Guidance for schools

Introduction

In this document you will find summarised advice on the operation and use of building services in schools to prevent the spread of the COVID-19 virus (SARS-CoV-2). This guide is aimed at school principals and facility managers.

Before taking preventive measures, you should have a basic understanding of how infectious agents are transmitted. In relation to COVID-19, there are four main transmission routes:

1. In close contact of 1–2 metres via droplets and microdroplets (when sneezing, coughing or talking)
2. Via the air through microdroplets (droplet nuclei), which may stay airborne for hours and can be transported long distances (released when breathing, talking, sneezing or coughing)
3. Via surface contact (hand-hand, hand-surface etc.)
4. Via the faecal-oral route.

More backgrounds on transmission routes of SARS-CoV-2 can be found in the REHVA COVID-19 Guidance.

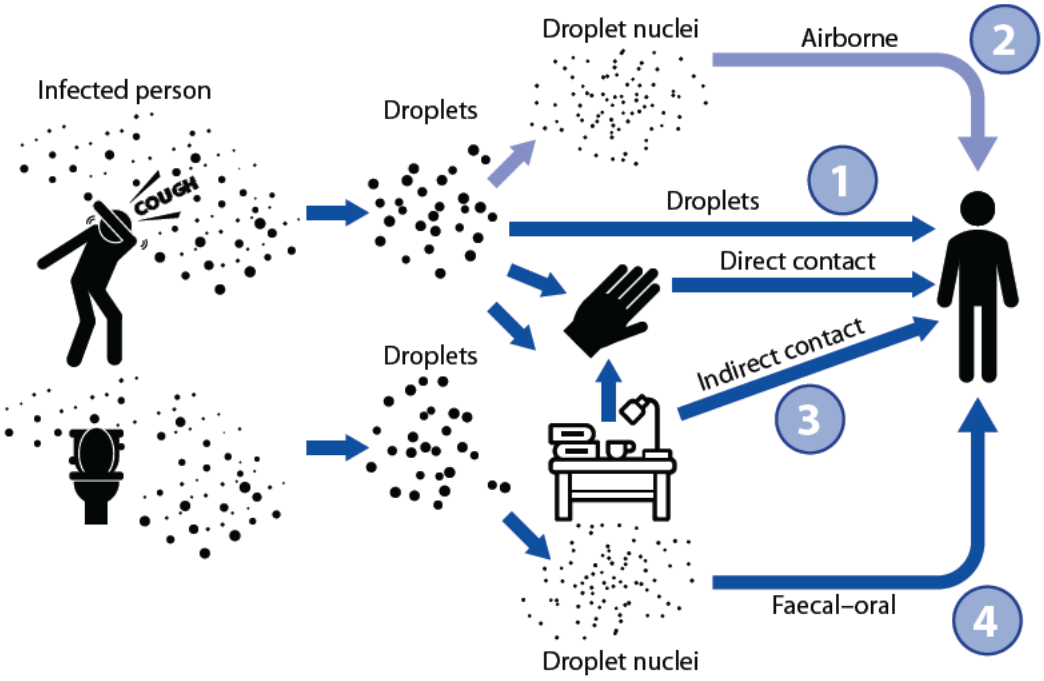

Figure 1. Exposure mechanisms of COVID-19 SARS-CoV-2 droplets. (figure: courtesy Francesco Franchimon).

National guidelines and guidance documents such as the WHO document 'Key Messages and Actions for COVID-19 Prevention and Control in Schools' focus on monitoring of symptoms, physical distancing, and good hygiene practices.

To keep the risk of infection as low as reasonably achievable, AIRAH also recommends measures related to ventilation (airborne transmission) and sanitary installations (faecal-oral transmission).

Ventilation

Many Australian schools do not have sufficient ventilation. Often they are naturally ventilated (e.g., using windows).

Natural ventilation relies on the temperature difference between indoor and outdoor air, and wind. For this reason, sufficient natural ventilation cannot be guaranteed at all times. Mechanical ventilation systems can ensure a continuous air exchange throughout the year. But installing these systems requires time and money.

Here are some practical steps to optimise ventilation in the short term.

- Improve air quality by using outdoor air for ventilation. Check whether the ventilation systems in classrooms, either natural or mechanical, are functioning well:
  - Check whether windows and ventilation grids can be opened.
  - Clean ventilation grids so the air supply is not obstructed.
  - Have mechanical ventilation systems checked by your maintenance company.
- Install a CO_2 monitor with traffic light indication (Figure 2) at least in the classrooms that rely on opening windows and/or ventilation grids. This makes it clear when windows need to be opened. Make sure that the CO_2 monitor is placed at a visible position in the classroom, away from fresh air inlets (e.g., open windows). In times of the pandemic, AIRAH suggests temporarily changing the default settings of the traffic light indicator (orange light up to 800ppm and red light up to 1,000ppm) in order to promote as much ventilation as possible.

Figure 2. Examples of CO_2 monitors with traffic light indicator showing the indoor air quality.

- Check operating hours of mechanical ventilation systems. Switch ventilation to nominal speed at least 2 hours before school starts and switch to lower speed 2 hours after occupancy. Keep toilet ventilation in operation 24/7. This also ensures a minimum of ventilation in the entire building at night.
- Switch air handling units with central recirculation to 100 per cent outdoor air. Please note, however, that depending on your climatic region, some air conditioning systems will struggle to adequately condition the air with 100 per cent outside air being introduced. Please consult your air conditioning service provider or seek assistance from suitably qualified people before changing the function of your systems.
- Adjust the set-points of CO_2 controlled ventilation systems (if present). With these systems, the amount of air exchange is automatically reduced with lower occupancy to save energy. To reduce the risk of transmitting infectious diseases, full ventilation is needed, even if only some of the students are present.
  Ask your maintenance company if your building has CO_2-controlled ventilation.
  Generally, they are the ones who adjust CO_2 set-points.

- Instruct teachers on how to improve ventilation:
  - Open windows and ventilation grids as much as possible during school hours. Opening windows just underneath the ceiling reduces the draught risk. In rooms with mechanical air supply and exhaust this is usually not necessary, but extra ventilation is positive and does not disrupt the ventilation system (except in very hot temperatures).
  - Ensure regular airing with windows during breaks when outdoor temperatures permit (also in mechanically ventilated buildings).
  - Make sure that ventilation facilities are not obstructed or blocked by curtains or furniture.
  - Keep an eye on any installed CO_2 monitors (ask pupils to assist). Be aware that more aerosols are released during activities such as singing or sport.
  - Use local cooling systems, like fan coils or split units, as you usually do. But make sure there is ***always*** a supply of fresh outdoor air through mechanical ventilation systems or operable windows.

Figure 3. Open windows as much as possible during school hours and ensure airing during breaks.

In the long term it obviously makes sense to structurally improve the ventilation, since poor indoor air quality leads to headache, fatigue and reduced learning performance, among other things.

Some installers and maintenance companies are now offering to replace filters, but this is NOT necessary to reduce infection risks. Only replace filters when necessary or already planned. Also, some people talk about cooling and humidification of air. Adjusting the set-points of the climate system to lower values is NOT necessary and useless in schools. The same goes for placing humidifiers because there is NO evidence that this is effective. Focus on things that really matter, such as proper ventilation.

Sanitary facilities

Points of attention for the sanitary facilities (taps, toilets, drains):

- Flush all toilets, water taps and showers before the school reopens. If water taps haven't been used for several weeks, the water that is still in the pipes may be of poor quality.
- Check if water taps in all toilets are in operating condition (with soap dispensers and paper towels) or provide other facilities to disinfect hands after using the toilet.
- Replace frequently used water taps with sensor taps, so they can be used without touching.
- Make sure that floor drains do not run dry to avoid an open connection to the sewer. Fill the drains regularly with water. Add some oil to prevent the water seal from evaporating quickly.
- Instruct students and staff to close toilet lids before flushing and wash hands after toilet use.

More information

- www.airah.org.au/coronavirus_faq
- www.rehva.eu/activities/covid-19-guidance
- www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public
- www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance-publications?publicationtypes=10ac82f5-5000-468d-94f9-c27a46127852

Disclaimer

This document is to be used for informational purposes only and is not intended to replace the advice of authorities or medical professionals. AIRAH excludes any liability for any direct, indirect, incidental damages or any other damages that would result from or be connected with these of the information presented in this document.

Acknowledgments

This document was produced by the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA) and has been updated and distributed in Australia by the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH). The information is shared with REHVA's permission.

