

Welcome to the GLOBE Ireland Air Quality Campaign



Teacher Guidelines 2023

Thank you for participating in this citizen-science initiative. The **GLOBE Air Quality Campaign** is a citizen science project to assess traffic-related air pollution at schools. The campaign measures nitrogen dioxide gas in the air, a principal pollutant associated with vehicle emissions.

While Ireland's overall air quality is generally good by international standards it is now apparent that local air quality may not be as consistently good. It is now considered that any level of air pollution is not acceptable and poses a health risk ([World Health Organisation](#)). There are often wide variations in local air quality going undetected that can have significant impacts on the health and wellbeing of local communities, so we want you to investigate the quality of the air around your school!

This project is coordinated by the GLOBE Team (Ireland), as part of The Environmental Education Unit (EEU) of An Taisce and is sponsored by the Irish Environmental Protection Agency (EPA). GLOBE is an international Environmental and Science Education program that is sponsored by NASA in the USA. GLOBE provides students and the public worldwide with the opportunity to participate in citizen science and contribute meaningfully to our understanding of the Earth system and global environment.

Teachers are encouraged to sign up for a GLOBE Educator account [here](#). This is not necessary for participation in the air quality campaign, however GLOBE has: excellent teacher resources, provides access to a large dataset of earth observations, communicates on new measurement campaigns and has teacher e-training opportunities [here](#).



Overview of Air Quality Campaign

In September/October, 200 schools across Ireland will measure nitrogen dioxide (NO₂) - a principal pollutant from car exhaust emissions - at two locations around their school grounds/local area. Schools will be provided with an air quality pack that contains monitoring tubes to measure nitrogen dioxide and instructions on how to put up the tubes outside.

What is in my Air Quality Pack?

- 2 Plastic Tubes; each tube has 2 caps – a grey cap and a white cap.
- 2 Black Plastic Holders
- 2 Long Cable Ties
- [Instructions](#) and a [GLOBE ID Cloud Chart](#)
- Return Envelope (pre-paid and pre-addressed)



The air quality packs will be arriving in schools **just before** the beginning of the measurement period. For this campaign, we plan on the packs arriving between **September 19th - September 25th** * (please note this date may change, watch your email for any updates). Please keep an eye out for your air quality pack, occasionally they can sit on desks/in mail slots for weeks!

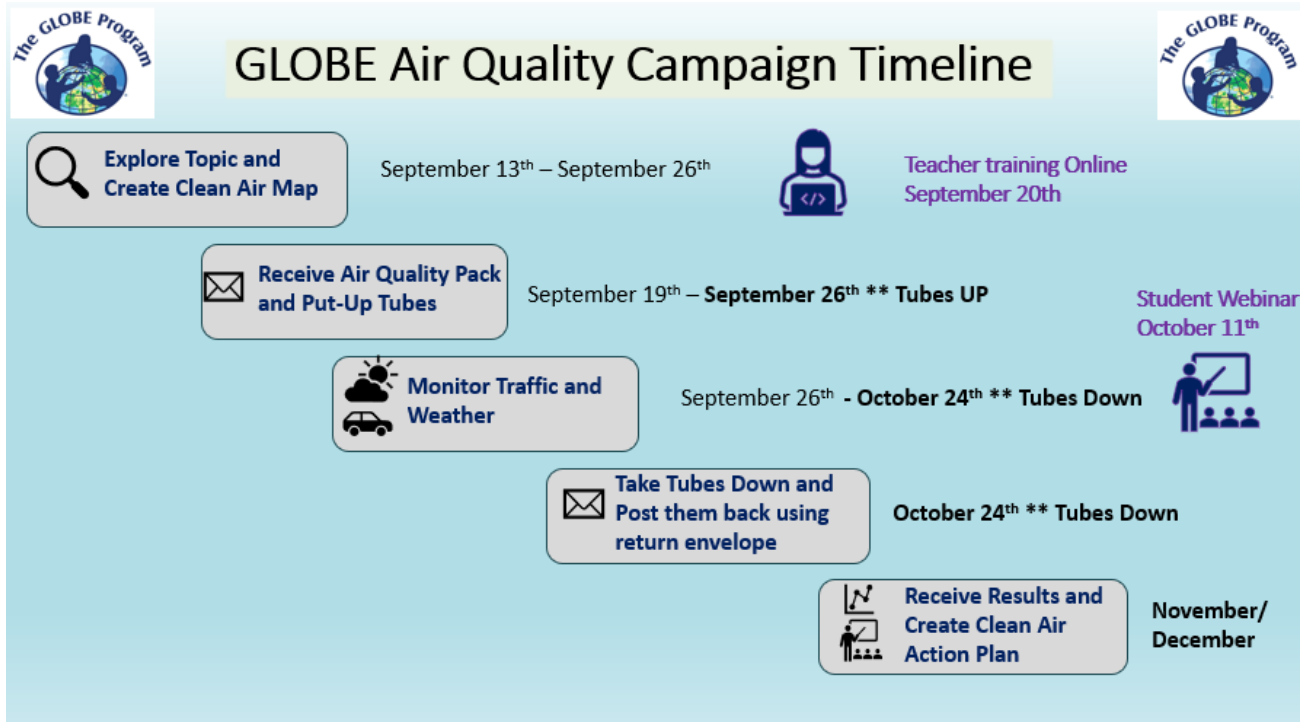
We will be sending a number of newsletters via Mail Chimp during the campaign to keep you updated on key dates, activities, and resources.

