University of Reading

Taking action in schools for healthier air indoors

Schools Climate Summit

Briony Turner, University of Reading

Secretariat, Indoor Air Quality Working Party & Vice Chair, CIBSE Resilient Cities group

Indoor Air Quality
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Indoor Air Quality Working Party

Advancing public understanding, equality of access and experience of healthier indoor air for children and other vulnerable groups in the wider population.

Our objectives:

1. Synthesise and make recommendations from evidence-based research of indoor air quality and its health effects on children and other vulnerable groups in the wider population
2. Give robust evidence a narrative, a story, a relevance in everyday life.
3. Inform and educate those in a position to take action for healthier indoor air.

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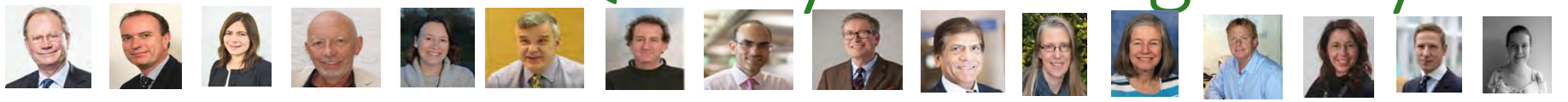
The Indoor Air Quality Working Party



- **Stephen Holgate - Co-Chair – MRC Clinical Professor, University of Southampton and UKRI Clean Air Champion.**
- **Jonathan Grigg - Co-Chair - Prof of Paediatric Respir. and Environ. Med., QMUL.**
- Alan Short - Prof of Architecture, University of Cambridge.
- Anne Greenough - Prof of Neonatology and Clinical Respiratory Physiology, KCL.
- Benjamin Jones -Assist Prof, Architecture and Built Environ., University of Nottingham
- Hasan Arshad - Prof of allergy and clinical Immunol, University of Southampton.
- Janet Barlow - Prof of Environmental Physics, University of Reading
- Marcella Ucci - Assoc Prof, Environmental and Healthy Buildings, UCL.
- Mike Holland - freelance consultant at Ecometrics Research and Consulting, Reading.
- Nicola Carslaw - Prof in Air Pollution, Environment and Geography, University of York,
- Paul Cullinan - Prof of Occupational and Environmental Respiratory Disease, IC.
- Paul Linden - Professor of Fluid Mechanics, Dept of Applied Mathematics and Theoretical Physics, University of Cambridge
- Sotiris Vardoulakis - Prof of Global Environmental Health, Austr Natl Univ, Canberra.
- Tim Sharpe - Prof of Environmental Architecture, Glasgow School of Art.
- Secretariat, hosted by the University of Reading
  - Briony Turner, University of Reading.
  - Catherine O'Leary, University of York

https://www.rcpch.ac.uk/work-we-do/research-activities/effects-indoor-air-quality-children-young-peoples-health-research-project

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Royal College of Physicians

RCPCH
Royal College of Paediatrics and Child Health
Leading the way in Children's Health

15 Recommendations

- Establish national strategy and regulations
- Advise the public and professionals
- Increase Local Authority oversight and powers
- Reduce the potential for inequality
- Performance-based building design, construction and management
- Protect school children
- Provide high-quality research and evidence
- Improve the air in your home

#TeamCleanAir&Us say:

Children and young people want Government to develop stricter regulations and guidance to control products and building materials that contribute to poor indoor air quality.

Many of the materials, products and designs that contribute to poor air quality are out of the control of children, young people and families. This is especially true if your family doesn't own their own house or can't make changes to their home. Government has an important role to play.

- Strict regulations about indoor air quality should be in place and should be monitored by Government.
- Social housing should have high standards for indoor air quality and this should be enforced.
- There should be clear information and warning systems developed for labelling products that can create poor air quality, so parents, carers and young people can make better purchasing choices.
- A 'clean air' house check-up system should be developed so that when families are thinking about buying a house it has a rating (like an energy certificate) to help them assess the air quality inside a building. There could also be an app for mobile phones that people could use to assess indoor air quality.

PROTECT SCHOOL CHILDREN FROM POOR INDOOR AIR QUALITY

Recommendation 14 - **Schools should:**

- (a) **Use adequate ventilation** to prevent the build-up of harmful indoor pollutants, ventilating between classes if outdoor noise causes a problem during lessons. If the school is located close to traffic, it may be best to do this during off-peak periods, or open windows and vents away from the road.
- (b) **Ensure classrooms are regularly cleaned** to reduce dust, and that damp or mould is removed. Repairs may be needed to prevent further damp and mould.
- (c) **Ensure that any air filtering or cleaning devices are regularly maintained.**
- (d) **Work with the Local Authority**, through the ambient air quality action plans, and with parents or carers to reduce traffic and idling vehicles close to the school.

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https://theinsidestory.health/protect-school-children/

Why this matters…

- We are spending more and more of our lives indoors, and the health impact of the air within our homes and schools needs to be taken seriously as a significant source of ill health.
- Children spend a greater proportion of their lives indoors than outdoors.
- The air inside our homes can be five times more polluted than the air outside.
- Children’s lungs are most susceptible to the harmful effects from damp, mould and airborne toxins.

Built environment recovery timescales….