The original document was prepared by Ir. Froukje van Dijken and reviewed by the COVID-19 Task Force of REHVA's Technology and Research Committee, which is based on volunteers. Members of the Task Force are:
Prof. Jarek Kurnitski, Tallinn University of Technology, Chair of REHVA Technology and Research Committee Atze Boerstra, REHVA vice-president, managing director at bba binnenmilieu
Francesco Franchimon, managing director Franchimon ICM
Prof. Livio Mazzarella, Milan Polytechnic University
Jaap Hogeling, manager International Projects at ISSO
Frank Hovorka, REHVA president, director technology and innovation FPI, Paris
Prof. Catalin Lungu, REHVA vice-president, vice-president of AIIR
Prof. em. Olli Seppänen, Aalto University
Ir. Froukje van Dijken, healthy building specialist at bba binnenmilieu
Prof. Guangyu Cao, Energy and Indoor Climate, Norwegian University of Science and Technology (NTNU) Igor Sikonczyk, Senior Technical and Regulatory Affairs Manager at Eurovent
Anders Berg, Institute for Building Energetics, Thermo-technology and Energy Storage (IGTE), University of Stuttgart
Francesco Scuderi, Deputy Secretary General at Eurovent Association
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Dr. Frederike Wittkopp, Association of German Engineers (VDI e.V.), Commission on Air Pollution Prevention Martin Lenz, Development Engineer at TROX GmbH
Prof. Dr.-Ing. habil. Birgit Müller, Hochschule für Technik und Wirtschaft (HTW) Berlin
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Francis Allard, Professor Emeritus at La Rochelle University
Prof. Dr. Marija S. Todorovic, University of Belgrade Serbia
Dipl.-Ing. Clemens Schickel, Association of German Engineers (VDI e.V.)
Dr. Benoit Sicre, Lucerne School of Engineering and Architecture

RECORD 72

School operations

Ventilation and Air Purification

Reducing COVID-19 transmission risk

Policy

The purpose of this policy is to ensure schools understand how to ventilate indoor school spaces, maximise the use of outdoor spaces and operate air purifiers to reduce the risk of COVID-19 transmission.

Summary

- Schools can reduce the risk of COVID-19 transmission through the way they use outdoor and indoor spaces.
- To reduce the risk of transmission of COVID-19, schools are strongly encouraged to:
  - maximise the use of outdoor learning areas wherever practicable
  - maximise ventilation of indoor spaces with outside air (for example, by opening windows and doors).
  - implement measures for a safe and comfortable learning environment (for example, considering thermal and noise comfort) with ventilation strategies in place
  - use air purifiers alongside natural and mechanical ventilation
  - open windows at intervals and continue using air purifiers when windows cannot be left open constantly due to external conditions
  - minimise the use of indoor space that can't be ventilated with outside air.
- Staff who move or lift air purifiers must follow the OHS measures in this policy to minimise the risk of injury.
- For information about the operation and placement of air purifiers provided to schools by the Department of Education and Training, refer to the Guidance tab <http://www2.education.vic.gov.au/pal/ventilation-air-purification/guidance> .
- Resources for schools, including printable fact sheets and a poster to display in classrooms and other school spaces, are available on the Resources tab <http://www2.education.vic.gov.au/pal/ventilation-air-purification/resources> .

Details

Reducing COVID-19 transmission in school settings can be achieved through maximising ventilation of indoor spaces, minimising the use of spaces that can't be ventilated with fresh air and using air purifiers to augment ventilation, particularly in areas which pose a higher transmission risk.

Ventilation through opening windows encourages fresh air into a room and assists in diluting potential viral particles in indoor air.

Ventilation is an important part of the broader suite of controls to reduce the risk of COVID-19 transmission in school settings including vaccination, physical distancing, good hygiene, cleaning and mask use, but should not be considered in isolation of these other measures.

There are 3 ways ventilation can be improved:

- natural – bringing in outside air by opening windows and doors
- mechanical – using air-conditioning/heating systems to bring outside air into the inside (air conditioning systems that do not bring in outside air are not mechanical ventilation)
- augmented – using air purifiers to filter the air.

Maximise the use of outdoor learning areas

Schools are strongly encouraged to conduct outdoor learning whenever and as much as practicable, noting that this may be less practicable in winter months.

Identify spaces within your school that could be used for outdoor learning. These spaces could be areas that are already sheltered and shaded. The use of this space could be rotated between classes.

Consider options to set up different spaces depending on weather conditions.

Maximise ventilation of indoor spaces with outside air

Ventilation is an important strategy in reducing the risk of aerosol transmission by increasing circulation of outside air, increasing the delivery of clean air, and diluting and filtering out aerosolised viral particles.

Schools are required to maximise fresh air flow into all indoor spaces.

Ventilation using windows and doors

- Keep all windows, doors and vents open as much of the day as possible and even when unoccupied, if practicable.
- If the weather does not permit windows and doors to be open throughout the school day (for example, during winter, extreme heat, storms or other severe weather conditions), consider opening windows and doors intermittently for short durations, for example for 10 minutes every hour, including while using air purifiers.
- Keep these openings clear of any obstruction to air flow.
- Open windows and doors on multiple sides of the room to draw air through a space. This is called cross ventilation and is more effective than if windows and doors are only open on one side of the room (single-sided ventilation).
- Where windows open at the top and bottom (double-sash windows) open both parts.
- Aim to open windows and vents that are higher or towards the ceiling during poor or windy weather.

Ventilation using air conditioning systems

- Some schools have a centrally controlled mechanical ventilation system which can bring in outside air. Where these are installed, they should be set to use as much outside air as possible. These systems should be run during school hours, including when rooms are unoccupied and, if possible, ideally 2 hours before and after the use of a space.
- A large proportion of air conditioning systems in schools are split systems. Split systems use recirculated air from the room and should therefore be used alongside open windows and doors to bring in outside air.
- Air conditioning filters should be maintained according to maintenance plans, checked and filters cleaned regularly.

Use of fans to assist air movement

- Maximise air movement by turning on fans when windows and doors are open.
- Ceiling fans and other fans can be used to increase air movement in a room.
- Pedestal or desk fans must be used on an oscillating function (not continually pointing in one direction).
- Exhaust fans are to be used as much as possible (for example in kitchens, bathrooms and laboratories).
- If split system air conditioners are not required for thermal comfort, they can still be used to assist with air movement within the room.

Use of demand controlled ventilation systems

- Some air conditioning and ventilation systems operate based on demand – this means they are responsive to indoor conditions, such as indoor temperature or occupancy. For example, some systems automatically open windows if a CO_2 monitor detects a reading reaching a pre-set threshold or turn on fans at a certain room temperature.
- Demand controlled air conditioning and ventilation systems should be disabled. Mechanical ventilation systems should be operated on high, irrespective of demand, to maximise the amount of air movement within a room.

Instances of poor outside air quality

- Monitor the VicEmergency App for risk warnings and advice on thunderstorm asthma, smoke and other events reducing outside air quality.
- Action to protect students during periods of poor outside air quality (such as smoke, thunderstorm asthma events) takes priority.
- Take steps to close windows and doors, set air conditioners to re-circulate air, and enhance other COVID safe behaviours and controls.
- Where possible, use air purifiers in rooms where windows must be closed.

Implement measures for a comfortable learning environment

COVIDSafe learning spaces are places where health and safety measures are practiced, but are also places where people can comfortably learn and work. Factors that affect a comfortable environment include temperature and noise levels.

Maintaining thermal comfort

To maintain thermal comfort, schools are encouraged to use heating and air conditioning systems – even when windows and doors are open. These can be either systems that bring in outside air or only use recirculated air. Schools can also introduce measures such as flexible uniform and seating arrangements.

Use air purifiers alongside natural and mechanical ventilation

Air purifiers should be used where they are available, both with windows and doors open and with mechanical ventilation in operation.

Air purifiers augment and complement natural and mechanical ventilation methods. They do not replace other ventilation methods.

Air purifiers filter existing air within a space and do not bring in outside air.

For information about the operation, placement, cleaning and maintenance of department-supplied air purifiers, refer to the Guidance tab <http://www2.education.vic.gov.au/pal/ventilation-air-purification/guidance> .

Use air purifiers and open windows at intervals when windows cannot be left open due to external conditions

External conditions such as winter temperatures, extreme heat, storms or other severe weather conditions affect whether windows can be opened and for how long.

If the weather does not permit windows and doors to be open throughout the school day, consider opening windows and doors intermittently for short durations, for example for 10 minutes every hour.

Air purifiers should be in use when windows cannot be opened and when windows are opened intermittently.

Minimise use of indoor spaces that can't be ventilated with outside air

Where possible, schools are encouraged to avoid the use of spaces without openable windows, particularly where air purifiers are not in use in these spaces. Other spaces with good ventilation or outdoor spaces should be used instead. Schools are encouraged to use an air purifier in spaces that cannot be well ventilated with outside air.

Window maintenance

Where windows are designed to be opened cannot be opened, schools are strongly encouraged to arrange for them to be fixed through their general maintenance processes.

This will generally be a simple and inexpensive maintenance issue and should be funded by a school's Student Resource Package maintenance funding. Schools are encouraged to speak to their regional provision and planning manager for further advice and assistance.

In some instances, schools are required to balance the requirement to bring in outside air with the risk of students absconding from their learning spaces. Schools are encouraged to consider and implement solutions that allow air in

while preventing absconding. Examples may include installation of fly screens for windows, mesh security doors for doorways, and indoor safety gates. Schools can speak with their regional provision and planning managers for assistance if required.

Use of aerosolised disinfectants

The use of products which introduce particles into the air to 'disinfect' indoor air, such as gels, liquids, spray bottles, aerosols or vaporisers, are not recommended.

