

2022 Pollutant emissions and waste transfers from SEPA regulated industrial sites



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This is an Official Statistics publication. These statistics have been produced to the high professional standards defined in the Code of Practice for Official Statistics, which sets out fourteen principles under the pillars of Trustworthiness, Quality and Value. More information on the Official Statistics Code of Practice can be found here: [Code of Practice for Statistics \(statisticsauthority.gov.uk\)](http://statisticsauthority.gov.uk). Lead statistician: Rosaria Cartisano

This statistical release shows emissions of pollutants to air and water and offsite waste transfers reported by operators of industrial sites under the **Scottish Pollutant Release Inventory (SPRI)** for the 2022 calendar year. Some historic data is included for comparison. Information about the SPRI and on the methods used to prepare this release is provided in sections two and three of this document.

Complete SPRI data is available at: [Scottish Pollution Release Inventory \(sepa.org.uk\)](http://sepa.org.uk)

This is a data analysis tool which allows you to view summarised information by industry sector for pollutants and waste transfers. Data can be downloaded in bulk, including at a site level. It is updated annually when the previous year's data is published.

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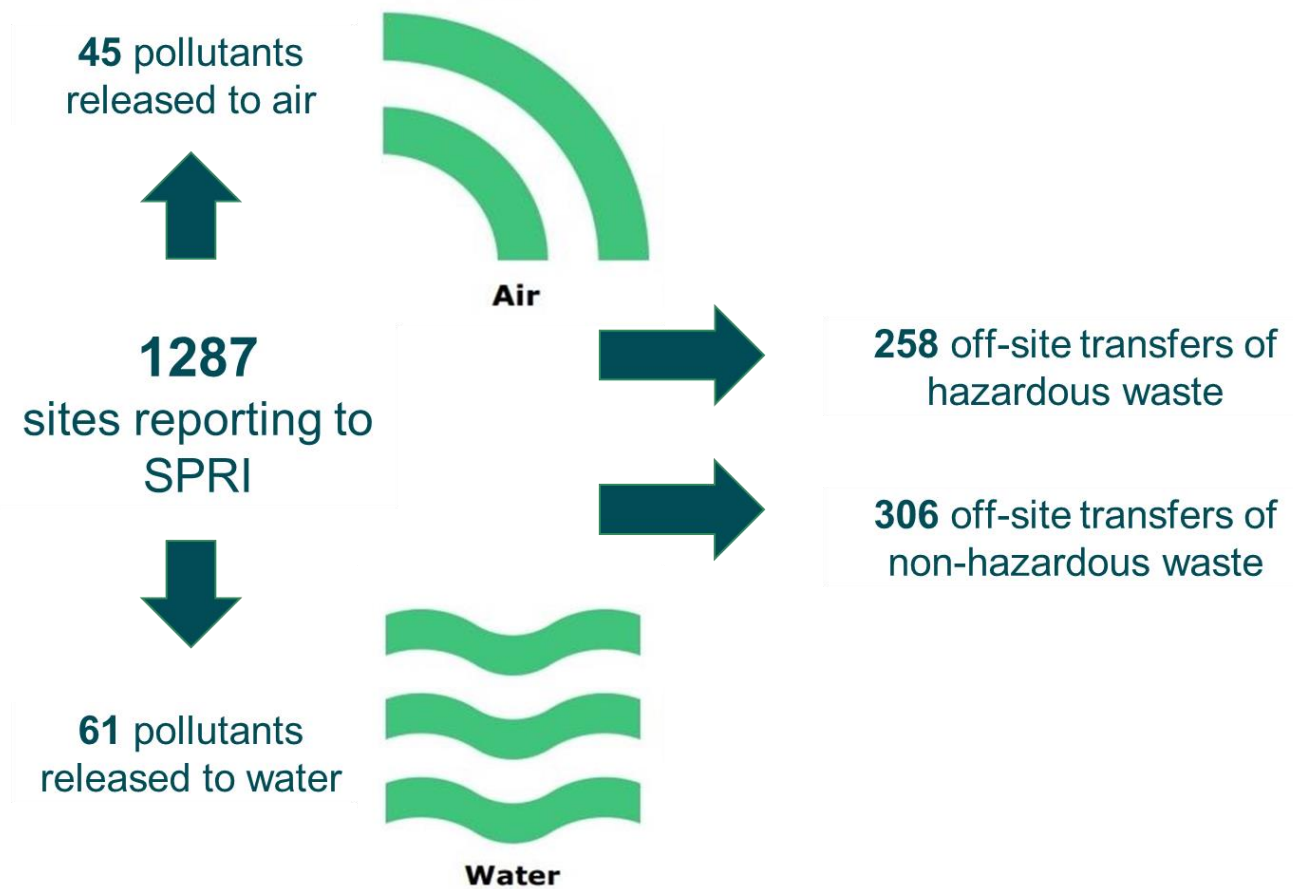
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1. The statistics

1.1 Key information for 2022



In 2022, 1,287 sites were expected to report to SPRI. Of these 1,241 (96.4%) submitted a return. Among the 46 remaining sites who did not submit a return, 9 of these sites were required to report air, water and waste data. The other 37 were required to provide data solely for waste, as their activities did not require them to report on other emissions. Of the 1,241 reporting sites, 213 (17%) had no reportable pollutant emissions or off-site waste transfers.

In many cases, as is normal for these types of industrial sites, changes to production or throughput were noted by many operators.¹ Information reported by some operators reflected an increase in productivity following the 2020/2021 Covid-19 lockdowns, which resulted in increased emissions.

¹ Note that this information is derived from the qualifications of the operators who are required to provide a valid explanation for a change or variation in pollutants at their site. We do not release this information at a site level.

The overall global warming potential of greenhouse gas emissions from the SEPA-regulated industrial sites which report to SPRI (measured as kilograms of carbon dioxide equivalent (kg CO_{2e})) increased by 2.7% between 2021 and 2022. Despite the increase from last year, the long-term trend continues to decrease since 2007, with year-to-year variations reflecting the complex interplay between economic recovery, production demands and post-pandemic dynamics. In fact, the global warming potential of greenhouse gas emissions in 2022 was less than the values recorded in 2018, 2019 and 2020. Emissions of all six greenhouse gases which are reportable to SPRI are discussed in section 1.3.

1.2 Emissions and waste transfers for 2022

Emissions

Summary data is provided for all “above reporting threshold” (‘ART’ – see note below) emissions to air and water in the tables below (and on the accompanying data sheet). This is followed by more detailed information on greenhouse gas emissions data captured within SPRI.

Tables provided below show:

- **Table 1:** Total ART emissions to air by pollutant and industry sector for 2022
- **Table 2:** Number of sites reporting ART emissions to air, and percentage of total ART emissions released, by industry sector and pollutant for 2022.
- **Table 3:** Total ART emissions to water by pollutant and industry sector for 2022. All values are kg.
- **Table 4:** Number of sites reporting ART emissions to water, and percentages of total ART emissions released, by sector and pollutant for 2022.

Notes on data provided in this publication:

- All values are in kilograms, with the exceptions of carbon dioxide to air which is given in tonnes (1,000kg) in some figures to simplify reporting.
- All pollutants in SPRI have a reporting threshold value. If a site’s emission is below this value, they report only ‘BRT’ (Below Reporting Threshold). If emissions are ‘ART’ (Above Reporting Threshold) they must supply us with a value. See [Figure 7](#) for a breakdown of ART and BRT reporting. **Figures for total emissions and number of reporting sites provided in this document are for ‘ART’ submissions only.**

- Percentage figures given to show proportion of total emissions from each industrial sector are rounded so may not total 100%.
- Precision of figures. Operators are asked to supply figures to three significant figures. Many provide more precise figures, and we have used these here. For some official reporting we are required to round each individual value to three significant figures which may cause slight discrepancies from the totals reported here.
- There are ten SPRI Industry Sectors, but only sectors with emissions of the pollutants listed, are reported in the tables below. For details of the activities which place a site within those sectors, including the minimum capacity a site must have to be required to report to SPRI, see [Table 6](#) and section 3 (*About the Scottish Pollutant Release Inventory*).

Table 1: Total ART emissions to air by pollutant and industry sector for 2022. All values are kg except for carbon dioxide which is in tonnes.

Pollutant name	Reporting threshold	Total Release	1 - Energy sector	2 - Production and processing of metals	3 - Mineral industry	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector	9 - Other activities
Ammonia	1,000	924,086	1,352		73,256	2,727	18,345		828,407		
Antimony	1	84.7	1.13		1.65		41.2	40.8			
Arsenic	1	54.5			11.3		3.68	39.5			
Benzene	1,000	84,400	18,014			66,385					
Butadiene	100	39,212	5,438			33,774					
Cadmium	1	12.8			4.21		4.86	3.72			
Carbon dioxide (tonnes)	10,000 t	10,514,224	4,954,369	50,598	667,166	1,494,620	2,230,090	771,561		334,901	10,920
Carbon monoxide	100,000	9,446,362	4,242,667		2,906,610	445,786	1,055,367	795,932			
Chlorine and total inorganic chlorine compounds - as HCl	10,000	52,459					28,081	24,378			
Chlorofluorocarbons (CFCs)	1	308					308				
Chromium	10	186			27.0		98.1	61.0			

Pollutant name	Reporting threshold	Total Release	1 - Energy sector	2 - Production and processing of metals	3 - Mineral industry	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector	9 - Other activities
Copper	10	104			27.7		11.1	64.9			
Dioxins and furans - as ITEQ	0.00001	0.000278					0.0000872	0.000191			
Dioxins and furans - as WHO TEQ	0.00001	0.000265					0.0000995	0.000165			
Ethylbenzene	100	684				684					
Fluorine and total inorganic fluorine compounds - as HF	1,000	18,885		17,878	1,007						
Formaldehyde	10	101,740			1,015	15.0		100,710			
Hydrochlorofluorocarbons (HCFCs)	1	205					205				
Hydrofluorocarbons (HFCs)	100	1,469				220				1,249	
Hydrogen chloride	10,000	67,250					67,250				
Hydrogen cyanide	100	130				130					
Lead	100	1,035						1,035			
Manganese	10	120			43.3		35.0	41.5			

Pollutant name	Reporting threshold	Total Release	1 - Energy sector	2 - Production and processing of metals	3 - Mineral industry	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector	9 - Other activities
Mercury	1	11.1			2.41		5.75	2.92			
Methane	10,000	23,233,842	2,481,538		31,252	357,919	19,760,080		576,094	26,959	
Methyl chloride	1,000	17,090				17,090					
Methyl chloroform	10	47.5					47.5				
Methylene chloride	1,000	105,917				105,917					
Naphthalene	100	345			345						
Nickel	10	165	18.8		40.9		46.8	58.8			
Nitrogen oxides, NO and NO2 as NO2	100,000	10,732,470	5,507,745		1,368,608	1,700,466	1,376,091	779,560			
Nitrous oxide	10,000	49,575	38,795				10,780				
Non-methane volatile organic compounds (NMVOCs)	10,000	21,257,846	7,603,802		78,394	3,399,738		711,559		9,169,375	294,978
Particulate matter - PM10 and smaller	10,000	613,104	55,919	14,108	308,284	78,051			156,742		
Particulate matter - total	50,000	276,985							276,985		
Particulates - PM2.5 and smaller only	1,000	5,909	1,398		3,382		1,129				

Pollutant name	Reporting threshold	Total Release	1 - Energy sector	2 - Production and processing of metals	3 - Mineral industry	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector	9 - Other activities
Perfluorocarbons (PFCs)	10	4,564		392		4,172					
Phenols - total as C	10	627			627						
Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	1	6.06					6.06				
Selenium	100	376			376						
Styrene	100	431				431					
Sulphur hexafluoride	10	230				230					
Sulphur oxides, SO ₂ and SO ₃ as SO ₂	100,000	3,556,953	2,121,844	397,531	1,037,578						
Toluene	100	62,527	22,773			36,639					3,115
Xylene - all isomers	1,000	24,264	19,714			4,550					

Table 2: Number of sites reporting ART emissions to air, and percentage of total ART emissions released, by industry sector and pollutant for 2022.

