

Ricardo-AEA

Scottish Government Clear the Air Educational Programme

**Scottish Air Quality Database and Website Annual Seminar
26th March 2015**

Clean the Air

- An educational air quality resource for 12-15 years olds
- It provides a learning repository with information on:
 - Pollutants
 - Sources
 - Impacts
 - Actions
- A coordinated citizen science study supported by narrated webinars.

- Raise awareness of air pollution within secondary school age pupils
- Provide ‘hands on’ experience of air quality monitoring and assessment
- Develop an interest and awareness in science and technology
- Encourage behaviour change – “what can I do?”





1. Develop an air quality educational programme in partnership with a pilot school and supporting local authority
2. Provide training on air quality, monitoring, impact and linking to sustainable actions
3. Develop an online resource which provides information on:
 - Air Quality
 - Emissions
 - Health Impact
 - Sustainable Travel Options (Including Emissions Calculator)
 - Research Exercise (Citizen Science)



Air Quality in Scotland

Clear the Air

Sign in with your school details...
Username Password
[Get help or learn how to sign up](#) [Sign in >](#)

[Home](#) [About air pollution](#) [Making a difference](#) [Citizen science](#) [Follow us!](#)

Latest Pollution Levels

Here's how the latest pollution levels across Scotland breakdown.

Low (1-3)	88 sites
Moderate (4-6)	1 sites
High (7-9)	0 sites
Very High (10)	0 sites
No Data	2 sites

Last updated at Today at 11:00
[Get more details on the main website >](#)

Welcome to Clear The Air!

This site is specially for 12-15 year olds to find out more about air pollution and if their school is signed up, use our Citizen Science tools to understand air pollution better.

What's the air pollution near me?

Find out the latest pollution levels from the monitoring sites near where you live or go to school. Enter a location below to find out!

[Search >](#)

Get involved in Citizen Science!

Citizen Science lets you collect and analyse air pollution data as a school project. The project enables you to map your school's data.

[Find out more >](#)

Calculate your emissions to school...

Use the Clear The Air emissions calculator to find out the impact your journey to school has on the environment.

[Calculate your emissions >](#)

You may also want to take a look at...

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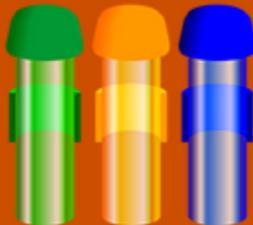
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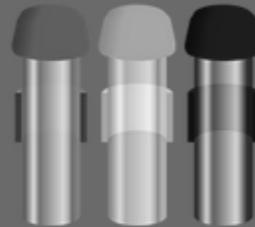


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e.g. your home or school

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Clear the Air

Home About air pollution Making a difference Citizen Science Follow us!

Sources of pollution

Impacts on me, my friends, my family

How do we monitor air pollution?

Monitoring site locations

Health information

What's air pollution like near me?

What's air pollution like near me?

Enter the location of your home or school below and find out the nearest air quality monitoring site near you.

Search >

The nearest 5 monitoring sites to your location are shown on the map and listed below.

[South Lanarkshire Hamilton](#)
1.64 miles away

Current pollution level:
LOW (Index 2)
 Last updated: 25/03/2015 07:00

[South Lanarkshire Uddingston](#)
2.68 miles away

Current pollution level:
LOW (Index 2)
 Last updated: 25/03/2015 08:00

[South Lanarkshire East Kilbride](#)
3.35 miles away

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[N Lanarkshire Motherwell](#)
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You may also want to take a look at...
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8

Ricardo-AEA in Confidence

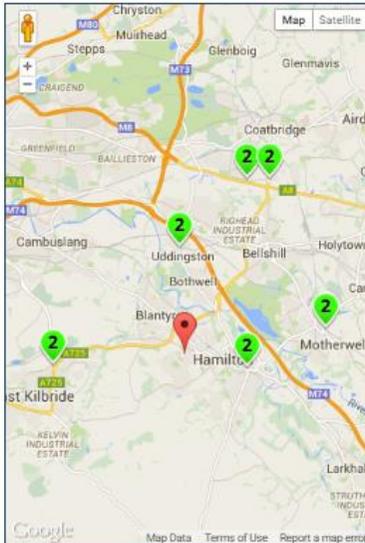
© Ricardo-AEA Ltd



- Sources of pollution
- Impacts on me, my friends, my family
- How do we monitor air pollution?
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- What's air pollution like near me?**

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This search uses Google's database to help locate the place you've typed in, so it may not be 100% perfect!