There can be allergen concerns with the introduction of particles into the air and introducing chemicals or oils into the air is not a proven method to reduce the risk of transmission of COVID-19 in indoor environments.

Definitions

Air purifier
An air purifier is an indoor portable device that filters domestic or industrial air, and which is used primarily to remove pollution, improve air quality, and purify the air.

Related policies

- Cleaning <http://www2.education.vic.gov.au/pal/cleaning/policy>
- Manual Handling <http://www2.education.vic.gov.au/pal/manual-handling/policy>
- Shade Sails <http://www2.education.vic.gov.au/pal/shade-sails/policy>
- Sun and UV Protection <http://www2.education.vic.gov.au/pal/sun-protection/policy>
- Testing and Tagging of Electrical Equipment <http://www2.education.vic.gov.au/pal/testing-and-tagging-electrical-equipment/policy>

Reviewed 22 March 2022

Policy last updated

22 March 2022

Scope

- Schools

RECORD 72

Contact

Victorian School Building Authority

1800 896 950

vsba@education.vic.gov.au <mailto:vsba@education.vic.gov.au>

Flint, Katrina

From: Parkinson, Andrew
Sent: Tuesday, 12 April 2022 9:30 AM
To: Yapp, Phillip; Flint, Katrina; Ryan, JohnW
Subject: ozsage document
Attachments: OzSAGE Children-and-schools1.pdf

OFFICIAL

as discussed,

Andrew Parkinson | Executive Branch Manager
Infrastructure & Capital Works | Education Directorate | **ACT Government**
Phone 02 6205 4593 | **Mobile 0478 301 085**
220 London Circuit, Civic | www.act.gov.au

Dhawura nguna, dhawura Ngunnawal

This record is not released in accordance with Section 17 of the *Freedom of Information Act 2016,* Schedule 1, 1.6 and outside of the scope of the request.

From: Elton Kathryn
To: Simmons Jane
Cc: EDUCOVID; EDU EGMBSG
Subject: FW: IAQ W nter Plans
Date: Wednesday 13 April 2022 5:38:09 PM
Attachments: image.png
FOR APPROVAL - IAQ Winter Window Operation Fact Sheet v1.2.docx

OFFICIAL

Hi Jane

Please see below and attached information from Andrew about the IAQs etc.

Happy to follow up further as needed.

Thanks Kathryn

Kathryn Elton | Director Governance & Coordination
COVID Management Team | Education Directorate | ACT Government
GPO Box 158 Canberra ACT 2601
www.education.act.gov.au | Facebook | Twitter | Pinterest | LinkedIn | Google

I acknowledge the traditional custodians of the lands and waters where we live and work and pay my respects to elders past present and emerging.

From: Parkinson Andrew <Andrew.Parkinson@act.gov.au>
Sent: Wednesday 13 April 2022 2 48 PM
To: EDUCOVID <EDUCOVID@act.gov.au>
Cc: Elton Kathryn <Kathryn.Elton@act.gov.au>; ICW EBM Office <ICWEBMOffice@act.gov.au>
Subject: IAQ Winter Plans

OFFICIAL

Hi there

ICW are currently on a tight timeline to update IAQ for winter. The program below sets out the key tasks and due dates and we are currently on schedule.

We've drafted the attached decision framework for opening windows based on CO2 levels. It needs some more polish and fine tuning but I'd appreciated Jane's views on the direction of this document.

Regards

Andrew Parkinson | Executive Branch Manager

Infrastructure & Capital Works | Education Directorate | **ACT Government**

Phone 02 6205 4593 | **Mobile 0478 301 085**

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Dhawura nguna dhawura Ngunnawal

RECORD 75

FACT SHEET

Indoor Air Quality – Winter Ventilation

Topic:	Fact sheet – Use of natural ventilation for improving indoor air quality during winter
Relevant Sector:	All Schools
Background:	~~ACT Health has advised that schools o~~Optimising~~e~~ fresh air circulation ~~as one of the~~is a key control~~s~~ to reduce the risk of COVID-19 transmission in schools. The risk of COVID-19 transmission is higher in crowded and poorly ventilated spaces where people spend long periods of time together in close proximity. Good ventilation is one part of a suite of controls to minimise transmission in schools, like vaccination, physical distancing, student cohorting, good hygiene, cleaning and mask use. Indoor Air Quality Plans have been developed for every school and have identified learning and teaching spaces that have ventilation provided by either natural or mechanical means. This fact sheet provides some guidance on the use of windows to provide ventilation, noting ventilation will need to be balanced with thermal comfort in winter.
Advice:	Where Indoor Air Quality Plans identify teaching and learning spaces that rely on natural ventilation via windows/louvres, consideration will need to be given to balancing ventilation and thermal comfort during colder weather. In these naturally ventilated spaces, schools can use ~~of~~ portable CO_2 monitors to provide an indication of the ventilation in the classroom. A CO_2 concentration of <800ppm is considered an indicator of good indoor air quality. • <800ppm: Low Relative Risk - windows/louvres may be closed or cracked slightly open to balance thermal comfort • 800-1500ppm: Moderate Relative Risk - partially open closed windows to increase ventilation • >1500ppm: High Relative Risk - windows should be fully opened to increase ventilation CO_2~~2~~ monitors should be placed at breathing level in a visible location away from fresh air inlets (e.g. open windows) and not within 1m of a student or teacher. Where schools do not have access to CO_2 monitors in the classroom, consider opening windows for short durations throughout the day to balance ventilation and thermal comfort. This could be for a period of time per hour (e.g. 10 minutes), when the space begins to feel stuffy, or when thermal comfort conditions allow.

Health Advice:	This advice has been developed in line with guidance from the Chief Health Officer, **World Health Organisation, Safe Work Australia,** OzSAGE and the Australian Institute of Refrigeration, Air-conditioning and Heating (AIRAH).
Support or further advice:	For further advice, schools can contact their ICW Network Officer or email **ACT.Education@act.gov.au**

Flint, Katrina

From: CMTEDD ACTPG HVAC Services
Sent: Thursday, 14 April 2022 7:48 AM
To: Graham, Cathy
Cc: Yapp, Phillip; Hull, John; CMTEDD ACTPG HVAC Services; [redacted]
Subject: FW: Ventilation Strategies for Schools Indoor Air Quality (IAQ)
Attachments: ECTL0422-004.pdf

OFFICIAL

Hi Cathy, Phil

Please find information regarding the discussion we had with [redacted] in regards to different systems for consideration, any questions please contact me.

Kind Regards,

Greg Kidney

Property Workplan & Building report Coordinator – HVAC
ACT PROPERTY GROUP | PROPERTY UPGRADES | CHIEF MINISTERS, TREASURY & ECONOMIC DEVELOPMENT DIRECTORATE ACT GOVERNMENT | www.act.gov.au
PH: M: 0408787633 E: Greg.Kidney@act.gov.au or ACTPG HVAC Team ACTPGHVAC@act.gov.au

COVID-19: there are currently travel restrictions in place for people travelling to the ACT from specified locations around Australia. These restrictions apply to contractors and suppliers of ACT Property Group unless an exemption has been granted.

ACT Property Group requires all contractors and suppliers to comply with any restrictions that are in force which are applicable to them. If permitted to travel to the ACT please follow COVID-safe practices and use the Check In CBR App at venues to support contact tracing. Updates can be found at: https://www.covid19.act.gov.au/travel/entering-the-act. Please contact ACT Property Group on 6213 0700, or where applicable the project officer, to discuss any impact this may have on delivery of services to ACT Property Group. 255 Canberra Avenue, Fyshwick, ACT 2609, PO Box 777 Fyshwick ACT 2609 *If you have any feedback for the ACT Property Group, please email actpgfeedback@act.gov.au*

"ACTPG is engaged by the Education Directorate to ensure the management of all contractors, past and present HVAC works are providing a turn-key solution".

ECHELON
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Ref: ECTL0422-004

8 April 2022

Mr Greg Kidney
Property Workplan & Building Report Coordinator - HVAC
ACT Property Group
PO Box 777
FYSHWICK ACT 2609

Dear Greg

VENTILATION STRATEGIES FOR SCHOOLS INDOOR AIR QUALITY (IAQ)

Over the past few months, Echelon Consultancy and Training have been involved in a number of IAQ projects for ACT Property Group and the Education Directorate. These primarily looked to provide ventilation strategies in accordance with the Australian Standard AS1668.2 and the World Health Organisation (WHO) strategies for managing ventilation in the context of Covid-19. The last decade has seen a significant increase in refrigerative air conditioning uptake in the schools portfolio utilising standalone split system systems, predominantly highwall and cassette style units. Typically, these are installed to supplement the natural ventilation or passive cooling which was the mainstay design for school cooling. This has resulted in a significant number of standalone refrigerative air conditioning systems capable of providing electrically powered heating and cooling with the benefits of this style of air conditioning unit numerous and have resulted in a significant improvement in comfort and amenity for students and staff across multiple schools. Typically these classroom areas served by the standalone split systems would have openable windows for the ventilation compliance requirements. This has served the ED well for a number of years however the WHO recommendations for controlled ventilation have highlighted a deficiency in the use of highwall style split system air conditioning. In peak summer and wintertime operation, teachers would be required to open windows for the classrooms to meet the ventilation requirements. This is often not practical and classrooms are often left sealed up with the refrigerative air conditioning running on recirculation mode. While the natural ventilation using openable window is a code compliant solution, the ability to meet the WHO recommendations requires a method of forced ventilation.