Pollutant	Total no of ART sites	1 - Energy sector		2 - Production and processing of metals		3 - Mineral industry		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal & vegetable products from food and beverage sector		9 - Other activities	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Ammonia	114	1	0.15			2	7.93	1	0.3	9	1.99			101	89.6				
Antimony	8	1	1.33			1	1.95			4	48.6	2	48.1						
Arsenic	8					3	20.7			2	6.7	3	72.5						
Benzene	3	1	21.3					2	78.7										
Butadiene	4	1	13.9					3	86.1										
Cadmium	6					2	32.9			3	38.0	1	29.1						
Carbon dioxide	75	24	47.1	1	0.48	4	6.35	6	14.2	29	21.2	6	7.34			4	3.19	1	0.10
Carbon monoxide	26	14	44.9			1	30.8	2	4.72	6	11.2	3	8.43						
Chlorine and total inorganic chlorine compounds - as HCl	2									1	53.5	1	46.5						
Chlorofluorocarbons (CFCs)	22									22	100								

Pollutant	Total no of ART sites	1 - Energy sector		2 - Production and processing of metals		3 - Mineral industry		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal & vegetable products from food and beverage sector		9 - Other activities	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Chromium	8					1	14.5			5	52.7	2	32.8						
Copper	3					1	26.7			1	10.7	1	62.6						
Dioxins and furans - as ITEQ	5									3	31.3	2	68.7						
Dioxins and furans - as WHO TEQ	4									2	37.6	2	62.4						
Ethylbenzene	1							1	100										
Fluorine and total inorganic fluorine compounds - as HF	2			1	94.7	1	5.33												
Formaldehyde	5					1	1.00	1	0.01			3	99.0						
Hydrochlorofluorocarbons (HCFCs)	19									19	100								
Hydrofluorocarbons (HFCs)	3							1	15.0							2	85.0		
Hydrogen chloride	3									3	100								
Hydrogen cyanide	1							1	100										
Lead	1											1	100						
Manganese	5					1	36.1			2	29.2	2	34.6						

Pollutant	Total no of ART sites	1 - Energy sector		2 - Production and processing of metals		3 - Mineral industry		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal & vegetable products from food and beverage sector		9 - Other activities	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Mercury	6					1	21.8			4	51.9	1	26.4						
Methane	104	16	10.7			1	0.13	3	1.54	60	85.0			23	2.48	1	0.12		
Methyl chloride	1							1	100										
Methyl chloroform	2									2	100								
Methylene chloride	2							2	100										
Naphthalene	1					1	100												
Nickel	6	1	11.4			2	24.8			1	28.3	2	35.6						
Nitrogen oxides, NO and NO2 as NO2	24	10	51.3			3	12.8	3	15.8	5	12.8	3	7.3						
Nitrous oxide	3	2	78.3							1	21.7								
Non-methane volatile organic compounds (NMVOCs)	37	17	35.8			2	0.37	8	16.0			2	3.35			4	43.1	4	1.39
Particulate matter - PM10 and smaller	20	2	9.12	1	2.30	8	50.3	1	12.7					8	25.6				
Particulate matter - total	3													3	100				

Pollutant	Total no of ART sites	1 - Energy sector		2 - Production and processing of metals		3 - Mineral industry		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal & vegetable products from food and beverage sector		9 - Other activities	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Particulates - PM2.5 and smaller only	4	1	23.7			2	57.2			1	19.1								
Perfluorocarbons (PFCs)	3			1	8.59			2	91.4										
Phenols - total as C	1					1	100												
Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	2									2	100								
Selenium	1					1	100												
Styrene	1							1	100										
Sulphur hexafluoride	2							2	100										
Sulphur oxides, SO2 and SO3 as SO2	8	4	59.7	1	11.2	3	29.2												
Toluene	7	1	36.4					4	58.6									2	4.98
Xylene - all isomers	2	1	81.2					1	18.8										

Table 3: Total ART emissions to water by pollutant and industry sector for 2022. All values are kg.

Pollutant name	Reporting threshold (kg)	Total Release (kg)	1 - Energy sector	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector
Aldrin	0.001	0.0037			0.0037			
Ammonia	20	11,796,495	2,300	96.0	9,658,886			2,135,213
Anthracene	0.1	35.2		0.41	34.8			
Arsenic	5	498	21.7	19.0	457			
Asbestos	0.1	75.4			75.4			
Azamethiphos	0.001	109					109	
Benzene	10	573	299	275				
Benzo (g,h,i) perylene	0.1	9.95		0.18	9.77			
Benzo(a) pyrene	1.0	1.04			1.04			
Brominated diphenylethers - total as Br	0.1	0.53			0.53			
Cadmium	1.0	73.8	2.33	3.00	31.1			37.4
Chlorides - total as Cl	2,000,000	53,813,420	4,313,420	3,610,000	45,890,000			
Chloroform	5	46.2			46.2			

Pollutant name	Reporting threshold (kg)	Total Release (kg)	1 - Energy sector	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector
Chromium	20	571		68.5	389			113
Copper	20	28,281	62.0	76.0	5,782		18,633	3,728
Cyanides - total as CN	50	828		97.4	731			
Cypermethrin	0.005	0.426			0.426			
Deltamethrin	0.002	2.18					2.18	
Di(2-ethylhexyl) phthalate	0.100	1,740			1,740			
Diazinon	0.01	0.65			0.65			
Dichlorvos	0.001	0.004			0.004			
Dieldrin	0.001	0.004			0.004			
Dioxins and furans - as ITEQ	0.0001	0.00063			0.00063			
Dioxins and furans - as WHO TEQ	0.0001	0.00063			0.00063			
Diuron	0.05	5.53			5.53			
Emamectin benzoate	0.001	41.8					41.8	
Endrin	0.001	0.004			0.004			

Pollutant name	Reporting threshold (kg)	Total Release (kg)	1 - Energy sector	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector
Ethylbenzene	10	21.1	21.1					
Fluoranthene	0.1	8.15		2.32	5.83			
Fluorides - total as F	2,000	178,170			178,170			
Halogenated organic compounds - total as AOX	1,000	83,450			83,450			
Hexachlorocyclohexane - all isomers	0.01	1.29			1.29			
Iron	1,000	400,430	1,670		398,760			
Isoproturon	0.01	0.136			0.136			
Lead	20	728			728			
Lindane	0.1	0.849			0.849			
Manganese	200	1,970						1,970
Mercury	0.1	12.7		1.04	11.0			
Methylene chloride	10	78.0		10.9	67.1			
Naphthalene	1.0	1,020	1.30	19.5	999			

Pollutant name	Reporting threshold (kg)	Total Release (kg)	1 - Energy sector	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector
Nickel	20	6,323		141	4,514			1,668
Nitrogen - total as N	50,000	33,847,146		199,000	18,441,922		10,381,631	4,824,593
Nonylphenol ethoxylates	1.0	3,570			3,570			
Nonylphenols	1.0	568			568			
Nonyphenol and nonylphenol ethoxylates	1.0	2,403			2,403			
Octylphenol and octylphenol ethoxylates	1.0	4.94			4.94			
Octylphenols	1.0	4.94			4.94			
Organic tin compounds - total as Sn	5.0	6.43			6.43			
Permethrin	0.001	3.46			3.46			
Phenols - total as C	20	3,083	1,746	1,213	102			22.0
Phosphorus - total as P	5,000	4,679,184		36,556	2,055,060		1,559,323	1,028,245
Polychlorinated biphenyls	0.001	0.652			0.652			

Pollutant name	Reporting threshold (kg)	Total Release (kg)	1 - Energy sector	4 - Chemical industry	5 - Waste and wastewater m/ment	6 - Paper and wood production and processing	7 - Intensive livestock production and aquaculture	8 - Animal and vegetable products from the food and beverage sector
Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	1.0	71.3		1.40	69.9			
Toluene	10	340	229	111				
Total organic carbon or COD/3	50,000	74,508,744	53,419	1,311,591	10,128,800	103,926	40,017,429	22,893,579
Tributyltin compounds	0.01	1.32			1.32			
Trichlorobenzene - all isomers	0.01	9.94			9.94			
Trifluralin	0.001	0.03			0.03			
Triphenyltin compounds	0.1	0.772			0.772			
Xylene - all isomers	10	128	75.5	25.4	27.6			
Zinc	100	64,678	256	583	25,595		31,982	6,262

Table 4: Number of sites reporting ART emissions to water, and percentage of total ART emissions released, by sector and pollutant for 2022.

