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IOSEA6

SCOPING REPORT - APPENDIX C

P2510_R2923_Rev1 | 28 November 2022

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C.1 AIR QUALITY

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C.1 AIR QUALITY

This section describes the baseline, existing environmental sensitivities and potential sensitives of Air Quality to the Plan. The baseline draws on information from IOSEA4 and IOSEA5, providing updates where applicable.

The extraction, stabilisation and export of hydrocarbons involves several processes that give rise to atmospheric emissions. These include combustion to provide electrical power and to drive compressors and pumps; flaring of excess gas for safety and during well testing; venting during tank loading and incidental releases from firefighting and refrigeration plant.

In the Oil and Gas sector, it is common practice to dispose of surplus flammable gases by flaring (i.e. combustion in an open-atmosphere flame) or venting (i.e. release of gases directly to atmosphere).

Combustion and flaring result in emissions of carbon dioxide (CO2), carbon monoxide (CO), methane (CH4) and oxides of nitrogen (NOx) and sulphur (SOx). Small amounts of nitrous oxide (N2O) are also released. Venting releases Volatile Organic Compounds (VOCs) and methane. Refrigeration is tightly controlled and gases should not be vented to the atmosphere under the ODS and F gas regs (1005/2009 and 517 of 2014)). Atmospheric emissions from offshore operations are implicated in several potential impacts:

- Anthropogenic global warming - which is attributable to greenhouse gas emissions notably CO2 (carbon dioxide) and CH4 (methane);
- Stratospheric ozone depletion – result of human-made chemicals containing various combinations of chlorine, fluorine, bromine, carbon, and hydrogen. Collectively, these compounds are called halocarbons.
- Ground level ozone formation – caused by reactions between VOCs and NOx; and
- Acidification – caused by emissions of acid gases such as NOx and SOx.

C.1.1 Atmospheric Emissions

OSPAR Joint Assessment and Monitoring Programme

The OSPAR Joint Assessment and Monitoring Programme (JAMP) was set up to evaluate impacts of human activities on the marine environment. This programme includes a Comprehensive Atmospheric Monitoring Programme (CAMP), as part of this programme the report "Deposition of air pollutants around the North Sea and the North-east Atlantic in 2017" was produced. This report presents the results from the CAMP programme and has been reviewed to provide baseline data for this section of the Scoping Report. Under the CAMP, OSPAR Contracting Parties are committed to monitoring, on a mandatory basis, the concentrations of a range of metals, organic compounds and nutrients in precipitation and air. The CAMP also encourages OSPAR Contracting Parties to monitor, on a voluntary basis, additional compounds (such as certain persistent organic pollutants). The report gives detailed information on observed atmospheric inputs of selected contaminants to the OSPAR maritime area and its regions during 2017, however, the report also states that the Irish Sea (Region III) is one of the more unrepresented regions with regard to data availability. The report also notes that the purpose of the monitoring is to indicate which regions have the highest and lowest levels of atmospheric contaminates compared to each other, and not necessarily whether the levels are higher than what is acceptable from a critical load perspective. There are now five monitoring points in Ireland, with an extra three monitoring stations have been added since IOSEA5 (Figure C-1, Drawing Ref P2510-AIR-001) but these only monitor nitrogen and some heavy metals in precipitation.

In terms of Ireland and the 2017 CAMP report on the deposition of air pollutants around the North Sea and the North-east Atlantic in 2017, Ireland had results for the following contaminates:

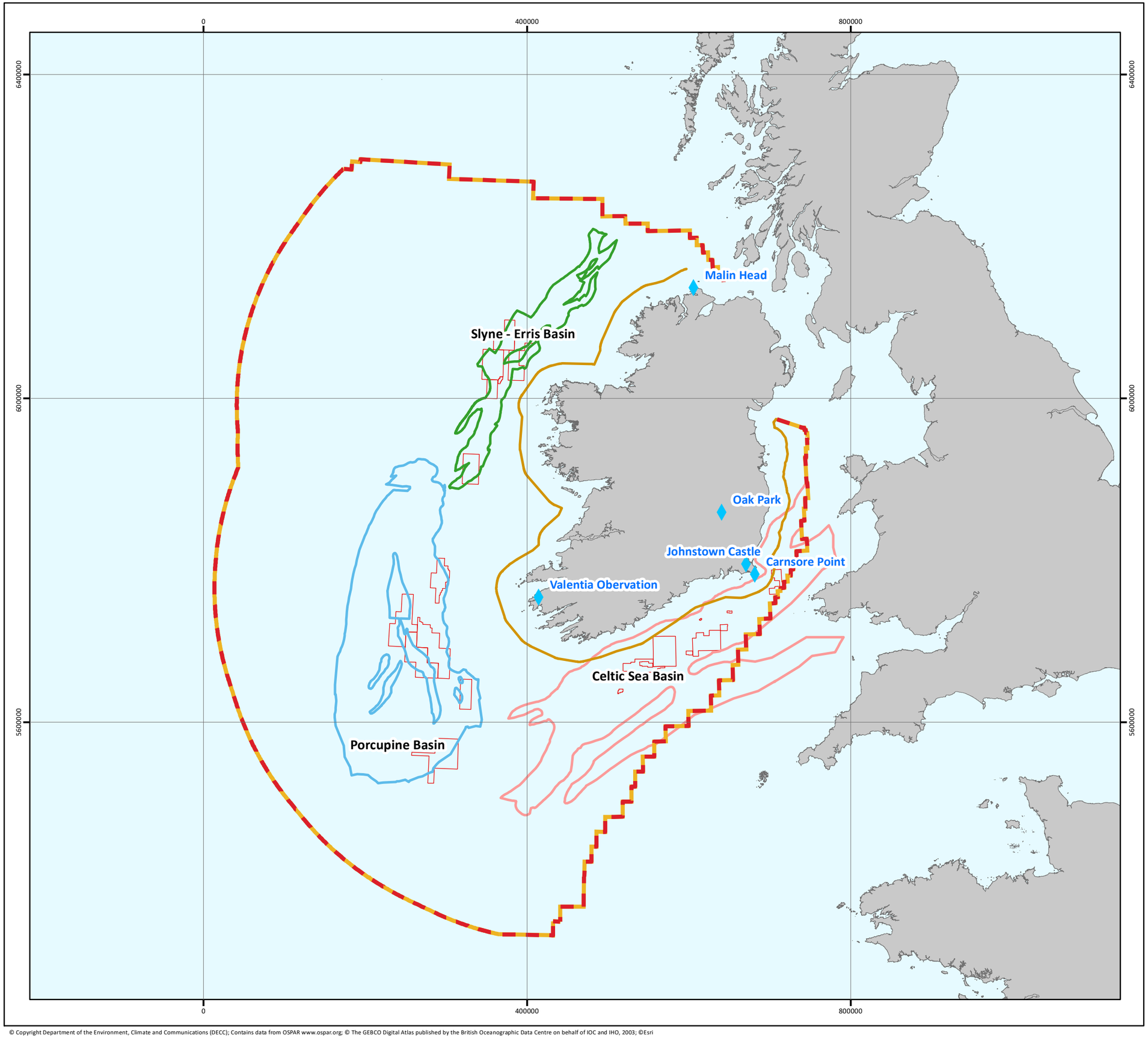
- cadmium in precipitation (= <0.02 (µg/L);
- lead in precipitation (=<0.6 µg/L);
- arsenic in precipitation (=<0.06-0.16 µg/L);
- copper in precipitation (<0.3µg/L);
- chromium in precipitation (0.05-0.1 µg/L);
- nickel in precipitation (<0.05 µg/L);
- zinc in precipitation (<2 µg/L); and
- mercury in precipitation (5-6 ng/L).

In 2017 the results also included concentrations of nitrogen compounds in precipitation in air and precipitation. It should be noted that the EPA ongoing monitoring at Mace Head could be used as another baseline data source as well as OSPAR monitoring.

The monitoring stations found low concentrations of most pollutants in precipitation at the monitoring points shown in Figure C-1 (Drawing Reference: P2510-AIR-001). The exceptions were arsenic (=<0.06-0.16 µg/L), (in the north-western monitoring point) which was found to be on the higher end compared with the other European monitoring stations mentioned in the CAMP report.