Under the current schools IAQ program, Echelon Consultancy and Training have developed a number of concept ventilation strategies and each have varying levels of benefits and costs depending on the application. A summary of the projects and scopes included in this trial are as follows:

Caroline Chisholm High School Demountable Classrooms

The Caroline Chisholm High School has two demountable buildings, each with dual office/classroom configurations. The demountables have received an upgrade to the original electric heating with the provision of highwall reverse cycle split system air conditioning units for each of the occupied areas. These assets are mid-lifecycle with no immediate requirement for upgrade or replacement. The ventilation strategy chosen for these demountable classrooms is a refrigerative tempered outside air unit. This system is developed by the major manufacturers and are modified traditional ducted air conditioning units configured for full outside air operation. This means that the air conditioning unit does not adjust temperature within the space, rather controls to a supply air temperature setpoint which is equal to the room temperature requirements. This solution provides full compliant ventilation to the space without imposing any additional heating or cooling loads on the existing air conditioning. These systems however operate independently and standalone from the current highwall split systems. The indicative scope for a typical demountable classroom utilising refrigerative ducted outside air processing units is as follows:

- Provision of a project specific outside air processing unit.
- Provision of a roof cowl or window penetration to allow full outside air introduction to the air conditioning unit.
- Provision of rigid or fabric ductwork distribution within the classrooms.
- Integration of the outside air processing unit into a BMS with motion activation and CO_2 sensing.
- Integration of the outside air processing unit operation into the ED's WebView portal.

O'Connor Cooperative School

The O'Connor Cooperative School is a permanent structure constructed in two stages approximately 20 years apart. The original stage of the building made provision for electric heating only, while the extension made provision for in-slab hydronic heating and passive cooling. A recent program looked to provide highwall split system air conditioning units to all of the teaching and administration areas in the building. The ED brief for controlled ventilation at the O'Connor Cooperative School was for the provision of Heat Recovery Ventilators (HRV). This system is an air-to-air heat exchanger which utilises conditioned air within the space to pre-temper outside air for ventilation. These systems do not heat or cool the air, rather look to reclaim energy from the exhaust air to minimise the energy loss typical of controlled ventilation. The indicative scope utilising heat recovery ventilator units is as follows:

- Provision of dual rooftop heat recovery ventilator units to serve the original and extension to the building.
- Provision of ductwork droppers to feed exposed fabric ductwork.
- Capacity to serve the five nominated classroom and administration areas.
- Provision of CO_2 sensing in each of the occupied rooms.
- Integration of the heat recovery ventilator unit operation into the ED's WebView portal.

Nicholls Preschool

The third ventilation solution proposed under this trial was the replacement of the existing highwall split system air conditioning units, which are "end of life", and provision of new fully functional ducted split system air conditioning units with heat recovery ventilation. Nicholls Preschool was chosen as the trial site as the existing highwall air conditioning units were end of life. Rather than providing replacement highwall split system air conditioning units and then an overlay of a separate ventilation system, the benefits of providing a consolidated HVAC system outweighs the two separate system option. The use of ducted refrigerative air conditioning units allows for demand controlled ventilation utilising classroom mounted CO_2 sensors. This means that outside air is only introduced as required and is tempered utilising HRV modules. This solution is the most appropriate and commensurate with a teaching environment as it meets all of the comfort and statutory requirements but in a fully controlled and commercial grade installation. The indicative scope utilising ducted split system air conditioning units with heat recovery ventilation is as follows:

- Decommission and removal of the existing highwall split systems which are "end of life".
- Provision of an in-ceiling reverse cycle ducted air conditioning unit.
- Provision of demand flow ventilation dampers and sensors.
- Provision of a HRV module for energy efficient operation.
- Integration of the system into a BMS with motion activation and CO_2 sensing.
- Integration of the air conditioning operation into the ED's WebView portal.

North Ainslie Primary School

The Education Directorate have pre-purchased a number of standalone HRV modules. These would be classroom mounted units suspended under-ceiling and requiring the removal of a perimeter glazing section for the provision of outside air. These units are totally standalone and require no connection to ductwork or refrigeration piping. These units can operate standalone however would be integrated to the ED's BMS infrastructure for control and monitoring. This concept using the HRV modules is similar to O'Connor Cooperative School in that they do not provide heating or cooling, rather energy reclaim from the exhaust air from the space. The indicative scope for this project is as follows:

- Provision of a standalone under-ceiling HRV modules for a typical classroom.
- Provision of electrical.
- Removal of a glazing section for connection to outside air.
- Integration of the heat recovery ventilator unit operation into the ED's WebView portal.

Project Budgets

Each of the options outlined above have varying levels of cost range depending on the school and the complexity of the installation and will vary across the school portfolio. Based on the tendered or pre-tender estimates for each of the options, these are summarised as follows:

- All works carried out during normal working hours.
- Unrestricted access to the building to facilitate the works.
- Excludes any major building works.
- Excludes any major sutural or electrical upgrades required to facilitate the works.
- Exclude design documentation, tendering and project management costs.

Option	Budget Range
Option 1 – Provision of ducted refrigerative reverse cycle outside air processing units including installation and BMS integration	$30,000 to $40,000 + GST per classroom
Option 2 – Provision of fully ducted heat recovery ventilator including installation and BMS integration	$35,000 to $45,000+ GST per classroom
Option 3 – Provision of fully compliant ducted air conditioning unit with demand flow ventilation and HRV module including installation and BMS integration	$55,000 to $65,000 + GST per classroom
Option 4 – Provision of standalone modular HRV including installation and BMS integration	$20,000 to $25,000 + GST per classroom

Advantages and Disadvantages

Each of the options above has varying levels of advantages and disadvantages as follows:

Advantages	Disadvantages
Option 1	
¤ Utilises refrigerative tempering of the outside air. ¤ Imposes no additional heating or cooling demands for the space.	¤ Requires ductwork reticulation. ¤ Does not integrate to the existing highwall split systems, with two separate HVAC systems per classroom.
Option 2	
¤ Provides energy efficient heat reclaim and tempering of outside air.	¤ Cannot provide heating or cooling to the ventilation air. ¤ May result in extreme loss of comfort conditions during peak summer or winter operation during pre-occupancy ventilation modes. ¤ Does not integrate to the existing highwall split systems, with two separate HVAC systems per classroom.

Advantages	Disadvantages
Option 3	
¤ A fully integrated HVAC solution. ¤ Provides demand flow controlled ventilation. ¤ Integrates with HRV for energy efficient operation. ¤ Negates the requirement for separate highwall split systems.	¤ Has a significantly higher first cost. ¤ Ideally requires concealed ceiling space for the location of equipment.
Option 4	
¤ A 'plug and play' solution for controlled ventilation. ¤ Lowest first-cost for compliant ventilation.	¤ Cannot provide heating or cooling to the ventilation air. ¤ May result in extreme loss of comfort conditions during peak summer or winter operation during pre-occupancy ventilation modes. ¤ Does not integrate to the existing highwall split systems, with two separate HVAC systems per classroom. ¤ HRV located in the teaching space and may prove noisy.

Summary and Recommendations

There are multiple compliant ventilation strategies which can be adopted under the schools portfolio to meet the Education Directorate's IAQ requirements. Each of the options outlined above have varying levels of cost and benefit to the schools and their selection should be chosen based on the 'best fit' with the existing systems and operational requirements for the space. The recommendations for suitable IAQ system selection is as follows:

- ¤ Option 1 be chosen as the baseline ventilation requirement for demountable classroom accommodation as it provides tempered refrigerative outside air which does not impose additional heating or cooling load to the existing air conditioning.
- ¤ Utilisation of Option 1 for classrooms utilising highwall split system air conditioning where HRV would not be compatible.
- ¤ The adoption of Options 2 and 4 where suitable for use but utilising a revised control strategy which negates the requirement for pre-occupation ventilation and only allows post-occupation ventilation while the air conditioning is in operation.
- ¤ Preferred utilisation of Option 3 for classroom air conditioning and ventilation however remove the design requirement for the provision of HRV and rely on demand controlled ventilation for complinace.

I look forward to discussing the above in further detail and should you require any further information or assistance, please contact the office on (02) 6299 7727.

Yours sincerely
ECHELON CONSULTANCY & TRAINING Pty Ltd

From: Martinez, Catherine on behalf of EDU, EGMBSG
To: Attridge, Vanessa
Subject: FW: FOR CLEARANCE - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)
Date: Tuesday, 26 April 2022 4:47:00 PM
Attachments: image001.png
04. 3-5 May 2022.tr5

OFFICIAL

Good afternoon Vanessa

Please find attached TRIM link to 4 x ICW Assembly briefs for your clearance.

