

## Information Provided to the Minister

**Date:** 8 October 2021

### ***Air purification in schools***

1. We are aware the Ministry of Health, through NZ Health Partnerships, has a purchasing arrangement for air purification systems which is available to government agencies. The arrangement has supply agreements with 7 suppliers who are able to provide air purification units each with different specifications. We understand that the Ministry of Health retains first rights over all air purification units imported to New Zealand through this arrangement. We understand there are air purification units installed in MIQ facilities and some health facilities.
2. From our initial conversations with NZ Health Partnerships, the biggest challenge may be in sourcing a sufficient number of units given the size of the Ministry's property portfolio which encompasses over 15,000 buildings and 35,000 teaching spaces. Units retail at around \$9,200 each (not including logistics costs).
3. We met one of the suppliers, ActivePure, this afternoon to gain a better understanding of the product they are offering and what benefits they may potentially bring for schools. The supplier indicated they may be able to source and deliver between 5,000 - 10,000 units within a month of an order being placed.
4. However, we have asked for significantly more information on how these units would be operationalised in a school setting, including information on costs, maintenance, day-to-day usability, the academic evidence supporting the use of the units, and a risk matrix on how the units might be deployed in a school setting to inform how many units might be required if this were a desirable course of action.
5. We need to be accurately informed on whether an investment of this scale would be effective in reducing risk in school settings. We will set up an advisory panel bringing together air quality, architectural, epidemiological and other relevant experts to inform decisions and a consistent approach across the state sector.
6. We have also reached out to Aurecon for a better understanding of what is being delivered in Victorian schools, including how many are being used and within what parameters.
7. At this stage, we are unable to comment on the effectiveness of air purification units in preventing or minimising the spread of SARS Cov-2.
8. From a recent meeting with other jurisdictions across Australia, a number of themes arose including that most jurisdictions are focussing on maximising fresh air and doing so using natural ventilation wherever possible. CO2 monitoring and air purification is not being actively pursued as accurate measurements in classrooms are very difficult, there are no targets/standards to measure against meaning there is little benefit, and there are limited realistic interventions available to address any 'alarming' measurements.

### ***CO2 monitors in schools***

9. We currently utilise Internal Environmental Monitoring devices, or dataloggers, in some schools to monitor thermal comfort, lighting, acoustics and CO2 levels. There are 750 data

loggers currently installed in schools, 1000 units have been provided to project managers for installation in schools, and we have confirmed orders for a further 1250 units, this will bring our total stock to 3000 units in around 300 schools.

10. We have purchasing arrangements with two suppliers who have confirmed they have capacity to provide additional units once we place a firm order. We have been working through the costing options to order additional units. Our current stock is designed to be rotated between schools at the moment, but we would be able to move to permanent installation upon confirmation of volume and timing.
11. All of our data loggers measure CO2 levels and this information is sent through to our Te Haratau reporting dashboards. Additionally, the devices from one of the two suppliers have an LCD screen which allows the reading of CO2 levels in real time in the classroom. We're working on the introduction of a real time display with the second supplier.
12. In terms of cost:
  - a. Smoother Sensors cost 9(2)(j) per unit (for an order of 1000 devices or more) with subscription 9(2)(j) per month; or 9(2)(j) to own (no subscriptions, no upgrades); or
  - b. Monkeytronics sensors cost approximately 9(2)(j) per unit with no ongoing subscription.

