Ireland's Transboundary Gas Emissions

1990-2030

May 2019

CONTENTS

KEY HIGHLIGHTS

- The figures show that emissions of two of the five main air pollutants increased – ammonia and non-methane volatile organic compounds.

- Ireland exceeded its emission ceilings for nitrogen oxides ($NO_{x)}$ and and non-methane volatile organic compounds (NMVOCs) for all years since 2010

- Ireland exceeded its emission ceilings for ammonia (NH_3) for 2016 and 2017. Adoption of abatement technologies and improvements in nutrient management at farm level are now required.

- As was the case for the 2016 Inventory, Ireland will use the flexibilities allowed in Article 5(1) of the Directive, as national total emissions of NO_x and NMVOC are non-compliant with reduction commitments due to updating inventories in accordance with scientific knowledge.

- Emissions of sulphur dioxide (SO_2) continue to decrease. These were well below the required EU emission limits, substantially due to the use of lower sulphur content fuels in electricity generation and transport.

- Particulate matter (PM2.5) emissions declined again in 2017. Future emissions will depend largely on the quantity and quality of solid fuel used in the residential and commercial sectors.

- A large number of other pollutants are also reported on. The general trend with these pollutants is a downward trend largely as a result of fuel switching from coal and peat to natural gas and kerosene used in the residential sector, penetration of renewables for electricity generation and reductions in the quantities of coal and peat combusted. Changes in the age structure of the national vehicle fleet have also had an effect.

- In terms air pollutants that are subject to 2020 and 2030 emission reduction targets, the latest projections estimate non-compliance with the ammonia (NH_3) ceiling over the entire period with a gap to target of over 20 kilotonnes in 2030 under the *With Additional Measures* scenario. Non-compliance for NOx and NMVOCs emissions are also projected in 2030 under this scenario.

Introduction and Background

The Directive (EU) 2016/2284 (new National Emissions Ceilings Directive) on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (old NEC Directive) entered in to force on the 31st of December 2016. This new legislative act harmonizes the reporting obligations to the European Union under the Convention on Long Range Transboundary Air Pollution (CLRTAP). A full outline of the reporting obligations and submission deadlines are outlined in Article 8 and Annex I of the Directive

Pollutants and time series

- Mandatory reporting of SO_2, NO_X, NMVOC, NH_3, CO, HM (Cd, Hg, Pb), POPs (PAHs, dioxins/furans, PCBs, HCB), $PM_{2.5}$, PM_{10}, (BC if available) for annual emissions, gridded data, LPS data;
- Mandatory reporting of projections for emissions of SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$, (BC if available) (for projection years 2020, 2025, 2030 and, where available, 2040 and 2050). Ireland reports two projection scenarios; *With Measures* and *With Additional Measures*[1];
- Voluntary reporting of annual emissions of HM (As, Cr, Cu, Ni, Se, Zn), TSP.
- Time series and resubmission: 1990 to reporting year minus 2 (X-2) for all pollutants, except TSP, PM_{10}, $PM_{2.5}$ and BC (starting year = 2000);
- Re-submissions within 4 weeks;
- Reporting of activity data and of an Informative Inventory Report (IIR);
- Possibility to use adjustment of emission inventories: reporting of notification by 15th February 2019 (including pollutants and sectors concerned, and where available, magnitude of impacts); reporting of supplementary information in the IIR by 15th March 2019.

Ceilings and Summary tables

In accordance with Article 21(1) of Directive 2016/2284, the commitments under Article 4 of the NEC Directive 2001/81/EC continue to apply until the 31st of December 2019. Ireland's emission ceilings under Article 4 of the NEC Directive 2001/81/EC are as follows:

- SO_2 42 kilotonnes
- NO_x 65 kilotonnes
- NH_3 116 kilotonnes
- NMVOC 55 kilotonnes

[1] The *With Measures* (WM) scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017 (latest national greenhouse gas emission inventory), are implemented. The *With Additional Measures* (WAM) scenario assumes implementation of the With Measures scenario in addition to, based on current progress, further implementation of Government renewable and energy efficiency policies and measures including those set out in the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) and more recently Ireland's National Development Plan 2018-2027.

Article 4(1) of Directive 2016/2284 and Annex II, sets out new national emission reduction commitments for SO_2, NO_x, NMVOC, NH_3 and $PM_{2.5}$ applicable from 2020 to 2029 and 2030 onwards. These new reduction commitments are relative to the emissions of 2005 and are presented with the latest emission estimates in Table 1 below.

This inventory submission for 1990-2017 data shows Ireland in compliance with the SO_2 emission ceilings for all years from 2010 to 2017, inclusive (Table 1). The submission also shows Ireland exceeding its emission ceilings for NO_x and NMVOC for all years since 2010 and the emission ceiling for NH_3 in 2016 and 2017.

Ireland's submission includes adjusted national emission inventories for NO_x and NMVOC, as allowed under Article 5(1) of Directive 2016/2284 in accordance with Part 4 of Annex IV, as Ireland is non-compliant with national emission reduction commitments as a result of applying improved emission inventory methods updated in accordance with scientific knowledge. Essentially this flexibility mechanism allows Member States to subtract emissions from new sources which have been included in the national inventory since the reduction commitments or ceilings were established or where the emission factors used to estimate emissions have changed significantly based on new science. Ireland's adjustments were approved following review under Article 10(3) of Directive 2016/2284 in June 2018. The adjusted total emissions for NO_x and NMVOC are presented in Table 2.

When the adjustment is considered, Ireland is still in exceedance of the emissions ceiling for NO_x and NMVOC for 2010 only and for NH_3 in 2016 and 2017.

