SSEN Transmission criteria for GHG emissions reporting

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1 - About SSEN Transmission

Scottish Hydro Electric Transmission plc (SSEN Transmission), part of the SSE Group, is responsible for the electricity transmission network in the north of Scotland. Operating under the name of Scottish and Southern Electricity Networks, together with our sister companies, Scottish Hydro Electric Power Distribution (SHEPD) and Southern Electric Power Distribution (SEPD), who operate the lower voltage distribution networks in the north of Scotland and central southern England.

As the Transmission Owner (TO) we maintain and invest in the high voltage 132kV, 220kV, 275kV and 400kV electricity transmission network in the north of Scotland. Our network consists of underground and subsea cables, overhead lines on wooden poles and steel towers, and electricity substations, extending over a quarter of the UK's land mass crossing some of its most challenging terrain.

We power our communities by providing a safe and reliable supply of electricity. We do this by taking the electricity from generators and transporting it at high voltages over long distances through our transmission network for onwards distribution to homes and businesses in villages, towns and cities.

2 - Aim of this document

This document details the reporting approach used by SSEN Transmission to report on GHG emissions during the financial year (1 April 2021 to 31 March 2022) as a result of operational activities undertaken by SSEN Transmission.

3 - Organisational boundaries included for this reporting period

There are two methods that are described in the GHG reporting protocol and ISO14064-1:2006 standards: the equity share and control (financial or operational) approaches. An operational control consolidation approach was used to account for emissions, in line with Ofgem regulatory requirements.

4 - GHG Reporting Criteria

This section outlines the annual greenhouse gas (GHG) emissions reporting approach used by SSEN Transmission to report the tonnes of carbon dioxide equivalent (CO_2e covers CO_2, CH_4, N_2O, and SF_6) from the Company's operational activities.

The document provides details of the amount of GHG emissions that can be directly attributed to SSEN Transmission operations within the declared boundary and scope for the specified reporting period. The inventory has been prepared in accordance with requirements of the UK Government's environmental reporting guidelines (DEFRA, June 2013); the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (revised edition)* developed by the World Resources Institute and the World Business Council for Sustainable Development (2004); and *ISO 14064-1:2006 Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*. Where relevant, the inventory is aligned with industry or sector best practice for emissions measurement and reporting.

This document aims to detail the GHG collection, collation, conversion and reporting process used by SSEN Transmission to report annual GHG emissions.

5 - GHG emissions source inclusions

The GHG emissions sources included in this inventory are those required by BEIS reporting standards (https://www.gov.uk/guidance/measuring-and-reporting-environmental-impacts-guidance-for-businesses), GHG Protocol (http://www.ghgprotocol.org/standards/corporate-standard) and ISO14064-1:2006 standards (https://www.iso.org/obp/ui/#iso:std:iso:14064:-1:ed-1:v1:en). GHG emissions are classified, in accordance with these standards, into the following categories:

- **Direct GHG emissions (scope 1):** GHG emissions from sources that are owned or controlled by the company.
- **Indirect GHG emissions (scope 2):** GHG emissions from the generation of purchased electricity, heat and steam consumed by the company.
- **Indirect GHG emissions (scope 3):** GHG emissions that occur as a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Inclusion of other scope 3 emissions sources is done on a case-by-case basis in accordance with the guidance given in the *Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (Supplement to the GHG Protocol Corporate Accounting and Reporting Standard).

The following emission sources from SSEN Transmission's operations are included in the GHG emissions reporting:

The direct GHG emissions (scope 1) cover:

- **Gas consumption in buildings** – this is the gas consumed by SSEN Transmission's non-operational buildings (offices, depots, call centres) to maintain building temperatures.
- **Network fuel consumed** – this includes diesel used to provide backup source of energy to substations in the event of other supplies being unavailable.
- **Company vehicles** – this is the petrol or diesel used by SSEN Transmission's operational vehicles for business activities (operational vehicles are those vehicles that are owned by SSE and used by employees for SSEN Transmission's business activities).
- **Fugitive emissions** – use of sulphur hexafluoride (SF_6) in the transmission network for conductivity (used in the switchgears and substations).