Exposure timescale, periods of a person's life –a childhood

- Repair and reinstatement after flooding, fires, storms
- Fumes, dust, environmental stressors (noise, smell, surfaces disruption), internet disruption

Health is not just about disease and diagnoses – it's also about how we feel, how we function and how we adapt to changes in our lives…our state of health is affected by our development and experience over the course of our entire lives.

Source: Closer https://www.closer.ac.uk/evidence/inequalities-adult-physical-functioning/

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The indoor environment shapes human health in multiple ways not just exposure to pollutants.

Birth and infancy

- Respiratory problems – wheeze, rhinitis, atopic asthma, respiratory infections
- Low birthweight and pre-term birth

Pre-school

- Respiratory problems – wheeze, allergies, asthma, risk of respiratory diseases and pneumonia
- Eczema and atopic dermatitis
- Greater hyperactivity, impulsivity and inattention

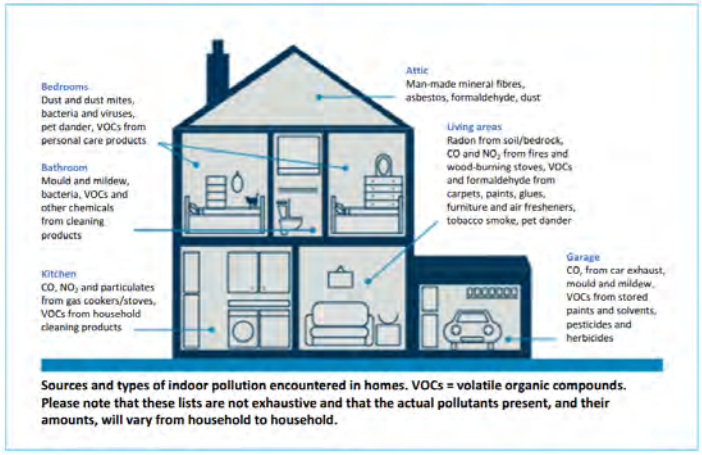
School age

- Respiratory problems – wheeze, rhinitis, asthma, throat irritation, nasal congestion, dry cough
- Eczema, dermatitis, conjunctivitis, skin and eye irritation
- Reduced cognitive performance, difficulty sleeping

Source: Royal College of Paediatrics and Child Health

Sources	Emissions of pollutants and chemicals
Mineral wool insulation[71]	Particulate matter (PM)
Polyurethane spray-foam insulation[72]	Flame retardants (tris phosphate) as well as aldehydes, under specific conditions
Urea-formaldehyde insulation[67, 73]	Formaldehyde
Paints (water-type latex types[67, 74]	Texanol® and formaldehyde
Older paints[67]	Mercury and lead
Green or natural paints[75]	Linseed oil, limonene, and other terpenoids, which can react with ozone to produce inhalable aerosols and formaldehyde
Wallpapers[76, 77]	Phthalate plasticisers
Adhesives and preservatives[67, 73]	Formaldehyde throughout their life, along with benzene, aldehydes and terpenoids
Furniture, soft furnishings, and soft toys, mattresses, and curtains[73]	Natural fibres or synthetic foams containing bromine flame retardants, dust mites
Flame retardants[78]	Organophosphates, both halogenated and non-halogenated
Carpets[73, 79]	Dust mites, VOCs, flame retardants
Flexible smooth floors[67]	Phthalate plasticisers
Composite wooden floors[73]	Formaldehyde and VOCs

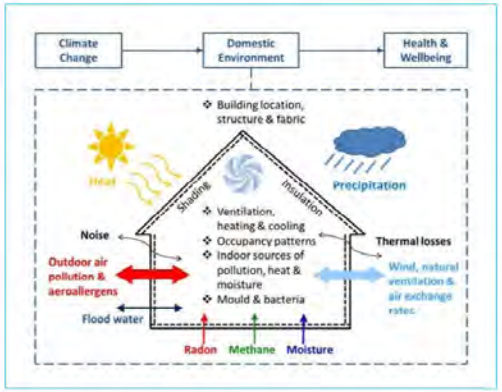
Figure 5: An overview of sources of indoor pollutants in a home.



Sources and types of indoor pollution encountered in homes. VOCs = volatile organic compounds. Please note that these lists are not exhaustive and that the actual pollutants present, and their amounts, will vary from household to household.

Source: Royal College of Physicians[6]

Figure 6: Drivers of indoor air quality in homes and schools.



Source: Vardoulakis et al[58]

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Key pollutants in homes and schools

