Thrive

Thrive is an ARC Training Centre for Advanced Building Systems Against Airborne Infection Transmission

N E W S

24 July 2026

Thrive Forum: Impact of landscape fires in a changing climate

The aim of the interdisciplinary Thrive Forum, "Impact of landscape fires in a changing climate", held at QUT on 2 July 2026, was to discuss landscape fire smoke. It is essential to centre the needs and experiences of impacted communities and to consider interdisciplinary solutions that reflect the complexity of climate change, land management, public health, ecological safety, and the fundamental right to clean air.

The presenters and panellists included: **Distinguished Professor Lidia Morawska** (International Laboratory for Air Quality and Health [ILAQH], QUT, THRIVE), **Dr Dwan Vilcins** (QUT, University of Queensland and Centre for Safe Air), **Associate Professor Andrew Dowdy** (University of Melbourne), **Associate Professor Rachael Nolan** (NSW Bushfire and Natural Hazards Research Centre, Western Sydney University), **David Kington** (Independent Land Manager and Vegetation Management Science), **Darren Burns** (Quandamooka Yoolooburrabee Aboriginal Corporation), **Professor David Bowman** (University of Tasmania), **David Wainwright** (Queensland Department of the Environment, Tourism, Science and Innovation), **Matthew Riley** (NSW Department of Climate Change, Energy, the Environment and Water), **Professor Fay Johnston** (University of Tasmania), **Dr Zijun Li** (ILAQH, QUT), **Dr Susan Rockloff** (Central Queensland University) and **Dr Sharon Campbell** (University of Tasmania). The **big questions** discussed at the forum included:

1. How is the climate affecting fire risk and the landscape in Queensland?
2. What does the science tell us about controlled burning?
3. What does the reinvigoration and growth of Aboriginal cultural burning mean for wider land management?
4. What do we know about the health impacts of landscape fire smoke?
5. What options are available to protect the health of communities affected by smoke?

The forum was attended by over 130 people, including online participants, and concluded with a consensus on the need to record the insights gained from the discussions and make them available to all stakeholders. We are compiling a summary document of the forum for publication in a journal.

P-Block Project update: AI integration for blueprint

An update has been released on the progress of our P-Block Project, the first building in the world to meet the proposed indoor air quality standards. A critical element of the project is to take various data feeds from sensors across the building (air quality, motion, energy, HVAC parameters) and use them to manage the building in the most optimal way. This will ensure efficient performance and seamless integration with the building management system for better outcomes (such as improved air quality and reduced energy usage) for occupants and building managers.

To achieve safe and effective function across the project, an AI model must be developed with correct guard rails and relevant redundancies. For this, we are using a deep reinforcement model (DRL) for training and development.

The deep reinforcement model

The DRL model is currently being developed and tested using level 8 of P-Block. To support this, a simulated environment that closely replicates the conditions of level 8 has been created, enabling the model to learn appropriate responses. The model has been tested in a range of trial scenarios and the results show that, compared with the conventional rule-based control (RBC) schedule strategy, the DRL agents dynamically increased ventilation, improving indoor air quality during occupied periods.

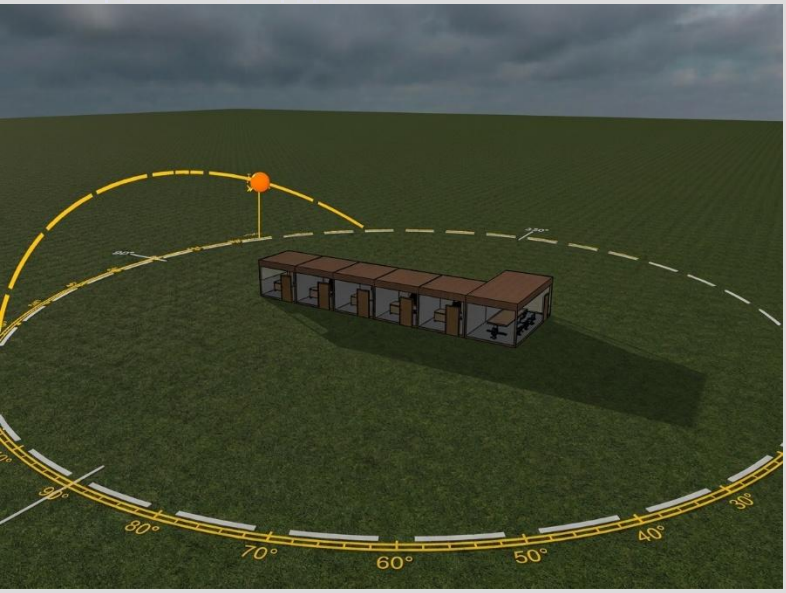


Figure 1: HVAC simulation for validation of our environment model, AI strategy and energy performance.

