

Air Quality in Ireland 2019



ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

Knowledge: *We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.*

Advocacy: *We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.*

Our Responsibilities

Licensing

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (e.g. landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g. pharmaceutical, cement manufacturing, power plants);
- intensive agriculture (e.g. pigs, poultry);
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- sources of ionising radiation (e.g. x-ray and radiotherapy equipment, industrial sources);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

National Environmental Enforcement

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by co-ordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

Water Management

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

Monitoring, Analysing and Reporting on the Environment

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (e.g. *periodic reporting on the State of Ireland's Environment and Indicator Reports*).

Regulating Ireland's Greenhouse Gas Emissions

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

Environmental Research and Development

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

Strategic Environmental Assessment

- Assessing the impact of proposed plans and programmes on the Irish environment (e.g. *major development plans*).

Radiological Protection

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

Guidance, Accessible Information and Education

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (e.g. *My Local Environment, Radon Maps*).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

Awareness Raising and Behavioural Change

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

Management and structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Environmental Sustainability
- Office of Environmental Enforcement
- Office of Evidence and Assessment
- Office of Radiation Protection and Environmental Monitoring
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

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Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil
PO Box 3000
Johnstown Castle Estate
County Wexford, Ireland

Telephone: +353 53 916 0600

Lo Call: 1890 33 55 99

Fax: +353 53 916 0699

Email: info@epa.ie

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Ambient air quality in Ireland

www.epa.ie/air/quality

Poor air quality causes

Stroke 	Heart disease 	Lung cancer and both chronic and acute Respiratory diseases, including asthma 	1,300 Premature deaths a year in Ireland due to PM _{2.5} air pollution
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Sources

Transport 	Residential solid fuel burning
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Solutions

Clean public transport systems 	More energy efficient buildings
Recharge network for electric vehicles should be expanded 	City or district heating
Pedestrian and cycle-friendly networks 	Restrictions on solid fuel use systems
Low-emission zones 	Updating of old heating systems

What can you do?

Think about each journey you make? Is there a cleaner alternative? Consider an electric vehicle for your next purchase 	Do you really need to light your open fire or stove? If you must, consult the EPA's 'better ways to heat your home' 	Make your house more energy efficient and move to a clean form of home heating Grants available from SEAI
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for Twitter Alerts sign up to @EPAAirQuality

Key findings...

How was air quality in Ireland in 2019...

- Air quality in Ireland is generally good however there are localised issues in some of our cities, towns and villages
- There was an **exceedance** of the EU annual average legal limit values in 2019 at one urban traffic station in Dublin due to **pollution from transport**.
- Ireland was above World Health Organization air quality guidelines at 33 monitoring sites across the country – mostly due to the **burning of solid fuel** in our cities, towns and villages.
- Ireland was **above** the European Environment Agency reference level for PAH, a toxic chemical, at 4 monitoring sites due to the burning of solid fuel.

Problem pollutants ...

- **Particulate matter** from the burning of solid fuel – is estimated to cause 1300 premature deaths per year.
- **Nitrogen dioxide (NO₂)** from **transport** emissions is polluting our urban areas.
- Indications are that we will **exceed EU limit** values for NO₂ at further monitoring stations in the future.

What should be done ...

- To tackle the problem of particulate matter:
 - Move away from burning solid fuel (coal, wood, turf) towards cleaner ways of heating our homes like gas or electrified heating
 - Implement a national Smoky Coal ban and determine the feasibility of a wider smoky fuel ban for towns and cities.
- To reduce the impact of NO₂:
 - Follow through on the legal requirement for an air quality action plan to be developed for Dublin to protect health.
 - Implement the transport options in the Government's Climate Action Plan, promoting clean public transport and increasing the use of electric vehicles
 - All, as individuals, consider our transport choices for each journey we take.

National Ambient Air Quality Monitoring Programme ...

Currently 84 monitoring stations in the national network

- 24 new monitoring stations were brought online during 2019
- 3 stations were upgraded
- 42 schools have now taken part in the GLOBE schools project operated in partnership with An Taisce

1 Introduction

This report is about the quality of the air in Ireland during 2019. It tells you how the EPA arrived at its findings and what the main conclusions and recommendations are.

The report starts by identifying and describing the main pollutants, their causes, their impact on our health (and the environment), how they are measured, and, very importantly, the solutions we now need to action. The solutions proposed range from the national requirements – such as enforcing the Smoky Coal Ban (a ban on burning of bituminous coal in ‘Low Smoke Zones’) – to new legal, regional requirements like developing action plans to improve air quality in Dublin, to things we can all do in our local communities and homes like opting for cleaner transport and heating choices.

Finally, this report presents a snapshot of air quality developments since the March 2020 Covid-19 lockdown and restrictions.

This report is for anyone who is interested in air quality. We want you to understand the actions needed to improve air quality, and to let you know what you can do. That said, it is still a technical report, so there are some scientific terms used. This is unavoidable given the subject matter. We have tried to make it accessible for those who don’t have a scientific background by giving descriptions and providing visuals.

As a minimum, we suggest you read the conclusions and recommendations starting on page 34. If you want to do something in your school or locality to promote better air quality, then read our section on citizen science starting on page 15. Or, if you want to find out what the air quality is like in your area, then read page 8 to see how to do this. The information in the report is based on the data from the National Ambient Air Quality Monitoring Network.

National Ambient Air Quality Network

This network is a series of air quality monitoring stations that are located across the country. These stations collect air quality data for public information on www.airquality.ie. This is assessed against the following values to help protect our health:

- European legal limit values¹ and
- the World Health Organization (WHO) guideline values

for good quality ambient air levels (ambient simply means the air in our atmosphere that we breathe). The network is managed by the Environmental Protection Agency, in partnership with Local Authorities and other public/semi-state bodies and universities such as Met Eireann, UCC, NUIG, TCD and CIT.

This network is supported by 'local monitoring stations'. You can see the network and all of its monitoring stations in Figure 1. The national stations are shown in **green**. And the local stations are in **yellow**. We tell you a lot more about the network in section 2 and you can read more about local stations in section 6.

¹ The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in A/ambient Air Regulations 2009 (S.I. No. 58 of 2009).

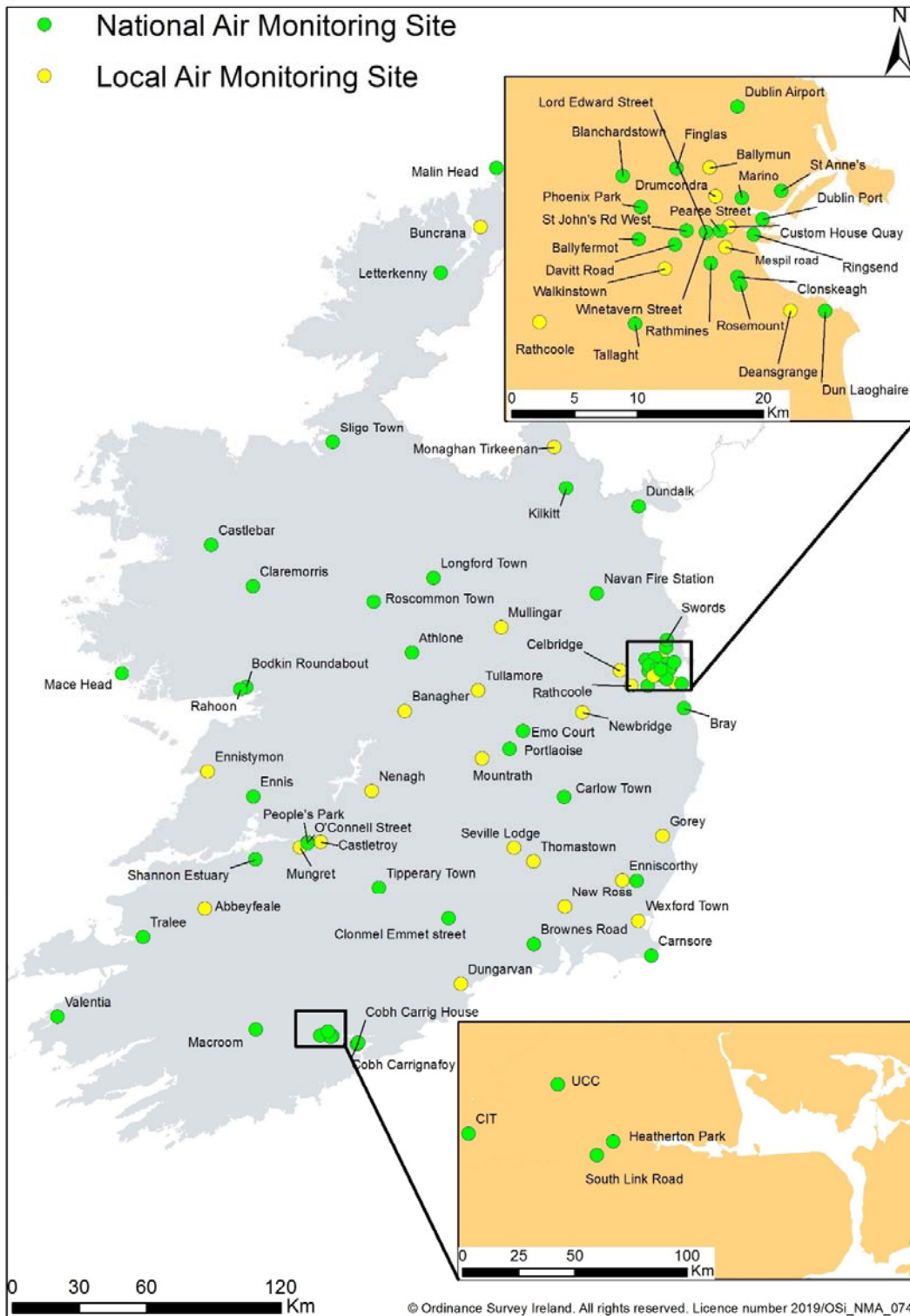


Figure 1 National Ambient Air Quality Monitoring Network in 2020

How do we assess air quality?