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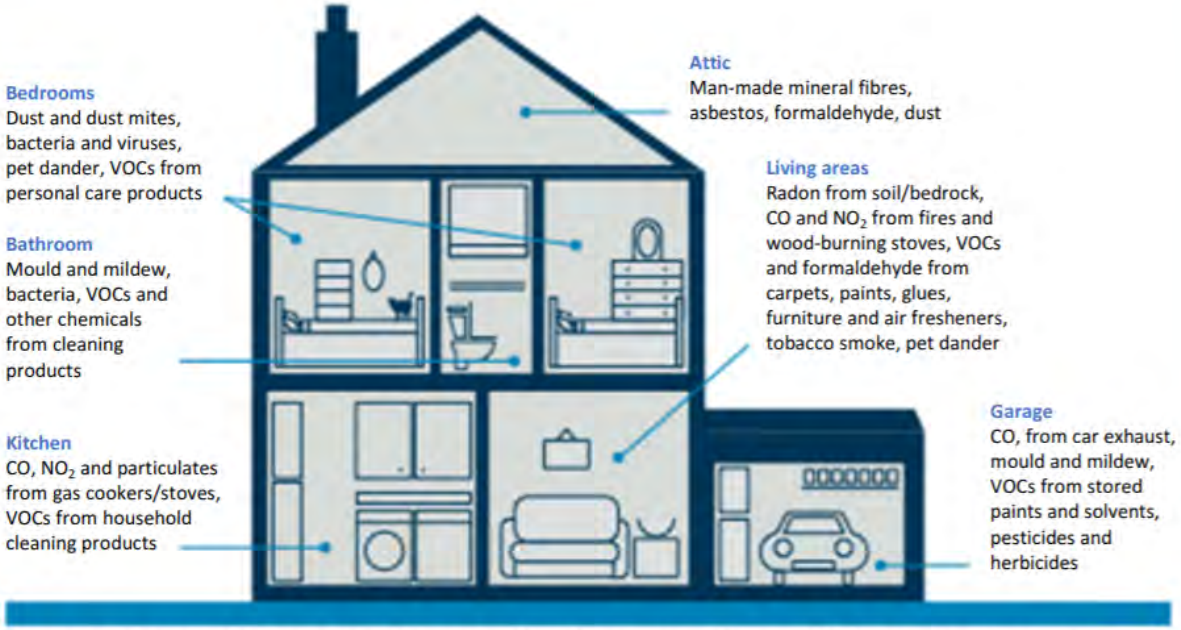

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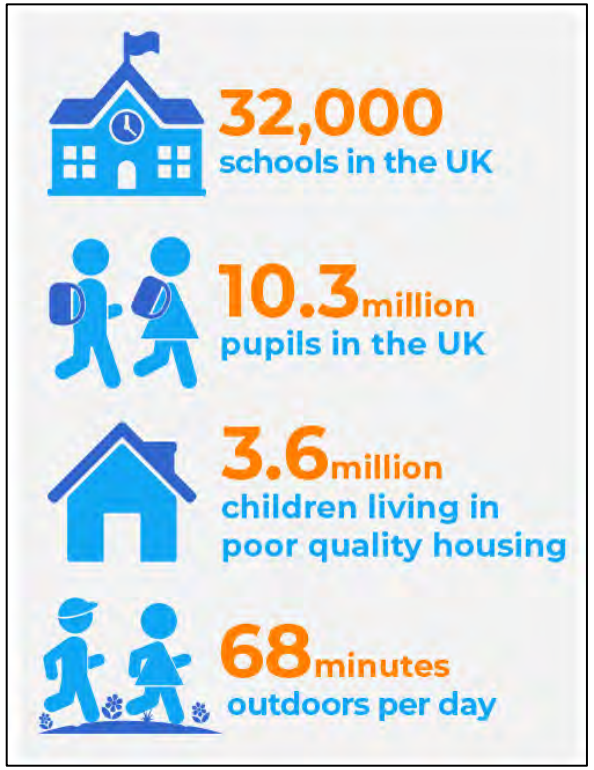
Source: Royal College of Physicians[8]

Calling for:

- **high quality health related research** to understand more about how the indoor environment influences health and well-being in vulnerable people.
- **greater understanding of different exposures in driving adverse health**
  - interaction of multiple chemicals, chemical and biological pollutants
- **healthier school and day nursery environments** (buildings) as well as homes and workplaces



Ventilation in school classrooms

– tips from Ben Jones, Assist Prof, Architecture and Built Environment, University of Nottingham

- **Use your nose!** If it smells when you first enter a space, your space is under-ventilated.
- **Understand your system!** For example, if your windows don't open you probably have a mechanical system. Have a look for grilles in the ceiling. Are there controls? How do they work? Find out!
- **Windows for summer: open wide!** Opening windows on the opposite sides of buildings induces ventilation than using windows on a single side. Where possible, opening doors that link rooms on opposite sides of a building will help a lot.
- **Windows for winter: opening higher windows first** enables incoming cool outdoor air to mix with room air before it reaches occupants, helping to preserve their thermal comfort. Consider opening windows wider at break time to purge the space. In a modern classroom, the children will soon help to heat the space up again.

Research in school classrooms suggests they are under-ventilated, but this is not usually the fault of the system. It is primarily a misunderstanding of occupants who close windows to save heating energy in winter.

Windows are sized to dissipate heat gains in the summer and keep occupants cool. These ventilation rates can be up to 10 times higher than those required for contaminant control. The point is that windows should be able to deliver enough air all year round if they have been designed correctly.

Useful resources and further information

- TAPAS (Tackling Air Pollution At School) network: https://tapasnetwork.co.uk
- the Clean Air for Schools Framework: https://www.transform-our-world.org/clean-air-for-schools providing an existing tool for working out what schools can do. It is being refined in the TAPAS project.
- Global Action Plan have a page on Schools as part of their Clean Air Day resources: https://www.cleanairday.org.uk/free-resources/schools

For London specifically there is:

- The Mayor of London has issued the 'Toolkit of Measures to Improve Air Quality at Schools': https://www.london.gov.uk/sites/default/files/school_aq_audits_-_toolkit_of_measures_dr_v3.3.pdf
- The Hackney School Streets Toolkit for Professionals is available at: https://modeshift.org.uk/modeshift-news/hackney-council-updates-school-streets-toolkit-for-professionals/

Clean Air for Schools Framework -Education

There are other measures that could be considered (e.g. not bringing goods into schools that will contaminate the air, such as some furnishings, cleaning products, etc.).