Regards
Catherine

From: Stewart, Ell <Ell.Stewart@act.gov.au> **On Behalf Of** ICW EBM Office
Sent: Tuesday, 26 April 2022 4:11 PM
To: EDU, EGMBSG <EGMBSG.EDU@act.gov.au>
Cc: ICW EBM Office <ICWEBMOffice@act.gov.au>
Subject: FW: FOR CLEARANCE - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

OFFICIAL

Good afternoon

ICW assembly briefs x4 in TRIM for EGM clearance please:

Brief
08. Ventilation in Schools in response to COVID-19

Date due to EGM BSG	**COB 26 April 2022**
Date Due to MO	**Midday 29 April 2022**

Thank you
Ell

From: Parkinson, Andrew <Andrew.Parkinson@act.gov.au>
Sent: Tuesday, 26 April 2022 2:33 PM
To: ICW EBM Office <ICWEBMOffice@act.gov.au>; Stewart, Ell <Ell.Stewart@act.gov.au>
Subject: Fw: FOR CLEARANCE BY 4PM - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

Hi Ell

I've reviewed those 4 brief and they are cleared to EGM

Andrew Parkinson | Executive Branch Manager

Infrastructure & Capital Works | Education Directorate | **ACT Government**

Phone 02 6205 4593 | **Mobile 0478 301 085**

220 London Circuit, Civic | www.act.gov.au

Dhawura nguna, dhawura Ngunnawal

From: Stewart, Ell <Ell.Stewart@act.gov.au> on behalf of ICW EBM Office <ICWEBMOffice@act.gov.au>
Sent: Tuesday, 26 April 2022 13:00
To: Parkinson, Andrew <Andrew.Parkinson@act.gov.au>
Cc: ICW EBM Office <ICWEBMOffice@act.gov.au>
Subject: FOR CLEARANCE BY 4PM - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

Andrew

Updated assembly briefs in TRIM for clearance by 4pm today please:

Brief	Team
08. Ventilation in Schools in response to COVID-19	ESD

Thanks
Ell

From: Nakkan, John <John.Nakkan@act.gov.au>
Sent: Friday, 22 April 2022 2:31 PM

To: ICW EBM Office <ICWEBMOffice@act.gov.au>; Zhi, Viki <Viki.Zhi@act.gov.au>
Cc: Hooper, Richard <Richard.Hooper@act.gov.au>
Subject: RE: FOR ACTION - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

Hi Ell,

[redacted]

Regards,

John Nakkan | Senior Director
Phone: +61 2 6207 1876 | Mobile: 0466 015 922 | Email: john.nakkan@act.gov.au
School Infrastructure Management | Education | ACT Government
Level Four 220 London Ct | GPO Box 158 Canberra ACT 2601
Ngunnawal Country
www.education.act.gov.au | Facebook | Twitter | Instagram | LinkedIn

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From: Stewart, Ell <Ell.Stewart@act.gov.au> **On Behalf Of** ICW EBM Office
Sent: Wednesday, 20 April 2022 1:30 PM
To: Ryan, JohnW <JohnW.Ryan@act.gov.au>; Yapp, Phillip <Phillip.Yapp@act.gov.au>; Hunter, Stuart <Stuart.Hunter@act.gov.au>; Hooper, Richard <Richard.Hooper@act.gov.au>; Blom, Dylan <Dylan.Blom@act.gov.au>; Player, Ben <Ben.Player@act.gov.au>; Zhi, Viki <Viki.Zhi@act.gov.au>
Cc: ICW EBM Office <ICWEBMOffice@act.gov.au>; Parkinson, Andrew <Andrew.Parkinson@act.gov.au>; Nakkan, John <John.Nakkan@act.gov.au>
Subject: FW: FOR ACTION - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

Good afternoon

Please update ICW assembly briefs (if required) for clearance by 10AM TUE 26 APR in track changes in TRIM:

Brief	Team
08. Ventilation in Schools in response to COVID-19	ESD

[redacted]

Thanks all
Ell

From: Nott, Georgia <Georgia.Nott@act.gov.au> **On Behalf Of** EDU Cabinet Liaison Officer
Sent: Wednesday, 20 April 2022 1:03 PM
To: EDU, EBM P&P <ebmpp.edu@act.gov.au>; Ackland, Daniel <Daniel.Ackland@act.gov.au>; ICW EBM Office <ICWEBMOffice@act.gov.au>; Parkinson, Andrew <Andrew.Parkinson@act.gov.au>; CFO EDU Office <CFOEDUOffice@act.gov.au>; Le, Thao <Thao.Le@act.gov.au>; EGMSDD <EGMSDD@act.gov.au>
Cc: EDU, EGMBSG <EGMBSG.EDU@act.gov.au>; EDU Cabinet Liaison Officer <EDUCabinet@act.gov.au>; Page, Vicki <Vicki.Page@act.gov.au>; Burn, Emma <Emma.Burn@act.gov.au>
Subject: FOR ACTION - Assembly Briefs for Sitting Period 3-5 May 2022 (BSG)

OFFICIAL

Good afternoon

Please see below and attached for action.

Title/Question	Assembly Briefs for Sitting Period 3-5 May 2022
Action	1. Update Assembly Briefs as required 2. If no are updates required, please email educabinet@act.gov.au and we will complete action tree/notes
Responsibility	**P&P: 6 and 4** (input will be required from @EGMSDD for newly combined brief 4 – please work together) **ICW: 8, 9, 10, 12** **SF&P: 5**
Response type	Assembly Brief
TRIM	FOL22/959
Date due to EGM BSG	**COB 26 April 2022**
Date Due to MO	**Midday 29 April 2022**
Clearance	Please refer to the Executive Clearance Protocol document for appropriate clearance levels/drop copy requirements: here
Comment	• Please contact educabinet@act.gov.au if you have any questions. • @EDU, EGMBSG – Please allow sufficient clearance time in the diary so these are returned to us by 3:00PM 28 April for collation/provision to MO. • Please note: TRIM Action Trees will be established by COB today.

Kind regards –

Georgia Nott | Assembly Liaison Officer | Ministerial & Corporate Reporting
Communications, Engagement and Government Support | Education | ACT Government

GPO Box 158 Canberra ACT 2601
www.education.act.gov.au | Facebook | Twitter | Instagram | LinkedIn

QUESTION TIME BRIEF

Portfolio/s: Education and Youth Affairs

VENTILATION IN SCHOOLS

Talking Points

- Improving air quality in ACT public schools is a priority to enable onsite learning and teaching in accordance with COVID-19 Health Advice.
- Ventilation is one component of a multilayered approach that has been implemented to prevent transmission of COVID-19 in schools.
- All learning spaces (about 3500) across the school portfolio have been checked to ensure adequate ventilation.
- Every school has its own Indoor Air Quality Plan (see example at end of brief) which lists actions undertaken by EDU (e.g. HVAC systems change) and actions for schools to undertake each day to improve air quality. The Plans can be found on each schools' website.
- Updated Indoor Air Quality Plans are being prepared for winter.
- Indoor Air Quality actions are being prioritised at preschools due to the potential vulnerability of this cohort.
- In line with expert advice, ventilation is being maximised by opening windows in classrooms, adjusting HVAC systems and turning on exhaust fans in rooms that have them.
- Winter ventilation solutions are currently being scoped for sites where ventilation is predominantly via opening of windows. Solutions include supplementary mechanical ventilation such as Heat and Energy Recovery Ventilation units (HRV and ERV), and the use of CO_2 monitors. HRV units allow fresh air to be provided while windows are closed, with the first retrofits completed at Macquarie Primary School in February 2022. CO_2 monitors can assist in ensuring adequate ventilation is provided from windows while retaining thermal comfort conditions in winter.
- The routine use of portable **HEPA filters** is not supported at this time, as the evidence for the additional public health benefit of these units over other public health measures and maximising fresh air is currently limited.
- UV-C light units have been installed at priority sites where mechanical ventilation does not introduce fresh air. UV-C lights have been used extensively in health settings to inactivate viruses as they pass the light unit. Units have been selected that do not produce ozone to ensure the safety of students.
- UV-C light units have been installed at 31 preschools and other priority sites in schools. Mobile units (43) will be distributed to priority sites to secure air quality while long term solutions are planned and procured.
- EDU will continue to be guided by ACT Health and AHPPC advice and the evolving evidence on the specific benefit of these devices in addition to other public health measures in a school setting.

QUESTION TIME BRIEF

Key Information

- Supply chain delays and stock availability has delayed the the work program.
- The CHO, AHPPC, World Health Organisation and Safe Work Australia recommend ensuring fresh air ventilation is optimised in all settings, including through adjusting mechanical systems to increase fresh (external) air supply and reduce air recirculation, and use of natural ventilation such as opening windows and doors.
- EDU has developed an Indoor Air Quality (IAQ) framework to assess the IAQ of all public schools commencing with ACT public colleges. All public school learning areas have been assessed under the IAQ framework.
- Site specific IAQ plans were provided to all ACT public colleges on 1 October 2021.
- Site specific IAQ plans were provided to all other ACT public schools on 22 October 2021.
- IAQ Plans were updated to include actions undertaken in term 4, 2021 and over the summer break and reissued to schools.
- From this work, EDU is confident that fresh air flow can be increased in all public school classrooms to improve ventilation.
- Cooler classroom temperatures during cool weather and warmer classroom temperatures during hotter weather are expected to result from increasing fresh air to learning environments.
- Higher energy bills were experienced across sites with mechanical ventilation over the summer period. Gas bills are expected to increase over the winter period.
- EDU is monitoring air quality in learning spaces to achieve the best ventilation for ACT public schools while managing energy costs and thermal comfort.

