Scottish and Southern Energy
Power Distribution

Environmental Impact Annual Report 2013/14

Our Environmental Impact

Introduction

We recognise the impact of our activities have on both the immediate and wider environment. Along with the increasing importance our stakeholders and consumers place on these activities, we continuously look into innovative ways to mitigate any such impact.

At group level, sustainability was introduced as a core value in November 2006. This value states that our decisions and actions are ethical, responsible and balanced, helping to achieve environmental, social and economic wellbeing for current and future generations. Sustainability was also included as one of our 2016 goals, where we have set ourselves the target of becoming the leading global utility in the field of sustainability and environmental impact.

The purpose of this Environment Report is to provide stakeholders with a transparent and public account of our commitment to address environmental matters and our role in the low carbon transition; whilst satisfying the requirements of Business Carbon Footprint Rigs Standard Condition 46A.

The combined total greenhouse emissions in year 2013/14 were 156,444.00 tCO_{2e}. According to DECC's latest statistical release, 35 per cent of greenhouse gas emissions were from Energy supply[1] sector which is equivalent to 202 $MtCO_{2e}$[2]. To put in context, SSEPD accounts for 0.08% of the emissions within the UK electricity industry as a whole.

Of our carbon footprint, as Ofgem is aware, by far the largest contributor is electrical losses. This accounts for c.48% of SHEPD's and c.64% 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.

We continue to replace current equipment with lower loss equipment and continually work to be smarter at targeting loss reduction. 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.

In terms of our vehicle emissions, our transport fleet runs on diesel and we are currently looking at the possibilities of increasing our use of biodiesel. 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 currently working through a programme to install low energy lighting with motion sensors in all of our buildings and car parks. Separately, we have installed solar panels on

[1] Emissions from fuel combustion for electricity and other energy production sources
[2] million tonnes of carbon dioxide equivalents

building roofs and invested in other heat recovery projects. This is in keeping with our group objective and demonstrates our commitment to sustainability, not just at a network level but right across the group.

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.

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.

Our Business Carbon Footprint

This document details the Carbon Dioxide (CO_2) emissions produced by Scottish and Southern Power Distribution (SSEPD) in the financial year 2013/14.

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

Detailed Tables

Summary

SHEPD Carbon Footprint

	2012/13 tonne CO_2	2013/14 tonne CO_2	% of change
Building Energy Usage	5,803	5,723	-1%
Operational Transport	8,198	8,309	1%
Business Transport	557	605	9%
Fugitive Emissions	1,099	1,381	26%
Fuel Combustion	18,191	7,956	-56%
Total	33,849	24,108	-29%

SEPD Carbon Footprint

	2012/13 tonne CO_2	2013/14 tonne CO_2	% of change
Building Energy Usage	8,382	7,981	-5%
Operational Transport	14,956	16,881	13%
Business Transport	1,294	1,281	-1%
Fugitive Emissions	7,720	7,434	-4%
Fuel Combustion	3,216	5,393	68%
Total	35,568	38,993	10%

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

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 apportioned using Corporate Recharge model consistent in all submissions to Ofgem. 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.

	2012/13			2013/14			
Consumption	*Electricity (kWh)*	*Gas (kWh)*	*tCO_2*	*Electricity (kWh)*	*Gas (kWh)*	*tCO_2*	% Change
SHEPD	2,456,512	0	1,087	2,323,785	59,036	1,040	5%
SEPD	3,867,394	760,518	1,867	2,611,434	877,488	1,334	-28.5%

Substation Energy

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

HV: 6.6kV - 20kV,
EHV: 22kV - 66kV,
132kV (SEPD only)

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.

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 CO_2 emissions.

	2012/13			*2013/14*			
SHEPD	***Number of Substations***	***Total Units (kWh)***	***tCO_2***	***Number of Substations***	***Total Units (kWh)***	***tCO_2***	***% Change***
HV	**7,445**	**1,704,905**	**-**	**7,502**	**1,759,896**	**-**	**-**
EHV	**411**	**8,957,334**	**-**	**412**	**8,826,340**	**-**	**-**
Total	**-**	**10,662,239**	**4,717**	**-**	**10,586,236**	**4,683**	**-0.7%**
SEPD	***Number of Substations***	***Total Units (kWh)***	***tCO_2***	***Number of Substations***	***Total Units (kWh)***	***tCO_2***	***% Change***
HV	**28,264**	**4,974,464**	**-**	**28,361**	**5,176,075**	**-**	**-**
EHV	**482**	**7,022,258**	**-**	**490**	**7,107,025**	**-**	**-**
132kV	**106**	**2,730,560**	**-**	**106**	**2,742,503**	**-**	**-**
Total	**-**	**14,727,282**	**6,515**	**-**	**15,025,604**	**6,647**	**2%**

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 CO_2. 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 CO_2 using the appropriate conversion factor.

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.

	2012/13					2013/14					
	Petrol (l)	*Diesel (l)*	*Gas Oil (l)*	*Contractor (miles)*	*tCO2*	*Petrol (l)*	*Diesel (l)*	*Gas Oil (l)*	*Contractor (miles)*	*tCO2*	*% Change*
SHEPD	20,472	1,922,842	2,682	7,414,286	8,113	16,310	2,013,979	4,306	7,231,428	8,144	0.4%
SEPD	39,221	3,384,135	65,145	14,228,571	14,922	39,381	3,508,696	79,312	18,311,429	16,699	12%

Air

Helicopters are required by SSE 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 13/14.