#### **Boundary permissions and impacts on school infrastructure provision**

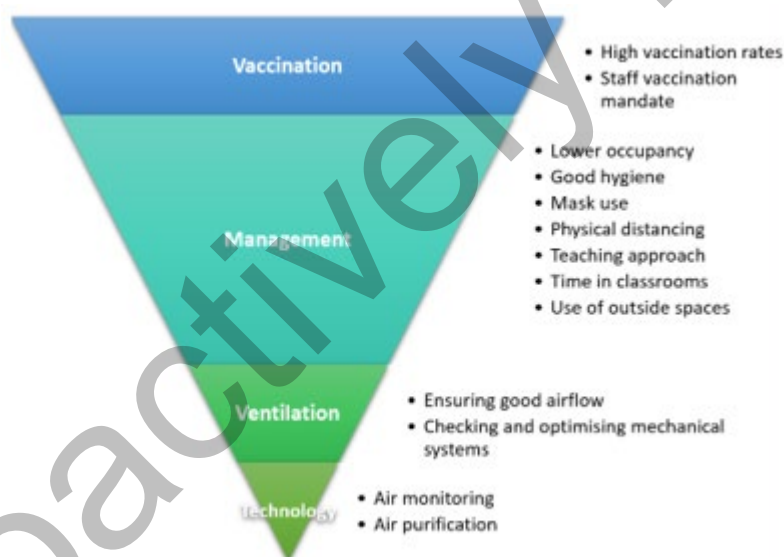
13. We are facing ongoing disruption and delay to critical roll growth and new school delivery programmes in the greater Auckland region. These issues will have a knock on effect for several schools including the opening date of three new schools in Auckland.
14. MBIE has been asked to put some advice together on further amendments to boundary permissions - to enable building and construction of infrastructure that contributes to government priority projects following the next public health risk assessment on 7 October 2021 (CAB-21-MIN-0407 refers). MBIE has worked across all infrastructure agencies to identify a range of options for possible changes. DPMC is leading the Cabinet paper which MBIE's advice will be included in.
15. The main changes identified to enable building and construction of infrastructure require amendment of the definition for building and construction in the Order to remove the link to enabling and supporting supply chains which limits the types of projects that travel can be approved for; or to make explicit provision for the building and construction criteria to provide for travel that supports projects funded / contracted by specified agencies.

**Date:** 2 Nov 2021

## **Overview**

- All schools and kura must be able to meet public health requirements when staff and students are on site. Indoor spaces with low levels of ventilation are high-risk settings for Covid-19 transmission.
- However, technological solutions are not the first step in mitigating that risk.
- Combining public health measures, management solutions and good ventilation as part of a suite of measures is the best course of action (see *Figure 1*). This includes measures such as testing and vaccination, good hygiene, physical distancing, mask use and staying at home when unwell, as well as good ventilation of buildings.
- We have been saying ‘the more fresh air, the better’.
- Our current advice to schools is to open windows, doors and vents to support the flow of fresh air. This advice has been endorsed by the Ministry of Health and NIWA.
- We are actively supporting a small number of schools who have contacted us with questions about whether they have sufficient ventilation.
- There has been significant media interest in whether the Ministry will provide air treatment technologies based on the views of a range of commentators, many outside the air quality field. The focus on ventilation has overestimated the actual protective value of air flow, at expense of the other vaccination, public health and management strategies that have a more direct influence on the minimising exposure and subsequent onward transmission of Covid-19.

**Figure 1**



## **Actions to date**

- We have provided regular comms to all schools outlining our advice that good ventilation is key to reducing risk.
- Schools have been asked to ensure their windows are able to open and for those where that may be an issue, arrange for the window to be fixed or contact their Property Advisor for a solution to be arranged. Extra funding will be provided where required.

- To inform property responses as a contribution to the overall management of risk, we are being advised by national indoor air quality experts through both the Indoor Air Quality (IAQ) Research Centre panel and an established Ministry IAQ Advisory panel. These panels bring together air quality, building performance, health, science and academic experts.
- Building on this advice, we are developing a self-assessment tool to support schools identify areas that may require an additional intervention such as supplementary technology to support air quality. The self-assessment tool will be completed in the next week, and we will share with schools when appropriate to do so.
- We will identify the preferred supplementary technology solution from those available, assess the number of units we consider will be required (based on some assumptions about the performance of our estate) and develop high level costs for targeted implementation where technology is likely to make a difference. This includes CO2 monitoring technology and filtration/purification systems.
- We will keep you updated of progress and key milestones.

#### ***Other comments***

- We are aware suppliers are making direct approaches to schools looking to sell air monitoring and/or air treatment technologies. We will be advising schools shortly that we are working closely with a panel of experts to determine the right interventions for the New Zealand school property portfolio.