Tubes Up and Tubes Down!

The monitoring period for the campaign is **September 26th to October 24th**. Please put your tubes up on September 26th (or as close to this date as possible). You will leave your tubes up for 4 weeks, until October 24th. **Important: please record the Tube number (the number is below the QR sticker on your tube) and the location of the tube (e.g., busy road, car park or sheltered location) and date and time of installation.** You will receive a link to an online form to



record this information. On October 24th, you will take your tubes down. **Important: please record the Tube number (the number is below the QR sticker on your tube) and the date and time of taking your tubes down.** The laboratory conducting the tube analysis uses this tube exposure duration to fine tune it's analysis and provide an accurate result. **Please Return your Tubes ASAP (You will get a pre-stamped, pre-addressed envelope to return your tubes in your air quality pack).**



The Air Quality Campaign Timeline is shown above. The most important dates are the **Tubes Up date of September 26th** and the **Tubes Down date of October 24th**.

It is fantastic that you are participating in this air quality investigation with your class/group, to make it more meaningful for your students, you are welcome to follow the project steps below that include creating a Clean Air School map, monitoring traffic and weather while your tubes are up and creating a school Clean Air Action Plan.

There are Classroom PowerPoints that you may wish to use to share knowledge with students on air pollution and to provide information to them about the campaign and project steps.

Classroom PowerPoint Resources

[Click here for: Secondary School Classroom PowerPoint](#)

[Click here for: Primary School Classroom PowerPoint](#)



We are excited to let you know that we'll be having a **GLOBE Ireland Student Air Quality Webinar** October 11th (Time TBC). We will be joined by air quality/sustainable city community who will provide feedback on comments on the short (5-6 minute) presentations.

Students will be invited to share their Clean Air Map, describe their school setting (urban, rural) and local traffic situation (road(s) to school), show where they have placed their tubes, make a prediction of how polluted it will be and perhaps share ideas of changes they would like to see to improve air quality.

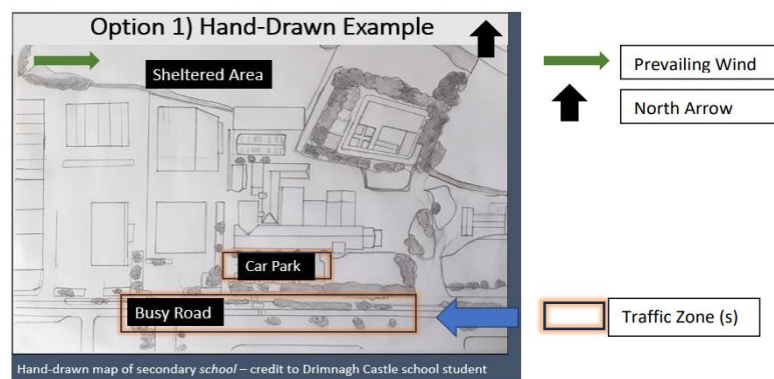
Air Quality Project Steps:

1) Create Clean Air School Map

Creating a Clean Air School Map is an important first step and should help students to visualise their school setting and encourage thinking around traffic, air pollution and active transport.

You may wish to use the following guidelines, click here: [Clean Air Map Guidelines](#)

Example:



Remember: Traffic Zones – are areas around the school where there is heavy traffic and where students congregate or travel.