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 CO_2 emissions. These figures are shown below:

	2012/13			2013/14			
	Hours Hire	*Fuel Consumed (litres)*	*tCO2*	*Hours Hire*	*Fuel Consumed (litres)*	*tCO2*	*% Change*
SHEPD	190	38,316	85	399	73,807	164	93%
SEPD	93	15,443	34	373	82,016	182	435%

Detailed Tables

The increased in total hours flown are contributed by an increased in additional training and maintenance for an upgrade on fleet for the use of twin engine aircraft. This is aimed to add service reliability, capability of flying and ground personnel. The increased in hours on patrol is due to storms experienced over winter period. The hours on patrol equates to about 11,000km of line patrolled.

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 CO_2 emissions.

Rail
Journeys made for business travel by rail are recorded through our travel department. The distance travelled is used to calculate the relevant CO_2 emissions.

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

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.

	2012/13				2013/14				
	Road (miles)	*Rail (km)*	*Air (km)*	*tCO2*	*Road (miles)*	*Rail (km)*	*Air (km)*	*tCO2*	*% Change*
SHEPD	**1,625,175**	**246,308**	**318,270**	**557**	**1,764,425**	**258,213**	**405,834**	**605**	**8.6%**
SEPD	**4,147,997**	**109,305**	**249,762**	**1,294**	**4,120,687**	**116,820**	**343,847**	**1,281**	**-1%**

Detailed Tables

Fugitive Emissions

SF_6

Emissions of SF_6 are calculated by combining the volume of SF_6 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 SF_6 lost to tCO_2.

	2012/13		2013/14		
	SF6 (kg)	*tCO_2*	*SF6 (kg)*	*tCO_2*	*% Change*
SHEPD	**46**	**1,099**	**58**	**1,381**	**26%**
SEPD	**323**	**7,720**	**311**	**7,434**	**-3.7%**

Detailed Tables

Fuel Combustion

We record the entire volume of fuel used to provide generation on our distribution networks. Separate records are kept for SEPD and SHEPD. A small amount of fuel which has been attributed to SHEPD may be attributable to Scottish Hydro Electric Transmission Limited (SHETL), but these figures would not be material in terms of emissions

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 fixed sites are located on the islands off the North of Scotland. No fixed generation sites are located in SEPD's area.

	2012/13					2013/14					
	Mobile Diesel (l)	Mobile Gas Oil (l)	Fixed Diesel (l)	Petrol (l)	tCO2	Mobile Diesel (l)	Mobile Gas Oil (l)	Fixed Diesel (l)	Petrol (l)	tCO2	% Change
SHEPD	791,236	0	6,055,504	0	18,191	580,758	0	2,522,689	0	7,956	-56.3%
SEPD	212,909	960,372	0	0	3,216	242,185	1,747,301	0	0	5,393	67.7%

Losses

Figures for network losses are not the final audited figures for Ofgem, as these have a two year lag, but an estimate produced at the end of the reporting year and converted to tCO_2. These figures are shown below:

	2012/13		2013/14		
	MWh	*tCO2*	*MWh*	*tCO2*	*% Change*
SHEPD	650,000	24,551	599,059	22,662	-8%
SEPD	2,011,000	75,955	1,868,393	70,681	-7%

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. Although DNO can recover AONB expenditure at the end of the Price Control period, DNOs are expected to meet the required 25% reduction in the supply of customer interruptions.

SSEPD use a Visual Amenity Impact scoring model to prioritise nominated schemes to ensure consistency in assessment across SSE areas. We have a total 15,473 km of overhead lines within designated areas at the year end of 12/13 in both DNO areas. In 13/14, our AONB programme spent approx. £1.2m on undergrounding in SHEPD and SEPD areas.

SEPD Schemes completed in 13/14 are as follow:

- Newtown, North Wessex Downs – 1.5km of circuit length
- Hunts Green Barn Spur, Chilterns – 118m of circuit length
- Yanworth to Chedworth Roman Villa, Cotswolds – 2.1km of circuit length
- Bembridge, Isle of Wight – 4km of circuit length
- Cocking Church, South Downs National Park – 360m of circuit length.

SHEPD Schemes in progress for 13/14 are as follow:

- Braemar Castle, Braemar – 170m of circuit length
- Invercauld, Cairngorm National Park – 470m of circuit length
- Petertown, Orkney – 4.35km of circuit length

Following SSE's sustainability and efficiency core values, we target our investment on areas that will benefit more people and be most cost effective. The focus is therefore narrowed down to 11kv overhead lines that have a high visual impact on the landscape, which have a dominant impact for many viewers. We also look to co-ordinate these works with other network investment or maintenance works to reduce impact on land owners and costs.

Detailed Tables

Fluid- Filled Cables

Oil filled cables often suffer leaks due to age and ware. To mitigate environmental impact and electricity restoration when there is a leak, we employ a leak location process that doses the oil filled cable system with an inert PFT tracer material. This process has several advantages, one of which allows the circuit to remain in service while the leak location is being conducted; and it is capable of detecting more than one leak on the circuit at each operation. In 13/14, the total expenditure of our 9 oil pollution mitigation schemes amount to £560k.

Depending on leak rate and volume, oil is pumped back into the cable to re-pressurise to enable circuit restoration and oil clean up is undertaken as required to minimise environmental impact. Regular inspection and maintenance of oil plant is carried out by Programmes and Major Projects teams at their respective levels of voltage.

Capital expenditure programme is in place for this and in the next price review to identify and execute intervention required for the top 25 circuits identified as having ongoing oil leaks, which involves replacing 76km of fluid filled cable. This also accounts for those circuits that are classified as high environmental risk due to proximity to water courses and potable water. Intervention includes refurbishment of joints and oil plant or replacement of oil filled cable with non pressurised cable.

Fluid filled replacement schemes completed in 13/14:

- Replaced 33kV oil filled cable between circuit breakers and overhead lines on the Pangbourne, Southcote, Kentwood Hill and Wilson 33kV circuits at Burghbuild Substation, with new XLPE.