#### ***Summary***

- Schools should be reassured that we are working with experts to inform our approach.
- Opening windows and doors and getting good air flow through buildings remains the best advice. This is endorsed by air quality experts and Health.
- This should be part of the wider strategy of management and mitigation measures.
- We are actively developing a plan for targeted intervention with technological solutions.
- When this is progressed we will be in touch with schools to advise of actions and next steps.
- Property staff are available to support schools that may have specific concerns about getting adequate ventilation.

**Date:** 27 January 2022

1. When schools, through the use of the provided CO2 monitoring device and toolkit, are able to identify where there are issues, they will have quantifiable evidence of which of their spaces require interventions to improve ventilation. If management measures, such as opening windows and doors, flushing rooms with fresh air between lessons, or the use of alternative spaces for the proposed activity are impractical or prove ineffective - we can then work with affected schools, through their property advisors, to determine what property interventions may be effective. Should management measures or property interventions not be possible to improve ventilation then supplementary air cleaning technology (i.e. portable air cleaners) would be considered.
2. To support this, we are currently training a team of Ministry property advisor 'champions' who have received and are learning how to best use the portable CO2 monitors ahead of time. These champions can then provide assistance to schools, and other Ministry property staff, to make best use of the devices and toolkit.
3. We will start dispatching monitors to schools this week with the majority of toolkits being dispatched over the next two weeks. Following our [Bulletin for School Leaders item](#) on 25 January, asking schools to confirm their details for issuing the devices, we have already had over 1,300 schools respond.
4. This self-assessment process, followed by direct engagement with schools through our property team will form the basis of how we determine where to target our support to schools across over 15,000 buildings.
5. We continue to plan our deployment of portable air cleaners. One option recommended by our technical advisory panel is for half of the 5,000 air cleaners to be deployed in school staff rooms where there may be a higher likelihood of transmission between adults, recognising the high impact on the school should the teaching staff become infected at the same time. In this scenario the remainder will be deployed in a targeted way in response to specific issues identified by schools that cannot be addressed by good management practice and other ventilation improvement strategies and solutions. This proposed deployment strategy for the air cleaners is not yet confirmed, or in the public domain and will be informed by the engagement with schools over the coming weeks.
6. As outlined in the paper *School Ventilation Approach under COVID-19* [METIS 1277412 refers], we expect around 80% of our school buildings are likely to meet World Health Organisation (WHO) and Center for Disease Control (CDC) guidelines for natural ventilation – meaning that at a high level, we might expect around 20% to require some intervention (whether management measures, property modifications or using supplementary technology).
7. However, as schools begin to self-assess their teaching spaces, we will have a clearer idea of exactly what interventions are required. We are returning to the market to ensure that we have options for the supply of simple air supply systems to support improved ventilation and extraction, as well as additional air cleaning technology if required.
8. It is also worth noting that schools were invited to raise ventilation concerns with us in November, and we have supported a small number of schools subsequent to that.

***Align room usage with its ventilation capabilities: How practical will this be for schools? Have we tested this with schools, peak bodies or unions as part of developing the overall plan?***

9. Schools have done a great job of adapting to the challenges of the pandemic, and implementing pragmatic management solutions to keep students and staff safe. However, there will clearly be some impact on the normal routine of a schooling day. The support we are providing aims to minimise those impacts.
10. There are likely to be variations between what a room was initially designed for and the design standards at the time, with how those rooms are currently used. However, our toolkit is designed to help schools determine what spaces work best for specific school activities today, in the context of the need for better ventilation as a result of COVID-19.
11. Our toolkit helps schools determine the effect that different activities will have in a given space. As an example, strenuous activities such as kapa haka can, particularly in summer weather, be taken outdoors. This also applies to non-strenuous activity such as academic lessons. Non-teaching space, such as halls or gyms, or surplus classrooms, can also be used to help schools when they need to refresh the air in a particular room or space. Schools will be best placed to determine exactly what works in their specific circumstances, with our support and advice.
12. We expect that with the support of the self-assessment toolkit, and our property staff, most schools will be able to adapt their practices to continue delivering face-to-face education – in conjunction with the other preventative measures. Where it becomes known that some spaces perform poorly and further management measures aren't possible, property interventions or technological assistance will be arranged where needed. If some schools struggle to manage the extra burden this places on them, we will of course provide further support.
13. We have had some discussions with peak bodies on these matters, including last week, and another is scheduled for this afternoon at which ventilation is a topic for discussion. We have not fully tested our plan with peak bodies but we are considering offering workshops with them in the near future. The absence of feasible alternatives to our strategy meant it was important to press ahead with developing these guidelines and supports for schools.