2) Identify Traffic Zones at Your School

Ask Students to consider where traffic is heavy around the school and in the community. The answer will very much depend on your local setting and how individual students get to school. The students could highlight the heavy 'Traffic Zones' on their Clean Air Maps. This is a good way to introduce the concept of potential **local air pollution hotspots** and the importance of **local monitoring** to understand the consequence of traffic congestion and idling cars.



You could also highlight that air pollution from cars is emitted from the exhaust pipe (point source) and will mix with the surrounding air. Consequently, levels of pollution are **higher at low levels in the air** (1-3 meters) and quite variable away from the source.

3) Choose where to put up your Air Quality Tubes

On September 26th, 200+ schools around Ireland will be putting up their air quality monitoring tubes!

Looking at the **Clean Air Map** and the identified **'Traffic Zones'** ask students to choose their tube locations and go outside and mount your tubes.

We recommend placing one tube in the identified Traffic Zone and one in a more sheltered location, this will help students compare results when received.

You may wish to go through the instructions on how to mount the tubes with your class, you can read the instructions by clicking here: [Read: Instructions on how to mount tubes](#). You received a printed version of this in your air quality pack.

4) Monitoring Traffic and Weather during the Campaign

You are invited to monitor traffic, idling cars, and the weather during the monitoring period.

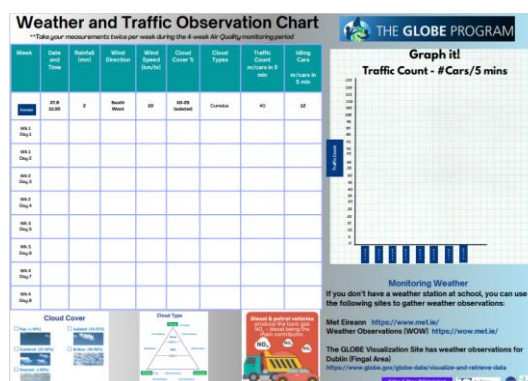
Why Traffic Count? We are measuring a traffic related pollutant consequently the volume of traffic at your school will be the primary factor influencing how much air pollution is found in the air during monitoring. By conducting traffic counts and idling car counts the connection between traffic and air pollution will be reinforced. Collecting observations gives students a way to demonstrate to their school community the connection between their recorded observations and their air quality results.

Why monitor Weather? The weather will have an impact on air pollution. The most important variables are rainfall, clouds, and wind/wind direction. Rain is known to wash particles and absorb pollutants, clouds block the sun reducing secondary pollutant formation, and wind can move air pollutants from one location to another.

How do we monitor and record our observations?

You were provided with an Observation Chart to record your observations, we recommend gathering traffic and weather observations **twice per week for 4 weeks, 8 observations in total**. You can print the observation chart in A2 (landscape) and share with the class. It makes a great poster for the school community, share your observations early!

Print A2 Observation Chart, Click here: [GLOBE Ireland Observation Chart](#)



The image shows a template for a 'Weather and Traffic Observation Chart'. It includes a table for recording data over 8 days, with columns for Date, Rainfall (mm), Wind Direction, Wind Speed (km/h), Cloud Cover (%), Cloud Types, Traffic Count (Cars/5 mins), and Idling Cars (Cars/5 mins). To the right of the table is a bar chart titled 'Graph it! Traffic Count - #Cars/5 mins'. Below the table are sections for 'Cloud Cover' and 'Cloud Type' with diagrams. At the bottom right, there is a section for 'Monitoring Weather' with links to 'Met Eireann' and 'Weather Observations (WOW)'. The chart is titled 'Weather and Traffic Observation Chart' and includes the text 'THE GLOBE PROGRAM'.

Continued...

To read more about conducting traffic counts, you can click here: [Traffic Count Guidelines](#)

For weather monitoring, you were provided with a print-out of the GLOBE Cloud Identification Sheet. You are welcome to use the ID Sheet to guide students through making cloud observations. If you prefer, you can download the [GLOBE Observer App](#) and follow the Clouds Wizard to record your observations which will then be directly submitted to GLOBE/NASA. Don't forget to record your observations on the GLOBE Observation chart too.



To record rainfall, wind/wind direction: if you do not have GLOBE weather monitoring equipment or a school weather station, please use Met Eireann's website and/or WOW to record observations from your local MET weather station.