Pollutant	Total no of ART sites	1 - Energy sector		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal and vegetable products from the food and beverage sector	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Aldrin	1					1	100						
Ammonia	78	1	0.02	2	0.001	73	81.9					2	18.1
Anthracene	54			1	1.16	53	98.8						
Arsenic	26	2	4.37	1	3.82	23	91.8						
Asbestos	71					71	100						
Azamethiphos	74									74	100		
Benzene	4	2	52.1	2	47.9								
Benzo (g,h,i) perylene	26			1	1.81	25	98.2						
Benzo(a) pyrene	1					1	100						
Brominated diphenylethers - total as Br	3					3	100						
Cadmium	17	1	3.16	1	4.06	13	42.1					2	50.7
Chlorides - total as Cl	12	1	8.02	1	6.7	10	85.3						

Pollutant	Total no of ART sites	1 - Energy sector		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal and vegetable products from the food and beverage sector	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Chloroform	4					4	100						
Chromium	8			1	12.0	6	68.2					1	19.8
Copper	83	1	0.22	1	0.27	56	20.4			23	65.9	2	13.2
Cyanides - total as CN	9			1	11.8	8	88.2						
Cypermethrin	14					14	100						
Deltamethrin	27									27	100		
Di(2-ethylhexyl) phthalate	73					73	100						
Diazinon	13					13	100						
Dichlorvos	1					1	100						
Dieldrin	1					1	100						
Dioxins and furans - as ITEQ	3					3	100						
Dioxins and furans - as WHO TEQ	3					3	100						
Diuron	26					26	100						
Enamectin benzoate	107									107	100		

Pollutant	Total no of ART sites	1 - Energy sector		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal and vegetable products from the food and beverage sector	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Endrin	1					1	100						
Ethylbenzene	1	1	100										
Fluoranthene	22			2	28.5	20	71.5						
Fluorides - total as F	25					25	100						
Halogenated organic compounds - total as AOX	24					24	100						
Hexachlorocyclohexane - all isomers	15					15	100						
Iron	53	1	0.42			52	100						
Isoproturon	7					7	100						
Lead	12					12	100						
Lindane	5					5	100						
Manganese	1											1	100
Mercury	37	2	2.77	3	8.20	31	87.0					1	2.05
Methylene chloride	3			1	14.0	2	86.0						

Pollutant	Total no of ART sites	1 - Energy sector		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal and vegetable products from the food and beverage sector	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Naphthalene	74	1	0.13	1	1.92	72	98.0						
Nickel	42			1	2.23	40	71.4					1	26.4
Nitrogen - total as N	165			1	0.59	54	54.5			108	30.7	2	14.3
Nonylphenol ethoxylates	73					73	100						
Nonylphenols	65					65	100						
Nonyphenol and nonylphenol ethoxylates	73					73	100						
Octylphenol and octylphenol ethoxylates	3					3	100						
Octylphenols	3					3	100						
Organic tin compounds - total as Sn	1					1	100						
Permethrin	22					22	100						
Phenols - total as C	10	4	56.6	2	39.3	3	3.32					1	0.71
Phosphorus - total as P	181			2	0.78	48	43.9			129	33.3	2	22.0
Polychlorinated biphenyls	20					20	100						

Pollutant	Total no of ART sites	1 - Energy sector		4 - Chemical industry		5 - Waste and wastewater m/ment		6 - Paper and wood production and processing		7 - Intensive livestock production and aquaculture		8 - Animal and vegetable products from the food and beverage sector	
		Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022	Sites	% of 2022
Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	23			1	1.96	22	98.0						
Toluene	4	2	67.4	2	32.6								
Total organic carbon or COD/3	218	1	0.07	3	1.76	37	13.6	1	0.14	173	53.7	3	30.7
Tributyltin compounds	27					27	100						
Trichlorobenzene - all isomers	1					1	100						
Trifluralin	1					1	100						
Triphenyltin compounds	1					1	100						
Xylene - all isomers	5	2	58.8	2	19.8	1	21.5						
Zinc	188	2	0.40	3	0.90	51	39.6			130	49.4	2	9.68

Waste transfers

Table 5: Offsite waste transfers by industry sector and type for 2022. All values are tonnes.

Industry sector	Hazardous waste		Non-hazardous waste	
	Disposal	Recovery	Disposal	Recovery
1 - Energy sector	2,806	8,576	3,553	11,464
2 - Production and processing of metals	2,944	1,302	159	4,338
3 - Mineral industry	433	189	-	4,688
4 - Chemical industry	256,912	45,007	4,178	8,372
5 - Waste and waste-water management	106,059	156,805	2,786,028	3,909,189
6 - Paper and wood production and processing	740	7,855	6,895	19,812
7 - Intensive livestock production and aquaculture	-	-	4,332	58,436
8 - Animal and vegetable products from the food and beverage sector	4,316	35.0	116,320	176,132
9 - Other activities	318	1,169	8,203	4,564
Total	374,528	220,938	2,929,668	4,196,995

Notes:

1. More detailed data on waste transfers are available here :

www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-data-for-scotland/

2. The thresholds for reporting offsite waste transfers are 2 tonnes for hazardous and 2,000 tonnes for non-hazardous. No 'BRT' report is necessary as it is assumed all sites will produce some waste.

3. 'Disposal' and 'Recovery' mean any of the operations provided for in Annex IIA and Annex IIB of [EU Waste Directive 2006/12/EC](#)

1.3 Greenhouse gas emissions

Emissions of four individual greenhouse gases, and two groups of greenhouse gases are reportable to SPRI.

Three of these are 'Fluorinated greenhouse gases' or 'F-gases'; a family of chemicals that contain fluorine which are also powerful greenhouse gases that contribute to climate change. The UK has a regulation² on the use of F-gases like hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). Note that the Kyoto 'basket' of greenhouse gases includes nitrogen trifluoride (an F-gas) which is not reportable to SPRI.

Individual gases	Carbon dioxide	
	Methane	
	Nitrous oxide	
Groups of gases	Sulphur hexafluoride	F-gas
	Hydrofluorocarbons (HFCs)	F-gas
	Perfluorocarbons (PFCs)	F-gas

Global warming potential: a note on the use of 'carbon dioxide equivalent' (CO₂e) mass

The Intergovernmental Panel on Climate Change (IPCC) explains Global Warming Potentials as: "Global Warming Potentials (GWP) are calculated as the ratio of the radiative forcing of one kilogramme greenhouse gas emitted to the atmosphere to that from one kilogramme CO₂ over a period of time."³

² The Fluorinated Greenhouse Gases (Amendment) (Eu Exit) Regulations 2021: [The Fluorinated Greenhouse Gases \(Amendment\) \(EU Exit\) Regulations 2021 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

³ 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Available at: www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/

The GWP values used in this publication are taken from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5)⁴ over a 100-year period (in line with the approach taken for the Scottish Greenhouse Gas Statistics 2021).⁵

The GWPs used for the individual greenhouse gases are:

Greenhouse gas	Lifetime (years)	100 years GWP (AR5)
Carbon dioxide	50-200	1
Methane	12	28
Nitrous oxide	114	265
Sulphur hexafluoride	3200	23,500

For grouped gases:

It is currently not possible for us to reliably convert these to carbon dioxide equivalent (CO_{2e}) values as we do not formally collect information identifying individual species of hydrofluorocarbons and perfluorocarbons.

- For hydrofluorocarbons, we have used the value for **HFC-23 (100 years GWP (AR5) = 12,400)**.
- In reality, most HFC releases are known to be of refrigerants and the gases most commonly specifically identified to SPRI have GWPs of between 1,000 and 4,000.
- For perfluorocarbons, we have used the value for **PFC-116 (100 years GWP (AR5) = 11,100)**. We have very limited information on the species of PFC released from SPRI sites.

SPRI provides information on greenhouse gas emissions from industrial sites only. The Scottish Greenhouse Gas Statistics is the key tool for understanding the origins and magnitudes of greenhouse gas emissions in Scotland.

⁴ IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: www.ipcc.ch/report/ar5/wg1/

⁵ www.gov.scot/publications/scottish-greenhouse-gas-statistics-2021/

Long term view of global warming potential of SPRI releases

Figures 1 and 2 show the global warming potential of total emissions from SPRI since 2007 (when the current regulations which our core reporting is based on came into force).

The long-term trend continues to decrease since 2007, with year-to-year variations reflecting the complex interplay between economic recovery, production demands and post-pandemic dynamics. In fact, the global warming potential of greenhouse gas emissions in 2022 was less than the values recorded in 2018, 2019 and 2020.

Figure 1: Global warming potential of greenhouse gases reported to SPRI since 2007 (MtCO₂e).

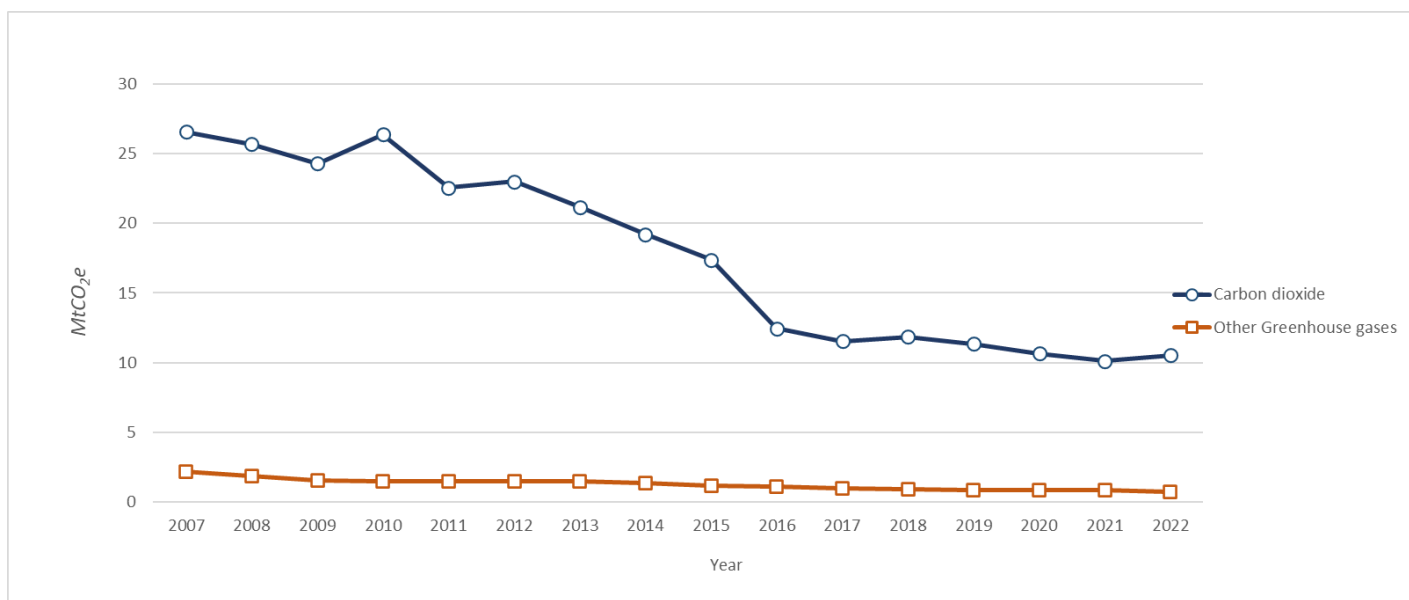
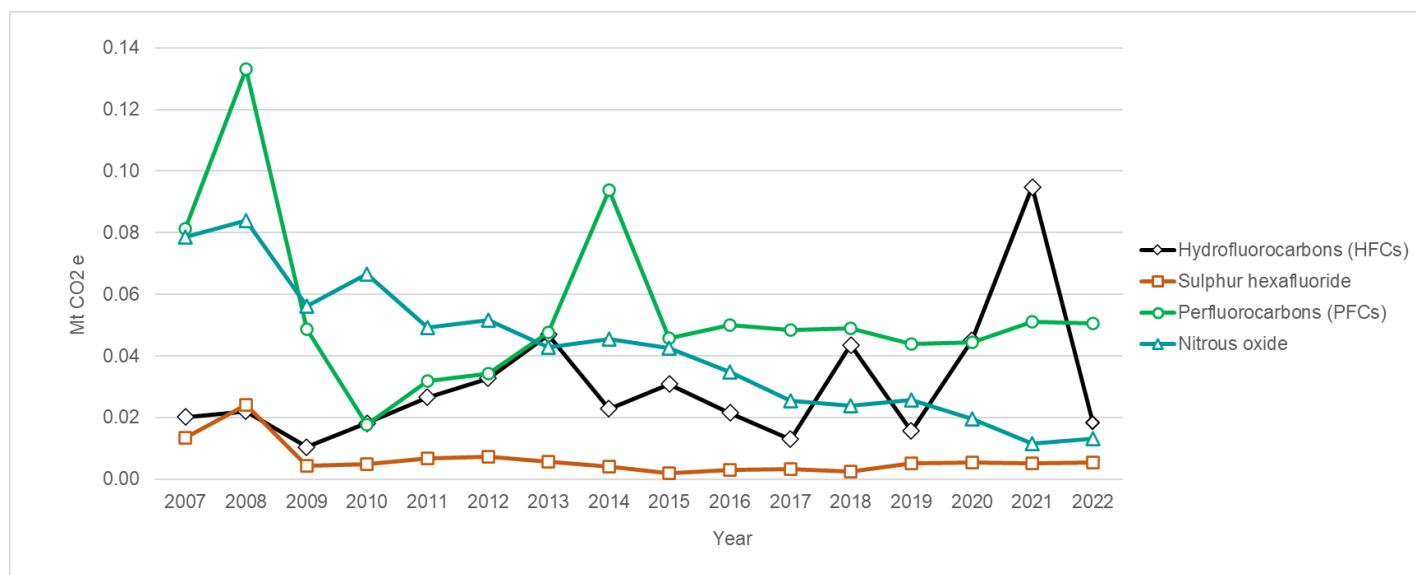