By learning to heat and cool on demand, the system reduced overall energy consumption by 6.88% to 7.32%, even with higher ventilation rates. It is now undergoing further testing and optimisation under diverse operational conditions, including varying occupancy levels, seasonal changes, and different times of the day to demonstrate its safe and effective deployment. Agents acting within the DRL are further explained below.

The agents

The AI model has various agents which have been designated zones within the building along with chiller and air handling unit agents. An agent is a virtual person that acts as an information processing broker for individual functions across the model. There is a strict policy for which these agents can operate, allowing them to implement zone policies which both collaborate and/or compete with each other's needs.

The agents are ingesting observation data from across various inputs (e.g., ambient temperature, total occupancy, zone temperature) and the learned policies decide how the DRL actions this data through the HVAC system.

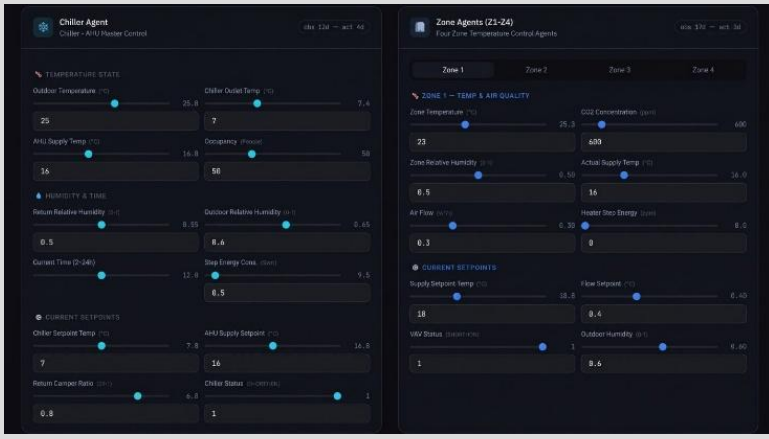


Figure 2: Example of data inputs for the multi-agent system.

The project website is now live and will be updated fortnightly: pblockproject.com

Respiratory protection and the precautionary principle in the current Andes virus outbreak – time to reset the default approach

The multinational outbreak of Andes hantavirus (ANDV) linked to cruise ship travel should prompt the World Health Organization (WHO) to change its default response to the risk of airborne transmission of the virus. Hantavirus is a pathogen with documented person-to-person transmission and high case fatality. Therefore, the starting point should not be to downplay the risk of airborne transmission until it is definitively proven. The starting point should be the immediate adoption of precautionary measures to reduce airborne transmission, such as respirator use by healthcare workers, cases, and close contacts; ventilation optimisation; avoidance of unfiltered air recirculation; and portable HEPA (high efficiency particulate air) filtration in all enclosed quarantine and transport settings. A new opinion piece was recently published in *The BMJ,* titled "Hantavirus outbreak should reset WHO's default approach to airborne risk" by Trish Greenhalgh, David Fisman, Amanda Kvalsvig, Lidia Morawska and Jonathan Samet. Read the paper

Three Thrive PhD scholarships available at Charles Darwin University

Charles Darwin University is offering three pre-approved PhD scholarship opportunities to new applicants on the following Thrive-related project topics:

- Learning from termites: Biomimetic ventilation design for tropical buildings
- Ventilation strategy selection for mould prevention in tropical buildings
- Psychosocially supportive design: Enhancing patient wellbeing in integrated indoor–outdoor healthcare waiting spaces at Royal Darwin Hospital

For more information and how to apply

Interdisciplinarity, consensus and integrated approach

The Warsaw XVIII Conference, "Indoor air quality problems in Poland", was held on 15–19 May. The conference strongly emphasised the importance of a model of cooperation in understanding, describing and implementing indoor air quality (IAQ) regulations in public buildings.

Prof Pawel Grzesiowski MD (Chief Sanitary Inspector of Poland) spoke about the importance of IAQ for public health (also in the context of schools). He also emphasised the importance of dialogue between various expert groups, referring to the work of a team of experts who developed recommendations for the design and implementation of technical solutions supporting IAQ in new schools.

D/Prof Lidia Morawska spoke about past, present and future work to promote good IAQ in our public buildings. She highlighted three main lessons from the COVID-19 pandemic: interdisciplinary coherent (consensus!) scientific knowledge is necessary to create a real impact on action; ventilation must go far beyond "open the window" – there is no simple solution here; and IAQ must be controlled on the basis of legal regulations as a measure to protect human health.