Detailed information relating to the adjustments is outlined in Ireland's Informative Inventory Report 2019 which was submitted on the 15th March 2019.

Table 1.

kilotonnes	Article 21(1) (a)								Article 4(1) and Annex II New reduction commitments	
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2020**	**2030**
National Total SO_2	26.294	24.752	23.287	23.403	17.056	15.207	13.750	13.219	**25.511**	**10.933**
NEC ceiling 2010-2019	42.000	42.000	42.000	42.000	42.000	42.000	42.000	42.000	-65%	-85%
National Total NO_x	114.045	102.229	105.647	106.642	106.322	106.239	108.704	108.264	**66.913**	**40.672**
NEC ceiling 2010-2019	65.000	65.000	65.000	65.000	65.000	65.000	65.000	65.00	-49%	-69%
National Total NMVOC	109.615	106.875	108.306	110.673	106.601	106.692	108.425	113.316	**56.935**	**51.621**
NEC ceiling 2010-2019	55.000	55.000	55.000	55.000	55.000	55.000	55.000	55.00	-25%	-32%
National Total NH_3	108.111	104.296	106.190	107.772	108.273	110.657	116.118	118.489	**112.077**	**107.549**
NEC ceiling 2010-2019	116.000	116.000	116.000	116.000	116.000	116.000	116.000	116.000	-1%	-5%
National Total PM2.5	16.263	14.584	14.204	14.559	13.400	13.281	12.628	11.879	**15.607**	**11.229**
NEC ceiling 2010-2019	NA	NA	NA	NA	NA	NA	NA	NA	-18%	-41%

Table 2.

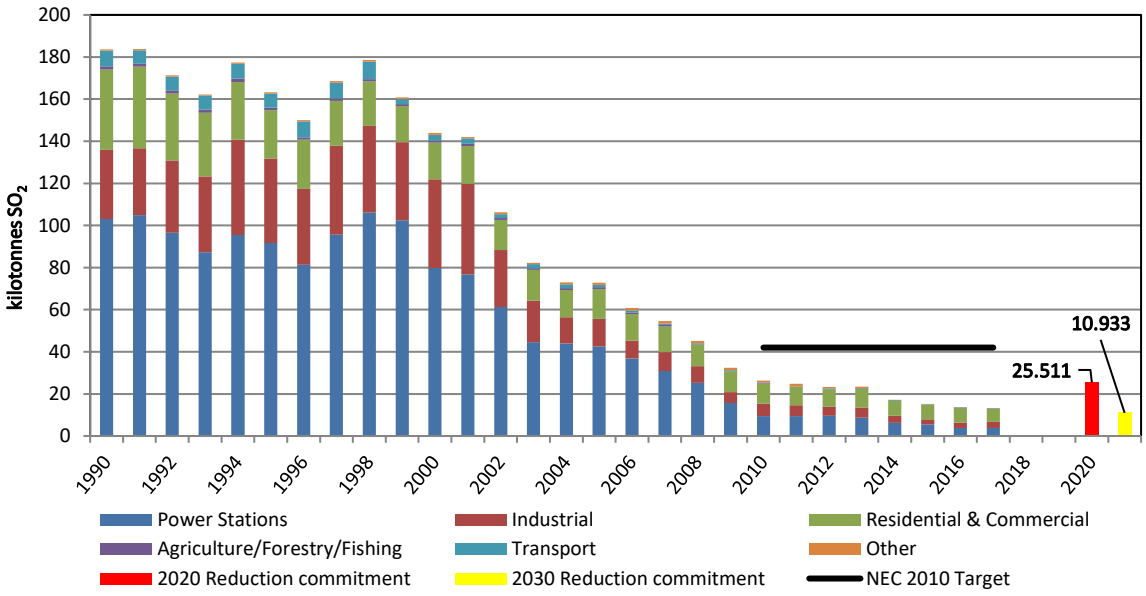
kilotonnes	Article 21(1) (a)							
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
National Total NO_x	114.045	102.229	105.647	106.642	106.322	106.239	108.704	108.264
Adjusted NO_x under Article 5(1)	68.124	59.306	61.341	58.711	58.595	59.525	60.628	60.369
NEC ceiling 2010-2019	65.000	65.000	65.000	65.000	65.000	65.000	65.000	65.000
National Total NMVOC	109.615	106.875	108.306	110.673	106.601	106.692	108.425	113.316
Adjusted NMVOC under Article 5(1)	55.675	52.133	50.837	50.784	49.404	48.361	47.279	46.407
NEC ceiling 2010-2019	55.000	55.000	55.000	55.000	55.000	55.000	55.000	55.000

Sulphur Dioxide

Sulphur dioxide (SO_2) is the major precursor to acid deposition, which is associated with the acidification of soils and surface waters and the accelerated corrosion of buildings and monuments. Emissions of SO_2 are derived from the sulphur in fossil fuels such as coal and oil used in combustion activities.

National Emissions Ceiling

Ireland's national emission ceiling for SO_2 under the NEC Directive is 42 kilotonnes (kt) to be achieved by 2010 and in each year after up to and including 2019. This is equivalent to a 77 per cent reduction from the 1990 baseline level of 183.6 kt SO_2.



Trends in SO_2 Emissions

SO_2 emissions in Ireland reduced considerably between 1990 and 2017. The latest estimates indicate a decrease of 92.8 per cent from 183.6 kt in 1990 to 13.2 kt in 2017. Power stations and combustion in residential and commercial sectors are the two principal sources of SO_2 emissions, contributing 29.4 and 46.6 per cent respectively to the total in 2017. Emissions in these sectors decreased by 96.2 and 83.9 per cent respectively since 1990. Combustion sources in the industrial sector accounted for 20.8 per cent in 2017. The remainder of emissions is from combustion in oil refining, agriculture, forestry and transport.