The Clean Air for Schools Framework is a free, online tool to help every school create a tailored clean air action plan to tackle air pollution in and around the school.

The framework is designed to help your school to:

- Reduce air pollution from your own operations
- Tackle air pollution at the school gate, including the school run
- Educate the next generation to help them and their families make cleaner air choices.
- Become a local leader on air pollution, working with local partners to improve air quality in the local area.

https://www.transform-our-world.org/clean-air-for-schools

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Clean Air for Schools Framework -Operation

Open windows to ventilate your school to improve indoor air quality	Improve air quality inside the school with natural ventilation by opening windows when outdoor air quality is good. Outdoor sources of air pollution, such as road transport, are also a source of indoor air pollution so make sure windows are closed next to busy roads, during rush hour and other high air pollution periods.
Provide showers and locker facilities for staff to encourage active travel	
Offer a cycle to work scheme to your staff to encourage active travel	The Cycle to Work scheme is designed to help your staff save money on a new bike and spread the cost of the bike over monthly tax-free instalments throughout the year.
Improve cycle and scooter parking to encourage active travel	The recommended minimum levels of scooter and cycle parking are: Primary schools: 1 scooter space per 10 pupils and 1 cycle space per 20 pupils Secondary schools: 1 cycle space per 10 pupils. In Scotland, funding is available to help implement cycle/scooter parking through Sustrans. All schools: 1 cycle space per 20 staff in a non-pupil area
Switch to a clean energy supplier and discover ways to limit the school's energy use	By switching to a clean energy supplier and using less energy through retrofits and changes in behaviour, schools can cut carbon emissions and air pollution. School Switch can help you change to a renewable energy supplier.
Service your boiler regularly	Make sure your boiler is serviced regularly to help keep it burning fuel cleanly. This will help prevent pollution being emitted from the boiler and flu.
Make your school a no smoking site	Smoking is banned in all indoor public places and in cars that carry children under 18. However, smoking policies relating to school gates, are decided and governed by schools themselves.
Switch cleaning products to fragrance free where possible and choose liquid products rather than sprays	Lots of different chemicals can create air pollution, including those known as volatile organic compounds (VOC)s. Look for products labelled as low emission or low VOC to minimise air pollution.
Replace strong-smelling pens, glues and paints with ones that are lower emission, sometimes labelled 'low Volatile Organic Compounds (VOCs)', for school arts and craft	Lots of different chemicals can create air pollution, including those known as volatile organic compounds (VOC)s. Look for products labelled as low emission or low VOC to minimise air pollution.
When doing school maintenance, choose low emission paints and products, often labelled 'low Volatile Organic Compounds (VOCs)'	Lots of different chemicals can create air pollution, including those known as volatile organic compounds (VOC)s. Look for products labelled as low emission or low VOC to minimise air pollution.
Install and maintain air purifiers	Where it is difficult to reduce the sources of air pollution in the classroom, e.g. those next to busy roads, air purifiers can help remove pollutants from the air.
Install and maintain an air filtration system in classrooms most exposed to air pollution	Mechanical filtration can filter out air pollution coming into the school and help improve indoor air quality.
Provide electric vehicle charging points on site to encourage visitors to drive an electric vehicle	For journeys that can't be walked, cycled or taken on public transport, choosing to drive an electric vehicle will produce less air pollution than a petrol or diesel vehicle. By providing an electric vehicle charging point at school you can help the transition to electric vehicles.
Reduce air pollution from deliveries by reducing the number, arranging them to arrive at quieter times and opting for lower pollution delivery vehicles	Reduce the number of delivery vehicles coming to your school by grouping deliveries together. Ask for deliveries to be made outside of peak hours to reduce congestion. And where possible choose providers that use cargo bikes or electric vans.
Install green infrastructure as a barrier to air pollution around the school	Green infrastructure - hedges, green walls, trees - planted as a barrier between busy roads and a school can help reduce children's exposure to air pollution.
Relocate pedestrian school entrances away from busy streets	To reduce student exposure to air pollution, create or re-open a pedestrian entrance away from more polluted streets.
Monitor air pollution outside and inside the school using air pollution monitors and sensors.	Measuring and monitoring air pollution levels inside and outside the school can help inform your clean air action plan and track your progress. It's also a great way to engage pupils with the topic.
Encourage contractors to limit their use of diesel generators and consider the levels of dust generated through building work	Building work can be dusty and generators and vehicles can be polluting. Many construction companies are members of the Considerate Constructors Scheme that includes advice on air pollution.
Work with construction teams to consider air pollution in new building designs and the construction materials used	When new school buildings are being designed and built, or existing buildings are being retrofitted, there are lots of opportunities to mitigate air pollution. Designing a new space with clean air as a core part of the design, such as through ventilation and choosing low emission materials, will make future operation of the building as a clean air school much easier. The construction and demolition processes too can also be a substantial source of air pollution to the local environment and should be considered carefully.