The EPA monitors air pollutants levels and compares and assesses them relative to EU legal limit values **and** the World Health Organization (WHO) guideline values.

When assessing air quality, we focus on the two main pollutants in this report.

Particulate matter – PM_{2.5} and PM₁₀

very small particles which can be solid or liquid. Particulate matter is usually just called PM with a number after it to show how small the PM is (These are PM₁₀ and PM_{2.5}). The EPA monitors these two types of PM. PM_{2.5} is more important than PM₁₀ from a health perspective as it is more impactful.

Nitrogen oxides (NO₂ and NO) – are the gases nitrogen oxide (NO) and nitrogen dioxide (NO₂). Both of these are pollutants that are emitted in ambient air when petrol or diesel is burned in internal combustion engines. NO₂ is more important than NO from our point of view as its impact on health is higher.

In section 5, we also list and explain other pollutants we monitor. These include ozone, dioxins and PAHs (a toxic chemical).

How can I find out about air quality?

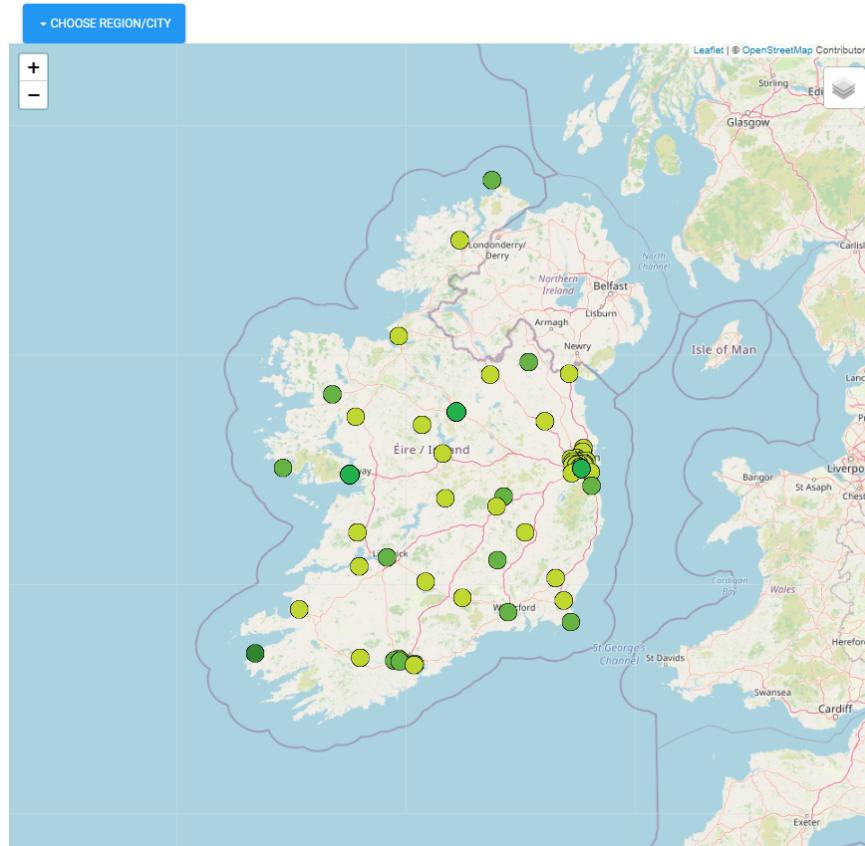
The best way to get information on air quality is to visit the EPA's air quality website www.airquality.ie or sign up to the EPA's @EPAAirQuality Twitter channel for automatic daily updates and see @EPAireland for further information on the environment. The air quality information on the EPA's site includes live information for monitoring stations.

How can I find out about air quality and health advice?

The **Air Quality Index for Health (AQIH)** is on the same site. The AQIH is a colour-coded map of Ireland, so you can quickly see what air quality is like in your area. As with traffic lights, **green** indicates good air quality and **red** poor. It also includes health advice for all of us and for those of us who are more sensitive to air pollution – for example, people with heart or lung conditions. The AQIH guidance explains what to do if you or your child is likely to be at risk from air pollution. Figure 2 below shows you the web page where you can click on your county and check its air quality.

Air Quality Index for Health Map.

The map below is coloured based on current air quality index for health (AQIH) staus (see legend below). Click on a monitoring stations to show more information and live data where available. Click here for a [list of stations](#)



This map updates every two to five minutes with the most up-to-date calculated Air Quality Index for Health (AQIH) for each station.

Four bands of air quality:	Index (1-10):
Good air quality	1
	2
	3
Fair air quality	4
	5
	6
Poor air quality	7
	8
Very Poor air quality	9
	10

If a station is blue ● it means that it is a non-automated station and data will only be available following laboratory analysis.

If a station displays no colour (grey) there may be an instrument or communication issue associated with it or it may be undergoing planned maintenance/upgrade.

The triangle symbols ▲ on the map relate to the Local Monitoring Network. These give an indication of air quality. The tab to turn on the local layer is on the top right hand side of the map.

As well as viewing the AQIH for the station closest to your home you can select to view the AQIH for your region on the map. The tab to turn on the region layer is on the top right hand side of the map.

A list of all the monitoring stations is available [here](#).

Detailed information on the AQIH is available at [Air Quality Index for Health](#). All historical EPA air quality data can be downloaded from the [Air Quality Archive](#).

All EPA air quality reports and the latest air quality bulletin can be viewed and downloaded at [Reports and Bulletins](#). For Further details on this legislation please see [Air Quality Standards](#).

*We would welcome any feedback on improving this page to airqualityqueries@epa.ie



CONTACT US:
 PO Box 3000
 Johnstown Castle Estate
 Wexford, Y35 W821
 Tel.: 053-916 0600
 Email: info@epa.ie
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Figure 2 The Air Quality Index for Health (www.airquality.ie)

Why is poor air quality a problem?

Poor air quality has serious health implications both in:

- the short-term (acute – temporary illnesses like headache, breathing difficulty, eye irritation or cardiac issues), and
- the long-term (chronic – ongoing illnesses like asthma, reduced liver function or cardiovascular (heart) disease).

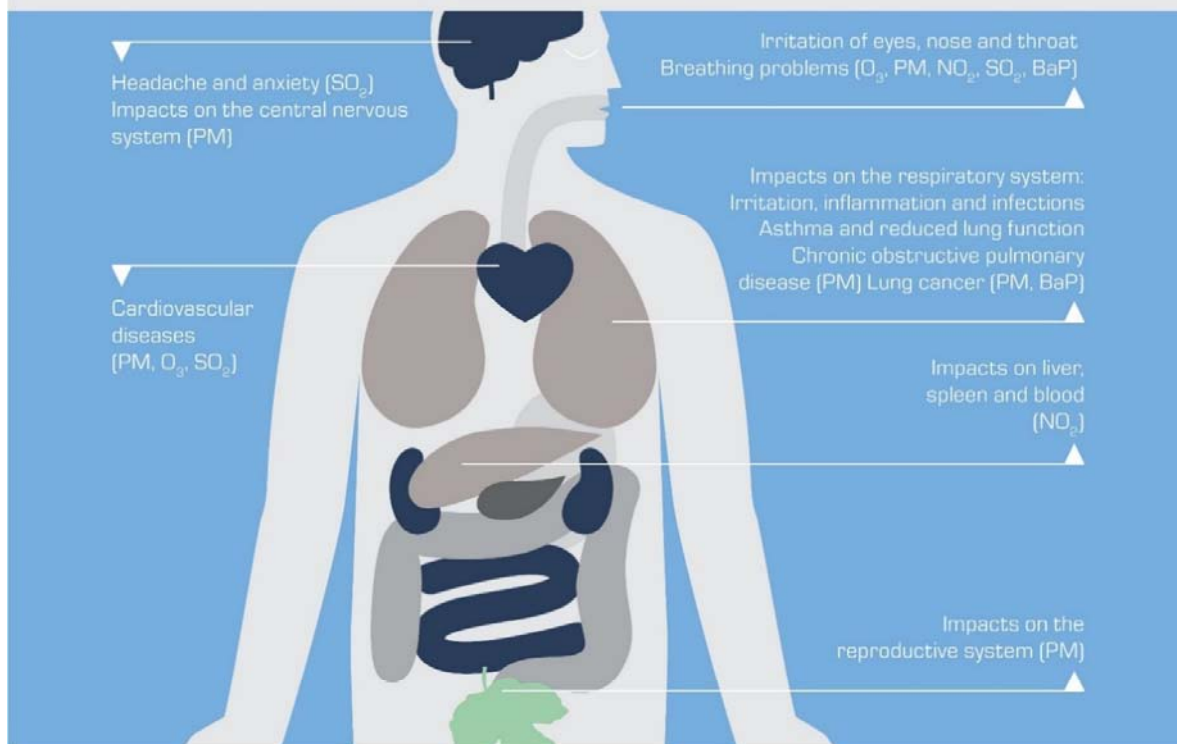
Poor air quality also causes premature deaths (which are deaths that would be avoided if air quality was improved). Using Irish air quality data from 2017, the EEA estimated that PM_{2.5} caused 1,300 premature deaths in Ireland in that year.

Figure 3 Health impacts of air pollution (source European Environment Agency) summarises the health impacts of air pollution.



Health impacts of air pollution

Air pollutants can have a serious impact on human health. Children and the elderly are especially vulnerable.



Particulate matter (PM) are particles that are suspended in the air. Sea salt, black carbon, dust and condensed particles from certain chemicals can be classed as a PM pollutant.

Nitrogen dioxide (NO_2) is formed mainly by combustion processes such as those occurring in car engines and power plants.

Ground-level ozone (O_3) is formed by chemical reactions (triggered by sunlight) involving pollutants emitted into the air, including those by transport, natural gas extraction, landfills and household chemicals.