Thrive Forum – Indoor air quality: dampness and mould

📅 Date: 16–18 September 2026
⏱ Time (main event): 17 September, 9:00am – 4:30pm (Darwin)
📍 Venue: Charles Darwin University, Northern Territory
💻 Online: A Zoom link will be included in the agenda and will be sent to participants as a calendar invitation upon registration.
📝 Register for the Forum

The agenda will be circulated soon.

Singapore hosts global platform for experts tackling critical IAQ challenges

More than 900 leading scientists, engineers and policymakers from over 40 countries gathered at Singapore Management University on 14–18 June for the Indoor Air 2026 conference – the premier global conference on IAQ. Our Centre Director D/Prof Lidia Morawska gave a plenary presentation on the first day, titled “From science to policy: how to shape the future of indoor air”.

A noteworthy late-breaker session was held on Thursday 18 June, titled "A medical-engineering game plan for airborne outbreaks", which brought together medical practitioners and engineers to tackle a question that affects us all: How do we prevent airborne outbreaks in the spaces where we live, work, and travel? Co-convened by Dr. Julian Tang, a medical expert specialising in airborne transmission and clinical virology, and Prof Chandra Sekhar, an engineering expert in building ventilation and IAQ, the session was a masterclass in interdisciplinary collaboration. The session also brought together a distinguished panel of international experts: D/Prof Lidia Morawska, WHO advisor; Prof Don Milton, airborne transmission expert; Prof Paul Tambyah, infectious disease specialist; Dr. Chang Wei Kang, computational fluid dynamics (CFD) specialist; and Prof William Bahnfleth, ASHRAE Distinguished Lecturer.

Using a recent cruise-ship hantavirus incident as a case study, the session explored practical engineering controls (ventilation optimisation, outdoor-air strategies, airflow management); policy and cost-effectiveness arguments for implementation; how to conduct rigorous engineer-led outbreak investigation research in collaboration with the medical fraternity; and candidate study designs (tracer-gas and smoke visualisation, manikin-based experiments, CFD modelling). The key takeaway was that we cannot wait for the next outbreak to figure this out. Preparedness, collaboration and evidence-based engineering interventions are our best defence.

One of the most important outcomes of this session was the call to close a longstanding gap: how to conduct rigorous, engineer-led outbreak investigation research in partnership with the medical community. When the next airborne threat emerges, we will need more than masks and hand sanitiser. We need buildings designed to protect us – and the data to prove what works.

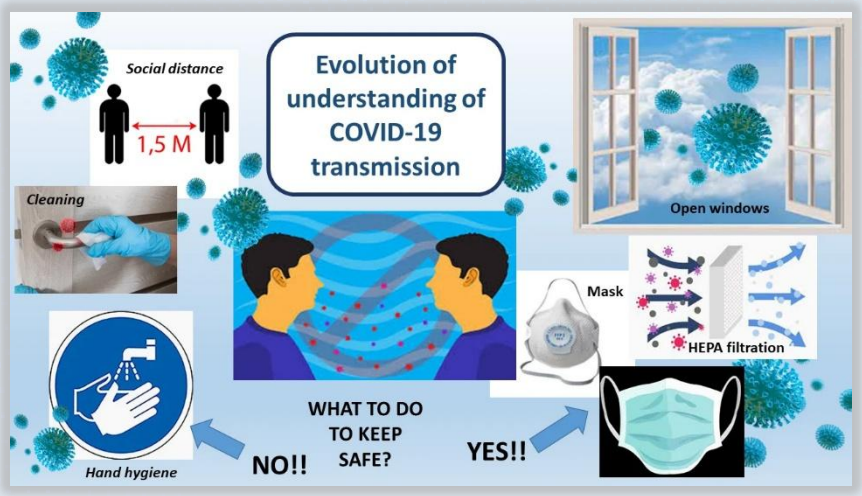
Pictured L-R: Dr. Julian Tang, Prof Chandra Sekhar, D/Prof Lidia Morawska, Prof Don Milton, Dr. Chang Wei Kang, Prof William Bahnfleth and Prof Paul Tambyah

Paper with 35 co-authors, 6 countries, 1 mission

A new paper was published by members of the team titled "Ten questions on indoor greening and environmental quality" in the *Building and Environment* journal, showing how indoor plants can quietly reshape the health and quality of our homes and workplaces. The authors took on the challenge of addressing the often-overlooked topic of indoor greening and environmental quality, bringing together brilliant minds from the United Kingdom, Europe, USA, Australia, Brazil and India. This paper was led by our partner, Professor Prashant Kumar as part of the EPSRC's GREENIN Micro Network Plus. Together, they have crafted a comprehensive article that explores this vital subject in depth. Read the full article | Read the Press Release