Met Eireann – Click here for [Latest Observations](#)

Met Eireann – click here for [WOW Observation Network](#)

5) Receiving your Air Quality (NO₂) Results

By end of November/early December, schools will receive their nitrogen dioxide results from GLOBE Ireland.

You will receive an **average value** for each tube that was sent back to GLOBE Ireland on time. The average value represents a small (4-week) snapshot of traffic-related air pollution at your school. The value can be compared to the **mean-annual scale below** to understand your nitrogen dioxide levels at your school. The units are microgram per cubic metre ($\mu\text{g}/\text{m}^3$).

$\mu\text{g}/\text{m}^3$	Colour Code	NO ₂ Level Description
>40	Red	High
30-40	Orange	Medium to High
20-30	Yellow	Medium
10-20	Green	Low to Medium
0-10	Blue	Low

Continued...

You may wish to compare the results you received to the mean-annual EU standards and WHO standards for NO₂.

	µg/m ³	Colour Code	NO ₂ Pollutant Level
	>40	Red	High
EU →	30-40	Orange	Medium to High
	20-30	Yellow	Medium
	10-20	Green	Low to Medium
	0-10	Blue	Low ← WHO

In 2021 the WHO revised their air quality guidelines based on the latest science that suggested the previous guideline limits were too high due to observed impacts on human health. The EU Air Quality Directive (legislation) is based on the WHO 2015 guidelines.

Consequently, there is presently a sizable difference between the EU, and the WHO's limit values. For example, the EU recommends NO₂ does not exceed 40 µg/m³ a year, where the WHO now recommends that NO₂ measurements should not exceed 10 µg/ m³ per year.

You can look at previous GLOBE Ireland Air Quality Campaign results here:

[EPA GLOBE Air Quality Campaign Results 2022](#)

6) Create a School Clean Air Action Plan

What happens next? We have our NO₂ results and our gathered traffic and weather data.

There are many ways to make a difference!

We recommend students create a **School Clean Air Action Plan** to encourage positive action on active travel and mobility in and around your school, thereby reducing air pollution.

What should be in the Action Plan?

The students could include their clean air maps, their traffic/weather observations, and their air quality results. **The purpose of the action plan is to act so make sure they include suggestions for actions**, some examples are establishing an anti-idling campaign, classroom posters promoting active travel, school active travel champions, changes to traffic flow.

GLOBE Ireland will be providing a prize for the Best Clean Air Action Plan – submission Date is Tuesday December 12th.

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Let's use our findings to make a change!

Step 5) Create your School Clean Air Action Plan

Creating your Action Plan

- Introduction – Who are you? What do you want? (clear goal of achieving clean(er) air*
- Why do you want change (Why have a Clean Air Action Plan)*
 - Describe traffic problems (Include traffic counts) and air pollution results*
 - Include your annotated Clean Air Map*
- How? List your proposed solutions (e.g., More bike parking, anti-idling campaign, more trees) and include When?*
- Present to your Board of Management/local councillor*

Specific - ensure that the goal is clear and has a narrow focus.

Measurable - can you measure your goal? Stay on track by asking: how will I know when its done?

Achievable - aim high, but make sure that it something that you can actually do.

Relevent - make sure your goal is relevant to what you are trying to achieve. Ask yourself: does this goal actually mean something to me?

Time-bound - a deadline will help establish a sense of urgency and will help you keep focus on your goal.

7) Students share their Air Quality Story – December

We are excited to let you know that we'll be having a **GLOBE Ireland Student Air Quality Webinar** in December (exact Date and Time TBC).



We will be joined by GLOBE international students and the GLOBE Coordinator Community.

Students will make short (5-6 minute) Air Quality presentations.