Sulphur dioxide (SO_2) is emitted when sulphur containing fuels are burned for heating, power generation and transport. Volcanoes also emit SO_2 into the atmosphere.

Benzo(a)pyrene (BaP) originates from incomplete combustion of fuels. Main sources include wood and waste burning, coke and steel production and motor vehicles' engines.

Figure 3 Health impacts of air pollution (source European Environment Agency)

2 National Ambient Air Quality Monitoring Programme (AAMP)

Following a review of ambient air quality monitoring in Ireland, a national ambient air quality monitoring programme commenced at the end of 2017. Currently at an advanced stage of roll out, this programme is providing more comprehensive, real-time localised air quality information linked to public health advice.

The programme involves a greatly expanded national monitoring network supported by increased modelling and forecasting capability to provide air quality forecasts to the public. Modelling and forecasting capability are technical terms. They mean that we look at different situations (different 'models') using computer programmes around air quality and predict (forecast) how air quality might change depending on different circumstances and what we have learned before. The programme also aims to involve the public by engaging with citizens through various citizen science initiatives to encourage greater public understanding of and involvement with air quality issues.

New monitoring stations established in 2019

There were 24 new monitoring stations brought online under the AAMP in 2019 (9 EU-standard monitoring sites and 15 'local' monitoring sites). The new EU level monitoring sites added in 2019 were:

- Pearse St., Dublin
- Cork Harbour
- Macroom, Cork
- Navan, Meath
- Athlone, Roscommon
- Tralee, Kerry
- Letterkenny, Donegal
- Tipperary Town
- Limerick People's Park

There were also **15 new 'Local Monitoring' sites** added to the network in 2019. For further information please see section 6.

There were **3 upgrades** to existing monitoring stations in 2019. These upgrades focused on providing more real-time information about particulate matter pollution to the network.

Air quality forecasting and modelling

In 2019 we published our 'Urban Environmental Indicators Report'. This report which was based on data from the year 2015, used two 'tools' to assess the impact of NO₂ across the urban areas of Dublin. The tools used were:

- indicative diffusion tube sampling (basic tool using simple equipment like tubes attached to street poles that capture pollutants in air and help to provide a sense of pollution levels over a few weeks), and
- dispersion modelling techniques (more sophisticated tool using computer programmes and software that give us more precise readings of air quality and help us to better predict air quality over a longer period of time).



Main finding from both techniques used: Concentrations of NO₂ at many locations in Dublin are potentially above **EU NO₂ annual limit value of 40µg/m³** (micrograms per cubic metre). Yearly NO₂ levels should not be higher than this level.

The results from the dispersion modelled techniques showed that the concentrations of NO₂ were highest around:

- the M50 motorway in Dublin,
- certain city centre streets,
- the entrance / exit of the Dublin Port tunnel.

The results from the indicative diffusion tube technique are strongly reflected in the modelled concentrations and show the potential for exceedances of limits in other locations besides those observed at St. John's Road, see Figure 5.

Figure 4 Indicative diffusion tube

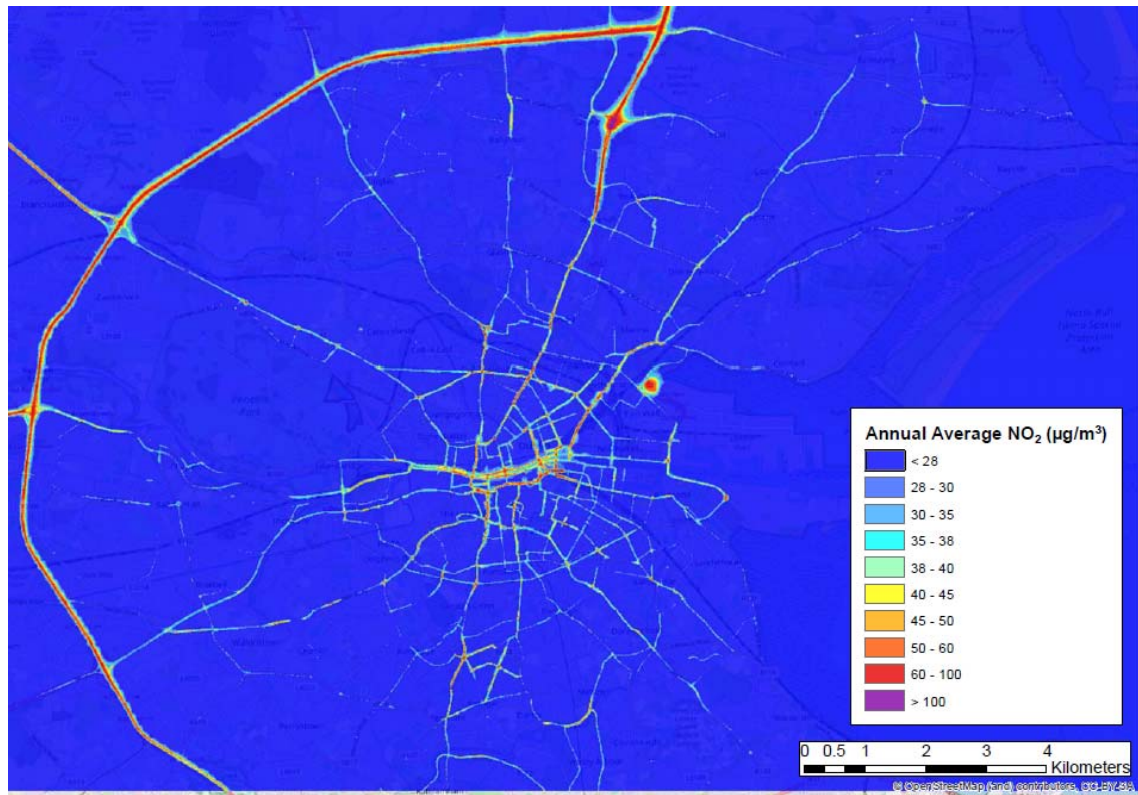


Figure 5 Modelled annual average NO₂ concentrations for 2015 in Dublin

How we involve the public (Citizen science and citizen engagement)

The Ambient Air Quality Programme involves the public by engaging with citizens through various citizen science initiatives to encourage greater public understanding of and involvement with air quality issues. The EPA has further developed several air quality - citizen science initiatives. Two of these – the GLOBE project and the CleanAir@School initiative – are described below. Both involve schools, and the EPA is keen to develop these projects in local communities and other sites.

The GLOBE project

GLOBE is an international science education programme running in 123 countries across the world. In Ireland, it is co-ordinated by the Environmental Education Unit of An Taisce in partnership with the EPA.

Since 2017, nearly 60 teachers nationwide have taken part in the programme with their students. In all, 2,600 observations have been uploaded to the GLOBE website by Irish students and teachers and they have shared their experience of collecting and analysing air quality data at several national and international events.

GLOBE's air quality measurement campaigns carried out in Spring and Autumn of 2019, used diffusion tube samples to measure nitrogen dioxide (NO₂) – a principal pollutant from car exhaust emissions – at locations around their schools. NO₂ levels were higher for schools in major towns and cities when compared to schools in rural areas while a deterioration in air quality was noted at the school gate when compared to more sheltered areas, such as school yards. However, the overall findings indicated generally good air quality.

Result? For most schools, the results ranged from 'excellent (0 -10 µg/m³)' to 'pretty good (20 - 25 µg/m³)'.

GLOBE Ireland Celebration, May 2019

The spectacular Wood Quay Venue in Dublin hosted the inaugural GLOBE Ireland Celebration event in May 2019. Sixty students and teachers from nine schools attended. At the event, Laura Burke, Director General, EPA, and Michael-John O'Mahony, Director, An Taisce's Environmental Education Unit congratulated the student scientists on the quality of their investigations.

Laura Burke told students:

"Through your work you are making an important contribution to protecting our shared environment. You are the scientists of the future and you can make a difference".

Further details of the 2019 Celebration Event can be found here: <https://www.globe.gov/web/ireland/home/overview-of-air-quality-campaign/celebration-events>, while the following short video provides you with a flavour of the day: <https://www.youtube.com/watch?v=cyW6Jp4t7M4&feature=youtu.be>



Image showing attendees at the 2019 GLOBE Ireland Celebration Event in the Wood Quay Venue (May 2019, Dublin).

For further details of the GLOBE (Ireland) Programme: <https://www.globe.gov/web/ireland/home>

Plans for the future - GLOBE continues to be implemented into 2020 with schools nationwide, while a wider citizen science air quality project to include schools, other target groups and the general public is planned for (2020 – 2022). This will focus on nitrogen dioxide measurements. In parallel to the GLOBE programme, the EPA has been working with An Taisce to develop this scaled-up citizen science air quality project *Clean Air Together*. and further details will be available in due course – keep an eye on www.epa.ie.

CleanAir@School initiative

CleanAir@School is a joint initiative between the European EPA Network and the European Environment Agency (EEA) that focused on air quality around schools during 2019.

Citizen science monitoring campaigns were carried out through the participating European partners, who supported schools to measure nitrogen dioxide (NO₂) levels in the school environment. The goals were to: educate children about air quality and raise awareness amongst pupils and their parents of the impacts of road transport on air quality. The initiative also aimed to explore whether parents adapt their choice of transport for bringing children to school because of increased awareness. In addition, the initiative explored how data collected by citizens might complement official air quality monitoring performed by EPAs to improve understanding of local air quality.

Irish school-participants from GLOBE's spring and autumn 2019 campaigns were also part of this EEA/ EPA CleanAir@School initiative. Overall, 42 schools in 16 cities and towns nationwide registered for the programme, with 17 schools taking part in both campaigns during 2019.