Clean Air for Schools Framework –School gate

Start a walking bus	Work with parents/carers to set up walking buses. A walking bus is a group of children and adults who walk to school along a set route, picking up more students along the way. When done on a regular basis, adults can take it in turns to accompany the walking bus.
Create and share a map of low pollution walking routes to school	A walking zone is a defined area around the school within which children and families are encouraged to walk. Work with students to use mapping software to create a map of low pollution walking routes within the walking zone, and distribute this across the school community.
Launch a week-long active travel challenge to encourage your students to try walking or cycling to school	By trying walking and/or cycling to school as part of a fun challenge week, new travel habits can be formed as families and students experience the benefits of active travel.
Hold a play street	Work with parents/carers and the council to close the road outside your school for a few hours, run fun activities and games using the space the road provides when there are no cars and experience traffic-free, cleaner air streets.
Close the road outside the school to cars permanently	Work with your local authority to permanently remove cars from the street outside your school. Modal filters still allow for bicycle, pedestrian and emergency vehicle access, and a bus gate can provide access to buses, taxis and those with mobility issues.
Organise a car free day	Work with the local authority to close the road outside the school to vehicles for the day to experience traffic-free, cleaner air streets. Use the space to encourage active play and collect feedback from your school community on the types of temporary and permanent road closures to see if a permanent road closure is possible.
Make your street a school street by adding traffic restrictions during school pick up and drop off times	A school street closes the road to traffic during drop off and pick up times to discourage the use of cars to get to and from school.
Talk to your local authority about reducing speed limits on the streets around your school	Reducing speed limits and encouraging smooth driving on roads near the school can cut pollution and improve road safety.
Talk to your local authority about moving the bus stop away from the playground	In some cases, bus stops near the school may be a significant source of emissions with buses frequently braking and accelerating to and from the stop. This may also contribute to queuing traffic and congestion. Relocating the stop further away from the school may help to lessen these issues.
Ask the council to replace heavy polluting public buses with low emission alternatives	Public transport is a lower air pollution option than the car per passenger. However, older buses can still contribute significantly to air pollution. The good news is that low emission buses are available.
Ask your local authority to limit heavy weight vehicles from using the roads around the school	Introduce a weight restriction to prevent large polluting freight vehicles driving past the school.
Ask your local authority to introduce Ultra Low Emission Vehicle (ULEV)-only streets around the school	Take a look at the case study on page 19 of the Mayor of London's 'Toolkit of Measures to Improve Air Quality at Schools' for inspiration.
Allocate a location for a Park and Stride	A Park and Stride involves allocating a parking point for parents and carers away from the school (e.g. a public car park or supermarket or cinema car park) from where students can complete their journey on foot.
Promote car sharing for those who need to drive	Car clubs and car-share schemes can help reduce the number of cars on the road. Encourage staff and families who can't walk/cycle/scoot to school to share the school run with others.
Implement a no idling zone around your school	Make your school a no idling zone so that drivers always turn off their engines when stationary, and it is safe to do so.

Clean Air for Schools Framework -Education

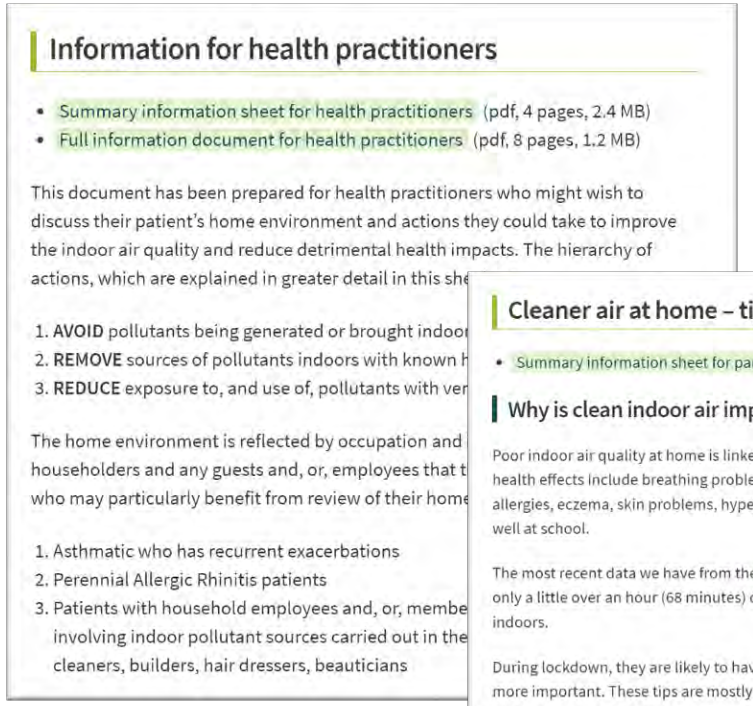
Action	Description
Organise an air quality focused assembly for your school	An assembly is a great way to reach the whole school at once with information about air pollution. A class that has been learning about air quality could present their findings to the rest of the school. The assembly could also be used as a moment to launch other initiatives, such as a no-idling campaign.
Lead action-focused lessons on air pollution with students of all ages	Engage your students through activity kits, lesson plans, and tailored PowerPoint presentations.
Talk to families about the air pollution actions you are taking at school in your school newsletter	Adding air pollution content to your school newsletter will help to inform parents/carers about the problem and what they can do to help tackle it.
Add a link to the Clean Air Hub on your school website	Providing information about air pollution and what people can to do improve it will help people to protect their health and reduce air pollution in the community. The Clean Air Hub is a one-stop shop for information on air pollution.
Send out text alerts to families informing them of high air pollution days	Informing families about high air pollution episodes can help protect people's health.
Make provisions for those with health issues to stay inside during periods of high air pollution	For some students with health conditions such as asthma, air pollution may exacerbate their symptoms. It is important to be aware of the possible implications of high pollution days and have a plan in place.
Display air pollution information on notice boards around the school	Clean Air Day posters and the leaflet helps you to share key information about air pollution and what you can do to avoid it.
Support teachers and school staff to learn more about air quality	Supporting teachers to learn more about air pollution can help them to develop further ideas to tackle air pollution in and around the school.
Help your students cycle to school	Cycle training helps to make bike journeys safe and enjoyable. Cycling training builds confidence and increases the likelihood of students cycling at an older age.
Involve pupils in developing and implementing your clean air plan through a school green team or eco-council	Forming a green team or eco-council at your school is a great starting point for your journey to becoming a clean air school. Students and teachers can work together to develop and implement your clean air plan.