The indirect emissions (scope 2) cover:

- **Electricity consumption in buildings** – this is the electricity consumed by SSEN Transmission's nonoperational buildings (customer call centres, offices). This data excludes leased buildings (which represent less than 1% of employees).
- **Electricity consumption in Transmission's Substations** – this is the electricity used by SSEN Transmission's operational buildings (e.g. substations) in the transmission network.

The indirect emissions (scope 3) cover:

- **Transmission losses** – the electricity lost in the SSEN Transmission network (the network between the generator and the distribution company) in the north of Scotland. The transmission of electricity is managed by the network operator, National Grid ESO.
- **Contractor emissions** – emissions from contractors undertaking activities on behalf of SSEN Transmission.
- **Business Travel -** domestic (between UK airports), short haul (international flights to/from UK less than 3,700km, usually to European destinations), long haul (international flights to/ from UK greater than 3,700km, usually to non-European destinations) and international (international flights to/ from non-UK destinations) travel by air, rail and car miles travelled using third party transport (this is vehicles owned and operated by other organisations that SSE employees use to conduct business activities).

Emissions Factors

Emissions factors to convert activity data into GHG emissions are sourced from the [BEIS conversion factors for company reporting of greenhouse gas emissions](). For the current reporting year (1st of April 2021 to 31st of March 2022), we use the factors published for calendar year 2021.

Three exceptions apply:

- Scope 1: In line with our regulatory licence conditions, we use a more recent emissions factor for fugitive SF_6 emissions, based on the IPCC's 2014 AR5 report, rather than the BEIS published factor, which is based on the IPCC's previous 2007 AR4 report. A comparison table has been published by the GHG protocol: [Global-Warming-Potential-Values.docx (ghgprotocol.org)]()
- Scope 2: The SSEN Transmission management will report all Scope 2 emissions using the market-based methodology provided by the GHG Protocol: "All electricity purchased is converted to CO_2 using emissions factors from contractual instruments which SSEN Transmission has purchased or entered into."
- Scope 3: Transmission losses have a calculated emissions factor based on the sources of electricity coming on to our network. This factor is also reported separately as our Transmission Network GHG Emissions Intensity. See details in the table below.

Table 1: GHG emissions sources included in the inventory.

GHG emissions source and scope	Data source & collection process	Data collection unit	Uncertainty (description)
Operational vehicles & plant (diesel) – Scope 1	Fuel is bought using fuel cards from independent fuel suppliers or dispensed at onsite fuel depot. Fuel card data is provided by independent fuel suppliers to Fleet Services. Fuel cards are reconciled with supplier invoices. Fuel dispensed from onsite depots is recorded and consolidated with fuel dispensed data from the independent suppliers.	litres	
Mobile Plant - Gas Oil – Scope 1	Fuel purchased is recorded through a fuel card or through purchase of fuel stock – all recorded in fleet database. Diesel burned in generators that provide power to networks outside our operational boundary (i.e. distribution-level networks) is excluded from the total.	litres	
Fugitive emissions (SF_6) – Scope 1	Transmission engineers record SF_6 top ups and exception events requiring SF_6 top up in the asset management system, Maximo. In October 2021, a new system (Cyberhawk) for recording top ups was implemented. This structured data entry system has	kg	

	improved the accuracy of data being input into Maximo.		
Office Buildings Electricity Use – Scope 2	Non-operational buildings are classed as offices, depots and warehouses. Sites are shared with non-SSEN Transmission staff and a percentage of the sites floor space occupancy is used to calculate the usage allocated to SSEN Transmission staff.

For all centrally managed sites (6 out of 9), the occupancy calculation takes the floor area occupied by SSEN Transmission plus a proportional allocation of common and circulation areas and divides it by the total floor area occupied by SSE in each building. Three sites are not centrally managed. Two of these – the HVDC Centre in Cumbernauld and Carolina Port Depot in Dundee – are occupied 100% by SSEN Transmission and no calculation is required. For the third – the Dundee Depot – the floor areas are pro-rated according to their associated costs, to avoid giving warehouse floor space the same weighting as office space.