***As we are trying to maximise face to face learning, how will the ventilation plan assist schools to meet this goal, particularly those where there is higher risk due to higher proportion of learners with co-morbidities, older buildings, or close to MIQs?***

14. Ventilation is one part of the plan to address these risks. However, we need to again caution that good ventilation alone is not capable of preventing the spread of COVID-19 in school settings.
15. The Covid Protection Framework is the key framework in which schools should operate in terms of responding to COVID-19.
16. Within that, vaccinations including staff vaccine mandates and the rollout of vaccinations to children aged 5-12 years old, is the most effective tool in helping prevent the spread of infection and serious illness arising from infection.

17. Management actions, which in schools includes the requirement for all staff and most students to wear a mask at school, as well as hygiene, physical distancing, the use of outdoor space, and limiting occupancy where possible, are the next most important tools in the overall plan.
18. Good ventilation supplements these measures by ensuring clean air, and the removal of stale air (which may include COVID particles where an infected person has been present), to help reduce the risk of transmission. The ventilation assessment toolkit referred to above, including the portable CO2 monitor, will help schools assess the quality and freshness of air in a space – as elevated levels of CO2 are a good proxy for the quality of the air and therefore the effectiveness of the room's ventilation.
19. Property interventions, where assessment identifies poor natural ventilation that cannot be addressed by management measures such as opening doors and windows, are the next step. This could include increasing window opening, removing internal partitions, or installing air intake or extraction or other measures to support natural air flow.
20. Supplementary air filtering and recirculation of air remains a last resort where other measures to improve ventilation are not available. To be clear, portable air cleaners are not a substitute for good natural ventilation, and this position is based on scientific advice.
21. There is no substitute for fresh air flow. We continue to follow national and international scientific experts in informing this approach.

***Do you have any information from NIWA of the quantitative effect of the various additional measures on reducing transmission?***

22. The Indoor Air Quality Research Centre, of which NIWA is a key member, has published its position on natural ventilation, air quality and supplementary mechanical air cleaning technology at [Indoor Air Quality Research Centre New Zealand \(iaq.org.nz\)](https://iaq.org.nz). This is a good summary of the best means of improving air quality and thus reducing transmission risks inside buildings.
23. NIWA continues to study classroom ventilation using proxies such as CO2 as an indicator of air quality, and therefore the relative airborne transmission risk. This work will continue to inform our strategy. However, the Ministry of Health is best placed to provide advice on the cumulative effect of risk mitigation strategies in reducing COVID-19 transmission rates.

***If the Ministry has a school ventilation implementation plan to share with the Minister + PMO, that would be great as well.***

24. We have been developing and implementing our plan in practice given the need to move with speed. However we intend to fully document and share our plan with Minister Hipkins next week. This will include the estimated financial implications of the property and technology interventions required to support air quality. This work is already underway.



Date: 4 February 2022

## Implementation Plan – Ventilation in Schools

### Overview

1. Our approach to addressing ventilation in schools, in response to the COVID-19 pandemic and as informed by evidence supporting good natural ventilation where possible, has previously been set out in some detail [*METIS 1275905, 1277412, 1279113 and 1280558 refer*]. This paper aims to provide an overview of the work we have carried out to date and to describe the various actions we intend to implement immediately in light of the Omicron variant, the medium term (by winter), and in the longer term (post-winter 2022).
2. We have previously described the supplementary role of ventilation in the context of other priority risk reduction measures, such as vaccinations, mask wearing, distancing and hygiene, and management measures regarding the occupancy of indoor spaces. **Figure 1** expands on the steps schools can take, with our support as required, to improve ventilation – and outlines the priority that should be afforded to each of those mitigation options.