The emissions from industrial sources decreased by 91.6 per cent from 1990 while the emissions in the transport sector decreased by 96.8 per cent. Total SO_2 emissions in 2010, and all subsequent years, are compliant with the 2010 ceiling. This reflects significant switching from the use of oil and solid fuels to natural gas, reduced sulphur content in coal and oil and implemented abatement measures at power stations.

Projected SO_2 Emissions

In terms of the outlook for 2020, SO_2 emissions under the *With Additional Measures* scenario are projected to be 13.7 kt in 2020. The emission projections predict compliance with the 2020 emission reduction target by 11.7 kt. In terms of 2030, total SO_2 emissions are projected to be 7.6 kt which is below the emission reduction target for that year by 3.2 kt. Key sources of projected SO_2 emissions include fossil fuel combustion for electricity generation and emissions from the residential, commercial and industry sectors.

Table 3.

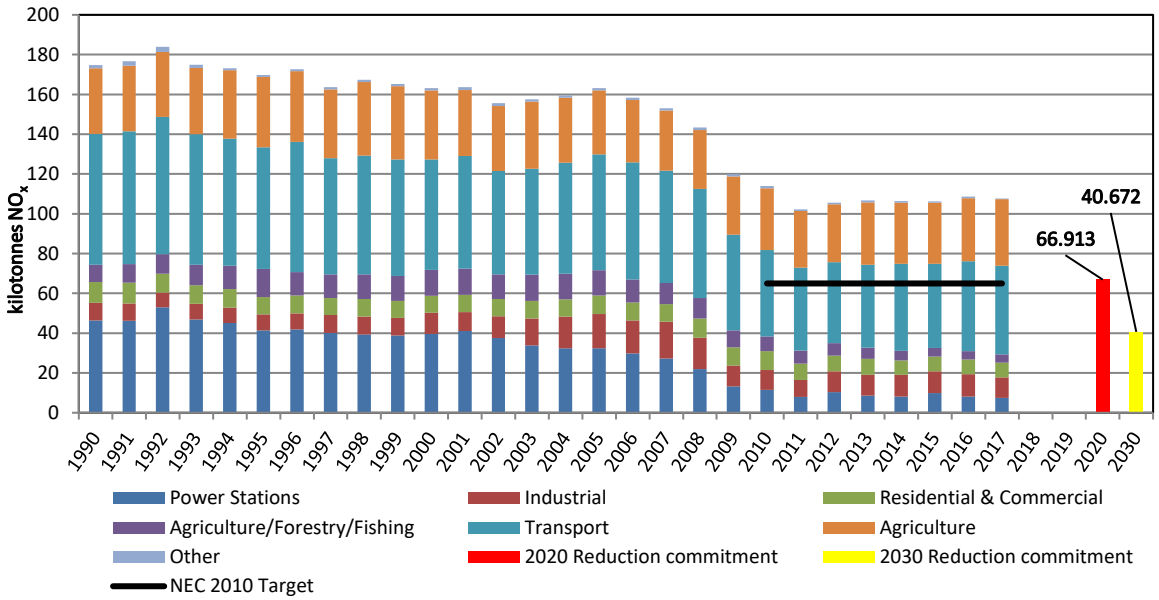
Projected SO_2 emissions	**2020**	**2030**
With Additional Measures Scenario (kt)	13.777	7.641
Target (kt)	25.511	10.933

Nitrogen Oxides

Emissions of nitrogen oxides (NO_x) contribute to acidification of soils and surface waters, tropospheric ozone formation and nitrogen saturation in terrestrial ecosystems. Fuel combustion in transport, nitrogen (dung, urine, fertilizer and manures) in agriculture and fuel combustion in power stations are the principal sources of nitrogen oxides.

National Emissions Ceiling

Ireland's national emission ceiling for NO_x under the NEC Directive is 65 kilotonnes (kt), to be achieved by 2010 and in each year up to and including 2019. This is equivalent to a 63 per cent reduction from the 1990 baseline level of 174.7 kt NO_x.



Trend in NO_x Emissions

NO_x emissions in Ireland have decreased by 38.0 per cent between 1990 and 2017 and emissions have decreased by 35.6 kt, or 24.5 per cent since 2008. This reduction was achieved due to improved abatement at Moneypoint power plant, reduced demand for clinker/cement and a reduction in emissions from road transportation as a result of the implementation of abatement technologies. The latest estimates are 108.3 kt in 2017. The transport sector, which mainly consists of road transport, is the principal source of NO_x emissions, contributing approximately 41.0 per cent of the total in 2017. Agriculture is the second biggest source of NO_x emissions, mainly from synthetic fertiliser application and emissions from urine and dung deposited by grazing animals and application of manures to soils, contributing 30.9 per cent of the 2017 total. The industrial, power stations and residential & commercial sectors are the other main source of NO_x emissions, with contributions of 9.5 per cent, 7.5 per cent and 6.8 per cent respectively in 2017. The remainder of NO_x emissions emanates from combustion in the agriculture and other (refining

and storage, solid fuel manufacture, fugitive emissions and waste) sectors, which together produced around 4.3 per cent of the total in 2017.