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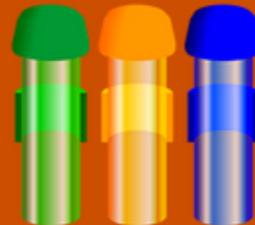
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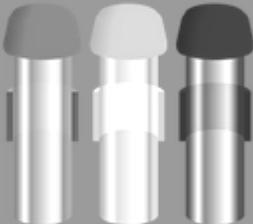
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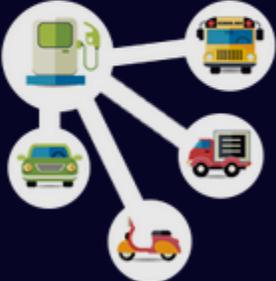
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Home About air pollution **Making a difference** Citizen science
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Emissions calculator

Emissions Calculator

Calculate your emissions getting to school using the emission calculator below!

Transport Type:

Distance to your school (miles):

Passengers:

Calculate Emissions >

How we do the calculation

This calculator provides information on the annual quantity of oxides of nitrogen (NO_x) and fine particulate matter (PM₁₀) emitted to air by your journeys to and from school during a year.

To calculate how much of each pollutant is emitted to air by your school journeys we use vehicle emission factors that are based on our current understanding of emissions from vehicles in Scotland.

The factors are used to calculate pollutant emission rates in grams per distance travelled for different vehicle types. The emission rate is then multiplied by the number of journeys to and from school in a year, and divided by the number of passengers in the vehicle to calculate an annual emission per person for each pollutant in grams.

The equation for the calculation is:

$$\frac{\text{Vehicle type emission rate} \left(\frac{\text{g}}{\text{km}} \right) \times \text{distance travelled (km)} \times \text{total number of journeys in a year}}{\text{number of passengers}}$$

Assumptions made in the calculator

There are a wide number of variables used when calculating vehicle pollutant emissions so some assumptions have been made for this simplified emissions calculator as follows:

- All vehicle emission rates are calculated based on the current understanding of the Scottish vehicle fleet age mix in 2014
- School buses are assumed to be double-decker with an average of 60 passengers
- Annual emission calculations are based on a typical school year of 190 days.
- The average speed for as school journey will be 30 mph in an urban area

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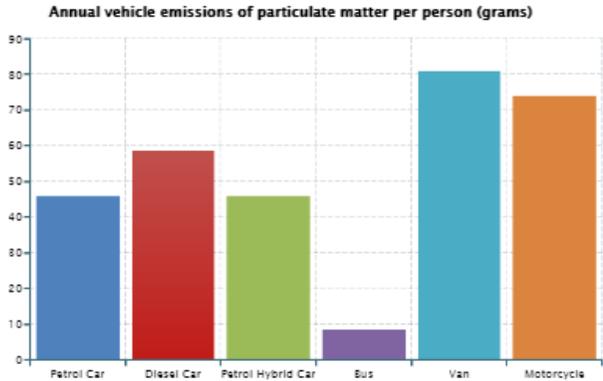
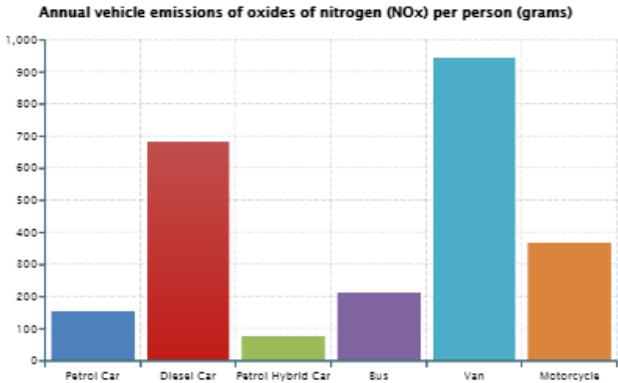
Your calculated emissions for a Diesel Car!