The EPA plans to publish a final report of the CleanAir@School-Ireland programme in early autumn 2020 on <https://www.eea.europa.eu/themes/air/urban-air-quality/cleanair-at-school/cleanair-at-school>

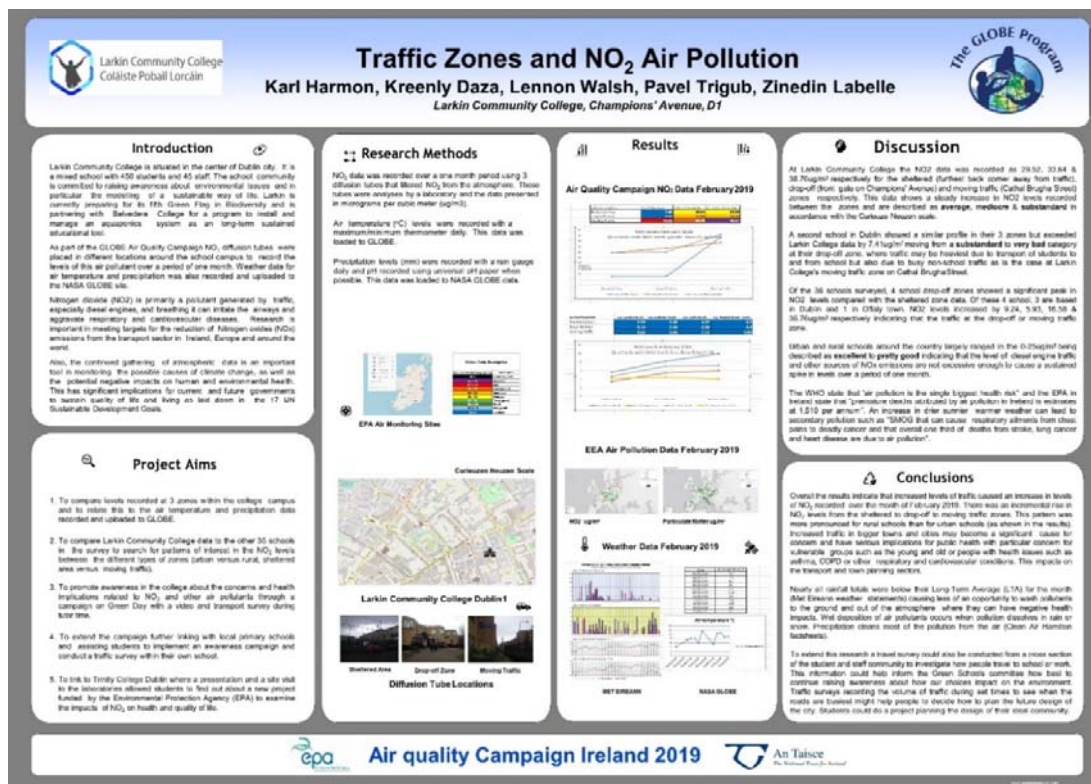


Figure 6 Poster created by students at Larkin Community College in Dublin City Centre as part of the GLOBE programme and a participating school in the CleanAir@School initiative

3 Nitrogen oxide, transport and the 2019 exceedance in Dublin

This section of the report introduces one of the main pollutants that impacts people's health in Ireland – nitrogen oxides. Here, we explain what nitrogen oxides are and outline how the EU limit value for NO₂ was exceeded in 2019 in Dublin. It is important to stay under these limits to protect human health.

What are nitrogen oxides?

Nitrogen oxides – or NO_x – are the gases nitrogen oxide (NO) and nitrogen dioxide (NO₂). Both of these are pollutants that are emitted in ambient air when petrol or diesel is burned in internal combustion engines. NO₂ is more important from an ambient air quality perspective due to its increased impact on health (See Figure 3).

What are the main sources of NO₂ in Ireland?

In terms of ambient air quality, the main source of NO₂ in Ireland is from **road transport**. Diesel engine vehicles produce more NO₂ than petrol vehicles. Other sources of NO₂ in Ireland include:

- off-road machinery (for example, earth movers and lawnmowers),
- industrial and construction activities, and
- electricity and heat production equipment such as central heating boilers and generators.

Summary of results in 2019

NO₂ was measured at 21 monitoring stations in Ireland in 2019. There was one exceedance of the EU annual limit value at St. John's Road West in Dublin. All other concentrations observed were below the annual limit values.

2019 Exceedance in Dublin – and why

There was an exceedance of the EU Air Quality limit value for nitrogen dioxide in Dublin. The exceedance was at the St. John's Road West station. An annual average concentration of 43 µg/m³ was measured in 2019. This is above the EU annual limit value for NO₂ of 40 µg/m³. This exceedance of an air pollution standard is as a result of the heavy traffic passing this monitoring station. Figure 7 shows the average NO₂ concentrations by hour of day observed at St. John's Road West for 2019. The classic pattern of traffic due to commuting can be seen with two peaks in pollutant levels - one during the morning and one during the evening rush hours. However, there is quite a high baseline level of NO₂ also which suggests quite consistent traffic volumes in this area.

This exceedance has been reported to the European Commission and the development of an Air Quality Action Plan by Dublin Local Authorities in conjunction with the EPA is now required. Once prepared the action plan will be submitted to the European Commission for analysis and approval. The Department of Communications, Climate Action and the Environment (DCCA) together with the Department of Transport (DOT) established a joint working group in 2019 to examine this exceedance and the steps needed to reduce air pollution from traffic in Dublin.

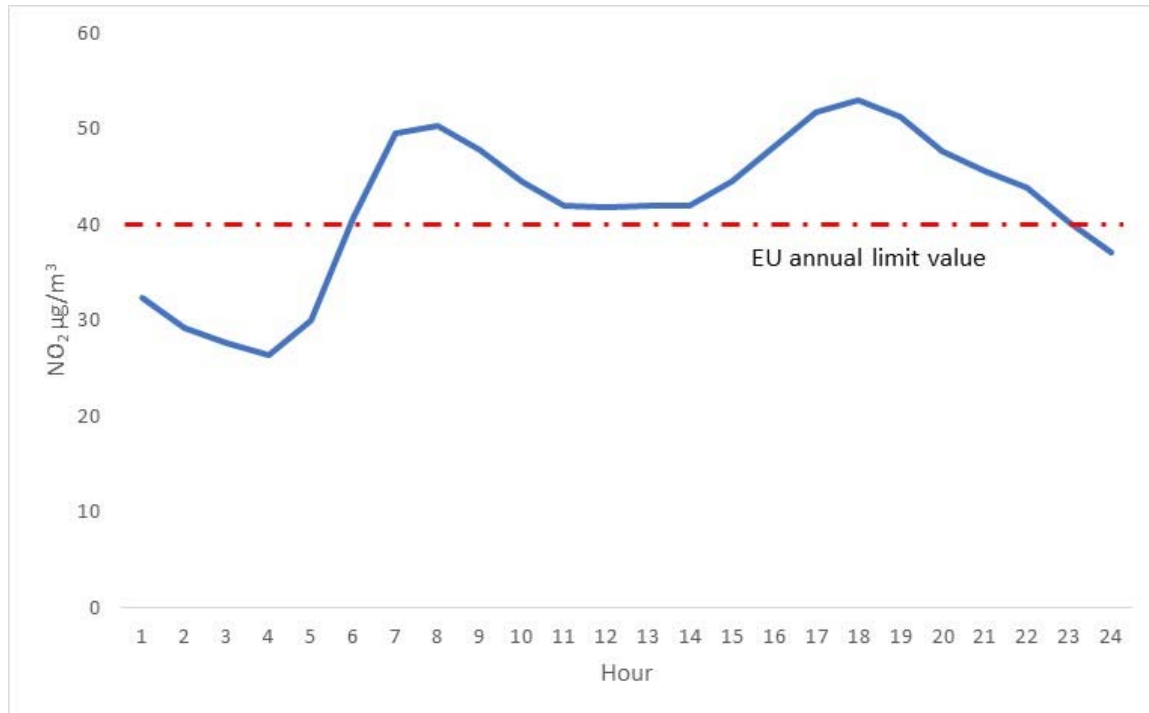


Figure 7 Average NO₂ concentrations by hour of day at St. John Road's West in 2019

This measured exceedance confirmed the predicted exceedance obtained from the dispersion modelling presented in our Urban Environmental Indicators Report (EPA 2019) released last year.

What can be done?

In addition to the specific actions that may be taken locally to reduce exceedances of the EU limit value, we must tackle the long-term issue of pollution from transport on a national-basis. The actions related to transport in the Government's Climate Action Plan are aimed at reducing our reliance on diesel and petrol vehicles and so they will also improve our air quality and health. These actions include

- Accelerating the take up of electric vehicles (EVs) so that we reach 100% of all new cars and vans being EVs by 2030.

- Making economic growth less transport intensive through better planning, remote and home-working and modal shift to public transport.
- Conversion of public transport fleets to zero carbon alternatives

Individually we can ask ourselves:

- Is there a 'clean air' alternative to making this journey by car?
 - Can I use public transport?
 - Can I walk or cycle?
 - If I must take a car, can I car pool?

The link between transport, air quality and climate change

Decarbonisation of our transport systems will, in the short-term reduce NO₂ but it will also reduce Ireland's emissions of greenhouse gases. In this way, a reduction in NO₂ for immediate health benefits can be used to deliver long-term benefits for the environment.



Air quality & transport in Ireland

www.epa.ie/air/quality

Transport - What is the problem?

<p>Diesel and petrol vehicles produce the toxic gas NO_x and particulate matter</p>	<p>They also contribute to climate change</p>	<p>Health implications of poor air quality from transport impacts the liver, lungs and spleen</p>	<p>Ireland is also facing exceedances of the EU limit values in our urban areas</p>
<p>Transport is contributing to 20% of Ireland's greenhouse gas emissions</p>			

What can be done?