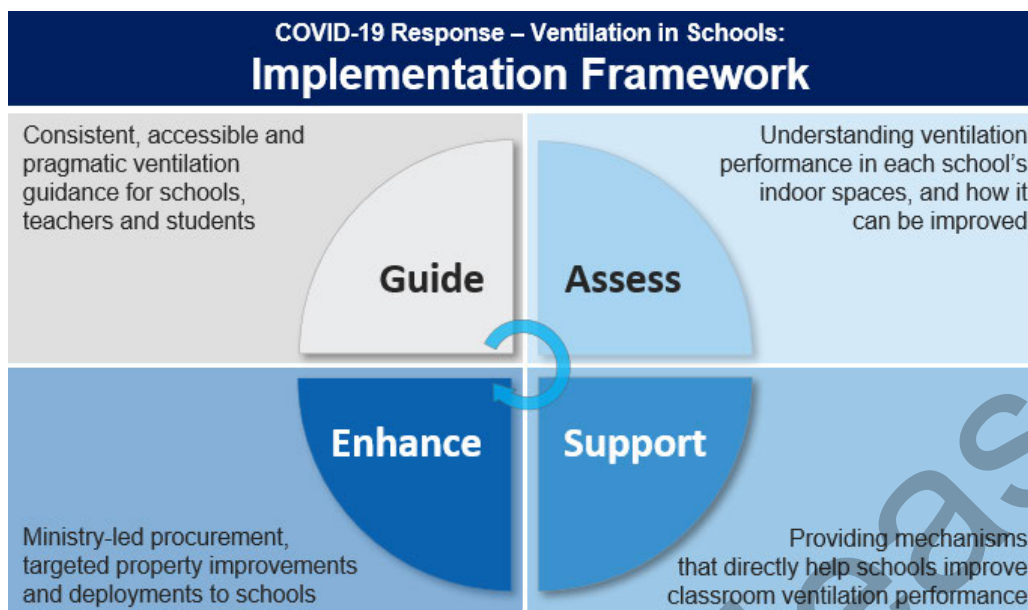
**Figure 1 – Ventilation strategy for New Zealand schools**



### Ventilation Programme Implementation Framework

3. Our Ventilation Programme Implementation Framework is based on four work streams:





4. The priority and scale of each work stream will be adjusted as the programme progresses, in consideration of the evolving public health advice, real-world evidence, and the changing needs and concerns of schools, staff, teachers, students, and communities.

### Timeframes for evolution and delivery of our ventilation strategy

5. The programme can, from this point forward, be summarised into three main phases:
  - a) **IMMEDIATE TERM (0-3 months)** - supporting schools to take all practical actions to successfully navigate the start of the school year and the anticipated spread of the Omicron variant. This is primarily focused on addressing any deferred maintenance, fully opening windows and doors, taking breaks if a room in use gets stuffy, and the provision of a portable CO<sub>2</sub> monitor (and associated guidance toolkit). The portable CO<sub>2</sub> monitor helps schools make operational decisions that support good ventilation, while helping the Ministry quantify how much of the portfolio may require further or longer-term interventions.
  - b) **MEDIUM TERM (0-9 months)**: Preparing for and helping schools to navigate the colder winter season. The assessment work now being carried out by schools, property advisors, and other providers will inform which spaces need to be prioritised to further improve natural ventilation, and what those interventions need to be. Where critical works cannot be carried out quickly to achieve acceptable clean air flow rates, portable air cleaners will be deployed as a short-term mitigation measure. Portable air cleaners may also be deployed in high-risk areas (e.g. staff rooms). While we are preparing on the basis that the pandemic continues through winter, our approach is purposely flexible should the situation rapidly change for other variants, or for the start of an endemic phase.

Our current procurement activity to support the medium-term phase is:

- Following similar international initiatives and local prototyping that was a part of the NIWA classroom study, the piloting and provision of low-cost *Assisted Natural Ventilation System(s)* that increase the natural flow of fresh air. Market engagement was completed in December 2021, and an advance notice posted in January; and
- Approaching the market imminently to identify a limited number of portable air cleaner suppliers with the rapid and ongoing ability to supply the Ministry, schools

and early childhood centres, should this be required (advance notice posted in January). This includes securing another circa 5,000 portable air cleaners should these be required as part of our medium term requirements (with this information not currently in the public domain and being commercial in confidence). We expect schools and ECEs to be able to leverage off our procurement approach for best value.