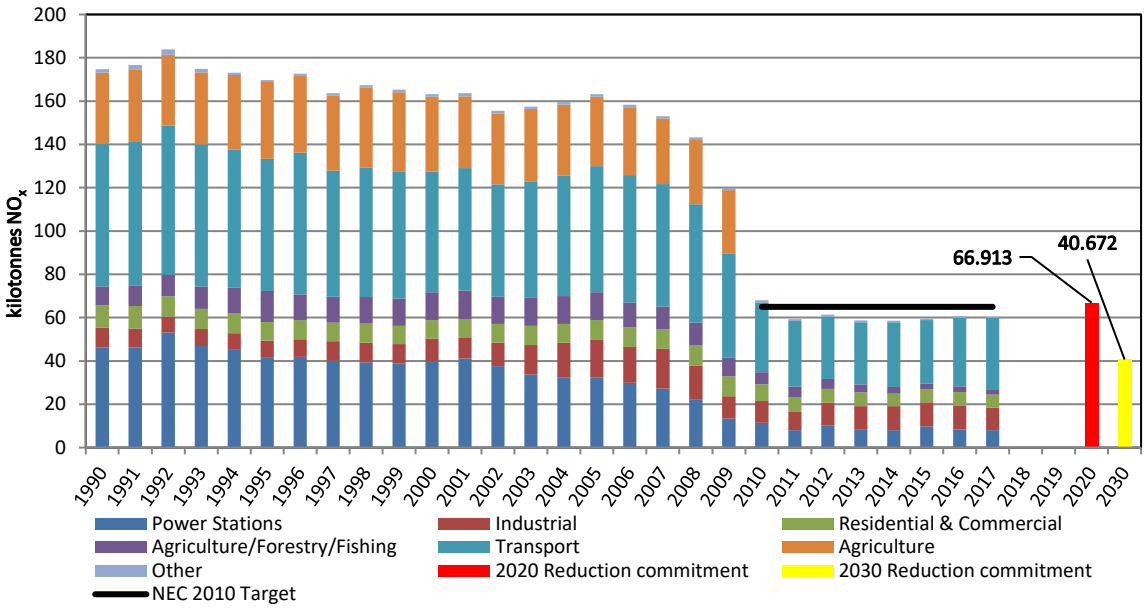
The application of low-NO_x burner technology in several major power stations and the increased use of natural gas have reduced NO_x emissions from electricity generation by 82.5 per cent on 1990 levels, even though electricity total final consumption has increased by 117.8 per cent over the same period. Emissions of NO_x from the coal-fired power plant at Moneypoint have decreased by 91.3 per cent between 1990 and 2017.

The increase in vehicle numbers and in road transport in general sustained emissions of NO_x through the period 2000 to 2008 even though improved technologies are reducing the emissions from individual vehicles. In recent years, however, road transport has seen a decline in emissions of 12.7 kt, or 25.4 per cent, between 2008 and 2017 due to the economic recession and improvements in vehicle technologies. Progress towards limiting emissions to below the ceiling of 65 kt for NO_x in 2010 and beyond has proved difficult even with large reductions in emissions from power stations and road transport in recent years. The most recent data for 2017 show emissions have decreased by 0.4 per cent since 2016 due to decreased emissions from transport, industrial and residential/commercial sectors, with an increase seen in the agriculture sector. Ireland is 43.3 kt above the 2010 emission ceiling in 2017.

The NO_x figures reported here are based on, fuel use, and not fuel sold, and therefore take into account fuel tourism i.e. the impact on emissions of fuel sold in the Republic of Ireland for consumption across the border in Northern Ireland is removed as allowed for under the *Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution*,[2] paragraph 23. It is estimated that fuel tourism accounted for 2.0 kt of NO_x in 2017.

Ireland has applied an adjustment to NO_x emission inventories, as allowed under Article 5(1) of Directive 2016/2284 in accordance with Part 4 of Annex IV, as Ireland is non-compliant with national emission reduction commitments as a result of applying improved emission inventory methods updated in accordance with scientific knowledge. Adjusted NO_x emissions are shown below. Ireland exceeds the emission ceiling in 2010 and is compliant with the NO_x emission ceiling from 2011 onwards.

[2] Paragraph 23, ECE/EB.AIR/125



Projected NO_x Emissions

In terms of projections, overall NOx emissions are projected to be in compliance with the 2020 emission reduction target by 6.8 kt under the *With Additional measures* scenario. Under the same scenario the projections predict non-compliance with the 2030 emission reduction target by 3.7 kt. In terms of the compliance assessment (i.e. in which emissions from agriculture are excluded from compliance assessment) transport accounts for the largest share of projected emissions in 2020 and 2030 (49.9 and 43.3 per cent respectively).

Table 4.

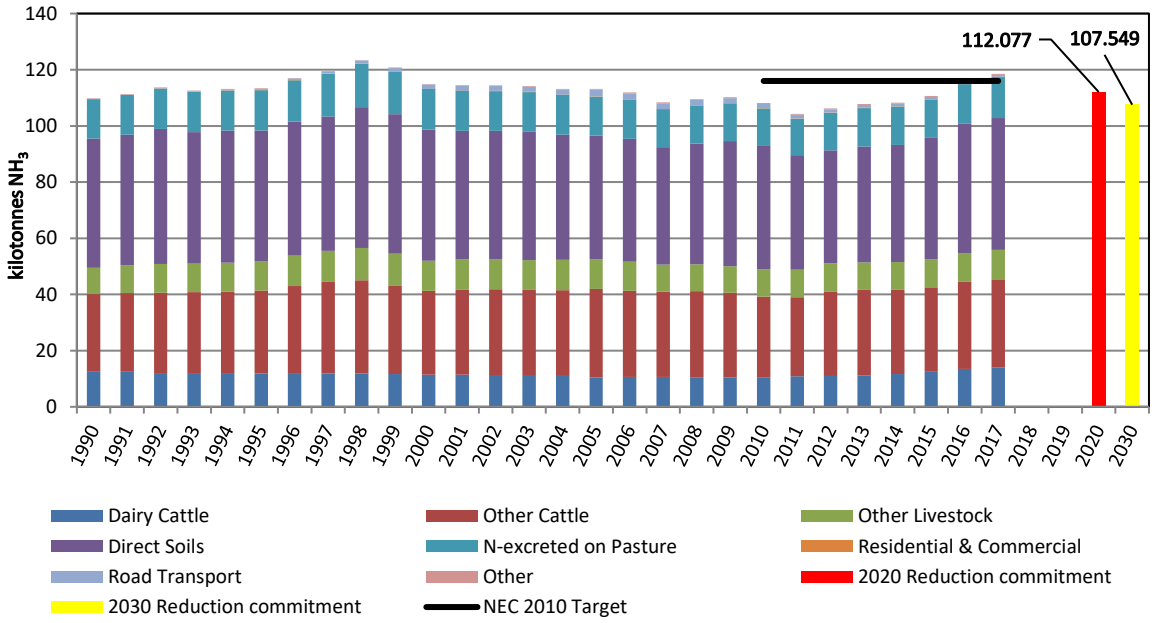
Projected NO_x emissions	**2020**	**2030**
With Additional Measures Scenario (kt)	60.108	44.376
Target (kt)	66.913	40.672