Figure 2: Global warming potential of greenhouse gases reported to SPRI since 2007 (MtCO₂e), excluding carbon dioxide and methane, to show relative scale of minor gases

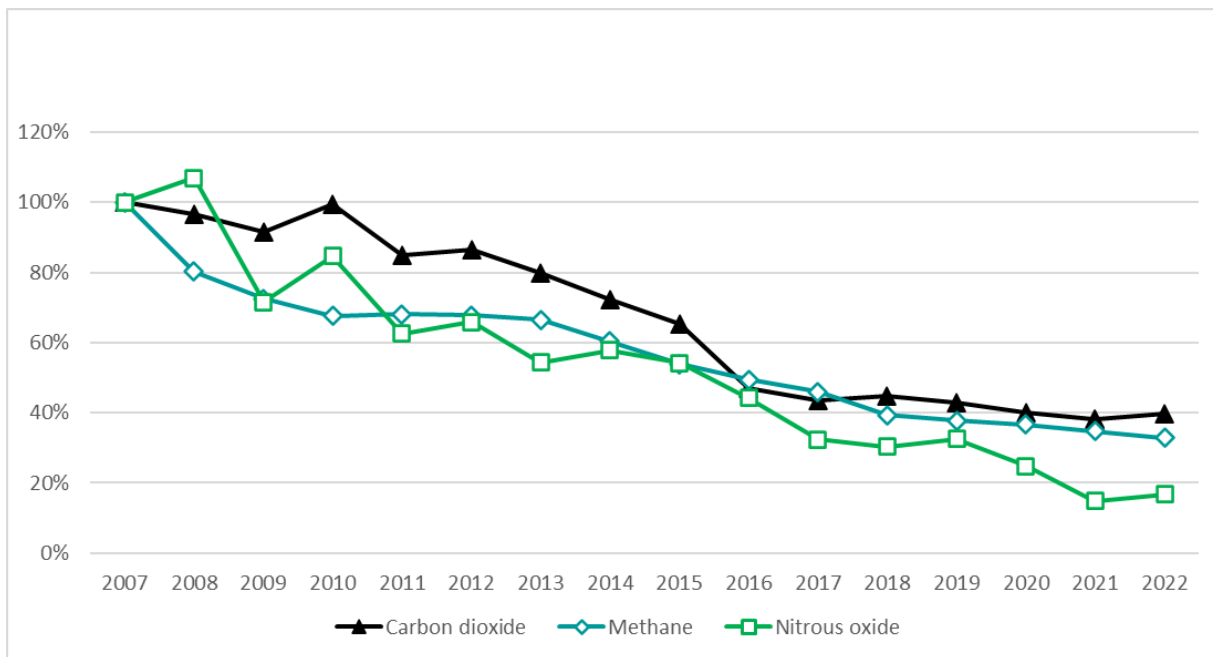


Long term trends in greenhouse gas emissions

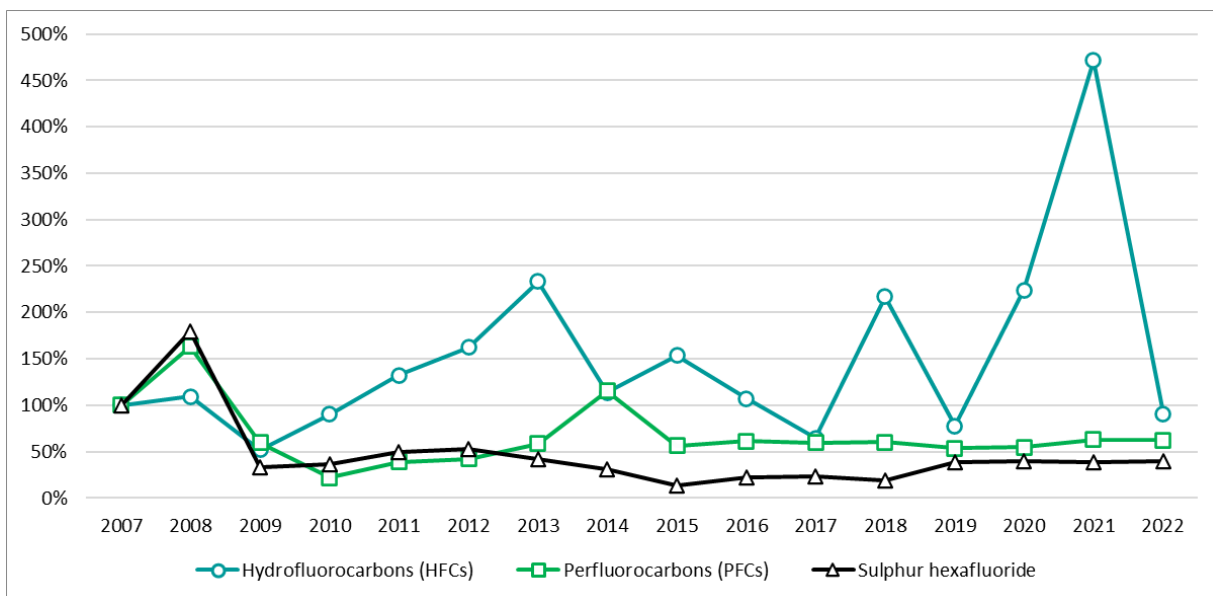
Carbon dioxide, methane and nitrous oxide emissions continue to follow a downward trend over the last five years (Figure 3), although less pronounced than in the period from 2007 to 2016.

Hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride do not follow this clear downward trend (Figure 4). For hydrofluorocarbons, this is partly because emissions are generally unplanned losses of refrigerant from chiller systems, from a relatively small number of sites. Perfluorocarbons and sulphur hexafluoride are now only reported from four sites in Scotland, and the biggest emissions for both come from one site which tends to be highly consistent between years.

Figures 3: Annual SPRI Greenhouse gas emissions normalised against 2007 values.



Figures 4: Annual SPRI F-gas emissions normalised against 2007 values.



Short term variations in greenhouse gas emissions

The overall global warming potential of greenhouse gas emissions from the SEPA-regulated industrial sites which report to SPRI (measured as kilograms of carbon dioxide equivalent (kg CO₂e)) increased by 2.7% between 2021 and 2022.

Figure 5 shows the global warming potential of emissions by industry sector for 2021 and 2022. For reference, figures for the three F-gases are provided in Figure 6.

Figure 5: Global warming potential of greenhouse gases reported to SPRI by industry sector for 2021 and 2022 (kgCO₂e)