Background Information

- To support schools to prepare for return to on campus learning following lockdown in 2021, the ACT Government allocated **$5.7 million to support essential supplies** such as masks and hand sanitiser, improved ventilation and additional relief teacher hours. **$2.9 million of this funding was allocated to improve ventilation** in ACT public schools. This includes building works, CO_2 monitoring, and changes to outdoor air introduced by heating, ventilation, and air conditioning (HVAC) systems.
- ACT public schools are very well placed as there has been an extensive program of work underway to improve school ventilation since the 2019-2020 bushfires.
- In early 2020, **400 Dyson air purifiers** were distributed to all public schools (88 at the time) for use in classrooms and other spaces to provide relief from smoke effects. These air purifiers have a HEPA filter contained within the unit. Filters require active management and replacement to ensure they don't have unintended consequences such as spreading mould spores.
- EDU has been progressively upgrading building controls in 65 schools to increase remote management of the Heating, Ventilation and Cooling (HVAC) systems.

- In 2018, EDU commenced a program of installing CO_2 sensors in schools (CO_2 sensors, provides a proxy for ventilation). To date CO_2 sensors with remote monitoring and management systems have been installed across 56 public schools. Installation of CO_2 sensors is progressing at a further nine ACT public schools. This will mean 73 per cent (65 of 89) schools will have CO_2 sensors to the monitor and manage indoor air quality.
- EDU has commissioned design work across 18 school that rely on natural ventilation via operable windows and integrated indoor air quality parameters into the specification documents for new whole of school heating, ventilation and cooling systems.

Canberra High School Indoor Air Quality Plan (example)	
Background:	As part of the return to on campus learning in Term 4 2021, ACT Health has advised that schools optimise fresh air circulation as one of the controls to reduce the risk of COVID-19 transmission in schools. The risk of COVID-19 transmission is higher in crowded and poorly ventilated spaces where people spend long periods of time together in close proximity. Good ventilation is one part of a suite of controls to minimise transmission in schools, like vaccination, physical distancing, student cohorting, good hygiene, cleaning and mask use. This Plan identifies actions that have been undertaken at your school by the Education Directorate and provides additional measures for the school to undertake to optimise the fresh air ventilation in the school in Term 4.
Health Advice:	The Chief Health Officer, the **Australian Health Protection Principal Committee, World Health Organisation** and **Safe Work Australia** all recommend good indoor air quality to reduce the chance of COVID-19 transmission.
Advice:	The ventilation systems at Canberra High School have now been assessed by the Directorate in accordance with the WHO guidance. Fresh air ventilation will be achieved through a mix of natural (opening windows and doors) and mechanical (cooling and ventilation systems). The settings for the Heating, Ventilation and Air Conditioning systems have been reset to achieve good fresh air supply and should not be altered by the school. Increasing the fresh air to classrooms may increase energy costs. Classrooms are also likely to experience lower room temperatures during cooler weather and higher room temperatures in warmer weather. **Learning and teaching spaces with fresh air ventilation from either natural or mechanical systems meet the COVID-19 Health Advice. The school is to prioritise the use of these spaces for indoor teaching and learning along with outdoor spaces**.
Daily actions to be undertaken by the school in Term 4:	Additional daily measures the school will undertake include: • Opening windows and doors in teaching spaces and other shared spaces of the school to supplement fresh air. Windows above ground level are to be opened only where window restriction is in place to ensure student safety. In line with the National Construction Code, window opening is to be 125mm or less. • Improving air circulation through use of ceiling fans and split system air-conditioning units, only when windows are open. • Ensure bathroom, kitchen and any other exhaust fans are on and operating at full capacity while the school or program is operating and for some time before and after occupancy.

QUESTION TIME BRIEF

Actions undertaken:	The following actions have been undertaken by the Directorate and its service providers to increase fresh air ventilation in the indoor teaching and learning spaces at the school: • air handling units have been programmed to supply additional fresh air via the mechanical ventilation systems • evaporative cooling in the school will provide full fresh air when operating in either cooling or fan mode. When not in operation, fresh air is to be provided by opening windows • contractors will continue work to audit and enhance the operation of the ventilation systems.
Support or further advice:	For further advice, schools can contact their ICW Network Officer or email **ACT.Education@act.gov.au**

Cleared as complete and accurate: 26/04/2022
Cleared for public release by: Executive Group Manager
Contact Officer name: Andrew Parkinson
Lead Directorate: Education
TRIM Ref: FOL22/959

This record is not released in accordance with Section 17 of the *Freedom of Information Act 2016,* Schedule 1, 1.6 and outside of the scope of the request.

Flint, Katrina

From: [redacted]
Sent: Wednesday, 4 May 2022 2:14 PM
To: Yapp, Phillip
Subject: RE: CO2 monitors bulk purchase
Attachments: H8CO2rev2 MONITOR box.pdf; origional H8 factory leaflet..pdf

HI PHIL as per our phone conversation , and discussions ive had with the factory in china.
The options are :

1.) The original co2 monitor un modified is available ex stock and can be despatched in a few days. Visual colour indication ring operates over the range of 400 to 2000 with buzzer alarm sounding at levels over 2000ppm.

2.) The modified version we have the factory make for us ..visual colour level indication ring operates from 400 to 1000 ppm & buzzer sounding at 1000ppm & buzzer **is also mutable**. Despatch from China is 2 weeks

3.) Modified version as above but buzzer disabled. Dispatch from china is 2 weeks.

In all cases delivery from china could take 4 weeks to arrive once despatched based on previous deliveries in recent times.

HSMO-DQ

MULTI-OUTPUT ROOM SENSOR/ CO2 CONTROLLER c/w TEMPERATURE, HUMIDITY & CO2 OUTPUTS

(Can be programmed for a preset CO2 output control range ie 700-1000ppm for 0-10v output, allowing direct connection & control of EC fans or damper motors for local zone CO2 control without the need of a separate control module). CO2 uses a self calibrating algorithm making this sensor maintenance free over its life time of upto 25 years.
https://hevac.com.au/store/index.php?route=product/category&path=22

Regards
[redacted]

HEVAC Control Agencies

From: Yapp, Phillip <Phillip.Yapp@act.gov.au>
Sent: Wednesday, 4 May 2022 11:18 AM
To: sales@hevac.com.au
Cc: CMTEDD ACTPG HVAC Services <ACTPGHVAC@act.gov.au>; Flint, Katrina <Katrina.Flint@act.gov.au>; Ryan, JohnW <JohnW.Ryan@act.gov.au>
Subject: CO2 monitors bulk purchase

Hi Nick

I spoke to Lisa this morning, hoping you can give me a call/email to discuss the potential purchase of 1,000 CO2 monitors for providing to schools. We recently discussed these, and we purchased 60 units through Capital Boilers which we've started sending to some schools as a trial.

We would like to see if we can get a price, availability and lead time for provision of 1,000 CO2 monitors in black, with the associated USB charger. However we would require the units to come without the audible alarm at 1,000ppm, and without additional instructions/advice around CO2 as we will be issuing that to schools ourselves.

If you can get in touch ASAP regarding this, that would be great.

Cheers
Phil

Phil Yapp | Assistant Director – Asset Strategies, Sustainability and Environment

Phone: +61 2 6207 9190 | M: 0435 655 176 | Email: phillip.yapp@act.gov.au
Infrastructure and Capital Works | Education | ACT Government
Level 4 220 London Circuit | GPO Box 158 Canberra ACT 2601 | www.det.act.gov.au

HEVAC
Control Agencies

H8-(W)or(B)-CO2

PORTABLE NDIR CO2 MONITORING MODULE

ALSO DISPLAYS CURRENT TEMPERATURE & HUMIDITY

IDEAL FOR SCHOOL CLASSROOMS & OFFICE BUILDINGS TO MONITOR CO2 LEVELS TO AID IN THE FIGHT AGAINST COVID & FOR GENERAL HEALTH & WELL BEING. THE MEASUREMENT OF CO2 LEVEL IS A GREAT INDICATION OF AIR QUALITY. THE MODULE MAKES USE OF AN NDIR TYPE CO2 MEASURING CELL WHICH OFFERS EXCELLENT LONG TERM STABILITY & AUTO CALIBRATION.