The monitoring stations found low concentrations of all nitrogen compounds (NO2 (air), HNO3 +NO3 (air + aerosol), and NO3 (precipitation) in all five monitoring stations (Figure C-1, Drawing Reference: P2510-AIR-001).

'There have been significant reductions in emissions of nitrogen oxides during the last decades in Europe' (Vestreng et al., 2009; Tørseth et al., 2012; Colette et al., 2016). From 1990 to 2017, nitrate in precipitation decreased on average, by 33%. The concentrations of total airborne nitrate and NO2 had on average a small decrease, 10% and 16%, respectively. The difference between the trend in 'air and precipitation can also partly be due to a shift in equilibrium towards more particulate ammonium nitrate relative to nitric acid caused by a reduction in sulphur dioxide emissions' (OSPAR 2017).



IOSEA6 - ENVIRONMENTAL REPORT

AIR QUALITY
Air Quality Monitoring Stations

Drawing No: P2510-AIR-001	B

Legend

- Air Quality Monitoring Station
- EEZ Boundary
- 12 NM Limit

Offshore Geological Basin

- Celtic Sea Basin
- Porcupine Basin
- Slyne - Erris Basin
- IOSEA6 Area

N W E S

NOTE: Not to be used for Navigation

Date	15 November 2022
Coordinate System	ED 1950 UTM Zone 29N
Projection	Transverse Mercator
Datum	European 1950
Data Source	OSPAR; DECC; ESRI; GEBCO
File Reference	J:\P2510\Mxd\09_AIR\ P2510-AIR-001.mxd
Created By	Lewis Castle
Reviewed By	Emma Langley
Approved By	Aodhfin Coyle

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications

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C.1.2 Greenhouse Gas Emissions

Oil and Gas operations bring with it increased levels of atmospheric Greenhouse Gases (GHGs), as a result of these increased levels, 'the greenhouse effect is heightened, which is globally recognised as the main cause of climate change' (ESB 2013). In 2021, Ireland ranked third in having the highest level of GHG emissions per capita in the EU and levels are still increasing, this is despite commitments from government to decrease these emissions. Ireland emitted 3.72 tonnes of carbon dioxide, methane, nitrous oxide and other fluorinated gases per capita in the first quarter of 2022, the third-highest level behind just Luxembourg (4.05) and Denmark (3.75), according to a report published in September 2022 by Eurostat.

Although Ireland is third behind Luxemburg and Denmark in the EU for GHG emissions released, Ireland's emissions have returned to pre-pandemic levels, representing a 19% increase in emissions levels year-on-year from Q1 2021 from 3.13 tons per capita, total emissions in Ireland increased by almost 5% in 2021 the EPA's Air Quality Ireland report 2021 has stated. The percentage of the different GHGs in Ireland are:

- carbon dioxide (CO_2) accounted for 61 %;
- Methane (CH_4) accounted for 27.9%;
- Nitrous oxide (N_2O) accounted for 9.9%; and
- F-gases accounted for 1.2%.

In 2021, the transport, agriculture, and energy industries were the highest emitters in Ireland. The highest emitter in Ireland of GHGs is Agriculture which accounts for just over 37.5% of the total emissions. The energy industry adds 16.7% and transport add 17.7% of all emissions into Ireland's air. Figure C-2 outlines the breakdown of emissions by industry and Figure C-3 outlines the profile of GHG Emissions in the years 1990 and 2021.