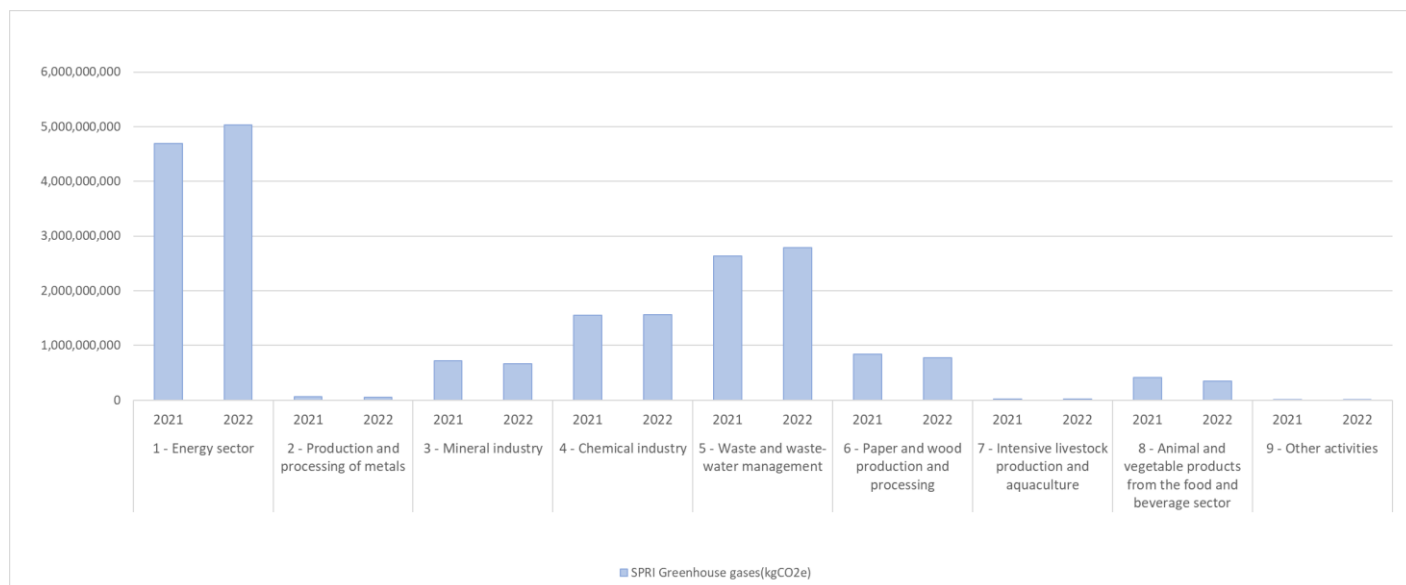
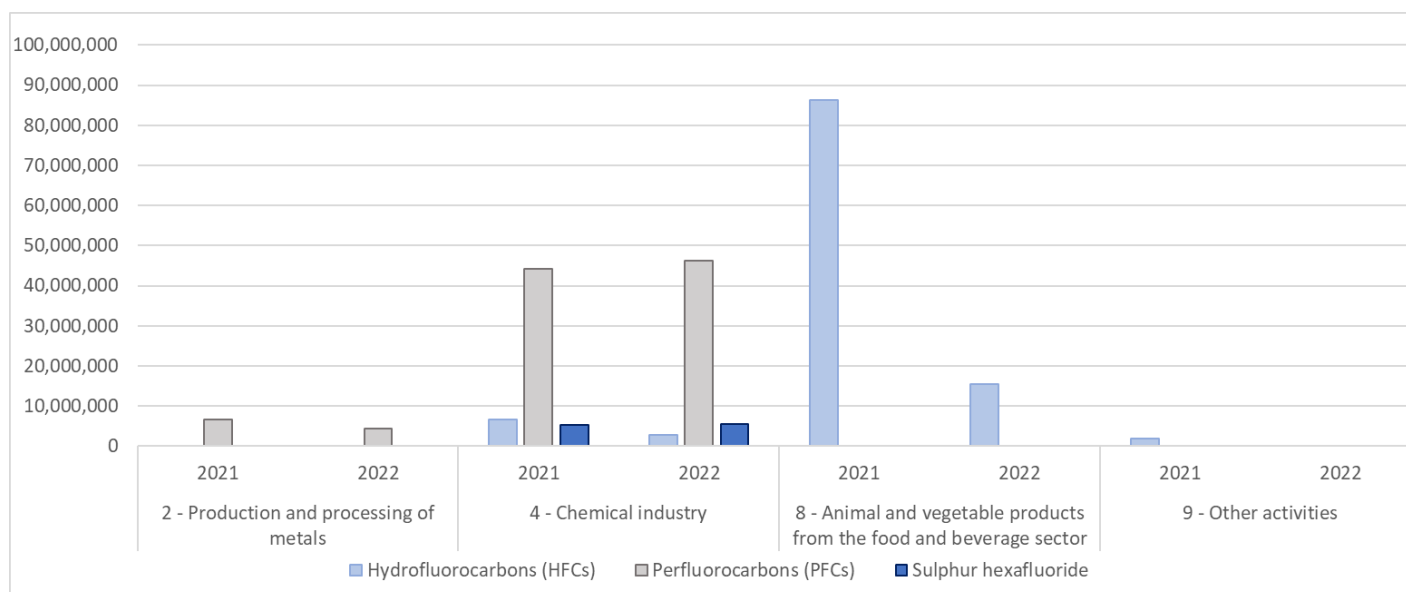


Figure 6: Emissions of F-gases reported to SPRI by industry sector for 2021 and 2022 (kgCO₂e).



Notes on year-to-year variation in greenhouse gas emissions

In 2022, the overall global warming potential of greenhouse gas emissions from the SEPA-regulated industrial sites which report to SPRI was estimated to be 11.25 million tonnes carbon dioxide equivalent (MtCO₂e). This is 2.7% higher than the 2021 figure of 10.95 MtCO₂e (+0.30 MtCO₂e). Carbon dioxide accounted for the 93.4% of the total GHG emissions (10.5 MtCO₂e). Other greenhouse gases constituted smaller proportions with methane accounting for 5.78%,

nitrous oxide for 0.12%, hydrofluorocarbons for 0.16%, perfluorocarbons for 0.45% and sulphur hexafluoride for 0.05%.

Carbon dioxide	<p>Overall, there is a 4.1% increase in 2022 from 2021. However, it should be noted that the 2022 value is 1% lower than the 2020 value and 7% lower than the 2019 value.</p> <p>The list of the top ten sites is the same as in 2021 and they are in almost the same ranking order. The carbon dioxide emissions from the top ten sites increased by almost 9%. This figure hides a large amount of variability with three reporting increases of more than 10% and the rest with decreases of more than 10%.</p> <p>The Energy sector reported a 7% increase in emissions mostly for public electricity generation. Note that emissions from Waste and waste-water management sites increased by 9% driven mostly by Energy from Waste incineration. The Food and Drink sector had an increase of 3% with all sites reporting an increase. The Chemical sector increased by 1% in emissions compared to 2021.</p> <p>Metal (-18%), Mineral (-7%) and Paper and wood (-8%) sectors have decreased their emissions from 2021.</p>
Methane	<p>Overall emissions decreased by 6%, but, as for carbon dioxide, some sites' emissions have increased. 2022 emissions are 16% lower than the average of the last 5 years.</p> <p>As in 2021, landfills accounted for 83% of the total methane emissions. It is important to note that landfill data is often modelled.</p>
Nitrous oxide	<p>There was an increase of 13% compared to 2021, due to increased production at the three sites that have reported this pollutant.</p>
Hydrofluorocarbons (HFCs)	<p>There was an 81% reduction in emissions compared to the previous year. Most reported emissions of HFCs are accidental. In</p>

	2022, no large accidental releases were reported, this compares to 2021 when a significant release was reported.
Perfluorocarbons (PFCs)	PFCs have decreased by 1% compared to 2021 because of one of the three reporting sites reduced production.
Sulphur hexafluoride	Only two SPRI sites reported ART emission values for sulphur hexafluoride in 2022, and the total has increased by 4% from 2021.

1.4 SPRI reporting data

SPRI sites by Activity code

The SPRI activity code reflects the activity or activities permitted to take place on a site as specified in the site authorisation. The codes allow Scottish sites to be compared to European sites by providing a common system of categorising industrial activities. The codes are largely the same as those listed in the European Pollutant Release and Transfer Register (E-PRTR) Regulation.⁶

Note that when we refer to 'Industry sectors' we mean the top-level Activity code (e.g., Industry sector 1 is Energy).

Table 6: Number of sites required to report to SPRI in 2022 under each main Activity code, in bold (including numbers per sub-code, not in bold).

An asterisk indicates that there is no capacity threshold.

Code	Activity	Capacity threshold	Operator submits return ⁷	Waste system transfer ⁸
1	Energy sector		45	
1(a)	Mineral oil and gas refineries	*	15	
1(b)	Installations for gasification and liquefaction	*	2	

⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006R0166&from=EN#d1e32-12-1>

⁷ Operators submit directly to SPRI via return form.

⁸ Data are collected separately by waste data team within SEPA.

Code	Activity	Capacity threshold	Operator submits return ⁷	Waste system transfer ⁸
1(c)	Thermal power stations and other combustion installations	With a heat input of 50 megawatts (MW)	28	
2	Production and processing of metals		15	
2(c).i	Hot-rolling mills	With a capacity of 20 tonnes of crude steel per hour	1	
2(c).ii	Smitheries with hammers	With an energy of 50 kilojoules per hammer, where the calorific power used exceeds 20 MW	1	
2(d)	Ferrous metal foundries	With a production capacity of 20 tonnes per day	1	
2(e).i	For the production of non-ferrous crude metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic processes	*	2	
2(e).ii	For the smelting, including the alloying, of non-ferrous metals, including recovered products (refining, foundry casting, etc.)	With a melting capacity of 4 tonnes per day for lead and cadmium or 20 tonnes per day for all other metals	2	
2(f)	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	Where the volume of the treatment vats equals 30m ³	8	
3	Mineral industry		24	
3(a)	Underground mining and related operations	*	1	
3(b)	Opencast mining	Where the surface of the area being mined equals 25 hectares	18	
3(c).i	Cement clinker in rotary kilns	With a production capacity of 500 tonnes per day	1	
3(e)	Installations for the manufacture of glass, including glass fibre	With a melting capacity of 20 tonnes per day	3	
3(g)	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	With a production capacity of 75 tonnes per day, or with a kiln capacity of 4m ³ and with a setting density per kiln of 300 kg/m ³	1	
4	Chemical industry		36	
4(a)	Chemical installations for the production on an industrial scale of basic organic chemicals, such as:	*	1	

Code	Activity	Capacity threshold	Operator submits return ⁷	Waste system transfer ⁸
4(a).i	Simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)	*	5	
4(a).ii	Oxygen-containing hydrocarbons such as alcohols, aldehydes, ketones, carboxylic acids, esters, acetates, ethers, peroxides, epoxy resins	*	4	
4(a).ix	Synthetic rubbers	*	1	
4(a).viii	Basic plastic materials (polymers, synthetic fibres and cellulose-based fibres)	*	1	
4(a).x	Dyes and pigments	*	1	
4(b).i	Gases, such as ammonia, chlorine or hydrogen chloride, fluorine or hydrogen fluoride, carbon oxides, sulphur compounds, nitrogen oxides, hydrogen, sulphur dioxide, carbonyl chloride	*	6	
4(b).ii	Acids, such as chromic acid, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulphuric acid, oleum, sulphurous acids	*	2	
4(b).iv	Salts, such as ammonium chloride, potassium chlorate, potassium carbonate, sodium carbonate, perborate, silver nitrate	*	2	
4(b).v	Non-metals, metal oxides or other inorganic compounds such as calcium carbide, silicon, silicon carbide	*	4	
4(d)	Chemical installations for the production on an industrial scale of basic plant health products and of biocides	*	2	
4(e)	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	*	6	
4(f)	Installations for the production on an industrial scale of explosives and pyrotechnic products	*	1	
5	Waste and wastewater management		506	
5(a)	Installations for the recovery or disposal of hazardous waste.	Receiving 10 tonnes per day	44	16
5(b)	Installations for the incineration of municipal waste	With a capacity of 3 tonnes per hour	17	