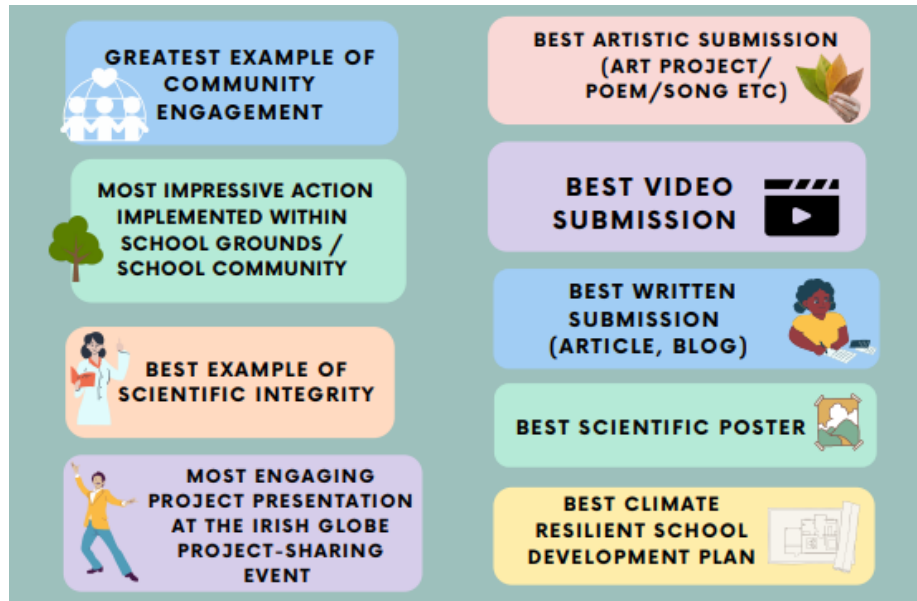
Students could share their:

- Clean Air Map
- Describe their school setting (urban, rural)
- Describe local traffic situation (road(s) close to school)
- Show where they placed their tubes
- Share their air quality results!
- Share ideas of changes they would like to see around their school to improve air quality

8) Create a GLOBE Ireland Air Quality Campaign Project!

GLOBE Ireland will once again be having a Project Competition for the 2023/24 academic year. We were so impressed with the projects we received last year. You can view them by clicking here: [GLOBE Link Tree](#)

The prize categories are:



Please submit all Air Quality Projects to globe@eeu.antaisce.org by January 31st, 2024. The winners will be chosen to attend the GLOBE end-of-year event, May 2024.

9) GLOBE Ireland International Collaborations

Did you know there are schools in GLOBE Europe countries working on Air Quality too?

There are air quality campaigns taking place in France, Netherlands, and Malta during the year. Previously we have linked up Irish schools that wish to directly collaborate with an international school. Thank you to the schools that have already expressed interest in this, we will try to match you with an international school.

Once schools are linked, the collaboration is teacher led. In the past, schools have connected via zoom to meet & greet, shared cultural information and shared details of their air quality investigations. In fact, we've had Irish schools create joint projects with GLOBE Malta for the GLOBE International Virtual Symposium and receive a prestigious 4 Stars and excellent feedback from judges.

There will also be a GLOBE Europe Student Conference on Air Quality where Irish schools will have the opportunity to present to an international audience of Teachers, GLOBE Coordinators, NASA scientists, and Students. This will be held in spring/summer 2024 (exact dates TBC)

Appendices

You will find all resources here: click [GLOBE Air Quality Campaign Resources](#)

Resource Type	File Name	Purpose	Curriculum link	Learning Outcome
Module	Module on Air Quality	Introduce the topic of air quality	TY group. JC Science, JC/LC Geography	Build knowledge and awareness around air quality
Lesson plan – design your Air Quality campaign study	Guidelines: Clean Air Map	Create a map of your local school and surroundings to guide NO ₂ tube placement for AQ campaign	JC Science (scientific process), JC/LC Geography (map creation, weather)	Develop: research skills, improve map work skills, observational methods, identifying prevailing winds and understand the practical scientific process
Lesson plan Cloud and weather observations	Cloud guidelines and Module on Weather	Gather cloud and weather information to support AQ campaign	JC Geography (weather) and Science (Earth)	Build knowledge base around what drives weather, how weather can impact air pollution and develop hands-on data recording skills
Lesson Plan Conduct traffic count survey	Traffic Count	Gather data on traffic levels close to the school to support AQ campaign	JC Mathematics (graphs, statistics) Geography (Transport)	Develop hands-on data recording skills and data analysis skills. Increase understanding around link between traffic and NO ₂
Lesson Plan Examine your local terrain	Topography	Examine the landscape features around school to support AQ campaign	JC Geography (landscape, map reading)	Develop map reading skills, identification of landforms (valley, hills) on maps. Build knowledge on the effect of landscape on air pollution.
Fact Sheet	Traffic-related Air Pollution	Raise Awareness	TY group. JC Science, JC/LC Geography	Increase knowledge base on basic facts on topic of traffic-related air pollution and air quality.
Fact Sheet	Air Pollution and weather			
Fact Sheet	Air Pollution Health and Environment			