Emissions Monitoring Report 2025 methodology

This document provides technical detail and references to support the analysis presented in the NSTA's 2025 Emissions Monitoring Report.

Intergovernmental Panel on Climate Change (IPCC) upstream oil and gas categories

GHG emissions from the UK upstream oil and gas sector are identified within the National Atmospheric Emissions Inventory (NAEI) dataset using relevant categories defined by the IPCC, which NSTA uses in its assessments.

The categories included as part of the UK upstream sector are unchanged for the 2025 Report. NAEI data as reported by the Department for Energy Security and Net Zero (DESNZ) is included for all categories in the "Oil and gas supply" subsector of the Territorial Emissions Statistics, except for the four categories in the table below which, are part of the downstream gas sector:

Territorial emissions statistics subsector	Common Reporting Table (CRT) category	Legacy IPCC code	Territorial emissions statistics category	Source
Oil and gas supply	1B2biv	1B2b4	Gas terminals	Gas leakage
Oil and gas supply	1B2bv	1B2b5	Gas distribution – leakage	Gas leakage
Oil and gas supply	1B2bvi1	1B2b5	Gas distribution – leakage	Gas leakage
Oil and gas supply	1A1ciii	1A1ciii	Gas distribution – combustion	Gas production

Note: as in the 2024 Report, estimated emissions from the Sullom Voe CHP facility are deducted from terminal totals reported by DESNZ.

Global warming potential factors

Non-CO_2 greenhouse gases (GHGs) have been converted to CO_2 equivalent (CO_2e) using global warming potential **(GWP)** factors from the IPCC's Fifth Assessment Report (AR5, Table 8.7, p. 714), excluding climate-carbon feedback (**no cc fb**) and based on a 100-year timescale (**GWP100**).

GHG	GWP100 (no cc fb)
Carbon dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous Oxide (N_2O)	265

UK upstream oil and gas emissions business as usual (BAU) projection

The NSTA's BAU projection of production-related GHG emissions by the UK upstream oil and gas sector uses a bottom-up approach, based on recent installation- Environmental and Emissions Monitoring System (EEMS) data from the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), the UK Emissions Trading Scheme (UK ETS) Registry and assuming no further abatement. Expected CoP dates for individual installations are based on operator submissions to the NSTA's latest annual UK Stewardship Survey (UKSS).

Projected emissions for a limited number of recently consented and potential future developments are based on operator estimates from the latest UKSS or published environmental statements. Inclusion of future developments does not imply that consent for development will be granted by OPRED or the NSTA.

For existing offshore installations which are expected to be in use after 2024, the BAU projection is guided by EEMS data for the last two years (i.e. 2023 and 2024). A similar approach is adopted for terminals (including Wytch Farm and Humbly Grove) but using verified CO_2 emissions from the UK ETS Registry. Terminal GHG emissions are projected to move in line with the projection for aggregate CO_2 emissions in scope of the UK ETS. Emissions from exploration flaring are assumed to decline at 5% a year starting from 2023 levels as reported in the UK NAEI.

UK upstream oil and gas electrification

The NSTA models low, mid, and high abatement scenarios for facilities based on whether they are estimated to be fully or partially electrified. The following criteria forms the basis of the modelling:

Electrification status	Assumed abatement of power generation emissions (%)	Emissions description
Full	100% abatement is assumed via UK grid-sourced power, eliminating all emissions from power generation.	Scope 2 emissions are estimated by multiplying projected power demand by DESNZ's industrial electricity factors. Net Scope 1 reductions equal Scope 1 abatement minus Scope 2 emissions.
Partial	35% reduction in baseline emissions through partial offshore wind power supply.	Offshore wind produces no Scope 2 emissions and are therefore not calculated for partially electrified facilities.

Abatement scenarios

For 2025, the NSTA has adopted a revised methodology that incorporates aggregated data and a broader set of potential electrification projects. The approach uses a full population of all feasible electrification projects currently stewarded by the NSTA with estimates of implementation timescales and savings related to each. The total emissions savings from these projects form a full deployment scenario against which high, mid and low ranges are calculated as described:

Scenario range	Description
High	Represents the deployment of up to 80% of all planned electrification projects as described in the 100% scenario, maintaining the original estimated first power dates.
Mid	Represents the deployment of up to 50% of all planned electrification projects, with the commencement of electrification deferred by one year relative to each project's estimated first power date.
Low	Represents the deployment of up to 10% of all planned electrification projects, with the commencement of electrification deferred by two years relative to each project's estimated first power date.