Code	Activity	Capacity threshold	Operator submits return ⁷	Waste system transfer ⁸
5(c)	Installations for the disposal of non-hazardous waste	With a capacity of 50 tonnes per day	12	256
5(d)	Landfills (excluding landfills of inert waste)	Receiving 10 tonnes per day or with a total capacity of 25,000 tonnes	73	1
5(e)	Installations for the disposal or recycling of animal carcasses and animal waste	With a treatment capacity of 10 tonnes per day	7	1
5(f).i	Municipal wastewater treatment plants	With a capacity below 100,000 population equivalent	59	
5(f).ii	Municipal wastewater treatment plants	With a capacity of 100,000 population equivalent	14	
5(g)	Independently operated industrial wastewater treatment plants which serve one or more activities of this list	With a capacity of 10,000m ³ per day	2	
5(h).v	Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day	When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.	4	
6	Paper and wood production and processing		37	
6(a)	Industrial plants for the production of pulp from timber or similar fibrous materials	*	1	
6(b)	Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)	With a production capacity of 20 tonnes per day	8	
6(c)	Industrial plants for the preservation of wood and wood products with chemicals	With a production capacity of 50m ³ per day	28	
7	Intensive livestock production and aquaculture		482	
7(a).i	Installations for the intensive rearing of poultry	With 40,000 places for poultry	94	
7(a).ii	Installations for the intensive rearing of pigs	With 2,000 places for production pigs (over 30 kg)	14	
7(a).iii	Installations for the intensive rearing of pigs	With 750 places for sows	2	
7(b).i	Intensive aquaculture	Not exceeding 1,000 tonnes of fish and shellfish per year	150	
7(b).ii	Intensive aquaculture	With 1,000 tonnes of fish and shellfish per year	222	
8	Animal and vegetable products from the food and beverage sector		57	

Code	Activity	Capacity threshold	Operator submits return ⁷	Waste system transfer ⁸
8(a)	Slaughterhouses	With a carcass production capacity of 50 tonnes per day	18	
8(b).i	(i) Animal raw materials (other than milk)	With a finished product production capacity of 75 tonnes per day	14	
8(b).ii	(ii) Vegetable raw materials	With a finished product production capacity of 300 tonnes per day (average value on a quarterly basis)	20	
8(c)	Treatment and processing of milk	With a capacity to receive 200 tonnes of milk or more per day (average value on an annual basis)	5	
9	Other activities		19	
9(a)	Plants for the pre-treatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles	With a treatment capacity of 10 tonnes per day	2	
9(b)	Plants for the tanning of hides and skins	With a treatment capacity of 12 tonnes of finished product per day	3	
9(c)	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	With a consumption capacity of 150 kg per hour or 200 tonnes per year	12	
9(e)	Installations for the building of, and painting or removal of paint from ships	With a capacity for ships 100m long	2	
10	Radioactive Substances sites		66	
10(a)	All nuclear installations (including plants undergoing decommissioning) and all non-nuclear installations holding authorisation for air, water and waste water releases: Radioactive substances activity – nuclear		5	
10(b)	All nuclear installations (including plants undergoing decommissioning) and all non-nuclear installations holding authorisation for air, water and waste water releases: Radioactive substances activity – non-nuclear		61	
Total sites required to report to SPRI in 2022			1287	

274 sites which have an activity of waste handling (under industry *sector 5 - Waste and wastewater management*) have SPRI data taken from their Waste Licensed Site Return data

submission. The data submitted is only for waste and is provided as a condition of their licence.

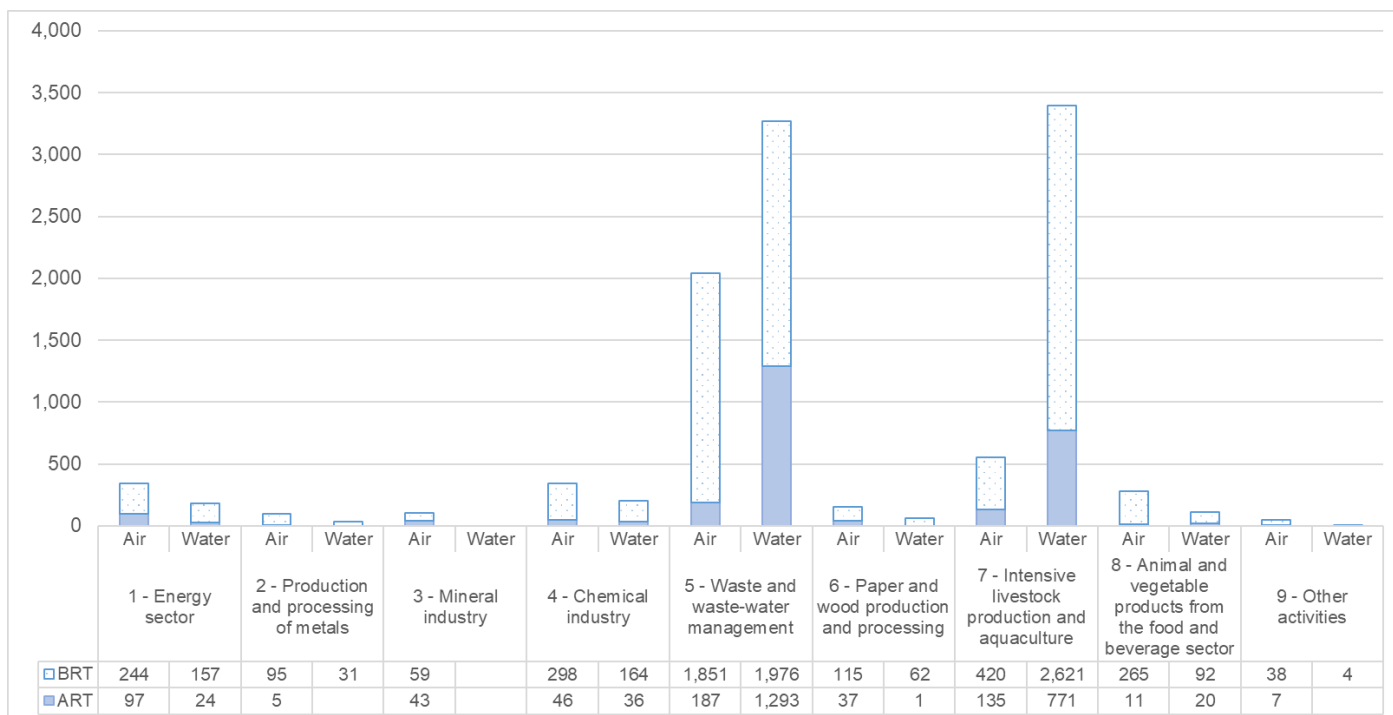
Pollutants reported by Activity code

As noted above, the quantitative figures provided in this statistical release include only those reports of pollutants at levels above reporting thresholds (ART). SPRI also requires all sites to report where they do emit a pollutant but at a level below reporting thresholds (BRT), and there may be substantial numbers of these unquantified minor releases.

The graph shows the total number of individual pollutant releases reported by each industry sector, identified as either ART or BRT. For example, Energy sector sites reported 341 individual emissions to air, of which 244 were ART. (Tables 2 and 4 show more detail on the numbers of sites reporting each pollutant at ART).

A full breakdown by pollutant is included in the accompanying datasheet.

Figure 7: Number of individually reported emissions to air and water at above and below reporting thresholds in each industry area for 2022.



2. Scope of this statistical release

We have focussed on the emissions of pollutants to the environment and on offsite waste transfers from non-waste sites, as these are the areas where SEPA receives the most enquiries, and where SPRI provides data which is both significant and unavailable elsewhere. It's important to note that we have not included discussions on the following topics in this context; however, all relevant data can be accessed on Scotland's Environment Web:

- Radioactive substances⁹
- Releases to wastewater
- Offsite waste transfers from waste sector sites

2.1 User statement

SPRI provides the Scottish part of the UK Pollutant Release and Transfer Register (UK-PRTR). The UK is a Party to the UN Kyiv Protocol on Pollutant Release and Transfer Registers¹⁰ which aims “to enhance public access to information through the establishment of coherent, nationwide PRTRs”. The Protocol requires Parties to provide information on pollution sources to members of the public. See [Section 3](#) for more details.

SPRI data are also used to fulfil various other reporting requirements and obligations including those of the UK National Atmospheric Emissions Inventory (NAEI)¹¹, and the UK Greenhouse Gas Inventory (UKGHGI), which fulfills the UN Kyoto Framework Convention on Climate Change (UNFCCC).¹² Other obligatory uses are the OSPAR Convention¹³ and Scotland's Marine Atlas.¹⁴

The data are also used by central government, researchers and the general public.

⁹ Data for Scottish sites in 2022 will be published in Radioactivity in Food and Environment ([RIFE 28](#)) later this year.

¹⁰ <https://unece.org/env/pp/protocol-on-prtrs-introduction>

¹¹ <https://naei.beis.gov.uk/>

¹² <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>

¹³ www.ospar.org/

¹⁴ <http://marine.gov.scot/data-source-types/scotlands-marine-atlas>

2.2 Feedback

We welcome feedback on this publication and the data from all users including information on how and why the data are used. This helps us to understand the value of the statistics to external users. Please see our contact details at the bottom of the first page of this document.

2.3 Revisions

SEPA will provide information about any revisions made to published information in this statistics release and the associated datasets. Revisions could occur for various reasons, including when data from third parties is unavailable or provisional at the time of publishing or if there are subsequent methodological improvements or refinements. Requests for revisions may be made by SEPA or by Operators.

Note that revisions to individual returns may occur throughout the year. The revision process requires similar Quality Assurance (QA) checks to those carried out on annual data submissions and the return may be unavailable during this period.

Data available on Scotland's Environment Web¹⁵ updates annually and will include all significant revisions to previous years. Where necessary, PRTR data revisions will be resupplied to Defra to allow the UK-PRTR to be updated.