Clean Air for Schools Framework -Voice

Campaign for national action on air pollution	The school community can significantly influence decision-makers and in turn help shape the world we live in, for example, from influencing national transport and car manufacturing regulations to securing national school funds and updating the curriculum. Write to the Prime Minister, Secretary of State for the Environment and your MP asking for the changes your school and students would like to see on air pollution, sending pictures can also help grab attention. Ask to meet, share what you have been doing to tackle air pollution and what more you want to happen.
Ask local decision makers for more action on air pollution	Use the student voice and the school community's experience of tackling air pollution to ask local decision makers to do more on reducing air pollution in your local area. Taking part in local decision-making could include: writing to and meeting your local councilors or MP, responding to consultations and/or attending consultation events. Students' experiences and opinions can be very influential.
Ask businesses to help tackle air pollution	Businesses play a crucial role in tackling air pollution, both through cutting their own air pollution emissions and by providing solutions to make low air pollution lifestyles easier. Use the student voice to approach local and national companies to ask them do more on air pollution.

Tips for healthier air at home –resources for school nurse and parents

- Instagram: https://www.instagram.com/iaq_wp/
- Twitter: https://twitter.com/IAQWP
- Facebook: https://www.facebook.com/IAQWP



Information for health practitioners

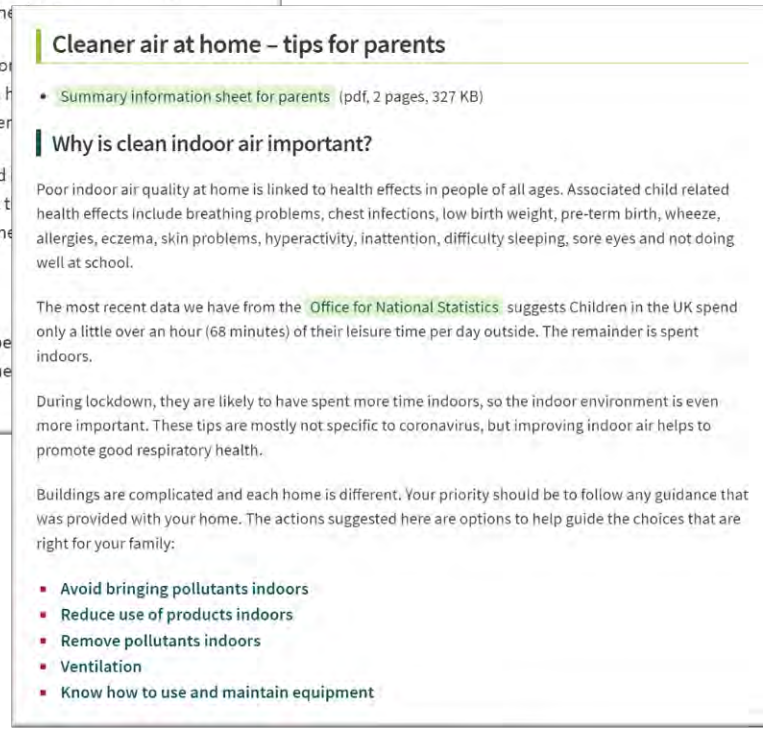
- Summary information sheet for health practitioners (pdf, 4 pages, 2.4 MB)
- Full information document for health practitioners (pdf, 8 pages, 1.2 MB)

This document has been prepared for health practitioners who might wish to discuss their patient's home environment and actions they could take to improve the indoor air quality and reduce detrimental health impacts. The hierarchy of actions, which are explained in greater detail in this she

1. **AVOID** pollutants being generated or brought indoo
2. **REMOVE** sources of pollutants indoors with known h
3. **REDUCE** exposure to, and use of, pollutants with ver

The home environment is reflected by occupation and householders and any guests and, or, employees that t who may particularly benefit from review of their home

1. Asthmatic who has recurrent exacerbations
2. Perennial Allergic Rhinitis patients
3. Patients with household employees and, or, membe involving indoor pollutant sources carried out in the cleaners, builders, hair dressers, beauticians



Cleaner air at home – tips for parents

- Summary information sheet for parents (pdf, 2 pages, 327 KB)

Why is clean indoor air important?

Poor indoor air quality at home is linked to health effects in people of all ages. Associated child related health effects include breathing problems, chest infections, low birth weight, pre-term birth, wheeze, allergies, eczema, skin problems, hyperactivity, inattention, difficulty sleeping, sore eyes and not doing well at school.

The most recent data we have from the Office for National Statistics suggests Children in the UK spend only a little over an hour (68 minutes) of their leisure time per day outside. The remainder is spent indoors.