NOx	684 g	PM₁₀	59 g
Annual vehicle emissions of oxides of nitrogen (NOx) per person		Annual vehicle emissions of particulate matter, per person	

[» Read how we calculate this, and the assumptions made](#)



Compare your journey with different vehicles



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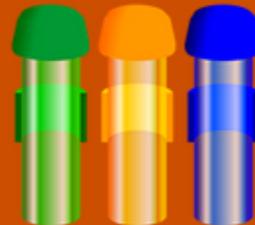
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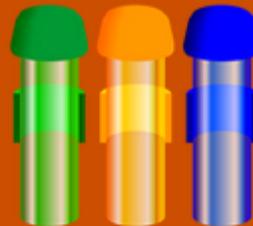


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Several schools involved in the pilot scheme

East Dunbartonshire

South Lanarkshire

Two Different Groups

Mixed ability 1st year group “Litter
Busters”

2nd year Chemistry Class –
mixed ability



- Raise awareness of air pollution within secondary school age pupils
- Undertake short-term monitoring using diffusion tubes to observe changes in NO₂ concentrations at various locations around the school
- Provide all pupils with a pupil pack with instructions for diffusion tube deployment at home
- Provide the pupils with the results of the analysed tubes so they may input the data into their schools webpage
- Undertake an interpretation and conclusions session with pupils to encourage them to work out what factors may be influencing the concentrations recorded.

- Questionnaires were given to each pupil who took part and the teachers
- Feedback has been extremely positive from both teachers and pupils
- Deputy Head Teacher
 - more activities could be built in
 - Use the data to provide help with graphs, pie charts etc

Clear the Air
Pupil Feedback Questionnaire

Session Presentations

1) Did you feel like the power point presentations were (please circle):

- Interesting 1 2 3 4 **5**
- Easy to understand 1 2 3 4 **5**

I feel this because.....

Practical

2) Putting up the diffusion tubes at my house was (please circle):

- Easy / **Difficult**

3) I found the instructions in my study pack (please circle):

- Easy to understand 1 2 3 **4** 5
- Helpful 1 2 3 **4** 5

I feel this because.....

The Overall Study

4) Did you find learning about air quality and getting hands on experience of scientific monitoring equipment interesting? **Yes** / No (please circle)

5) Do you feel other pupils/ schools would benefit from this experience? **Yes** / No (please circle)

My favourite part of the study was getting to appear on the BBC and getting to study air quality around our school.



BBC Sign in News Sport Weather iPlayer TV Radio

NEWS

Home UK World Business Politics Tech Science Health Education Entertainment

Scotland Scotland Politics Scotland Business Edinburgh, Fife & East Glasgow & West Hi



The kids are fuming: Pupils track pollution on the school run

8 August 2014 | Scotland



Pupils at a Glasgow school have joined forces with pollution analysts to measure the effect of the school run on air quality. BBC Scotland's health correspondent Eleanor Bradford spent an afternoon with them.



<http://www.bbc.co.uk/news/uk-scotland-28697096>

Clear the Air Educational Programme

- 4 Narrated Webinar Sessions
- Teachers Pack
 - provides the teacher with information on:
 - The Clear the Air Education Programme
 - Air Quality and Pollutants
 - Webinar Session information
- Pupil Pack
 - Diffusion Tube Deployment Instructions
 - Home Exposure Detail Sheet
 - Diffusion Tube Checklist



Introduction to Clear the Air and Air Quality Issues



- Introduction to Clear the Air and the website

- Discusses:

- What is air pollution?
- What are the main pollutants?
- What are the sources of pollution?
- Impacts of air pollution on both the environment and health

- Emissions Calculator

Sources of pollution	<h3>Impacts on me, my family, my friends</h3> <p>Air pollution at very high levels can have negative effects on everyone in the family – from your little brother or sister to your Grandparents. It is estimated that you breathe 20,000 litres of air each day. This means the more polluted the air is, the more dangerous chemicals we breathe into our lungs.</p> <p>Babies and small children are more likely to be affected by air pollution as they:</p> <ul style="list-style-type: none">▪ breathe faster than adults▪ have a developing lung and immune system  <p>Children's lungs, immune system and brain continue to rapidly develop until approximately age 6, and the cell layer lining the inside of the respiratory tract is particularly permeable during this age period meaning pollution is easily absorbed. Compared to adults, children also have a larger lung surface area in relation to their body weight, and breathe 50% more air per kilogram of body weight.</p> <p>Young adults will also be affected by poor air quality if they have any lung or heart conditions. Those living in cities with high exposure to air pollutants are at increased risk of developing asthma, pneumonia and other lower respiratory infections.</p> <p>Parents and Grandparents can also be affected by air pollution. As people age, their bodies are less able to compensate for the effects of pollution. Poor air quality can aggravate any pre-existing health issues such as asthma and heart problems.</p> <p>Ozone and Particulate Matter (PM) (especially smaller, fine particle pollution called PM 2.5) have the greatest potential to affect the health of older adults. Fine particle pollution have been linked to asthma attacks, heart attacks and the development of chronic bronchitis. Ozone, even at low levels, can exacerbate respiratory diseases.</p>
Impacts on me, my friends, my family	
How do we monitor air pollution?	
Monitoring site locations	
Health information	
What's air pollution like near me?	