Figure C-2 Greenhouse Gas emissions share by sector in 2021 (Source EPA 2022)

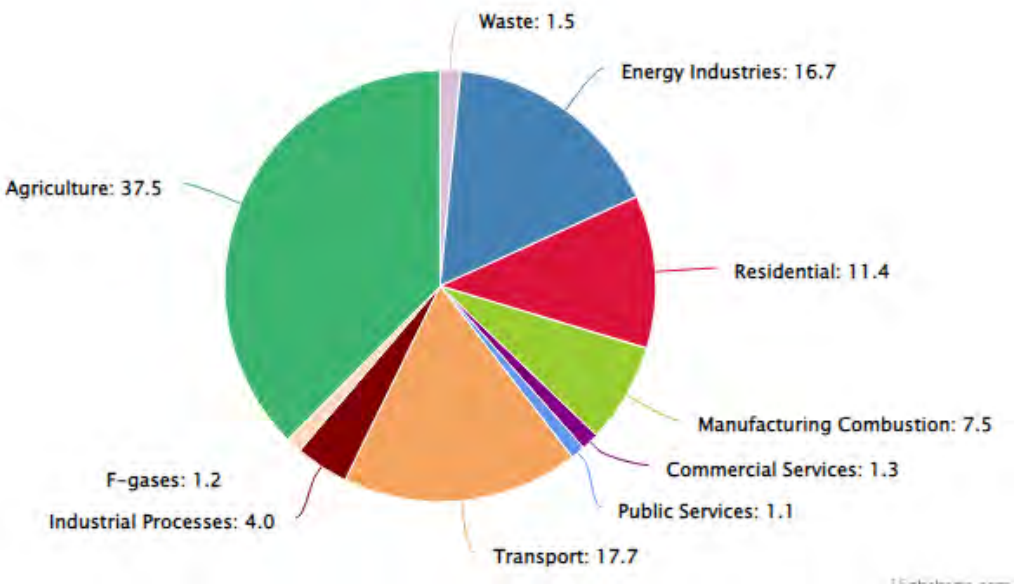
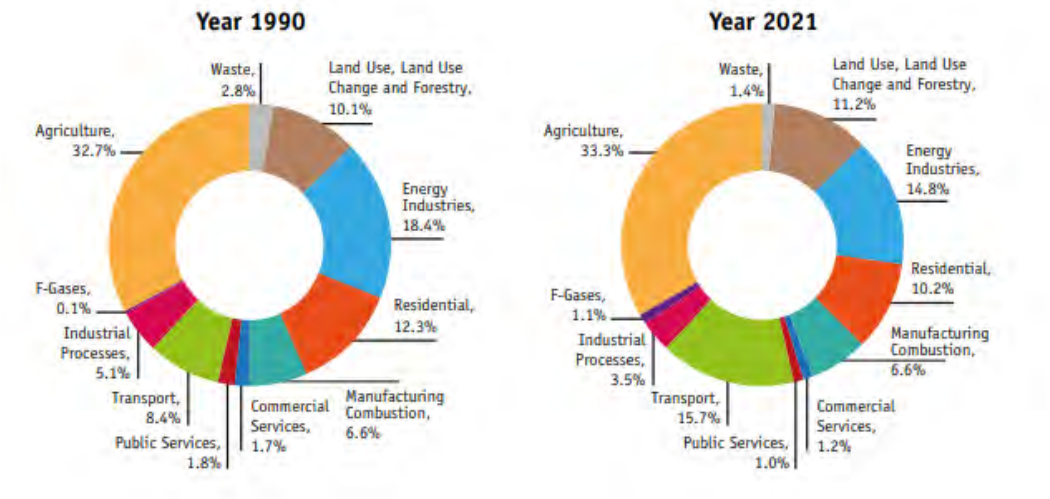


Figure C-3 Profile of GHG Emissions (including, Land use, Land use Change and Forestry) in 1990 and 2021 by Sector (EPA, 2022)



C.1.3 Existing Environmental Problems

Air Quality in Ireland is overall regarded as good. However, according to the EPA Air Quality in Ireland report 2021, Table C-1 shows that Ireland did not meet the World Health Organisation (WHO) Air Quality Guideline (WHOAQG) for certain parameters.