<p>Is it necessary to make your journey in a diesel or petrol car? Is there an alternative?</p>	<p>Walk and Cycle friendly networks making it easier for individuals to make the cleaner/healthier choice</p>	<p>Consider an EV as your next vehicle purchase</p>
<ul style="list-style-type: none"> > Use public transport > Car pool/sharing > Walking and cycling 	<p>Decarbonisation of the public transport system also has benefits for air quality</p>	<p>Expansion of the electric vehicle recharging network - making it as easy to charge an EV as it is to fill up with petrol/diesel</p>
<p>Low-emission zones</p>		

Outcomes

<p>Better air quality - better health for you</p>	<p>Compliance with EU limit values</p>	<p>Lower greenhouse gas emissions - better for the planet</p>
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4 Particulate matter and solid fuel burning

This section of the report introduces another of the main types of pollutant that impacts people's health in Ireland – particulate matter.

What is 'particulate matter'?

Particulate matter consists of very small particles which can be solid or liquid. Some of these particles occur naturally, and many are man-made. Particulate matter is usually referred to as PM with a number after it to show how small the PM is. The EPA monitors two types of PM and compares levels to limit values in the CAFE (Cleaner Air for Europe) Directive and WHO guidelines. These are PM₁₀ and PM_{2.5}.

PM₁₀ means that the particulate matter is 10 microns or less in diameter, small enough so you could lay 10 of these particles across the width of an average human hair. PM_{2.5} signifies that it is particulate matter of 2.5 microns or less in diameter – you could lay 40 of these particles across the width of an average human hair.

What are the main sources of PM in Ireland?

In Ireland the main source – especially of the smaller and more dangerous PM_{2.5} particles – is **solid fuel burning** for home heating. PM₁₀ can be made up of several sources. Some can be **natural sources** such as pollen, or wind-blown sea salt. Others are **man-made sources** such as pollution from road transport or construction activities.

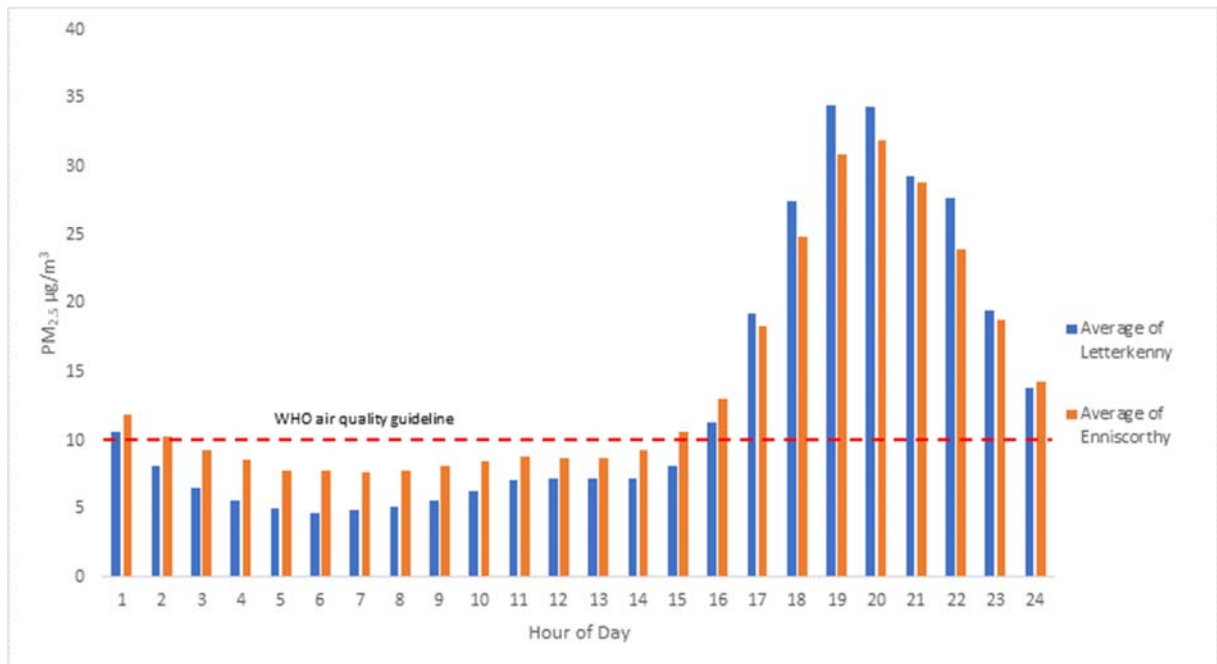


Figure 8 Average concentrations of PM_{2.5} by time of day at Letterkenny and Enniscorthy monitoring stations

Figure 8 shows the average concentrations of PM_{2.5} at the monitoring stations in Letterkenny, Donegal and Enniscorthy, Wexford. These two towns were chosen because they are two of the localised areas which have concerning levels of air pollution. This graph clearly shows the times of high concentrations of PM_{2.5} which coincide with times that people light fires and burn solid fuel to heat their homes.

Why is solid fuel burning so bad for air quality?

Burning solid fuel in stoves and especially in open fires is an inefficient process – not all the solid fuel is fully burned. These unburnt particles leave the fireplace or stove by the chimney, or directly into the room they are heating. This causes both indoor and outdoor PM air pollution. This PM air pollution is then breathed in and leads to the health effects described in section 0. This direct link between solid fuel burning in Ireland and PM has been established both by EPA monitoring and EPA-funded research projects such as the SAPPHIRE project and AEROSOURCE project.

Summary of results for 2019

PM₁₀ was monitored at 30 monitoring stations in 2019.

✓ There were no exceedances of the EU limit values (annual and daily).

However:

✗ the World Health Organisation (WHO) air quality guideline daily value was exceeded at fourteen monitoring stations.

PM_{2.5} was monitored at 30 monitoring stations in 2019.

✓ There were no exceedances of the EU annual limit.

However:

✗ the WHO air quality guideline annual value was exceeded at five of the 30 monitoring stations.

✗ the WHO air quality guideline daily value was exceeded at 25 of the 30 monitoring stations.

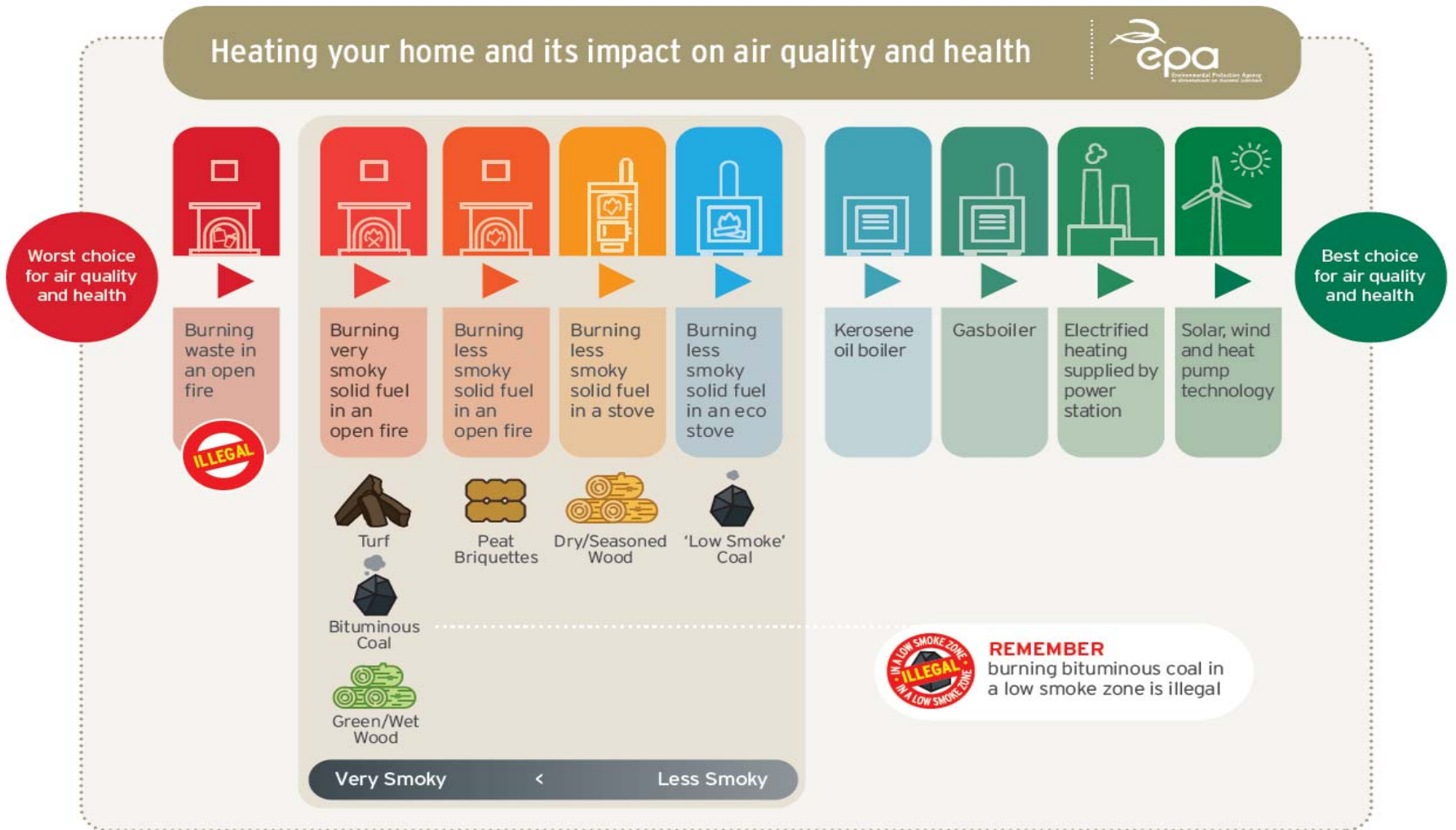


Figure 9 better ways to heat your home

The link between PM, home heating and climate change

There is a link between the causes of harmful PM and of climate change. As we make our homes more energy efficient, we will need less energy to heat our homes. If that energy comes in the form of solid fuel burning, then any reduction in that energy demand will lead to less production of PM.