During lockdown, they are likely to have spent more time indoors, so the indoor environment is even more important. These tips are mostly not specific to coronavirus, but improving indoor air helps to promote good respiratory health.

Buildings are complicated and each home is different. Your priority should be to follow any guidance that was provided with your home. The actions suggested here are options to help guide the choices that are right for your family:

- Avoid bringing pollutants indoors
- Reduce use of products indoors
- Remove pollutants indoors
- Ventilation
- Know how to use and maintain equipment

https://theinsidestory.health/category/resources/

Integrate this knowledge into education

https://theinsidestory.health/contact-us/

Clean air – a call to action

Everyone – from children and their carers, researchers, politicians, health professionals, landlords, teachers and school governors, through to all the trades, suppliers and professions involved in valuing, letting, constructing, maintaining and renovating buildings – can make a start today.

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Other useful resources

Nature-based solutions handbook for practitioners

The handbook aims to provide decision-makers with a comprehensive NBS impact assessment framework and a robust set of indicators and methodologies, to assess impacts of nature-based solutions across 12 societal challenge areas.

Covid-19 assistance for schools tool

This tool was developed as part of the EPSRC funded CO-TRACE project to help schools minimise Covid-19 transmission in classrooms.

Mitigating exposure to traffic pollution in and around schools

This guidance document translates complex science into simple action points that enable children, schools and local communities to make informed decisions and help reduce the exposure of school children to air pollution.

https://www.surrey.ac.uk/global-centre-clean-air-research/resources

Allergy UK press release on tree planting recommendations https://www.allergyuk.org/about/latest-news/1124-allergy-uk-launches-its-top-10-recommendations-for-tree-planting-in-national-tree-week

Professor Prashant Kumar's species selection booklet booklets about tree species selection for air pollution mitigation "Implementing Green Infrastructure for Air Pollution Abatement" and "Mitigating Exposure to Traffic Pollution in and around Schools". https://figshare.com/articles/figure/Considerations_regarding_green_infrastructure_implementation_for_improved_air_quality/8198261/3

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Clean Air Programme

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All | Wave 1 | Wave 2

https://www.ukcleanair.org/

ANTICIPATE: Actively anticipating the unintended consequences on air quality of future public policies

UK public policies can have significant environmental, economic, social and political consequences over both near and distant timescales, but the full range of impacts are not always thoroughly considered at the appraisal stage…

Read more →

QUANT: Quantification of Utility of Atmospheric Network Technologies

Low-cost air pollution sensors could play a vital role in improving air quality, but a deeper understanding of their performance is required to realise their full potential. This project will directly address this challenge …

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DREaM: Component-Specific Air pollutant Drivers of Disease Risk in Early to Midlife: a pathway approach

High pollutant concentrations are linked to a range of long-term adverse health effects, and it is thought that as well as aggravating symptoms, air pollution may contribute to the development of disease. DREaM will identify the ways…

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APEx: An Air Pollution Exposure model to integrate protection of vulnerable groups into the UK Clean Air Programme

Current methods for assessing the impact of clean air policies are entirely based on outdoor air quality, without considering human behaviours or susceptibility. This study will place people at the centre of the problem…

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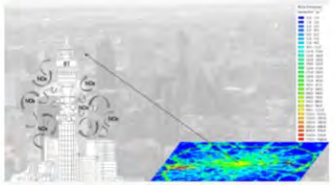

OSCA: Integrated Research Observation System for Clean Air

Changes to transport systems, energy supplies, solvent use, methods for heating homes and agricultural systems are likely to cause profound changes in the emissions of air pollutants in the near future. The OSCA project will provide…

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National Physical Laboratory

The National Physical Laboratory (NPL) is one of the Public Sector Research Establishment (PSRE) partners in…

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UK CLIMATE RESILIENCE PROGRAMME