Ammonia

Ammonia (NH_3) emissions are associated with acid deposition and the formation of secondary particulate matter. The agriculture sector accounts for virtually all (99.1 per cent) of ammonia emissions in Ireland. Grasslands ultimately receive the bulk of the 40 million tonnes (Mt) of animal manures produced annually in Ireland along with nitrogen fertilisers which amounted to 369,000 tonnes in 2017. A proportion of the nitrogen in these inputs is volatilised into the air as ammonia.

National Emissions Ceiling

Ireland's national emission ceiling for NH_3 under the NEC Directive is 116 kilotonnes (kt), to be achieved by 2010 and in each year up to and including 2019. This is equivalent to a 5.6 per cent permitted increase in emissions from the 109.8 kt 1990 baseline figure.



Trend in NH_3 Emissions

The emissions in 2017 were 8.7 kt or 7.9 per cent higher than emissions in 1990. Animal manures produce about 90 per cent of ammonia emissions and chemical fertilisers and road transport account for the remainder. It is estimated that approximately 15 per cent of the nitrogen in animal manures and 2 per cent of nitrogen contained in chemical fertilisers is lost to the atmosphere as NH_3. The NH_3 emissions trend is consequently largely determined by the cattle population and showed a steady increase up to 123.5 kt in 1998. There was some decline in the populations of cattle and sheep after 1998, as well as a decrease in fertiliser use, which contributed to a decrease in NH_3 emissions in the period 2000 to 2011. Recent increases in cattle numbers and fertiliser use have seen NH_3 emissions increase for the last five years. NH_3 emissions increased in 2017 by 2.4 kt, primarily as a result of a 3.1 per cent

increase in the size of the dairy herd and an 8.8 per cent increase in synthetic fertiliser nitrogen use.

Road transport produces a small proportion of emissions of ammonia (< 1 per cent) mainly from petrol passenger cars with three way catalysts.

The emissions of NH_3 are compliant with the 2010 NECD ceiling for the years 2010 to 2015, however Ireland exceeds the emission ceiling in 2016 and 2017. Limiting and reducing NH_3 emissions into the future could be problematic given the strong performance of the agriculture sector in line with the ambitious targets of Food Wise 2025. A 26 per cent increase in dairy cow numbers and 24 per cent increase in nitrogen fertilizer use over the period 2012 to 2017 are the most significant drivers. There is now an immediate requirement for focused implementation of abatement measures at farm level. These measures include the use of low emission landspreading techniques and the use of urea fertilizer products that include urease inhibitors. Furthermore, increases in nutrient use efficiencies at farm level through improvements in soil fertility and soil pH levels should lead to more optimum use of manures and synthetic fertilizers.

Projected NH_3 Emissions

Total NH_3 emissions under the *With Additional Measures* scenario are projected to be 121.7 kt in 2020 which is an exceedance of the 2020 emission reduction target by 9.6 kt. Post 2020, emissions increase to 128.1 kt in 2030. Ireland's 2030 emission target of a 5 per cent reduction on 2005 levels results in a distance to target of 20.56 kt in 2030 under the *With Additional Measures* scenario.

Table 5.

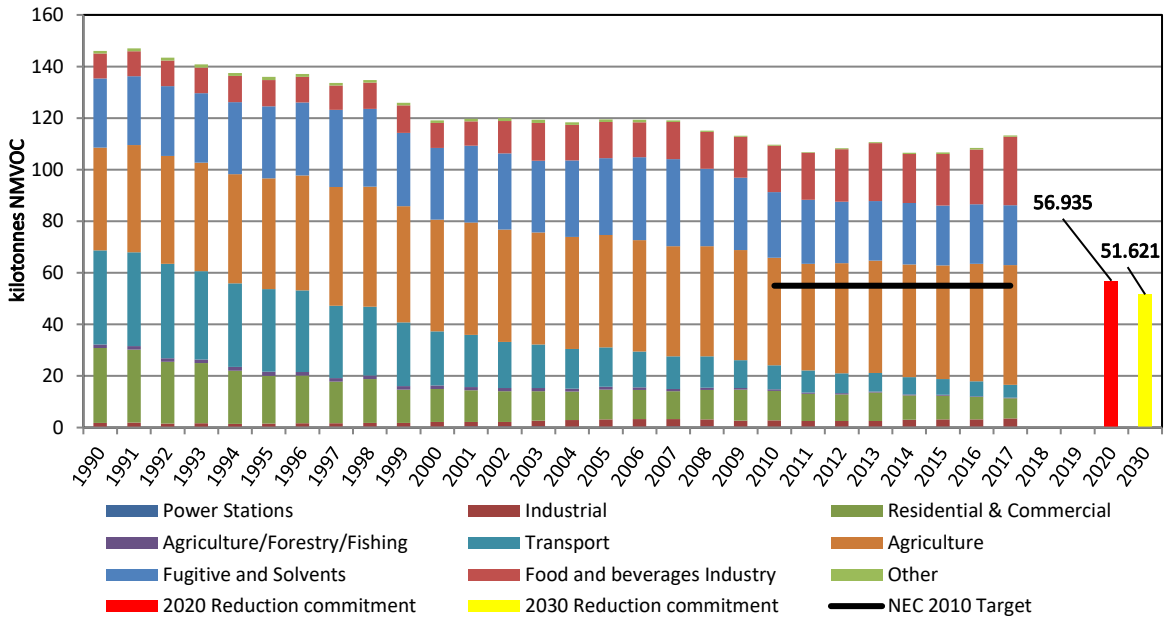
Projected NH_3 emissions	**2020**	**2030**
With Additional Measures scenario (kt)	121.743	128.112
Target (kt)	112.077	107.549