To the NSTA’s knowledge, facilities assessed in the 2025 EMR reflect the most current data regarding electrification projects. As with the BAU projection analysis, the abatement potential estimated in the electrification scenarios is not a forecast and should not be used as such. Scenarios are based on the NSTA’s best understanding of the scope of projects that could be electrified and makes assumptions intended to capture a range of potential future deployments and are, therefore, subject to uncertainty.

Implementation of ZRFV

The NSTA provides projections illustrating the impact of ZRFV by the end of 2030, applying the following methodology to estimate emissions abatement attributable to ZRFV extending to 2050.

Facilities expected to continue producing beyond 2030 are identified using responses from the latest UKSS. Historical levels of routine flaring and venting for these facilities are estimated using data from NSTA flaring and venting consent applications. Based on these estimates and accounting for when each facility is anticipated to cease production, a projected proportion of routine flaring and venting emissions under a baseline scenario is applied to each year for the period 2031 to 2050. Future facility-level emissions attributable specifically to routine flaring and venting are then estimated and subtracted from the total flaring and venting emissions within the BAU profile.

To reflect anticipated progress toward achieving ZRFV between 2026 and 2031, a tapered abatement profile is applied. This approach assigns one sixth of the peak annual abatement to 2026, increasing incrementally by a sixth in each subsequent year culminating in full abatement by 2031. The resulting ZRFV abatement estimates are subtracted from the mid-range electrification scenario to produce a combined abatement projection.

Abatement projects

Operators submit data to the UK Stewardship Survey on the status of their emissions abatement projects. Abatement plan data is provided for emissions reduction plans that exceed 5000 tonnes CO_2e per annum. The criteria around submission of probability of proceeding is as follows:

Abatement project status	Probability of proceeding (%)
Completed, under execution or planned	100
Under evaluation	99 - 50
Under scoping	49 - 1
Assumed cancelled	0

Emissions intensity

Emissions intensity is defined as the total volume of GHGs (carbon dioxide, methane and nitrous oxide) emitted per barrel of oil equivalent (boe) produced. Two levels of emissions intensity are calculated, as follows:

Emissions intensity level	Description
UKCS average emissions intensity	Total UK GHG emissions from offshore fields and terminals are divided by the total volume of UK oil and net gas production. The UK-level data come from the NAEI (up to 2023) or NSTA estimates (for 2024) while total UK production is as estimated by the NSTA based on production data published by DESNZ.
Facility average emissions intensity	Facility GHG emissions are divided by the total volume of sales production exported from each facility. Emissions from terminals are excluded. Emissions and sales production data for offshore facilities are sourced, respectively, from the latest EEMS and Petroleum Production Reporting System (PPRS) datasets.

Note: while GHG intensity is a more comprehensive measure, it relies on detailed non-CO_2 GHG emissions data which can vary in quality.

International benchmarking

UK upstream emissions performance is assessed using Rystad Energy data to compare carbon and methane intensities from upstream production only to other hydrocarbon-producing countries. Benchmarking covers 88 countries, each with production exceeding 10,000 barrels of oil equivalent per day, providing a representative global comparison of emissions intensity across the sector and considers the following points:

- Non-CO_2 GHGs are converted to CO_2-equivalent (CO_2e) using AR5 GWP100 factors (excluding climate-carbon feedback).
- Emissions intensity figures in Figure 18 of the 2025 EMR exclude onshore terminals and midstream/downstream activities, reflecting emissions solely from oil and gas field operations.
- Rystad Energy's upstream methane emissions data are derived from a proprietary field-level inventory that integrates asset-level reported data (where available), aggregated company and regional data, methane satellite observations and satellite flaring data (via VIIRS Nightfire, Colorado School of Mines). Due to limited availability and quality of public data, these bottom-up estimates do not represent total industry emissions, but rather emissions that can be attributed to individual fields based on reported information, facility profiles and satellite measurements.
- Emissions intensities at country level obscures the extent of in-country variation in emissions intensity at field level. Some of this variation is related to the phase in the life cycle of each field, with late-life emissions intensity rising as production rates decline and CoP approaches.