There is some risk that the current assessment approach may not provide us with the speed or accuracy of coverage we need across some key parts of the portfolio. We have reached out to Argest, our national Building Warrant of Fitness supplier, with a view to determining their ability to carry out this type of assessments for some schools.

We will shortly be commencing a trial where assessments are carried out on behalf of specialist schools, and we will keep you informed of any updates in this regard. Other supply chain arrangements are being canvassed should we need to take this outsourced approach more widely.

With the range of different interventions and options we have, we will have the ability to pivot towards those that prove most effective.

- c) **LONG TERM (post-winter 2022):** These activities will help us determine longer term strategies and activities to help all school buildings achieve better natural ventilation. This may include revisiting our new build design standards, and longer term remediation and/or indoor air quality improvement investments across the existing portfolio.

## **Evidence and alignment with other jurisdictions**

- 6. A targeted study of New Zealand classroom ventilation performance has been completed in collaboration with NIWA and the Universities of Canterbury and Victoria. This study involved classroom CO<sub>2</sub>, temperature, and behavioural monitoring in 18 occupied classrooms at three schools which were representative of the common classroom construction types/designs across most New Zealand schools. The study's preliminary findings, comparative international advice, and the sharing of information and approaches with counterparts in Australia and further afield has informed the New Zealand-specific stance we have adopted. Note the NIWA report findings are currently in draft, to be published this month.
- 7. Our approach broadly aligns with the approach being taken in the Australian states of New South Wales and Victoria, and other overseas jurisdictions where naturally-ventilated schools are prevalent.
- 8. Both Australian states referenced above place primary importance on vaccinations, outdoor teaching, mask use, hygiene measures and other management actions to reduce risk in schools, with good natural ventilation supplementing those measures. Assisted ventilation systems and portable air cleaners supplement these core measures when the existing ventilation approach is not providing sufficient fresh air ratios. Each state's position is outlined at [Ventilation \(nsw.gov.au\)](https://www.nsw.gov.au/ventilation) and [Policy | education.vic.gov.au](https://www.education.vic.gov.au/policy).
- 9. 9(2)(ba)(i)

## **Deployment of portable air cleaners**

10. An urgent order of 5,000 medium and large Samsung portable air cleaners was confirmed in December 2021, with units progressively arriving from mid-February through to late April, noting some risk from global shipping delays. We are currently on track for at least 500 units to be available for deployment by the end of February.
11. We are in the process of finalising our deployment strategy for the portable air cleaners, which will be continually refined as we learn more through our assessment activities. Considerations include:
  - a) Targeting spaces that are high risk due to an evidenced health risk. For example, a school in Bromley, Christchurch near to a fire-damaged waste treatment plant, and a school with two students who cannot be exposed to normal sunlight UV levels.
  - b) Spaces with sustained ventilation challenges unable to be addressed through other interventions.
  - c) A possible bulk deployment to all schools with guidance on higher risk areas the school may elect to use them (e.g. staff rooms, sick bays, music rooms, cafeterias). If this is adopted, we would prioritise deployment based on local community risk factors such as vaccination and infection levels, decile, climate etc.
12. Pending this further consideration, our current position is that deployment of portable air cleaners is a targeted or temporary solution for spaces where good natural ventilation is not possible. Air cleaners are not as effective when windows and doors are open, meaning they are rarely suitable in classrooms. This position is informed by and consistent with how portable air cleaners are being deployed in similar environments overseas.