The module displays the current CO2 value by a large central digital display directly in parts per million (ppm) & incorporates a surrounding colour graphic ring giving quick visual indication from afar of the range of the current reading. The flashing colour indicates the current measurement range, green is the ideal level indicating levels are below 700ppm, Note typical outside fresh air is approximately ~420ppm and most indoor typical lightly occupied environments will sit in the range from ~450 to 650ppm. Each flashing colour ring indicates an increase in the measured value in 100ppm steps. Measurements over 900ppm (red flashing ring) for sustained periods (~1 hour) should be considered as an unsuitable environment and steps taken to introduce fresh air to ventilate the space. At undesirable levels above 1000ppm an internal latched beeper (1 min. delay) also sounds which can be muted by momentary pushing the power button. The device is powered by an external 5vdc plug pack & to also charge its internal battery. The device can be left on charge as a semi-permanent installation or just charged and used as a portable monitor (up to 6 hr run time). The unit can be wall mounted using the rear mounting slots hanging on 2 suitable exposed screw heads.

TECHNICAL DATA

ALLOW 2 HOURS FOR READINGS TO STABILISE ONCE POWER APPLIED

CO2 ppm **BELOW 450** WILL TYPICALLY READ ~400ppm

Product model	H8-(W) or (B)-CO2 -W = WHITE CASE, -B = BLACK CASE
Detection Technology	Infrared beam detection technology
Proper Temperature	0 ~ 70℃
Display Mode	LCD screen+backlight
CO2 Detection Range	400 ~ 5000 PPM **+/- 100ppm** in the range of 400 -1000
Product Size	70*90*35 mm
Charging voltage	5V
CO2 Sensor	NDIR sensor self calibrating
Battery Capacity	1200mAh
Charging Port	Type-C
Package Size	150*100*50mm
Gross Weight	200g
Net Weight	130g
CO2 Detection Sensitivity	1 PPM
Temp Measurement Range	0 ~ 50℃
Temp Measurement Accuracy	±2℃ Note : Temperature & Humidity measurements can
Humidity Measurement Range	0 ~ 99%RH be affected whilst charging & from other heat influences
Humidity Measurement Accuracy	±7%RH
Packaging Details	One box: 15 * 10 * 5cm 20 pieces in a box: 24 * 25 * 24cm 80 pieces in a box: 47 * 25 * 48cm
CO2 colour bar trigger levels	400~700 ppm: GREEN SECTION FLASHES 701~800 ppm: YELLOW SECTION FLASHES 801~900 ppm: ORANGE SECTION FLASHES 901~1000 ppm: RED SECTION FLASHING
OVER 1000ppm SIREN BEEPS, (1 minute delay) mutable by momentary pushing power button.	

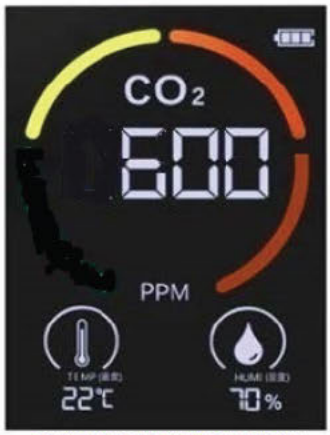
The monitor generally does not require calibration as this module uses a **self calibrating** & checking algorithm (ABC) measured over an 8 day cycle to automatically maintain correct CO2 levels over a typical 10 year life span. **Please note** however, rough transport or being dropped may cause the CO2 cell to be jarred out of calibration beyond the auto cal capabilities so a forced manual reset will be required. To check calibration place module in a protected outside fresh air environment - within 1 hour module should display a typical fresh air CO2 value of between 400 to 450ppm, if high, perform a manual reset of the module by the following procedure..**note remove external power for this procedure**.

1.) Momentary push the power button **twice** ..."HHHH" will be displayed , than after approximately 1minute the display will change to read "0000".

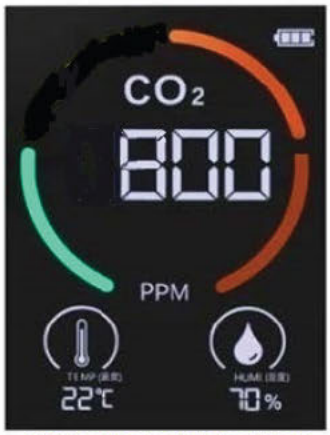
2.) Wait 10 seconds, then turn module power off by pressing & holding power button for 3 seconds.

3.) After 30 seconds turn power back on by pressing power button for 3 seconds ...unit should now display a more accurate reading & over 1/2 hour settle down to a correct calibration tolerance.

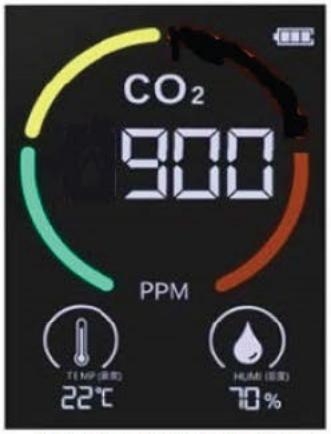
EXAMPLE SCREEN DISPLAYS AT VARIOUS CO2 CONCENTRATIONS



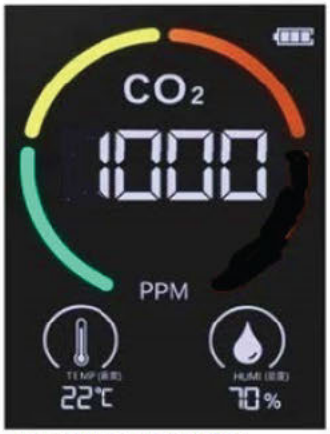
GREEN CIRCLE SECTION
FLASHES UPTO 700 ppm



YELLOW CIRCLE SECTION
FLASHES 701-800 ppm



ORANGE CIRCLE SECTION
FLASHES 801-900 ppm



RED CIRCLE SECTION
FLASHES 901-1000ppm +
ABOVE 1000ppm BUZZER BEEPS

POWER ON/OFF & SIREN MUTE BUTTON

CHARGER / POWER TYPE C PORT SOCKET.
USB -C CABLE SUPPLIED

TYPICAL AFFECTS OF CO2 ON WELL BEING & COMFORT

350 - 450 LOW CO2 LEVEL, TYPICAL OF OUTSIDE FRESH AIR CONDITIONS

450 - 750 TYPICAL OCCUPIED ENVIROMENTS CONSIDERED EXCEPTABLE

750 - 900 WARNING LEVEL THAT CO2 LEVELS HAVE INCREASED AND FRESH AIR SHOULD BE INTRODUCED TO REDUCE LEVEL ESPECIALLY FOR SUSTAINED PERIODS OF OCCUPATION.

900 - 1000 RECOMMENED LEVEL TO FLUSH ROOM TO REDUCE LEVEL, AVOID LONG EXPOSURE.

1000-2000 SUSTAINED EXPOSURE CAUSES FEELING OF DISCOMFORT & DROWSINESS.

2000-3000 TYPICALLY CAUSES DIZZINESS AND DIFFICULT TO CONCENTRATE

3000-4000 ACCELERATED HEART BEAT & NAUSEA

4000-5000 SUSTAINED EXPOSURE CAUSES SEVERE HYPOXIA & POSSIBLE BRAIN DAMAGE.

5000 & ABOVE PROLONGED EXPOSURE CAUSES COMA LEADING TO DEATH

A WORD ABOUT CO2 MONITORING AND COVID SAFETY

Besides the cause & affects of high CO2 levels as detailed above on human health & well being, Obviously CO2 measurement isn't a measure of Covid Virus particals floating in the air in the monitored space, but what it does give is an indication of the freshness of the air. Typical CO2 levels in a fresh outside air environment sit around 430ppm, whereas in a typical lightly occupied building CO2 levels tend to be in the range of 500 to 650ppm. It has long been the practice in commercial air conditioning systems to start introducing fresh air into a building as CO2 levels increase over 700ppm, with 100% fresh air introduced to flush the building as levels approach 1000ppm.

CO2 measurement gives an indication of the contamination in a room of exhaled air we breath out (CO2) and as such the increased risk of inhaling someones else's exhaled air which may be contaminated with Covid particals, so the lower the CO2 level the less chance of breathing contaminated air. Obviously there has to be some consideration and balance against the increased cost of running the air conditioning system to cope with large amounts of fresh air, but we highly recommend all efforts be made to keep levels below ~ 650ppm during this pandemic.