Most non-operational buildings have automatic electricity meters. Records of electricity use are transmitted through automatic meter readings to Clarity and IMServ. Clarity and IMServ integrates with ESG ecomonitor web-based facility where the electricity use is downloaded into an excel spreadsheet.

Reconciliation of meter reads is completed with monthly invoices. | kWh | Not all non-operational buildings are on half hourly meters. Some are based on submitted actual meter reading or estimated on billing system. Less than 5% of data points were based on estimates in the reporting period.

Data excludes leased buildings with small number of employees (less than 1% of employees). |
| Gas consumption - non-operational buildings – Scope 1 | Non-operational buildings are classed as offices, depots and warehouses. Sites are shared with non-SSEN Transmission staff and a percentage of the sites floor space occupancy is used to calculate the usage allocated to SSEN Transmission staff.

For all centrally managed sites (6 out of 9), the occupancy calculation takes the floor area occupied by SSEN Transmission plus a proportional allocation of common and circulation areas and divides it by the total floor area occupied by SSE in each building. Three sites are not centrally managed. Two of these – the HVDC Centre in Cumbernauld and Carolina Port Depot in Dundee – are occupied 100% by SSEN Transmission and no calculation is required. For the third – the Dundee Depot – the floor areas are pro-rated according to their associated costs, to avoid giving warehouse floor space the same weighting as office space.

Most non-operational buildings have automatic electricity meter. Records of electricity use are transmitted through automatic meter readings to Clarity and IMServ. Clarity and IMServ integrates with | kWh | Not all non-operational buildings are on half hourly meters. Some are based on submitted actual meter reading or estimated on billing system. Less than 3% of data points were based on estimates in the reporting period

Data excludes leased buildings with small number of employees (less than 1% of employees). |

	ESG ecomonitor web based facility where the electricity use is downloaded into an excel spreadsheet. Reconciliation of meter reads is completed with monthly invoices.		
Substations Electricity Use – Scope 2	SSEN Transmission's substations consume electricity to power control and protection equipment as well as to provide light to the site and heat to any buildings. The power is drawn directly from the SSEN Transmission network, which means that substation electricity consumption is not metered and must therefore be estimated. The current method for estimating substation electricity consumption assumes that larger substations which contain more transmission circuits, and more transformers will be larger consumers of energy due to the likely increased size of the substation building as well as the increased amount of protection and control equipment located at the substation. The number of transformers and number of transmission circuits connected are thus used as proxies for substation size in the following formula: Substation electricity use (kWh) = Number of transformers * 83,000 kWh/transformer + Number of Transmission circuits connected * 6,500 kWh/circuit The coefficients in the formula have been re-calibrated in 21/22, using new data from 5 substations with energy monitors installed (November '21 to July '22) in addition to the previously used data from 4 substations that had at least one continuous 12-month period of accurately metered consumption: Blackhillock (FY20/21), Tummel Bridge (FY20/21), Loch Buidhe (FY17/18) and Braco West (FY17/18). Energy monitor data was applied to the reporting year as follows: - For the period from 1 April 2021 to 31 July 2021, data from 1 year later (1 April to 31 July 2022) has been used as the closest proxy. - For the period from early November 2021 to 31 March 2022, actual consumption is available.	kWh	The estimate of substation electricity consumption is sensitive to the coefficients in the formula, which are based on data from 9 substations, out of a total of 129. On the basis of number of transformers and number of connected circuits, this sample is directly representative of 40% of the substation fleet. The estimation method will continue to be revised as more substations have monitors installed. The revised estimation methodology has been applied to all previous years retrospectively to ensure that reported figures remain comparable year-to-year. Future updates to the methodology will also be applied retrospectively.