Table 7: Revisions to historic SPRI pollutant emission data since last publication (all values are kg)

Site name	Dataset year	Pollutant	Medium	Mass (kg)	
				original	updated
Barr Environ, Auchencarroch L/F, Jamestown	2021	Carbon dioxide	Air	28,960,000	36,920,000
Barr Environ, Auchencarroch L/F, Jamestown	2021	Methane	Air	1,300,000	1,700,000
Barr Environ, Auchencarroch L/F, Jamestown	2021	Chlorofluorocarbons (CFCs)	Air	31.0	39.9
Barr Environ, Auchencarroch L/F, Jamestown	2021	Hydrochlorofluorocarbons (HCFCs)	Air	21.3	36.2
Barr Environ, Auchencarroch L/F, Jamestown	2021	Carbon Monoxide	Air	183,844	123,000

¹⁵ <https://informatics.sepa.org.uk/SPRI/>

Barr Environ, Garlaff L/F, Skares Rd, Cumnock	2021	Carbon dioxide	Air	18,680,000	27,380,000
Barr Environ, Garlaff L/F, Skares Rd, Cumnock	2021	Methane	Air	999,000	1,470,000
Barr Environ, Garlaff L/F, Skares Rd, Cumnock	2021	Chlorofluorocarbons (CFCs)	Air	13.7	46.3
Barr Environ, Garlaff L/F, Skares Rd, Cumnock	2021	Hydrochlorofluorocarbons (HCFCs)	Air	13.3	34.2
Barr Environ, Garlaff L/F, Skares Rd, Cumnock	2021	Carbon monoxide	Air	173,630	108,000
TWMA - Dales Ind Est, Peterhead	2021	Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	Air	BRT	4
TWMA - Dales Ind Est, Peterhead	2021	Polycyclic aromatic hydrocarbons (PAHs) (four indicator compounds of LRTAP)	Wastewater	BRT	1
Diodes Semiconductors GB Limited, Greenock	2021	Carbon dioxide	Air	14,566,631	11,996,758
Gates Power Transmission, Heathhall, Dumfries	2021	Carbon dioxide	Air	11,059,585	10,307,000
Gates Power Transmission, Heathhall, Dumfries	2021	Toluene	Air	1,613	0
Dalmuir STW, Beardmore Street, Clydebank	2021	Ammonia	Water	966,000	911,000
Flotta Terminal, Orkney	2021	Ra-226	Water	666	512
Flotta Terminal, Orkney	2021	Ra-228	Water	769	809
Flotta Terminal, Orkney	2021	Pb-210	Water	134	147
Flotta Terminal, Orkney	2021	Po-210	Water	134	147
Marine Harvest Ltd, Blar Mhor, Fort William	2021	Total organic carbon or COD/3	Wastewater	223,088	5,886
Easter Deans Farm, Leadburn, W.Linton, Tweeddale	2021	Ammonia	Air	34,359	32,812
Glengorm Landfill Site, Glengorm Rd, Tobermor	2021	Chlorofluorocarbons (CFCs)	Air	omitted	1.53

Glengorm Landfill Site, Glengorm Rd, Tobermor	2021	Hydrochlorofluorocarbons (HCFCs)	Air	omitted	1
Thornton Feed Mill, Thornton, Fife	2021	Particulate matter - PM10 and smaller	Air	102	265
Lundie Castle Poultry Farm, Dundee	2021	Ammonia	Air	7,360	7,436
Glasgow Royal Infirmary, Dennistoun	2021	Carbon monoxide	Air	15,157	1,132
Glasgow Royal Infirmary, Dennistoun	2021	Nitrogen oxides, NO and NO2 as NO2	Air	96,674	3,760
Glasgow Royal Infirmary, Dennistoun	2021	Particulate matter - PM10 and smaller	Air	2,914	103
Glenhead of Aldouran Farm, Stranraer	2021	Ammonia	Air		11,520
Glenhead of Aldouran Farm, Stranraer	2021	Particulate matter - PM10 and smaller	Air		1,400
Glenhead of Aldouran Farm, Stranraer	2021	Particulate matter - total	Air		4,800
Grangemouth Chemical Plant	2021	Xylene - all isomers	Air	3,200	3,670
Silberline Ltd, Banbeath Road, Leven	2021	Non-methane volatile organic compounds (NMVOCs)	Air	108,100	7,848
Shell UK Ltd, St Fergus Gas Plant	2021	Nitrogen oxides, NO and NO2 as NO2	Air	208,001	635,890
Allanfearn Sewage Treatment Works, Inverness	2021	Arsenic	Water	8.2	7.6
Alloa STW, Forth Bank Ind Est, Alloa	2021	Arsenic	Water	5.1	4.8 (BRT)
Dumbarton West (Ardoch) STW	2021	Arsenic	Water	7.1	6.7
Falkirk STW, Abbots Road, Falkirk	2021	Arsenic	Water	12.0	11
Falkirk STW, Abbots Road, Falkirk	2021	Chromium	Water	2.2 (BRT)	1.8 (NA)
Daldowie STW, Glasgow Rd, Uddingston	2021	Arsenic	Water	31.0	29
Dalmarnock STW, Cotton St, Dalmarnock, Glasgow	2021	Arsenic	Water	23.0	22

Dalmuir STW, Beardmore Street, Clydebank	2021	Arsenic	Water	65.0	61.0
Dunfermline STW, North Queensferry Road, Fife	2021	Arsenic	Water	7.8	7.2
East Calder STW, East Calder	2021	Arsenic	Water	8.6	7.9
Erskine STW, Old Mains Farm, Inchinnan	2021	Arsenic	Water	8.2	7.5
Hamilton STW, Bothwell Rd, Hamilton	2021	Arsenic	Water	5.6	5.2
Hatton STW, By Hatton Farm, Arbroath	2021	Arsenic	Water	28.0	26
Inverclyde STW, Underheugh, By Gourrock	2021	Arsenic	Water	10.0	9.5
Kinneil Kerse STW, Boness Road, Grangemouth	2021	Arsenic	Water	5.1	4.7 (BRT)
Paisley STW, Abercorn St, Paisley	2021	Arsenic	Water	11.0	9.8
Levenmouth STW, Elm Park, Methilhaven Rd, Methil	2021	Arsenic	Water	17.0	16.0
Meadowhead Sewage Treatment Works, Irvine	2021	Arsenic	Water	26.0	24.0
Perth STW, Sleepless Inch, Perth	2021	Arsenic	Water	7.8	7.3
Philipshill WWTW, Westerfield Rd, Busby, Glasgow	2021	Arsenic	Water	5.1	4.7 (BRT)
Edinburgh Sewage Treatment Works, Leith	2021	Arsenic	Water	86.0	80.0
Shieldhall STW, 38 Renfrew Rd, Glasgow	2021	Arsenic	Water	46.0	43.0
Stevenston STW, Ludholm Rd, Stevenson	2021	Arsenic	Water	12.0	11.0
Shell UK Ltd, St Fergus Gas Plant	2020	Nitrogen oxides, NO and NO2 as NO2	Air	241,679	671,450
Shell UK Ltd, St Fergus Gas Plant	2019	Nitrogen oxides, NO and NO2 as NO2	Air	234,559	692,660
Shell UK Ltd, St Fergus Gas Plant	2018	Nitrogen oxides, NO and NO2 as NO2	Air	270,592	731,600

McIntosh Donald, Portlethen, Aberdeen	2021	Ammonia	Air		1,000
Elrig Farm, Port William, Newton Stewart	2021	Ammonia	Air		13,920
Elrig Farm, Port William, Newton Stewart	2021	Methane	Air		13,572
Elrig Farm, Port William, Newton Stewart	2021	Particulate matter - PM10 and smaller	Air		5,800
Elrig Farm, Port William, Newton Stewart	2021	Particulate matter - total	Air		17,400
Peacehill Farm, Wormit, Fife	2021	methane	Air		29,640
Sullom Voe Terminal, Refinery	2021	Zinc	Water	BRT	ART
Blantyre Brick Plant	2021	Carbon dioxide	Air	6,070	6,070,000
Daldowie RDF Plant	2021	Aldrin	Water	BRT	0.0037
Daldowie RDF Plant	2021	Dichlorvos	Water	BRT	0
Daldowie RDF Plant	2021	Dieldrin	Water	BRT	0.0037
Daldowie RDF Plant	2021	Tributyltin compounds	Water	BRT	0
Daldowie RDF Plant	2021	Trichlorobenzene - all isomers	Water	BRT	9.94
Daldowie RDF Plant	2021	Trifluralin	Water	BRT	0
Daldowie RDF Plant	2021	Xylene - all isomers	Water	BRT	27.8
Edinburgh Sewage Treatment Works, Leith	2021	Methylene chloride	Water		12.8
Daldowie RDF Plant	2020	Chloroform	Water	BRT	9.26
Daldowie RDF Plant	2020	Copper	Water	1,180	55.6
Daldowie RDF Plant	2020	Nitrogen - total as N	Air	BRT	52,328
Daldowie RDF Plant	2020	Xylene - all isomers	Water	BRT	27.8
Daldowie RDF Plant	2020	Tributyltin compounds	Water	BRT	0.0774
Flotta Terminal, Orkney	2020	Nitrogen oxides, NO and NO2 as NO2	Air	364,700	203,083
Daldowie RDF Plant	2019	Benzene	Water	BRT	10.080335
Daldowie RDF Plant	2019	Chloroform	Water	BRT	29.6

Daldowie RDF Plant	2018	Chloroform	Water	BRT	31.3
Daldowie RDF Plant	2019	Copper	Water	605	46.8
Daldowie RDF Plant	2019	Nitrogen - total as N	Water	1,050	82,087
Daldowie RDF Plant	2018	Nitrogen - total as N	Water	795	84,310
Daldowie RDF Plant	2018	Xylene - all isomers	Water	BRT	31.4
Daldowie RDF Plant	2018	Zinc	Water	1,710	105
Daldowie RDF Plant	2018	Tributyltin compounds	Water	0.03	0.0738
Daldowie RDF Plant	2019	Tributyltin compounds	Water	0.0346	0.0844
Daldowie RDF Plant	2019	Xylene - all isomers	Water	BRT	30.2
Daldowie RDF Plant	2018	Benzene	Water	BRT	10.5
Versalis UK Ltd, Grangemouth	2022	Styrene	Air	320	431
Nigg WWTW, Aberdeen	2019	Carbon dioxide	Air		1,300,000
Norbord Europe Ltd, Station Rd, Cowie	2021	Formaldehyde	Air	147,122	94,585
Norbord Europe Ltd, Station Rd, Cowie	2021	Particulate matter - total	Air	64,097	52,636
Norbord Europe Ltd, Station Rd, Cowie	2021	Nitrogen oxides, NO and NO2 as NO2	Air	149,561	273,609
Gates Power Transmission, Heathhall, Dumfries	2021	Toluene	Air	NA	1,613
Edinburgh Sewage Treatment Works, Leith	2018	Ammonia	Water	631,000	2,850,000
Edinburgh Sewage Treatment Works, Leith	2019	Ammonia	Water	695,000	2,610,000
Nigg WWTW, Aberdeen	2018	Ammonia	Water	190,000	749,000
Nigg WWTW, Aberdeen	2019	Ammonia	Water	200,000	607,000
Hatton STW, By Hatton Farm, Arbroath	2019	Ammonia	Water	710,000	709,000
Hamilton STW, Bothwell Rd, Hamilton	2018	Ammonia	Water	47,000	1,670
Stevenston STW, Ludholm Rd, Stevenson	2019	Ammonia	Water	160,000	156,000

Table 8: Revisions to historic SPRI waste data since last publication (all values are tonnes)

