	-	2.40	-	-	2.40	-
Isle of Wight	-	3.28	-	-	4.04	-
North Wessex Downs	-	1.52	-	-	1.53	-
Chilterns	-	0.12	-	-	0.12	-
Chichester Harbour	-	2.95	-	0.13	2.95	-
Surrey Hills	-	2.15	1.95	-	2.70	3.35
South Downs National Park	-	0.30	-	-	0.36	-
	0.88	17.30	1.95	1.01	20.51	3.35



Detailed Tables

SHEPD

Hoy & West Mainland
The Cairngorm Mountains

Undergrounding inside of Designated Areas under undergrounding scheme - OHL - km removed during year	
HV	33kV & 66kV
-	4.38
1.90	1.41
<u>1.90</u>	<u>5.80</u>

Undergrounding inside of Designated Areas under undergrounding scheme -	
HV	33kV & 66kV
-	4.35
1.90	1.41
<u>1.90</u>	<u>5.76</u>

Fluid- Filled Cables

Oil filled cables often suffer leaks due to age and wear. To mitigate the environmental impact and supply disruption when there is a leak, we employ a proactive leak location process. This process allows the circuit to remain in service while the leak location is being conducted by doses the oil filled cable system with an inert PFT tracer material. This method of detection is capable of detecting more than one leak on the circuit at each operation. This process is built in to the routine maintenance of our asset. Depending on leak rate and volume, oil is pumped back in to the cable to re-pressurise and restore operation; and any leakage is cleaned up as required to minimise environmental impact.

We acknowledge that using oil as a cable insulator is an expired practice, and this has been superseded by solid cables. Besides operational maintenance, we invest in replacement programme. Over the DPCR5 period, the length of our oil filled cable in SEPD area has reduced by 51.5km and 4.7 km in SHEPD. This represents a 8% decrease in SEPD and 6% decreased in SHEPD of oil filled cable length owned by SSEPD. The total spent in oil pollution mitigation scheme in this price control amounts to £3.22m in 07/08 prices.