## Progress made to date

13. In its first three months (and prior to the formalisation of this Implementation Plan), the COVID-19 Ventilation Programme has successfully established or delivered a number of key items:
  - a) We have provided, and continue to evolve up-to-date **ventilation guidance** to schools via the [Ministry of Education web site](#) and regular school bulletins, including an **initial self-assessment process** for classroom ventilation. This is further supported by a more detailed knowledge base and **tiered support system** available to all Ministry Property Advisors to support their schools with as required.
  - b) We have or are **handling around 300 school queries on ventilation**, responding to a wide range of comments and questions. This should not be taken as 300 schools needing direct intervention to address a ventilation issue.
  - c) As part of the self-assessment toolkit now being released to schools, we have **procured and received 2,500 portable Aranet Carbon Dioxide (CO<sub>2</sub>) Monitors** for deployment to state-owned and state-integrated schools. This activity is complimentary to the Ministry's Indoor Environmental Monitoring (IEM) initiative that includes the deployment of devices that monitor CO<sub>2</sub>, heating, lighting, and other conditions in schools.
  - d) We have **despatched almost 1700 monitors this week** in response to requests from schools (exact number to be confirmed as this is an ongoing process). We have stock ready to be issued and we are able to rapidly deploy more as schools sign up to receive a monitor.
  - e) An online **Classroom Ventilation Calculator** is available for Ministry Property Advisors to help schools identify and address ventilation challenges, alongside the portable CO<sub>2</sub> monitor provided to schools as part of the self-assessment toolkit. We are working on expanding the availability of the calculator to schools in due course.

- f) An urgent order of **5,000 medium and large [Samsung portable air cleaners/purifiers](#)** has been confirmed with initial 500 units expected to progressively arrive starting this month, and further units expected throughout April and May (noting current international shipping congestion challenges).
- g) We are currently **testing the market for the availability of other air cleaning units** that can be made available in a short period of time, as outlined in point **5B** above.
- h) The New Zealand industry that supplies air conditioning and air quality improvement solutions and devices has been engaged via a **GETS Expression of Interest (EOI)** process, seeking feedback on the development of cost-effective, rapidly deployable solutions that provide 'bolt on' betterment of existing natural ventilation solutions. This EOI was undertaken urgently following preliminary findings from the NIWA classroom ventilation study, that identified the potential benefit of what has been coined **Assisted Natural Ventilation Systems (ANVS)**.

## Financial approach

- 14. We are funding current and planned activities under this programme from our baselines. We continue to explore a variety of ways to enable existing funding sources to be repurposed.
- 15. We have already decided to create a central funding source to address ventilation-related property improvements, separate and in addition to schools' 5YA.
- 16. Schools may see rises in their heating expenses as a result of the need to maintain good natural ventilation through opening windows and doors, particularly in colder months. Some schools may also need to carry out moderate to significant property improvement work to achieve good natural ventilation, where self-assessment indicates a longer-term issue needs to be addressed.
- 17. We expect to have to reprioritise some aspects of our capital expenditure programme to accommodate costs arising from our ventilation response, including additional technologies and 'quick win' property improvement activity. The scale of investment will depend on the effectiveness of the existing mitigation approaches, and the responses received from the assessment process, among other factors.
- 18. We continue to explore and quantify the extent and cost of the interventions likely to be required, and we will update you on the cost implications as this becomes clearer.

## Equity

- 19. While noting there is a risk that some schools may be perceived to do better than others, particularly schools that are stronger financially and able to acquire additional technology solutions themselves, equity is fundamental to the Ministry's approach.
- 20. In the context that air cleaners are not preferable to or more effective than natural ventilation, but a last resort if other activity cannot improve ventilation, any school with an evidenced need for air cleaners will receive them.
- 21. As noted in point 11c, our deployment strategy is likely to consider local vaccination rates, infection levels and decile (with these risk factors being weighted towards schools in lower socio-economic communities) for any additional deployment of air cleaners.
- 22. As also noted in point 14, we're working on ways to reprioritise our capital expenditure programme so that any school that requires additional financial support (above existing

funding) to address ventilation issues will receive it. Creating a central fund, as outlined in *point 15*, will help ensure all schools are well supported.

### **Closing comments**

23. As schools return fully to school in the coming days, we anticipate increased engagement with our assessment toolkit and are prepared to ramp up our responses to support schools. We'll also continue to refine our tools in response to real-world feedback from schools.
24. We will also keep your office updated on any significant departure from the implementation set out in this paper, while noting that we may need to make more operational-level shifts to our programme as the situation (both in schools and more broadly) evolves and our body of knowledge increases.