Non-Methane Volatile Organic Compound (NMVOC) emissions

Non-methane volatile organic compounds (NMVOC) arise from the storage and handling of animal manures and synthetic fertilizers in agriculture. They are also emitted from the production of food and beverages and a wide array of products including paints, paint strippers, glues, cleaning agents and adhesives. Incomplete combustion of fuels is also a source.

National Emissions Ceiling

The EU National Emissions Ceilings (NEC) Directive has set a target of 55 kilotonnes (kt) of NMVOC emissions in Ireland by 2010 and in each year up to and including 2019. This is equivalent to a 62.3 per cent reduction in emissions from the 146.1 kt 1990 baseline figure.



Trend over time

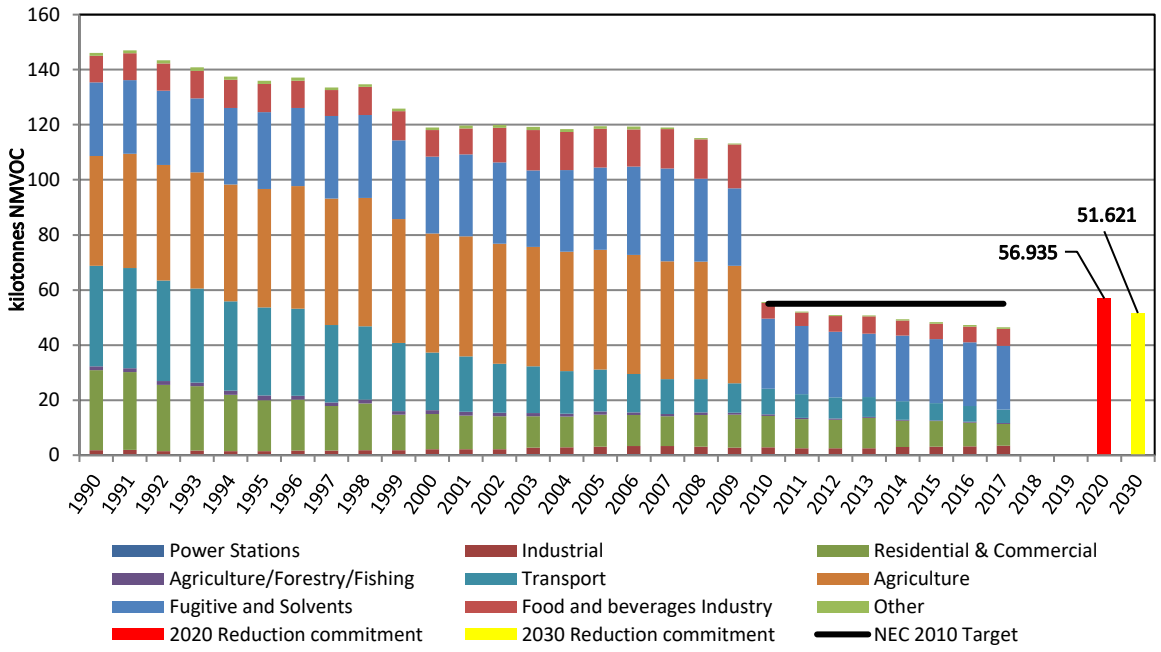
The main sources of NMVOC emissions in Ireland are from manure management in agriculture, food and beverages industry and solvent use. These sources produced 41.0 per cent, 23.5 per cent and 20.4 per cent, respectively of the annual total in 2017. Coal burning in the residential sector is another important but declining source as coal consumption decreases. Emissions from stationary combustion of fossil fuels across all sectors; power stations, residential & commercial and agriculture/forestry/fishing account for 10.3 per cent of national total NMVOC emissions in 2017. Transport emissions account for 4.3 per cent of national total emissions of NMVOC, mainly from exhaust and fugitive releases from gasoline vehicles. Technological controls for NMVOCs in motor vehicles, which have led to a significant reduction in emissions from road transport, have largely been responsible for the decrease in overall emissions along with reduced use of coal and peat as a source of heating in the residential sector.

The inclusion of NMVOC emissions from manure management and fertiliser use in Ireland's two previous submissions, and the inclusion from the food and beverages industry have added over 57.6 kt of NMVOC, on average, to Ireland's national total, effectively doubling the

national emissions for this pollutant. The agriculture sector is now the principal source of NMVOC emissions.