Air Quality Monitoring

- How Air Quality Is Monitored
- Overview Of Automatic Monitoring Methods
- Overview Of Non-automatic Monitoring Methods
- Introduction To The Monitoring Study



Webinar Session 3

Diffusion Tube Deployment and Pupil Pack Handout

- Instructions on how to deploy the diffusion tubes for sampling
- Deploy school diffusion tubes
- Pupil pack hand out



Results and Discussion

- Dedicated school login
 - Allows pupils to input their diffusion tube data
- Discussion of results
 - What factors could be may be influencing the concentrations recorded?
- Potential to have all participating groups monitored results visible



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Get help or learn how to sign up

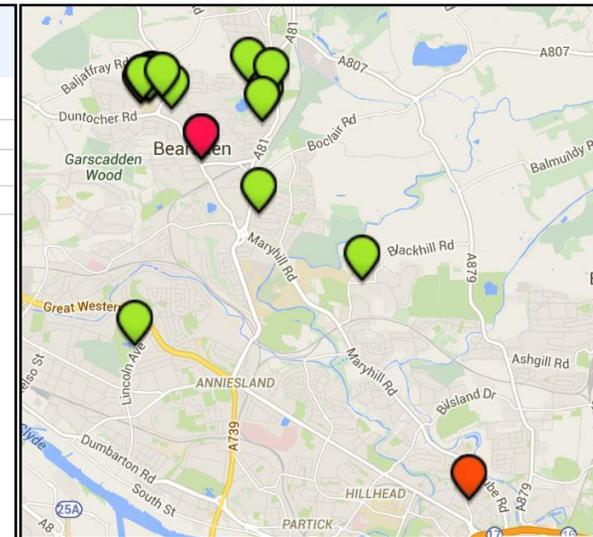
Select the period to enter data for:
2014

 Latitude: 55.86860407440095
Longitude: -4.110843460327146

Environment Type:

Date Started: e.g. 21/03/2014
Date Ended: e.g. 21/03/2014
Measured Concentration: $\mu\text{g}\text{m}^{-3}$
Your Name:

Check the data you've entered above and make sure it's correct before clicking the button below. Your data will then instantly appear on the map.





successful learners	confident individuals	responsible citizens	effective contributors
<p>attributes</p> <ul style="list-style-type: none"> • enthusiasm and motivation for learning • determination to reach high standards of achievement • openness to new thinking and ideas <p>capabilities</p> <ul style="list-style-type: none"> • use literacy, communication and numeracy skills • use technology for learning • think creatively and independently • learn independently and as part of a group • make reasoned evaluations • link and apply different kinds of learning in new situations. 	<p>attributes</p> <ul style="list-style-type: none"> • self-respect • a sense of physical, mental and emotional well-being • secure values and beliefs • ambition <p>capabilities</p> <ul style="list-style-type: none"> • relate to others and manage themselves • pursue a healthy and active lifestyle • be self-aware • develop and communicate their own beliefs and view of the world • live as independently as they can • assess risk and make informed decisions • achieve success in different areas of activity. 	<p>attributes</p> <ul style="list-style-type: none"> • respect for others • commitment to participate responsibly in political, economic, social and cultural life <p>capabilities</p> <ul style="list-style-type: none"> • develop knowledge and understanding of the world and Scotland's place in it • understand different beliefs and cultures • make informed choices and decisions • evaluate environmental, scientific and technological issues • develop informed, ethical views of complex issues. 	<p>attributes</p> <ul style="list-style-type: none"> • an enterprising attitude • resilience • self-reliance <p>capabilities</p> <ul style="list-style-type: none"> • communicate in different ways and in different settings • work in partnership and in teams • take the initiative and lead • apply critical thinking in new contexts • create and develop • solve problems

Interest in the Clear the Air Educational Programme



Clean the Air

Thank you for listening

Susannah Telfer

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