Improving our housing stock's energy efficiency and moving to clean home heating choices will have the twin benefit of lowering emissions of greenhouse gases, and improving air quality in Ireland

Also, if we move towards the 'best choice for air quality and health' for heating your home, shown in Figure 9, we will also reduce our emissions of green-house gases. Thus, dealing with our air quality issues will be better for our health and lead to long-term benefits for climate change. To benefit air quality and our health, relevant strategies in the Government's Climate Action Plan (2019) should be progressed immediately.

5 Coronavirus, restrictions and the impact on air quality

In March 2020 the Irish Government imposed a series of restrictions on economic and social activity aimed at halting the spread of COVID-19. This section aims to examine the impact of these restrictions on air quality, focusing on the two most important pollutants regarding human health impact in Ireland:

- Nitrogen Dioxide (NO₂), and
- Particulate Matter (PM).

Impact on NO₂

The impact of these economic and social restrictions, on NO₂ pollution was marked. This was predictable due to the direct connection between restrictions on movement and the reduction in emissions from transport. Figure 10 shows the average NO₂ concentration by week for 2020 (for the year to date) at Pearse St. and St John's Road West in Dublin. Both are urban traffic sites and are very sensitive to fluctuations in traffic volumes. The impact of the introduction on restrictions is obvious and indeed the easing of restrictions on economic and social restrictions can also be seen to have led to an increase in NO₂ concentrations.

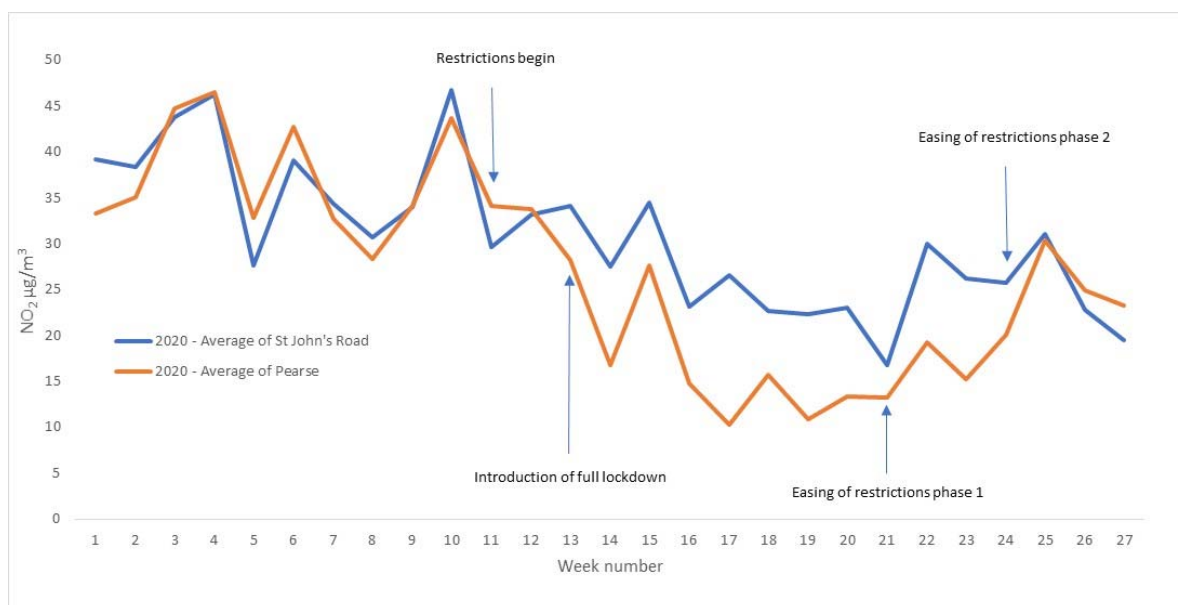


Figure 10 Average NO₂ concentrations by week for 2020 (year to date) at Pearse St. and St John's Road West

Impact on particulate matter

The impact of restrictions on particulate matter during the COVID19 restrictions was not as clear or apparent, which may be as expected as transport is not a large source of PM in Ireland.