Emissions in 2017, at 113.3 kt, are not compliant with the 2010 ceiling, even though reductions corresponding to 22.4 per cent have been achieved from 1990 to 2017. National total emissions are, on average, 53.8 kt above the 2010 emission ceiling. Future trends in NMVOC emissions depend largely on cattle numbers in the agriculture sector, solid fuel combustion in the residential sector, results from implementation of EU Directives on solvent and product uses and the levels of alcoholic spirits production in Ireland.

Ireland has applied an adjustment to NMVOC emission inventories, as allowed under Article 5(1) of Directive 2016/2284 in accordance with Part 4 of Annex IV, as Ireland is non-compliant with national emission reduction commitments as a result of applying improved emission inventory methods updated in accordance with scientific knowledge. Adjusted NMVOC emissions are shown below. Ireland exceeds the emission ceiling in 2010 and is compliant with the NMVOC emission ceiling from 2011 onwards when the adjustment is applied.



Projected NMVOC emissions

Total NMVOC emissions under the *With Additional Measures* scenario (in which emissions from agriculture and spirit production are excluded from compliance assessment) are projected to be 46.9 kt in 2020. The emission projections predict compliance with the 2020 target by approximately 3.05 kt. Emissions in 2030 are projected to be 47.1 kt which is 1.85 kt above the emission reduction target for 2030. Key drivers in emissions over the projected period include solvents and other product use.

Table 6.

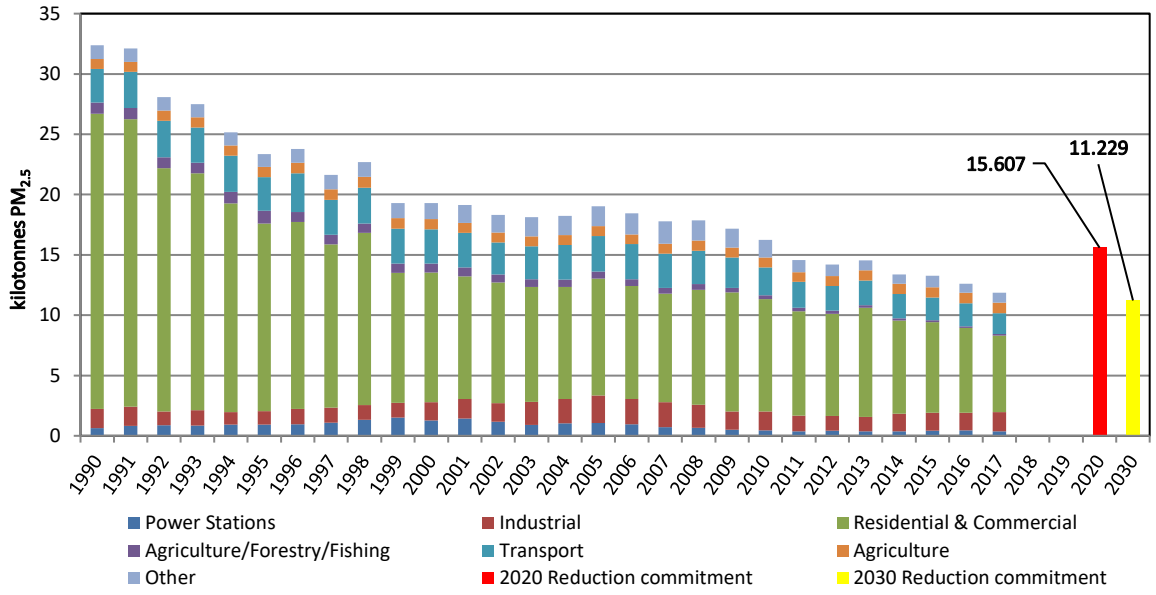
Projected NMVOC emissions	2020	2030
With Additional Measures scenario (kt)	46.916	47.153
Target (kt)	49.965	45.301

Particulate matter <2.5 µm Diameter ($PM_{2.5}$) emissions

There are many sources of particulate matter (dust) including residential & commercial fuel combustion, vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. Particulate matter can be formed from reactions between different pollutant gases. Fine particulate matter $PM_{2.5}$ is associated with significant negative impacts on human health including acute and chronic respiratory illnesses and cardiovascular diseases.

National Emissions Ceiling

The EU National Emissions Ceilings (NEC) Directive 2001/81/EC did not set a 2010 target for $PM_{2.5}$ for Ireland. Article 4(1) of Directive 2016/2284 and Annex II, sets out new national emission reduction commitments for $PM_{2.5}$ applicable from 2020 to 2029 and 2030 onwards. These new reduction commitments are relative to the emissions of 2005 and can be seen in the chart below.



Trend over time

The main sources of $PM_{2.5}$ emissions in Ireland are from residential & commercial sectors which together produced 53.4 per cent of the annual total in 2017. Reduced use of coal and peat, with increased use of gasoil, kerosene and natural gas in these sectors has resulted in 74.1 per cent lower emissions between 1990 and 2017. $PM_{2.5}$ emissions in the Other sector account for 7.0 per cent of the total in 2017. These emissions arise from manufacture of solid fuels, oil refining/storage sectors, coal mining and handling, quarrying and mining of minerals other than coal, construction and demolition, storage, handling and transport of mineral products, road paving with asphalt, fireworks, use of tobacco, storage handling and transport of agricultural products and accidental vehicle and building fires.