ARID: SCHOOL BUILDINGS ADAPTATION, RESILIENCE AND IMPACTS ON DECARBONISATION IN A CHANGING CLIMATE

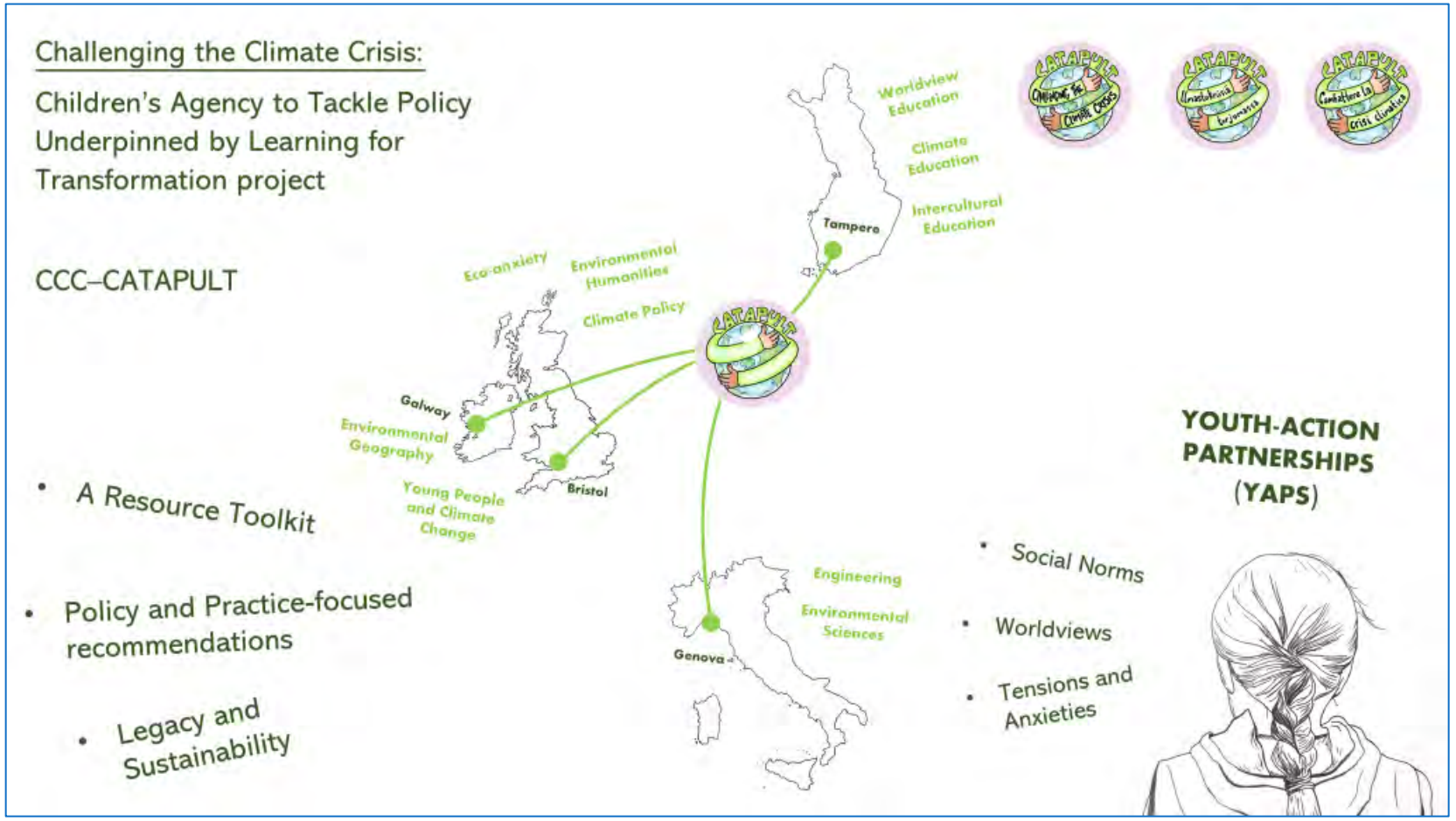
KEY INFO

This is an Embedded Researcher project; click here to find out more about the scheme and a summary of the projects.

This project aims to develop risk-informed resilience of school building stock and optimise the opportunities from a transition to a low carbon future. It will characterise, quantify and

https://www.ukclimateresilience.org/projects/arid-school-buildings-adaptation-resilience-and-impacts-on-decarbonisation-in-a-changing-climate/

CCC-CATAPULT Challenging the Climate Crisis: Children's Agency to Tackle Policy Underpinned by Learning for Transformation



Watch:
https://www.youtube.com/watch?v=hfa1HBVZVmI

Visit the website:
https://ccc-catapult.org/

Follow on Twitter:
@CCC_CATAPULT

Indoor Air Quality
WORKING PARTY

UKRI Economic and Social Research Council

UWE Bristol | University of the West of England

DRY Project's freely-available resources bring the UK's world-leading science into your classroom

- 'DRY: The Diary of a Water Superhero' – online book in English & Welsh (7-11+)
  - Read, share & download in English: https://issuu.com/uwebristol/docs/dry_the_diary_of_a_water_superhero
  - Read, share & download in Welsh: https://issuu.com/uwebristol/docs/sych_dyddiadur_arwres_ddwr
  - Teacher's notes English: https://dryutility.info/wp-content/uploads/2020/01/DRY-book-Teachers-Notes-FINAL-E-VERSION.pdf
  - Teacher's notes Welsh: https://dryutility.info/wp-content/uploads/2021/04/DRY-book-Teachers-Notes-FINAL-W-VERSION.pdf
- Confluence, animation by author/illustrator Chris Haughton, puts DRY research into a global climate change context, for all ages: https://www.youtube.com/watch?v=lpt_ZjKzI8E (4 minutes)
- 'Day Zero and Chips' a short story by award-winning author Patrice Lawrence for ages 12/13+ Video reading https://www.youtube.com/watch?v=Rb427N9BWLM (21 minutes)

About Drought

Institute for Environmental Analytics

UKRI Natural Environment Research Council

DRY Project's freely-available resources bring the UK's world-leading science into your classroom

- Myth-busting videos and podcasts of memories of UK droughts https://aboutdrought.info/videos-podcasts/ (3 videos, around 5 minutes each)
- Geographical Association's 6 lesson plans for Key Stages 3&4 -https://www.geography.org.uk/All-About-Drought-Resources
- Podcasts of first-hand memories of the 1976 drought https://aboutdrought.info/experiences-of-drought/
- Water, Drought & You – handy z-cards, also in poster format (A3 printable poster available) dryutility.info/learning and https://issuu.com/uwebristol/docs/water_drought_and_you

COMING SOON …

- DRY Utility website – story bank is live; story maps and other resources to be released shortly https://dryutility.info

The Psci-com email list is also a great source of fresh ideas and inspirational material for STEM teachers.