Table C-1 Selected Pollutants measured in 2021 failing the WHO AQG levels (EPA, 2022)

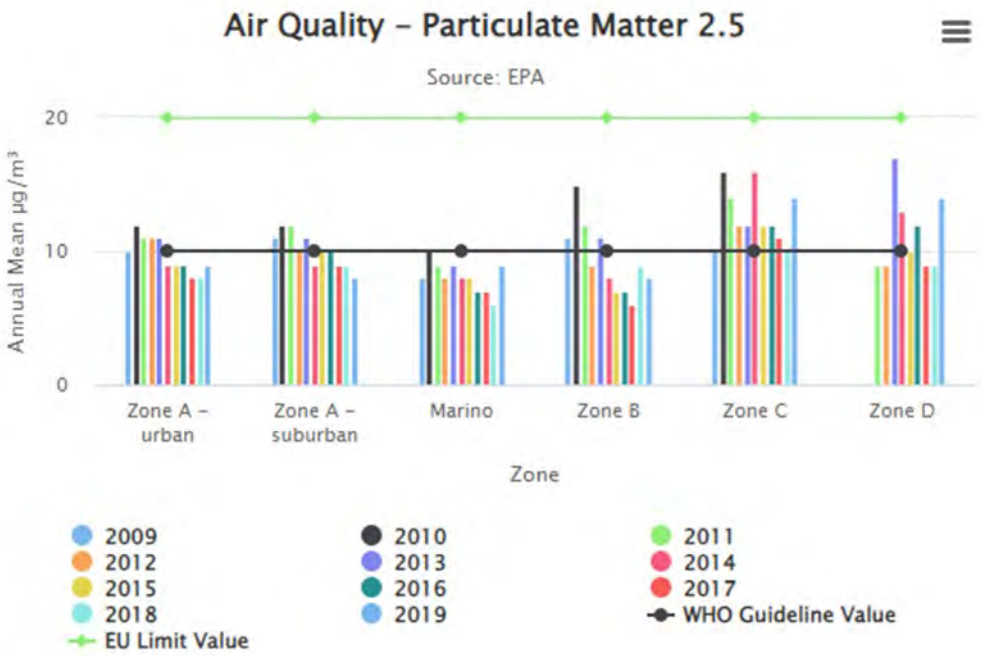
Pollutant	Number of Stations Monitored	WHO Air Quality Guideline (WHO AQG)
PM_{10}	87	Above annual WHO AQG value at 8 stations, above daily WHOAQG value at 21 stations
$PM_{2.5}$	81	Above annual WHO AQG value at 65 stations, above daily WHOAQG value at 61 stations
NO_2	30	Above annual WHO annual or 24hr at 23 stations
Ozone (O_3)	21	Above annual WHO AQG level at 19 stations
Sulphur Dixoide (SO_2)	15	Above WHO 24hr AQG level at 1 station
PAH_s	5	Above EEA reference level at 3 stations

Table C-1 above shows the number of stations selected pollutants are monitored at, and how many stations failed the WHO AQG. The two problem pollutants that can be seen in the table above is Particulate Matter (PM) and Nitrogen Dioxide (NO_2. $PM_{2.5}$ is the most important of the two PM's pollutants, $PM_{2.5}$ can cause significant health issues, as the small particles associated with $PM_{2.5}$ can infiltrate lungs, causing chronic illness and disease. $PM_{2.5}$ and PM_{10} is at its worst during the winter months in towns and cities. NO_2 is mainly sourced from petrol and diesel cars, this pollutant can affect

the lungs in the same way as PM. NO_2 is at its worst in areas of high traffic volume, in areas such as Dublin, Cork, Galway and Limerick.

The most significant failing was of $PM_{2.5}$ at 65 out of 81 monitoring stations for annual WHO AQG values. Figure C-4 outlines the breakdown of PM2.5 in different zones around Ireland. The WHO updated their guidelines in 2021, "the updated guidelines state that annual average concentrations of $PM_{2.5}$ should not exceed 5 µg/m^3, while 24-hour average exposures should not exceed 15 µg/m^3 more than 3 - 4 days per year" (WHO, 2022).

Figure C-4 Air Quality PM2.5 breakdown in different zones around Ireland from 2009 to 2019 (Source EPA 2020)



PM2.5 mainly arises from solid fuels such as peat, coal and wood, and this pollutant has been outlined as having the worst impact on the health of the Irish population, 'with PM2.5 responsible for 1300 premature deaths in 2018' (EPA 2021).