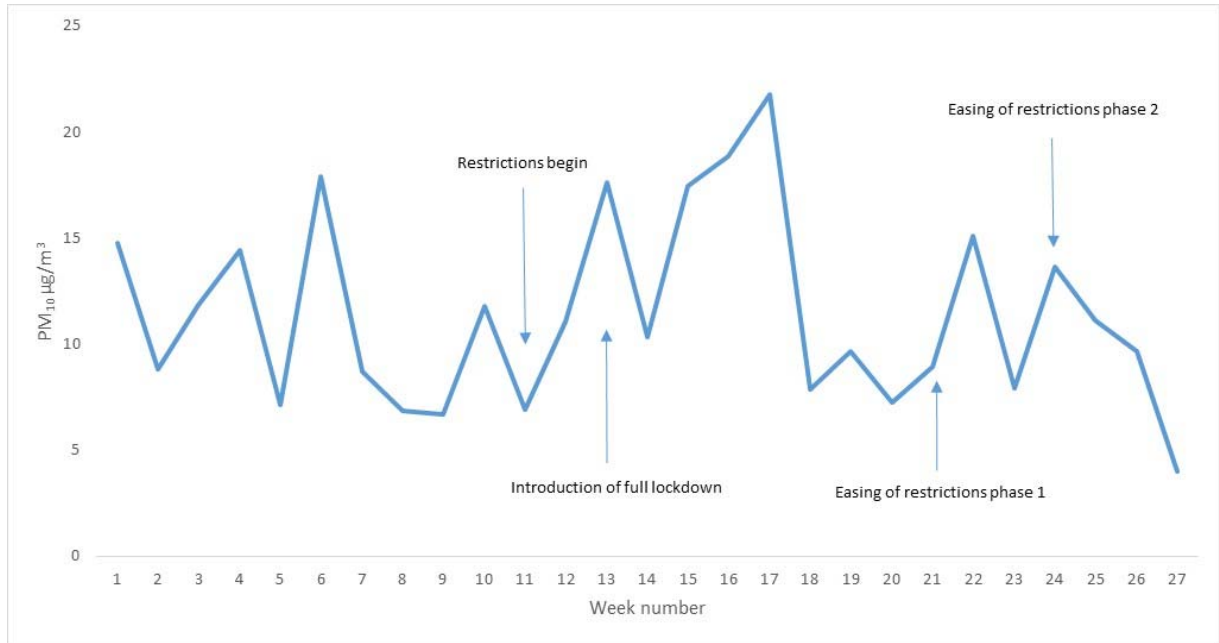


Figure 11 Average concentrations of PM₁₀ by week for Rathmines in 2020

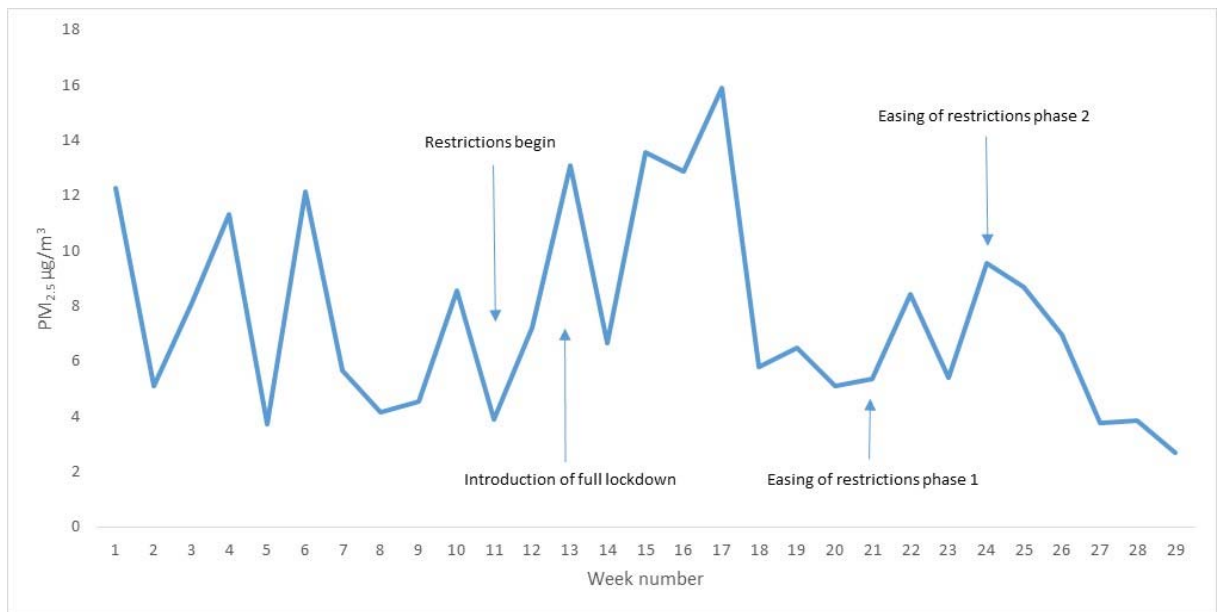


Figure 12 Average concentrations of PM_{2.5} by week for Rathmines in 2020

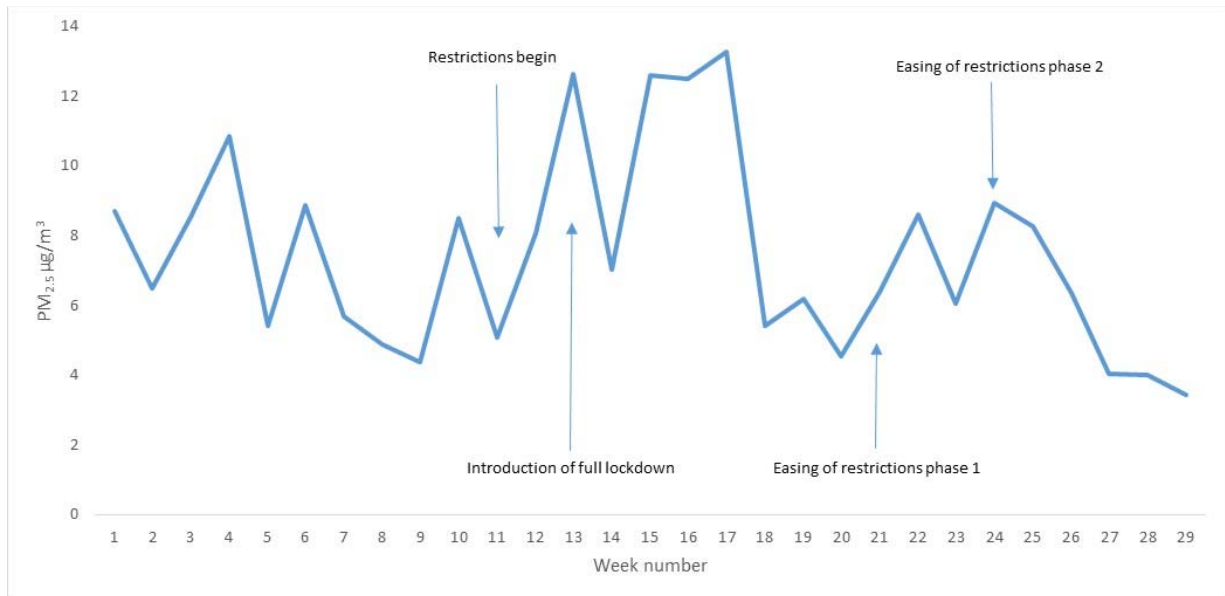


Figure 13 Average concentrations of PM_{2.5} by week for St. John's Road West in 2020

Other pollutants in 2019

This section of the report presents a highlight of the EPA's findings on the rest of the pollutants we assessed in 2019. Full details of air quality results can be found at www.epa.ie/air/quality/reports/aqsupp/. For a summary of the findings see Table 1.

Ozone

Ground level ozone is a pollutant formed in urban areas when you have car exhaust emissions mixing together and undergoing chemical reactions in sunny weather. Ground level ozone can be bad for your health, see section 1 for further details. Ozone also has negative impacts on ecosystems where it can damage plant and crop growth.

Normally, ozone is a '**transboundary**' pollutant in Ireland – this means that the sources of the ozone are outside Ireland (normally mainland Europe). Then, the pollutants are carried in an air mass across the sea to impact here. There is also a natural component to the ozone normally measured in Ireland. However, when weather conditions are suitable – namely dry, hot, sunny weather – then ozone can be produced by reactions of NO_x and other emissions from car exhausts to produce a brown, hazy atmosphere which is called 'photochemical smog'.

The main way to reduce the impact of ground-level ozone in Ireland is to reduce the levels of NO_x in our urban areas. Again, a modal shift away from the internal combustion engine powered vehicles will also reduce the impact of ground-level ozone in Ireland. Reduction in the impact of transboundary ozone (outside Ireland) is more problematic as it will take a Europe-wide reduction in ground-level ozone formation – something which will be difficult to achieve given current NO_x concentrations across Europe.

Dioxins

'Dioxins' is a collective term for a group of chemical compounds that can be formed when carbon containing material is burned at low-temperature. This happens predominantly from residential combustion and backyard burning of waste. Dioxins were again monitored in 2019 at selected locations across Ireland. This pollutant is measured in samples of cow's milk and compare to European standards. Concentrations observed in 2019 were in line with previous years' measured results and well below European limit values.

PAH

Polycyclic aromatic hydrocarbons (PAH) are chemical compounds which consist of two or more fused aromatic rings made entirely from carbon and hydrogen. PAH are emitted residentially from the combustion of solid fuels, such as peat, wood and coal. PAH and in particular benzo (a) pyrene (BaP), which is used as a marker for PAH, are known carcinogens.

Table 1 selected pollutants measured in 2019 and their adherence to EU legal limit values and WHO air quality guideline values

Pollutant	Number of stations where monitored 2019	EU legal limit values	WHO Air Quality Guideline (AQG) level or EEA reference level
PM₁₀	30	No exceedances	Above WHO AQG value at 14 of the 30 stations
PM_{2.5}	30	No exceedances	Above WHO AQG value at 25 of the 30 stations
NO₂	21	One exceedance	Above WHO AQG value at 1 station
Ozone	18	No exceedances	Above WHO AQG value at 2 stations
Sulphur dioxide (SO₂)	12	No exceedances	Above WHO AQG value at 1 station
PAH	5	No exceedances	Above EEA reference value at 4 stations
Dioxins	37	No exceedances	N/A
All other pollutants		No exceedances	Below AQG value

6 Local Air Quality Monitoring Network

Under the Air Ambient Air Monitoring Programme, we have continued to expand our network of ‘Local’ air quality monitoring stations. These monitoring stations have lower cost monitoring equipment that gives people a rapid and up-to-date indication of air quality in their locality. This information informs decisions about where to put further monitoring stations.

In 2019, there were 15 new ‘local’ air quality monitoring stations added to existing ‘local monitoring sites’ that local authorities operated. These stations measure the pollutants PM₁₀ and PM_{2.5}.

Figure 14 below shows the monthly average concentrations of PM₁₀ at selected monitoring locations in 2019.

These measurements help us to examine the impact on air quality of the ‘Winter heating season’ which in Ireland generally runs from November to March/April.

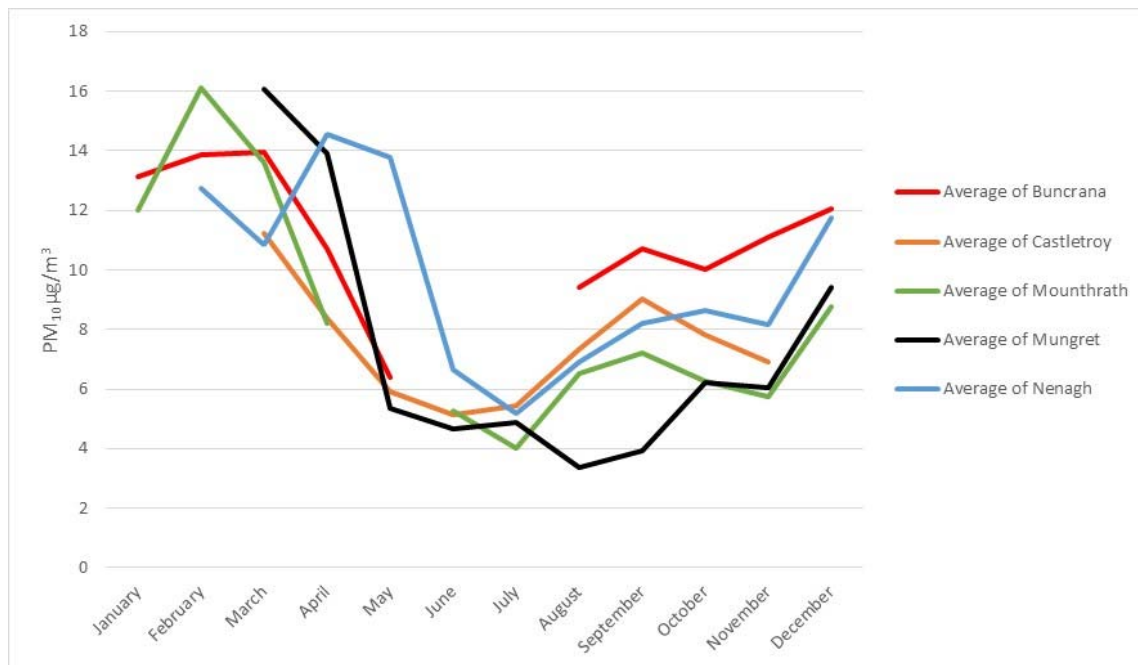


Figure 14 PM₁₀ monthly average concentrations at selected stations in the Local Air Quality Monitoring Network in 2019

Figure 15 below shows the monthly average concentrations of PM_{2.5} at selected locations in the local monitoring network in 2019.

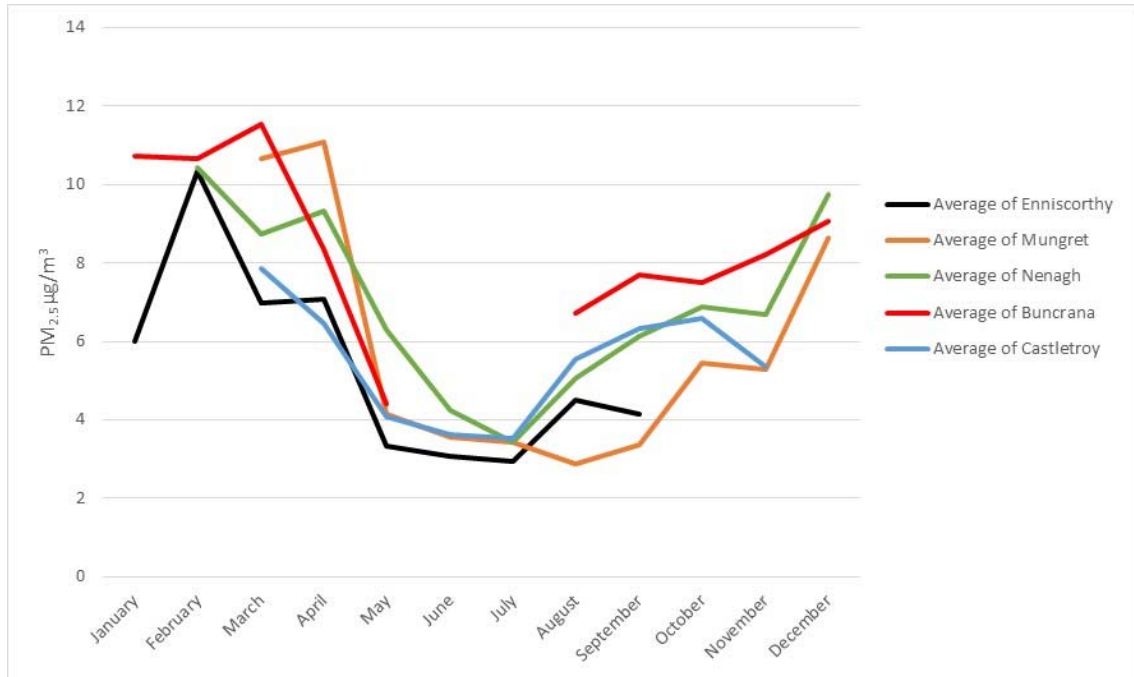


Figure 15 PM_{2.5} monthly average concentrations at selected stations in the Local Air Quality Monitoring Network in 2019

7 Conclusions

Air pollution is a major environmental health risk (WHO 2018). The European Environment Agency estimates that there were 1,300 premature deaths in Ireland due to fine dust particles (PM_{2.5}) air pollution in 2017 alone, with a figure of 538,014 premature deaths across the wider EU². Air quality in Ireland is generally good, however there are localised issues across the country with several air pollutants, in particular fine particulate matter.