Site name	Dataset year	Waste type	Recovery or disposal	Mass (tonnes)	
				original	new
Barr Environ, Auchencarroch L/F, Jamestown	2021	Hazardous	Disposal	19,335	Non-Hazardous Waste - Disposal
Rueval L/F Site, Market Stance, Benbecula	2021	Hazardous	Disposal	17.0	0
North Forr Landfill Site, Crieff	2021	Hazardous	Recovery	43.6	0
North Forr Landfill Site, Crieff	2021	Non-Hazardous	Disposal	6,011.0	0
North Forr Landfill Site, Crieff	2021	Non-Hazardous	Recovery	763	0
Gates Power Transmission, Heathhall, Dumfries	2021	Hazardous	Disposal	7.20	0
Gates Power Transmission, Heathhall, Dumfries	2021	Hazardous	Recovery	82.7	137
Gates Power Transmission, Heathhall, Dumfries	2021	Non-Hazardous	Disposal	0	826
Gates Power Transmission, Heathhall, Dumfries	2021	Non-Hazardous	Recovery	0	111
Raigmore Hospital, Inverness	2021	Hazardous	Disposal	28.9	0
Raigmore Hospital, Inverness	2021	Hazardous	Recovery	215	0
Marine Harvest Ltd, Blar Mhor, Fort William	2021	Non-Hazardous	Recovery	2,624	0
Cononish Gold & Silver Mine Tyndrum	2021	Hazardous	Disposal	0	5.46
INEOS Chemicals Grangemouth Ltd, Grangemouth	2021	Hazardous	Disposal	1,568	1,559

INEOS Chemicals Grangemouth Ltd, Grangemouth	2021	Hazardous	Recovery	723	688
INEOS Chemicals Grangemouth Ltd, Grangemouth	2021	Non-Hazardous	Recovery	14,044	6,517
UK Waste Mgmt Ltd, Wellbank Quarry LF, Dundee	2021	Non-Hazardous	Disposal	0	4,563
Dalmuir STW, Beardmore Street, Clydebank	2021	Non-Hazardous	Recovery	27,820	30,285
Dalmuir STW, Beardmore Street, Clydebank	2020	Non-Hazardous	Recovery	26,217	26,463

2.4 Release

The release of this publication is in line with practices specified in the Code of Practice for Official Statistics. The statistics are released at the standard time of 9.30 am on a preannounced weekday date. Pre-release access to the statistics in their final form is provided to Scottish Ministers and those on a list of named officials advising them five working days before the public release. This is to ensure that at the time of release Scottish Ministers are able to comment publicly on the statistics based on a correct understanding of them.

3. About the Scottish Pollutant Release Inventory

3.1 What is the Scottish Pollutant Release Inventory?

The SPRI is a Pollutant Release and Transfer Register (PRTR) and has the primary purpose of making publicly available officially reported annual releases of specified pollutants to air and water from certain SEPA-regulated industrial facilities. It also provides information on offsite transfers of waste and wastewater from these facilities.

The SPRI data is collected, quality assured and made public under the requirements of Freedom of Information and can be compared with PRTR information from other countries. SPRI datasets from 2002 to the present year (except 2003) are available and reported annually.

A full list of the pollutants whose emissions must be reported can be found on the SPRI Schedule,¹⁶ which is updated annually. SPRI pollutants are substances considered to be environmentally significant and of interest to the public.

3.2 Who reports?

Operators of sites carrying out specific activities (67 activities covering 10 major sectors) above defined capacity thresholds are obliged to report to SPRI on an annual basis. The activities and their thresholds are largely determined by previous European Union (EU) reporting requirements, but some activity thresholds have been lowered so more Scottish sites are included.

Below is a brief summary of the SPRI activities and thresholds:

- Most Part A processes defined in the Pollution Prevention and Control (Scotland) Regulations 2012 (as amended), together with any directly associated activities. These are the bigger industrial activities covering the energy, mineral, metal, chemical, waste management, food and drink, paper and pulp and intensive agricultural sectors.
- Municipal sewage treatment works with a design population equivalent of >15,000 population equivalent (where population equivalent has the meaning given in the Urban Wastewater Treatment (Scotland) Regulations (UWWTR)).

¹⁶ www.sepa.org.uk/media/594578/spri-schedule-2022.pdf

- All industrial wastewater treatment plants with a capacity to treat at least 10,000 m³/d (cubic metres per day).
- All marine-caged fish farms (no capacity limit).
- All opencast mining and quarrying sites where the surface area of the area effectively under extractive operation equals 25 hectares and above and includes all underground mining.
- All sites having a waste management licence (WML) with a capacity to accept at least 50 tonnes/day for the disposal of non-hazardous waste and sites with a capacity of receiving 10 tonnes/day for the recovery and disposal of hazardous waste.
- All nuclear installations (including plants undergoing decommissioning) and all non-nuclear installations holding authorisation for air, water and wastewater releases.

Most sites which are required to report to SPRI will have been notified by SEPA by either a Pollution Prevention and Control (PPC) Regulation 63(2) Notice or a notification letter. Sites with only Waste Management Licences (WML) report their offsite waste transfers quarterly to SEPA and are notified that SEPA will use this data to fulfil their reporting obligations.

Sites which have not operated and have no emissions must still submit a return while they retain an active authorisation or permit. Reports must be submitted annually for the previous calendar year; for most sites by 28 February each year.

3.3 SEPA's role

We collect and quality assure (QA) the SPRI data, and then make it publicly available.

SPRI data remains the operator's and it is their legal responsibility to supply accurate information. Our QA process is there to check that the data is complete, coherent and suitable for publication. In outline:

- We carry out data checks using historic data from the site and similar sites.
- Where data are flagged in our checking process, we may ask the operator to confirm their figures and provide more detail on the reasons for any variations. We also ask Site Officers to cross reference against other available data and to use their knowledge of the site to assess whether information is credible.

- We carry out a set of crosschecks against other SEPA data sources – for example the Emissions Trading System data on carbon dioxide emissions. We check that accidental releases have been notified to SEPA where appropriate.
- The overall data for each industry sector is reviewed by colleagues who have substantial knowledge of the sites and the processes they use, to help us understand each individual return's place in the sector.
- Once data has been through QA, we will submit the required sub-set to Defra, who will use it in the UK-PRTR. Defra will carry out further checks and inform us of any issues they identify.
- Sub-sets of SPRI data are used to fulfil national and international reporting obligations (e.g. UK National Atmospheric Emissions Inventory), and these will often have their own quality assurance processes which provide us with feedback.

Note that we do not use SPRI data to assess regulatory compliance.

3.4 Information to consider when using SPRI data and technical notes

Regulatory and environmental impact

SPRI data can be used to broadly compare facilities or sectors and it provides a general overview of the total amounts of pollutants released or waste transferred. However, direct, detailed comparisons between sites are only possible where significant further information is available about all of the processes carried out on site; even where this is possible, few sites have direct equivalents.

SPRI data cannot provide assessments of the regulatory compliance of the facilities or the health or environmental impact of their releases. Compliance information can be found on SEPA's website.¹⁷

Annual mass emissions alone are not necessarily directly related to concentrations being emitted at any particular time and cannot be used to directly predict the resulting concentrations in the environment. High annual mass emissions are often due to the large size of the industrial process, where relatively low concentrations are released in very large flows of air or water. The efficiency of the site's industrial abatement and treatment processes will have

¹⁷ www.sepa.org.uk/regulations/authorisations-and-permits/compliance-assessment-scheme/

a significant impact on emissions. These are guided by relevant UK legislation and Scottish legislation.

Annual mass releases are not directly comparable with air or water quality standards. Reporting thresholds for each pollutant are set based on characteristics of the pollutant (such as its toxicity, transport and persistence in the environment) to indicate what mass emission may give rise to 'significant' environmental concentrations.

Technical notes on data:

Annual variability

Caution should be used when comparing one year's data to the previous year's, particularly on a site-by-site basis. Substantial year to year variability is expected within some sections of the SPRI data, and we allow for this in our QA process.

For example, within the industry sector 7 – Intensive livestock production and agriculture we would expect emissions from poultry farms to be some of the most consistent in SPRI, because operators will tend to stock to similar levels across the whole year, every year. Marine fish farms, on the other hand, have clearly defined production cycles which include fallow periods, so emissions are expected to vary accordingly.

Many sites will base their emission values on spot testing which has happened at different points throughout the year and again, in some industry sectors we can expect these to be quite variable.

Methods

There are three broad ways operators can produce their SPRI figures: measuring, calculating or estimating. Guidance on the SPRI webpage¹⁸ explains where and when each should be used in detail, but we expect the operator to use the best available data and method to produce their figure. In many cases this will be to use the methodologies described under the terms of their SEPA authorisations. In some cases, data may be modelled (e.g., many of the pollutants from landfills and wastewater treatment works), or we ask the operator to use an emission factor (e.g., poultry farmers' ammonia emissions). The best available methods therefore have a wide range of both precisions and accuracies, and this should be kept in mind when data is used.

¹⁸ [Scottish Pollutant Release Inventory Reporting \(sepa.org.uk\)](https://sepa.org.uk)

Figures reported

Related to the point about methods; we formally ask operators to supply data to three significant figures but, as noted in Section one, they normally provide much more than this. We do not receive information on confidence intervals; be aware that a figure which provides high precision may have lower accuracy.

Note that:

- All non-radioactive pollutants are reported in kilograms (kg)
- Offsite waste transfers are reported in metric tonnes (t)

We may display data using different units for ease of use. Commonly, carbon dioxide and overall greenhouse gas emissions are reported in kilotonnes (kt – 1,000,000kg) and megatonnes (Mt – 1,000,000,000kg).

Accidental releases

Figures for accidental releases are included within the main total. It is possible to have a quantified accidental release but for the total emission to be below the reporting threshold (BRT). SPRI has very clear and specific definitions of accidental releases.

United Kingdom Pollutant Release and Transfer Register – UK-PRTR

Most SPRI waste transfer data and a sub-set of pollutant emissions data, covering roughly half of the SPRI sites, is supplied to the UK PRTR and will be published on the [UK's PRTR webpage](#). The datasets have different reporting requirements: the UK-PRTR remains focused on emissions significant at the national and European scale, whereas SPRI is tailored to gather information which is useful from the Scottish national perspective. Around 20% of individual reported rows of SPRI pollutant data is included in the UK-PRTR, but as it covers the largest releases, it will generally represent around 90% of SPRI's total emissions for each pollutant. Around 50% of the SPRI sites report releases and transfers above the PRTR thresholds although this varies from year-to-year.

Various Scotland-relevant pollutants and industrial sectors are included in the SPRI but not required by the legislation covering the UK-PRTR; for example the radioactive substances. In addition, Urban Wastewater Treatment Plants and marine fish farms have a lower activity threshold in SPRI, so more of our sites come into reporting requirements. Thresholds for some pollutants are set to less than the UK thresholds.

Full details of the SPRI and UK-PRTR reporting requirements are available on the SPRI website¹⁹ and the UK-PRTR website.²⁰

¹⁹ www.sepa.org.uk/environment/environmental-data/spri/

²⁰ www.gov.uk/guidance/uk-pollutant-release-and-transfer-register-prtr-data-sets#search-the-prtr-database-on-your-chosen-parameters