Evolution of understanding of COVID-19 transmission

In early 2020, a respiratory virus swept across the world. The WHO confirmed pandemic status and the virus was identified as a coronavirus with superlative transmission properties. Using work from the 1950s, the WHO declared that the virus was transmitted through respiratory 'droplets', which were expelled by infected persons through coughing/sneezing. These would fall to the ground within 1–2 m. Scientists investigating viral transmission questioned this premise because recent work had shown that viruses populate the smallest respiratory particles, remaining airborne for much longer than larger 'droplets' and being capable of spreading throughout the indoor environment. Advice such as handwashing, surface disinfection and social distancing was not as important as face masks and adequate indoor ventilation. People needed to know that poor ventilation constituted the highest risk for contracting the virus. Instead, homes and surfaces were disinfected, and social distancing was maintained in community settings. The scientists formed a consortium named Group 36, led by our Centre Director D/Prof Lidia Morawska, to contest the WHO over airborne transmission, but they could not present definitive evidence in the short term to reverse initial guidance. This account details the evolution of understanding of COVID-19 transmission and the role of Group 36 and others in challenging WHO-based policies based on dated physical science. Read the full paper



Helping the world breathe easy

The Australian Academy of Technological Sciences & Engineering (ATSE) has released their latest issue of IMPACT magazine, featuring inspiring stories from leading engineers and scientists, and from the next generation of young STEM professionals in the Elevate STEM scholarship program. Included in this issue is an article on improving IAQ for a healthy population featuring our Centre Director, D/Prof Lidia Morawska FTSE FAA, titled "Helping the world breathe easy". Read the article

Team member spotlight

Ms Samitha Wijewantha, Thrive PhD student, Queensland University of Technology

My name is Samitha Wijewantha and I am from a small village surrounded by nature in southern Sri Lanka. From an early age, I developed a strong interest in science that led me to study mathematics, chemistry, and physics during my advanced Level education. In 2017, I was selected to study at the University of Peradeniya, one of Sri Lanka's leading government universities. Although I initially enrolled in the Bachelor of Physical Science program, I soon realised that my true interests lay in Chemistry and Environmental Science. This inspired me to pursue a Bachelor of Science (Honours) Special Degree in Environmental Science, from which I graduated in 2021. My undergraduate research focused on characterising changes in ambient air chemistry using rainwater samples collected from one of the most air-polluted cities in Sri Lanka. Conducting this research during the COVID-19 pandemic gave me the unique opportunity to observe the dramatic improvements in outdoor air quality during lockdowns. Witnessing these changes made me curious about indoor air quality, as people were spending most of their time indoors. Although I could not explore this question at the time, it became the foundation of my long-term interest in indoor air chemistry.

After graduation, I worked in the environmental, health, safety, and sustainability sector at one of Sri Lanka's largest apparel manufacturing companies. While this role provided valuable industry experience and strengthened my understanding of environmental management and workplace sustainability, it also helped me realise that my greatest passion is conducting scientific research and contributing new knowledge to address real-world environmental challenges.

In 2024, I joined THRIVE at QUT as a PhD candidate. My research focuses on understanding how acidic and basic gases present in indoor air influence the pH of respiratory particles. This is an important question because the acidity of respiratory particles affects the survival of airborne pathogens. By investigating the chemical processes that occur in indoor environments, I hope my research will contribute to a better understanding of indoor air chemistry and support the development of strategies that reduce the transmission of respiratory diseases in indoor spaces.

Being part of THRIVE has been one of the most rewarding aspects of my PhD journey. Working within a multidisciplinary team allows me to collaborate with researchers from diverse scientific backgrounds, each bringing unique expertise and perspectives. I enjoy exchanging ideas with colleagues, learning from their experiences, and contributing whenever I can. These interactions have broadened my understanding of indoor air quality beyond chemistry alone, encouraged me to think more creatively about research challenges, and helped me grow as a researcher. In the future, I hope to bring the valuable knowledge and insights I gain through THRIVE back to my home country, Sri Lanka, where research on indoor air quality has received relatively little attention, and contribute to advancing this important field.

New publications

Hupkes, J., Burton, L., Bornn, R., Li, Z. and Morawska, L. Building ventilation – a taxonomy of global terminology. *Building and Environment,* 30: 114741, 2026.

Sharon, B., Morawska, L. and Burton, L. Smart vape detection in schools for mitigating student e-cigarette use. *International Journal of Environmental Research and Public Health,* 23(4): 501, 2026.

Adotey, E., Salthammer, T. and Morawska, L. Insights into the physical fragmentation of plastics into airborne microplastics. *Environmental Science & Technology Air,* 3(4): 913-933, 2026.

Fan, Y., Chen, Z., Zheng, M., Li, Y., Liu, X., Li, J., Li, X., Monty, J. and Morawska, L. Directional effects of human and door motions on the transport of aerosols across a doorway. *Indoor Air,* 2026(1): 8863692, 2026.