Emissions from agriculture arise from manure management and synthetic nitrogen fertilizers in 2017 at 0.9 kt accounted for 7.4 per cent of the national total and indicated a 6.8 per cent increase on their 1990 levels and a 1.2 per cent increase on 2016 levels. Transport contributed 1.73 kt (14.5 per cent share) to the national total in 2017. Emissions from the transport sector,

dominated by road transport have been decreasing since 2005, with a 37.7 per cent reduction between 1990 and 2017 which is largely due to technological advances and the age structure of the national fleet which in turn have been balanced by the increases in vehicle numbers over the time series

Emissions in 2017, at 11.9 kt, show reductions corresponding to 63.3 per cent between 1990 to 2017. Future trends in $PM_{2.5}$ emissions depend largely on solid fuel combustion in the residential and commercial sectors.

Projected $PM_{2.5}$ emissions

Total $PM_{2.5}$ emissions under the *With Additional Measures* scenario are projected to be 11.4 kt in 2020 and 9.5 kt in 2030. The emission projections predict compliance with both the 2020 and 2030 emission reduction targets by a margin of 4.1 kt and 1.6 kt respectively. Key contributors to emissions over the projected period include the residential, commercial and industry sectors.

Table 7.

Projected $PM_{2.5}$ emissions	**2020**	**2030**
With Additional Measures scenario (kt)	11.442	9.537
Target (kt)	15.607	11.229

National Emissions 1990-2017

	SO_2	NO_x	NMVOC kilotonnes	NH_3	$PM_{2.5}$
1990	183.619	174.714	146.065	109.797	32.377
1991	183.722	176.701	147.034	111.351	32.134
1992	171.354	183.926	143.398	113.700	28.098
1993	162.254	174.942	140.808	112.574	27.495
1994	177.364	173.080	137.512	113.152	25.181
1995	163.235	169.777	135.998	113.354	23.378
1996	150.091	172.642	137.115	117.105	23.780
1997	168.551	163.603	133.592	119.543	21.637
1998	178.658	167.389	134.690	123.451	22.714
1999	160.883	165.242	125.878	120.768	19.306
2000	143.913	163.254	119.055	114.936	19.310
2001	141.990	163.611	119.735	114.565	19.139
2002	106.230	155.555	119.940	114.430	18.326
2003	82.294	157.503	119.291	114.151	18.128
2004	72.948	159.483	118.401	113.149	18.254
2005	72.889	163.250	119.470	113.209	19.033
2006	60.808	158.378	119.304	111.868	18.466
2007	54.594	153.074	119.060	108.365	17.804
2008	45.200	143.325	115.163	109.575	17.863
2009	32.387	119.859	113.172	110.164	17.189
2010	26.294	114.045	109.615	108.111	16.263
2011	24.752	102.229	106.875	104.296	14.584
2012	23.287	105.647	108.306	106.190	14.204
2013	23.403	106.642	110.673	107.772	14.559
2014	17.056	106.322	106.601	108.273	13.400
2015	15.207	106.239	106.692	110.657	13.281
2016	13.750	108.704	108.425	116.118	12.628
2017	13.219	108.264	113.316	118.489	11.879

Other Air Pollutants

The reporting obligations outlined in Article 8 and Annex I of the Directive (EU) 2016/2284 also includes the mandatory reporting of carbon monoxide (CO), cadmium (Cd), mercury (Hg), lead (Pb), polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, polychlorinated biphenyls (PCB), hexachlorobenzene (HCB), particulate matter < 10µm (PM_{10}) and black carbon (BC). Voluntary reporting of annual emissions of arsenic (As), chromium (Cr), copper (Cu), nickel (Ni), selenium (Se), Zinc (Zn) and total suspended particulates (TSP) is also undertaken. Emission ceilings are not set for any of the aforementioned pollutants in Directive (EU) 2016/2284.

With the exception of emissions of Cu, emissions of the remaining pollutants have reduced over time since 1990, as a result of fuel switching from coal and peat to natural gas and kerosene used in the residential sector, penetration of renewables for electricity generation and reductions in the quantities of coal and peat combusted. Changes in the age structure of the national car fleet and implementation of abatement measures in new cars have led to reductions in PM_{10} emissions, however with increased vehicle numbers and diesel vehicles the effect of these measures is offset. The closure of Ireland's only steel plant and more recently a number of foundries has resulted in reduced emissions of a number of pollutants namely Pb, Cd, Hg, As, Cr, Ni, and Zn. The introduction of unleaded petrol in the late 1990's is the main driver of emission reductions for Pb. The use of lubricants in combustion engines and increasing size of the national fleet are the drivers behind increased emissions of Cu.

The use of three way catalysts in petrol fueled vehicles is the main determinant of CO emission reductions. The application of increasing quantities of synthetic fertilizers to agricultural soils are largest source of PM_{10} emissions. Whilst the contamination of certain pesticides is the driver behind agriculture being the largest source of HCB emissions. Fuel combustion across all sectors and vehicle and building fires and illegal burning of waste continue to be important sources of dioxins/furans.

The following table outlines the contribution of each sector to total emissions of each of the pollutants in 2017.

Sector	Largest source	Significant source
Road Transport	CO, Cu, Zn, BC	PM_{10}, Pb, Hg, Cr,
Power Stations	Hg	CO, Pb, Cd, As, Cr, Ni, Se, HCB
Combustion in manufacturing industries	Cd, Ni	CO, PM_{10}, PB, Cd, Hg, Cr, NI, Zn, Dioxins & Furans, BC
Industrial Processes	TSP, PCB	Cd, Cr, Cu, Zn, Dioxins & Furans
Residential Combustion	Pb, Se, PAH, BC Dioxins & Furans	CO, PM_{10}, Cd, Hg, Cr, Zn, PCB
Commercial Combustion	-	Ni, BC
Agriculture	HCB, PM_{10}	TSP
Industrial waste incineration	As, Cr	-
Solid waste disposal (landfills)	-	Hg
Vehicle and building fires and waste burning	-	Dioxins/Furans, PCB