Carbon dioxide detector parameter

Product model	H8 CO2 UNMODIED
Detection Technology	Infrared detection technology
Proper Temperature	0 ~ 70℃
Display Mode	LCD screen+backlight
CO2 Detection Range	400 ~ 5000 PPM
Product Size	70*90*35 mm
Charging voltage	5V
Sensor	NDIR sensor
Battery Capacity	1200mAh
Charging Port	Type-C
Package Size	115*116*47mm
Gross Weight	200g
Net Weight	130g
CO2 Detection Sensitivity	1 PPM
Temp Measurement Range	0 ~ 50℃
Temp Measurement Accuracy	±2℃
Humidity Measurement Range	0 ~ 99%RH
Humidity Measurement Accuracy	±5%RH
Packaging Details	One box: 15 * 15 * 5cm 20 pieces in a box: 24 * 25 * 24cm 80 pieces in a box: 47 * 25 * 48cm
CO2 Instructions	0~799 PPM:Green flashing 800~1199 PPM:Light green flashing 1200~1599 PPM:Orange flashing 1600~1999 PPM:Red flashing Four colors flashed above 2000 PPM

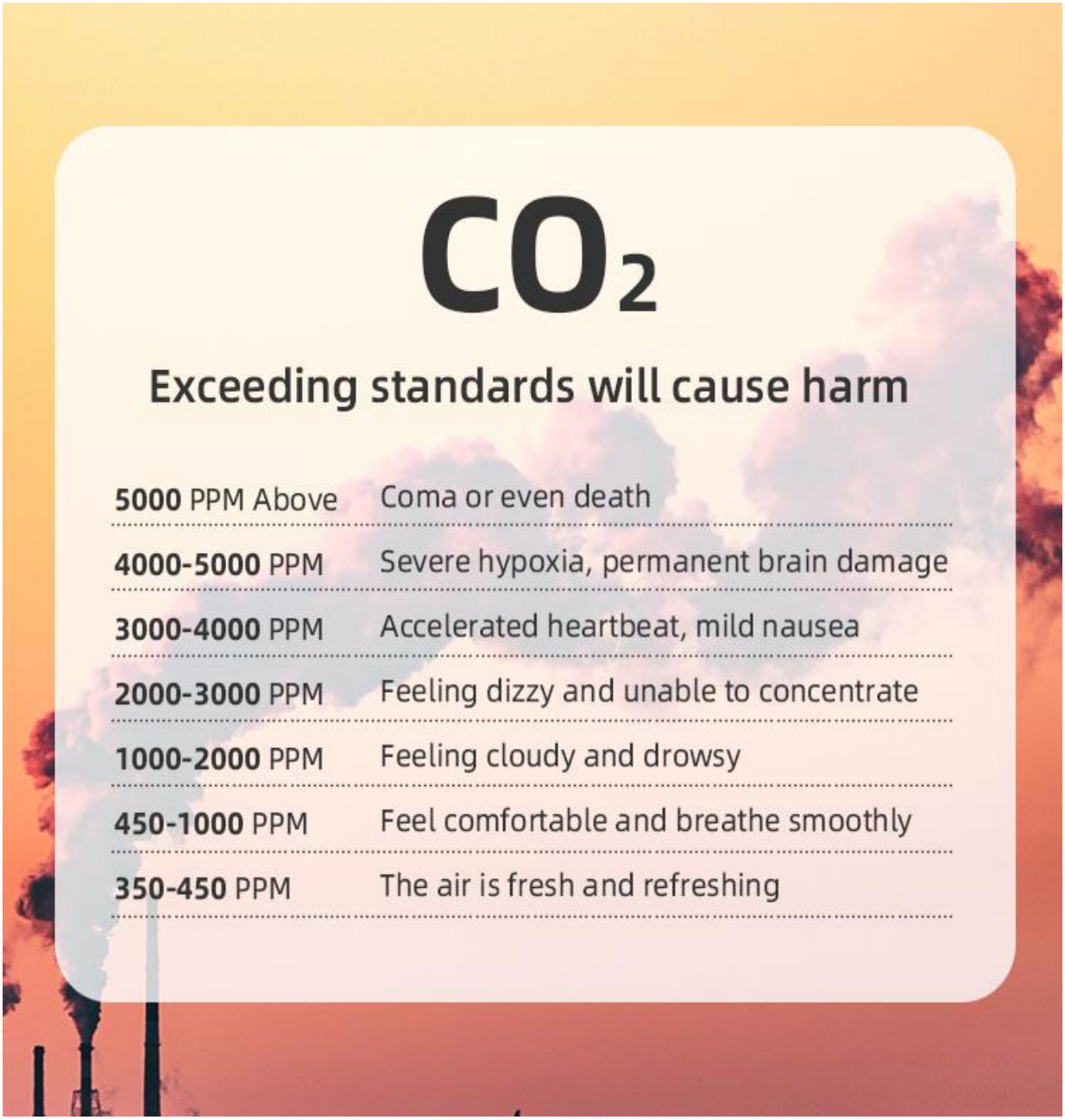
ACCURACY WORST CASE +/-100ppm between 400 to 1000ppm after calibration.

Our choice

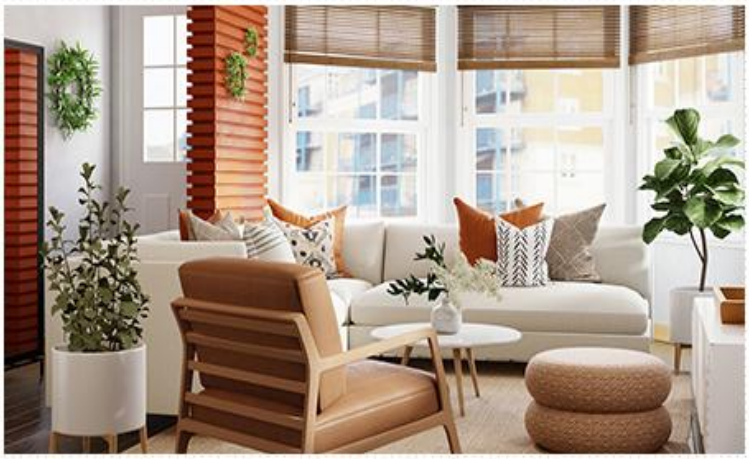
The NDIR gas sensor can be seen directly from the top and back of the CO_2 detector.
The NDIR gas sensor has higher accuracy, longer service life and less fluctuation caused by additional factors.

Other people's choices

From the exhaust outlet of the CO_2 detector, only metal cylindrical sensors can be seen, which are generally CO_2 semiconductor sensors. Although the price is low, the accuracy is low, greatly fluctuated by additional factors (such as alcohol, which Will cause the PPM value of CO_2 to soar), and the service life is not long.


CO_2
Exceeding standards will cause harm
5000 PPM Above
Coma or even death
4000-5000 PPM
Severe hypoxia, permanent brain damage
3000-4000 PPM
Accelerated heartbeat, mild nausea
2000-3000 PPM
Feeling dizzy and unable to concentrate
1000-2000 PPM
Feeling cloudy and drowsy
450-1000 PPM
Feel comfortable and breathe smoothly
350-450 PPM
The air is fresh and refreshing

APPLICATION FIELD



Home housing

Keep low carbon dioxide level and promote healthy life.

Greenhouse planting

Promote photosynthesis, effectively protect the quality and high yield of agricultural products.

Warehouse powerhouse

Modern warehouses are often filled with carbon dioxide to extend the shelf life and prevent the growth of bacteria molds, and insects.

Raw material processing

During the wine brewing process, carbon dioxide has a certain effect of preventing deterioration.

INDOOR AIR QUALITY – WINTER VENTILATION

USE OF NATURAL VENTILATION FOR IMPROVING INDOOR AIR QUALITY DURING WINTER FACTSHEET

RECORD 80

Keep CBR safe & strong

Topic:	**Use of natural ventilation for improving indoor air quality during winter**
Relevant sector:	All Schools
Background:	ACT Health has advised that schools optimise fresh air circulation as one of the controls to reduce the risk of COVID-19 transmission in schools. The risk of COVID-19 transmission is higher in crowded and poorly ventilated spaces where people spend long periods of time together in close proximity. Good ventilation is one part of a suite of controls to minimise transmission in schools, like vaccination, physical distancing, student cohorting, good hygiene, cleaning and mask use. Indoor Air Quality Plans have been developed for every school and have a map that identifies the type of ventilation in each learning and teaching space that have ventilation provided by either natural or mechanical means. Natural ventilation is provided either by operable windows or louvres, while mechanical ventilation is provided by the school's heating, ventilation and air conditioning (HVAC) systems. This fact sheet provides guidance on how to operate naturally ventilated spaces and balance the use of windows and louvres to provide ventilation, in balance with thermal comfort in winter.
Advice:	Where Indoor Air Quality Maps identify teaching and learning spaces that rely on natural ventilation via windows or louvres, consideration will need to be given to balancing ventilation and thermal comfort during colder weather. In these naturally ventilated spaces, schools can use of portable CO_2 monitors to provide an indication of the ventilation in the classroom. A CO_2 concentration of <800ppm is considered an indicator of good indoor air quality. • <800ppm: Low Relative Risk - windows/louvres may be closed or cracked slightly open to balance thermal comfort • 800-1500ppm: Moderate Relative Risk - partially open closed windows to increase ventilation

INDOOR AIR QUALITY – WINTER VENTILATION

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	• >1500ppm: High Relative Risk - windows should be fully opened to increase ventilation CO2 monitors should be placed at breathing level in a visible location away from fresh air inlets (e.g. open windows) and not within 1m of a student or teacher. Where schools do not have access to CO_2 monitors in the classroom, consider opening windows for short durations throughout the day to balance ventilation and thermal comfort. This could be for a period of time per hour (e.g. 10 minutes), when the space begins to feel stuffy, or when thermal comfort conditions allow.
Heath Advice:	This advice has been developed in line with guidance from the Chief Health Officer, World Health Organisation, Safe Work Australia, OzSAGE and the Australian Institute of Refrigeration, Air-conditioning and Heating (AIRAH).
Support or further advice:	For further advice, schools can contact their ICW Network Officer or email ACT.Education@act.gov.au