	• For the missing period from 1st of August 2021 to early November 2021, each day has been assigned the average of the daily consumption in the two weeks prior to and the two weeks after the gap. Electricity consumption in SSEN Transmission's substations is not governed by any contractual arrangements as it is a direct supply from the Transmission network. Therefore, we use the BEIS 2021 UK average grid electricity carbon intensity for our substations' electricity use as the most relevant emissions factor.		
Transmission Losses– Scope 3	When transferring power across the SSEN Transmission network, some of the power is dissipated known as 'Transmission Losses'. GHG emissions associated with transmission losses are the product of two figures: the net quantity of electricity lost from our network [kWh] multiplied by the GHG intensity of the electricity on our network [$kgCO_{2e}$/kWh]. The amount of electricity lost during transmission across our network is calculated for each financial year by NG ESO (National Grid Electricity System Operator) and published on their open data portal[1]. This figure is calculated using standard transmission losses guidance produced by Elexon. The data is verified by an independent third party, WSP, for National Grid. To avoid double-counting the electricity drawn from our network to power our substations (a Scope 2 emission as it is in our direct operational control), the substation electricity consumption is subtracted from the total network losses. This net losses figure, converted from TWh into kWh, constitutes the first figure in the product listed above. The second figure is the GHG intensity of the electricity on our network. This is simply a weighted average of the GHG intensities of all incoming flows of electricity. The calculation method for this figure is presented in the next row of this table. The net Transmission Losses figure [kWh] is multiplied by the Transmission Network GHG Intensity [$kgCO_{2e}$/kWh] to calculate the Scope 3 GHG emissions associated with transmission losses and then converted into tCO_{2e}.	kWh	There is a small uncertainty related to the substation electricity consumption estimate as this is subtracted from the ESO-published figure to avoid double-counting consumption. In the current reporting year, substation electricity consumption represented 5.2% of the ESO-published network losses figure.

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[1] ESO Data Portal: Financial Year Losses - Dataset| National Grid Electricity System Operator (nationalgrideso.com)

Transmission Network GHG Emissions Intensity	The Transmission Network GHG Emissions Intensity is used to convert Transmission Losses [kWh] into tCO_{2e}.	kgCO$_{2e}$ per kWh	We do not have detailed information about electricity coming from other networks (distribution-level or other transmission operators) and therefore apply the 2021 average UK grid intensity factor to this power. This is a conservative assumption as the majority of power imports are from distribution-level networks and are likely to be primarily from small-scale renewable generators.
	There are three types of power that come onto our network:		
	1. Renewable electricity from wind and hydropower generators connected to our network. 2. Non-renewable electricity from Peterhead gas-fired power station. 3. Electricity imported from neighbouring transmission networks. While SSEN Transmission is generally an electricity exporter, electricity occasionally comes onto the network from the neighbouring Transmission Operator (Scottish Power Energy Networks) or from the lower-voltage networks operated by our sister company SSEN Distribution[2].		
	The amount of each source of electricity coming onto our network is derived as follows:		
	1. Generation from directly connected wind and hydropower generators is recorded on a half-hourly basis in the SSEN Transmission data repository (referred to as "PI" or "the PI system" after the name of the software). 2. Generation from Peterhead power station is also recorded half-hourly in PI. Note that occasional exports of electricity *from* our network *to* the power station are excluded from the calculation as they don't affect the GHG intensity of our network. 3. Imports from the neighbouring transmission operator are also recorded in PI. Again, only incoming flows of power from their network onto ours are counted. Imports from SSEN Distribution are not recorded in PI and must be calculated based on the difference between total generation (recorded in PI) and the sum of incoming power from Peterhead and renewable energy generators (described above).		
	The total amount of electricity coming onto our network is the sum of these figures.		
	These power sources have the following GHG intensities:		
	1. Renewable electricity has a GHG intensity of 0kgCO$_{2e}$/kWh. 2. Electricity from Peterhead has a GHG intensity calculated by taking the total reported GHG emissions for Peterhead (sourced from SSE		

[2] This occurs in situations where the power produced by generators connected to a specific low-voltage distribution network exceeds the local demand. The excess is fed up through the grid supply point to our high-voltage transmission network and counted as an import.

| | Group sustainability team) and dividing them by the total amount of power supplied onto our network from Peterhead power station.
3. Electricity imported from other networks is assumed to have a GHG intensity equal to the UK Grid average (sourced from the BEIS 2021 emissions factors database).

Our overall Transmission Network GHG Emissions Intensity [kgCO$_{2e}$/kWh] is thus calculated as:

Sum of (amount of each type of electricity [kWh] x GHG intensity of each type of electricity [kgCO$_{2e}$/kWh]) divided by the total amount of electricity coming onto our network [kWh]. | | |