Another pollutant causing significant problems to Ireland's Air Quality is the increasing Ammonia emissions. An EPA report "Irelands Air Pollutant Emissions 2020(1990-2030) reported that Ammonia emissions increased by 2% in 2017, and suggests that Ammonia levels will increase continuously year on year until 2030.

The EU has set two Nitrogen Dioxide (NO2) limits: the NO2 hourly mean value may not exceed 200 micrograms per cubic metre (µg/m3) more than 18 times in a year; and the NO2 annual mean value may not exceed 40 micrograms per cubic metre (µg/m3).

The European Union set two Nitrogen Dioxide targets for member countries to adhere too, the limits are:

- "The NO2 hourly mean value may not exceed 200 micrograms per cubic metre (µg/m3) more than 18 times in a year and" (EEA, 2014)
- "The NO2 annual mean value may not exceed 40 micrograms per cubic metre (µg/m3)" (EEA, 2014)

In 2019 in Dublin, Ireland, there was an exceedance of nitrogen dioxide level set by the EU, “the exceedance was at the St. John’s Road West monitoring station. An annual average concentration of 43 µg/m3 was measured for 2019, which is higher than the 40µg/m3 set by the EU” (EPA 2021).

C.1.4 Potential Sensitivities to the Plan

A summary of the potential pressures and sensitive aspects of the topic are displayed in Table C-2.

Table C-2 Summary of potential pressures of the Plan on Air Quality

Plan activity	Aspect	Pressure	Sub-Topic	Key sensitivities
Seismic	Atmospheric emissions due to energy requirements (combustion) of survey vessels (engines/generators)	Atmospheric Emissions	Atmospheric Emissions	Use of fuel for survey, drilling and support vessels causes release of SO_2 and NO_X which can cause impacts on air quality.
			Greenhouse Gas Emissions	
Seismic survey and drilling	Accidental events (e.g. loss of diesel, chemicals, base oil; worst case scenario - blowout)	Hydrocarbon & PAH contamination	Atmospheric Emissions	Combustion as a result of an accidental spill of oil or fuel may result in generation of air-borne pollutants, but unlikely to be high in magnitude.
			Greenhouse Gas Emissions	
Drilling	Atmospheric emissions due to energy requirements (combustion) of rigs and associated vessels and helicopters (engines/generators)	Atmospheric Emissions	Atmospheric Emissions	Drilling, combustion and flaring result in emissions of oxides of nitrogen (NO_x) and sulphur (SO_x). Small amounts of nitrous oxide (N2O) are also released. Due to the huge amount of power required by the oil and gas industry through all phases of exploration. A substantial volume of CO_2 is released into the atmosphere, therefore contributing to climate change. It can be assumed that emissions will decrease in the future as the European Union Emissions Trading Scheme and with the IPPC Directive. Considering the above it is likely that carbon emissions from oil and gas activities will decrease in line with a general improvement in air quality across Europe.
			Greenhouse Gas Emissions	
Drilling	Well testing (flaring)	Atmospheric Emissions	Atmospheric Emissions	
			Greenhouse Gas Emissions	
Seismic survey and drilling	In-combination effect		Atmospheric Emissions	The impacts of these should account for cumulative impacts from other industries (e.g. shipping).
			Greenhouse Gas Emissions	

C.1.5 Data Gaps

From review of data collected by the EPA and OSPAR, it has been established that there is no data gaps established in Air Quality in Ireland. The EPA have a significant amount of air quality data available on their website, with new data published daily, monthly and yearly.

C.1.6 Predicted future baseline for the topic

Levels of NO_2 should continue to be monitored as urban areas in Ireland are close to the EU limit and this is expected to rise. PM2.5 is another pollutant which should be monitored, as this pollutant can be linked to the use of solid fuels. Ireland is in the process of transitioning away from solid fuels such as peat and turf. Future baseline studies could look at the levels of PM2.5 in Ireland's atmosphere, however studies by the EPA have found this difficult to model, with EPA research report 270 reporting that, "Particulate Matter is one of the most difficult pollutants to model because of its wide range of anthropogenic and natural sources" (EPA 2020).

C.1.7 References

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