Ireland exceeded the EU limit value for NO₂ at one monitoring station in 2019

As signalled in last year's Air Quality Report and also flagged in the 'Urban Environmental Indicators Report', Ireland has **exceeded the EU annual limit value for NO₂** at our urban traffic monitoring station at St. John's Road West. As shown in this report the key contributor to pollution at this site is traffic-related emissions. Indeed, with further monitoring it is becoming increasingly obvious that the problems of emissions from transport (in particular diesel engine passenger cars) are **more extensive than previously understood**.

Residential use of solid fuel such as coal, peat and wood is still the largest problem for air quality and health in Ireland

The continued use of solid fuel burning for home heating remains the leading contributor to fine particulate matter (PM_{2.5}) pollution across Ireland. This pollutant is the most health-impactful of those affecting Irish people today and is thus the largest problem from an air quality point of view.

We are above the WHO air quality guidelines for PM_{2.5} and these guidelines are the new benchmarks for good air quality globally, and so exceeding these is a cause for concern. PAH in ambient air as a result of the burning of solid fuels is also a large problem in our towns and villages and we are above the related EEA reference level for PAH.

What can be done?

- Solid fuel

Encouraging people to move to using cleaner fuels, more efficient methods of using those fuels and with effective implementation and enforcement of the proposed nationwide 'smoky' coal ban can all help reduce air pollution. This approach follows the principle that any movement towards an ultimately clean home-heating choice will benefit air quality. See Figure 9 on page 25 for an illustration of the impact of different home heating choices on our local air quality and health.

In the longer-term, a reduction in the amount of heating required through improved energy efficiency of homes is an important part of the solution. The Government's plans to retrofit 500,000 homes under the Climate Action Plan is an important part of the solution. This, along with a move to clean heating technology, also included in the Climate Action Plan, will improve air quality. It will also reduce Ireland's greenhouse gas emissions and thus aid in tackling climate change.

² Air Quality in Europe 2020 – European Environment Agency

- **Transport**

As an exceedance of an EU limit for nitrogen dioxide has been confirmed in Dublin, the Local Authorities in Dublin and its suburbs, are now legally required to prepare an air quality action plan to address this exceedance. The action plan must be produced by the end of 2021. This will involve examining both the causes and providing solutions in the affected areas. The Department of Communications, Climate Action and the Environment (DCCAE) together with the Department of Transport (DOT) established a joint working group to address this issue during 2019 and a report on this group's recommendations is currently being prepared, which is welcomed by the EPA.

Examples of measures other European cities use to address similar issues include the promotion of alternatives to the private car – public transport, carpooling, cycling and walking together with moving to cleaner modes of public transport and an expansion of the re-charging network for electric vehicles. The establishment of low-emission zones within urban areas is also an option.

The transport options in the Government's Climate Action Plan, chiefly aimed at decarbonisation of our public transport system and generally reducing our reliance on diesel and petrol-powered vehicles, once implemented will have the twin benefit of lowering greenhouse gas emissions as well as reducing NO₂ emissions and improving health. These plans include getting 700,000 electric vehicles on Ireland's roads by 2030, transitioning bus fleets to low emission vehicles and sustainable mobility projects to support more short journeys to be taken by walking and cycling.

Although policy change will certainly play a major role in the reduction of NO₂ in our urban areas, the most important factor will be recognition by the public that they can make a difference in their choice of transport option for each journey they make.

Public awareness and behavioural change

Key to improving air quality will be increasing **public awareness** of the impacts that our home-heating choices and modes of transport have on air quality and facilitating **behavioural change** to improve air quality and our health.

In the context of a sustainable society and economy, encouraging and supporting the public to make cleaner choices will be important. In this regard, the EPA looks forward to the impending publication of the Government's first National Clean Air Strategy (NCAS). Together with the recently published Climate Action Plan to address climate change, which also contains many measures which will have air quality benefits, these documents will point the way forward from a policy perspective. The adoption of the WHO guideline values across Europe would signal the commitment of Member States to the improvement of air quality and subsequent health improvements.

To then tackle the problem of air pollution in Ireland, the incentivisation, promotion and support of the continued shift in society away from solid fuel as a method of home heating to clean alternatives and a promotion of clean transport options must be supported. Further to this, consideration should be given to the feasibility of a smoky fuels ban in our cities and

larger towns. Such a ban could include all fuels with a smoke generation potential above a set limit value. This would include smoky coal, wet/green wood and turf. This would require financial support for people who are in or at risk of fuel poverty to make a transition to healthier forms of heating over time. Together with enhanced enforcement this could have a dramatic effect on air quality in these areas.

The continued implementation of the AAMP, which to date has increased the number of monitoring stations to 84 nationwide has not only provided increased availability of the public to high quality real-time air quality information but it is also being used to engage with the public and assist and support them to consider the impact of their heating and transport choices on the air quality in their neighbourhood and then act in improving air quality and health in their communities.

8 Acknowledgements:

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AN GHNÍOMHAIREACHT UM CHAOMHNÚ COMHSHAOIL

Tá an Gníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaoil a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaoil a chosaint ó éifeachtaí díobhálacha na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: Déanaimid córais éifeachtacha rialaithe agus comhlionta comhshaoil a chur i bhfeidhm chun torthaí maithe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.

Eolas: Soláthraimid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírithé agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.

Tacaíocht: Bímid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaoil atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaoil inbhuanaithe.

Ár bhFreagrachtaí

Ceadúnú

Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaoil:

- saoráidí dramháiola (*m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistrithe dramháiola*);
- gníomhaíochtaí tionsclaíoch ar scála mór (*m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta*);
- an dionalmhaíocht (*m.sh. muca, éanlaith*);
- úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaithe (*OGM*);
- foinsí radaíochta ianúcháin (*m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíochta*);
- áiseanna móra stórála peitрил;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdarás áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, trí dhírú ar chiontóirí, agus trí mhaoirsiú a dhéanamh ar leasúcháin.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídíonn an ciseal ózóin.
- An dlí a chur orthu siúd a bhreiseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaoil.

Bainistíocht Uisce

- Monatóireacht agus tuairiscí a dhéanamh ar cháilíocht aibhneacha, lochanna, uisce idirchriosacha agus cósta na hÉireann, agus screamhuiscí; leibhéil uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairiscí a dhéanamh ar Cháilíocht an Uisce Snámha.

Monatóireacht, Anailís agus Tuairiscí ar an gComhshaoil

- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairiscí neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil (*m.sh. tuairiscíu tréimhsiúil ar staid Chomhshaoil na hÉireann agus Tuarascálacha ar Tháscairí*).

Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn

- Fardail agus réamh-mheastacháin na hÉireann maidir le gáis cheaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn.

Taighde agus Forbairt Comhshaoil

- Taighde comhshaoil a chistiú chun brúnna a shainnaint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeraíde, an uisce agus na hinbhuanaitheachta.

Measúnacht Straitéiseach Timpeallachta

- Measúnacht a dhéanamh ar thionchar pleananna agus clár beartaithe ar an gcomhshaoil in Éirinn (*m.sh. mórphleananna forbartha*).

Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéil radaíochta, measúnacht a dhéanamh ar nochtadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Faisnéis Inrochtana agus Oideachas

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaoil ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaoil (*m.sh. Timpeall an Tí, léarscáileanna radóin*).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramháiola Guaisí a fhorbairt chun dramháil ghuaiseach a chosc agus a bhainistiú.

Múscailt Feasachta agus Athrú Iompraíochta

- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlaigh a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an gníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

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- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Fianaise is Measúnú
- Oifig um Chosaint Radaíochta agus Monatóireachta Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair inní agus le comhairle a chur ar an mBord.



Headquarters
PO Box 3000, Johnstown Castle Estate
County Wexford, Y35 W821, Ireland
Bosca Poist 3000, Eastát Chaisleán Bhaile Sheáin Contae Loch
Garman, Y35 W821, Éire

T: +353 53 9160600
F: +353 53 9160699
E: info@epa.ie
W: www.epa.ie
Lo Call: 1890 33 55 99

EPA Regional Inspectorate Dublin
McCumiskey House
Richview
Clonskeagh Road
Dublin 14
D14 YR62
Tel: 01-268 0100
Fax: 01-268 0199

EPA Regional Inspectorate Cork
Inniscarra
Co. Cork
P31 VX59
Tel: 021-4875540
Fax: 021-4875545

EPA Regional Inspectorate Castlebar
John Moore Road
Castlebar
Co. Mayo
F23 KT91
Tel: 094-9048400
Fax: 094-9021934

EPA Regional Inspectorate Kilkenny
Seville Lodge
Callan Road
Kilkenny
R95 ED28
Tel: 056-7796700
Fax: 056-7796798

EPA Regional Inspectorate Monaghan
The Glen
Monaghan
H18 YT02
Tel: 047-77600
Fax: 047-84987

E: info@epa.ie
W: www.epa.ie
LoCall: 1890 33 55 99