

# HVAC&R Nation

AN AIRAH PUBLICATION



## Skills WORKSHOP

Inverter  
diagnostics  
and testing



## Holding the key

The power of trades to  
unlock better buildings  
in Australia

# BMS revolution!

How building management systems  
have become a vital tool for technicians





# UNLOCKING BETTER BUILDINGS

According to a landmark Australian survey, HVAC&R technicians hold the key to more efficient, sustainable and comfortable workplaces. **Willow Aliento** reports.

The majority of Australians who work in an office do not work in a premium-grade CBD commercial tower. Instead, they work in older, smaller and poorer quality buildings, which represent about 80 per cent of Australia's commercial building stock. These buildings are known as the mid-tier.

It's a sector we don't know much about. Although NABERS ratings, Property Council of Australia data and other sources have a lot of information about the top end of town, there has been a real lack of insight into the mid-tier and how these buildings are performing.

A multi-disciplinary team from the University of Wollongong and commissioned by the federal Department of Industry, Science, Energy and Resources has been trying to fill this gap. They have conducted research into the sector by surveying the people who are closest to the action when it comes to building systems – the HVAC&R technicians. The project is called Better Ways to Work.

Understanding and improving energy performance involves both technical and human factors. Accordingly, the UOW team brought together engineers and social scientists from its own Sustainable Buildings Research Centre and Australian Centre for Culture, Environment, Society and Space.

Researcher Dr Daniel Daly says that because the ownership of buildings in the mid-tier is quite fragmented, and it is a known challenge to engage owners in this sector, the research team decided speaking with the contractors, tradespeople and facilities managers was the best way to gather data.

## WHAT IS THE MID-TIER AND WHY DOES IT MATTER?

The mid-tier comprises about 50 per cent of all office space in Australia, and about 80 per cent of commercial buildings, according to Bruce Precious, M.AIRAH, property sector expert and principal consultant at Six Capitals Consulting.

It ranges from the small commercial office block in Dubbo to the outer suburbs accountant's office building, the bank building in Bunbury, an administration block attached to a manufacturing facility, or a hospital's administration building.

Precious noted at an AIRAH webinar launching the research, "Opportunities to Create Value through HVAC Maintenance", that the mid-tier is characterised by older plant and equipment. This can mean the HVAC systems are using phased-out refrigerants, and they generally have less integration of sensors or automation. On top of this, they often lack an onsite facilities manager.

UOW researcher Dr Chantel Carr, co-leader of the Better Ways To Work research, says the complexity of the sector extends to building ownership. While premium buildings are often owned by a major fund as part of a portfolio, a mid-tier building may be owned by single offshore investor, a small self-managed super fund, or a local professional like a lawyer or doctor.

The business case for these small investors in terms of what motivates them to want to improve their building and its performance is different to the premium office market, where NABERS ratings and competition for tenants drive momentum for improvement.

Precious says that often in the mid-tier, expenditure on building maintenance is managed from a "zero baseline".

"That means there is no budget for routine maintenance, and no budget for breakdown maintenance," he says, "and that presents its own problems."

Carr says that most contractors have a very good sense of the business case for proactive maintenance, but it can be hard to get this point across.

"Contractors reported lack of budget and interest from owners as the biggest barriers to better maintenance, and FMs reported low levels of capex discretion," says Carr. "So owners in this market are clearly sensitive to costs, and don't think a lot about their HVAC systems until something goes wrong."

"We've known this anecdotally for some time, but being able to put some numbers behind it [from the survey] really helps us to get these issues onto the policy radar."

Daly says another key barrier that often comes up in the researcher team's interviews is difficulty in getting in front of the owner to explain the benefits of an alternative approach – particularly when the owner is a trust or international investor.

These barriers mean that maintenance or replacement takes a “like for like” approach rather than aiming for betterment.

“The point of upgrade or replacement is really key to installing more efficient systems, because decisions are being made that have life-cycle ramifications of 20–30 years,” says Carr. “And these decisions are often being made under time pressure where a system has completely broken down and tenants are complaining.

“We know that technology improvements mean new kit is likely to perform much better than an old ‘heritage’ system that’s limped along and been patched up over the years, but one of the big issues contractors raised is that even like-for-like is often not available due to model changes.

“We’re going to spend a bit more time digging into point of upgrade decisions, and lots of survey respondents indicated they’re keen to help us with that, which is terrific.”

## FMS DON'T KNOW WHAT THEY DON'T KNOW

Business development manager for Airmaster, Pat McManus, also spoke about the mid-tier issues at the “Opportunities to Create Value” webinar. He flagged a crucial issue around lack of knowledge on the part of FMs and building operators around the testing regimes required to ensure fire and smoke control protection systems are functional.

In many cases, he said, these were made part of the HVAC system design in the original building.

But many older buildings have been renovated or reconfigured to reflect changes in tenancy or occupancy, and this can impact the performance of the fire and smoke protection systems.

Without an understanding of the original specifications or access to the original building documentation, the FMs are not well positioned to understand the testing and maintenance required.

According to Ellis Air Senior Contracts Manager, Gary Ward, M.AIRAH, FMs in mid-tier buildings generally don't have the knowledge to look after the building correctly. Many are ex-tradies, he explained, and they know their own trade extremely well.

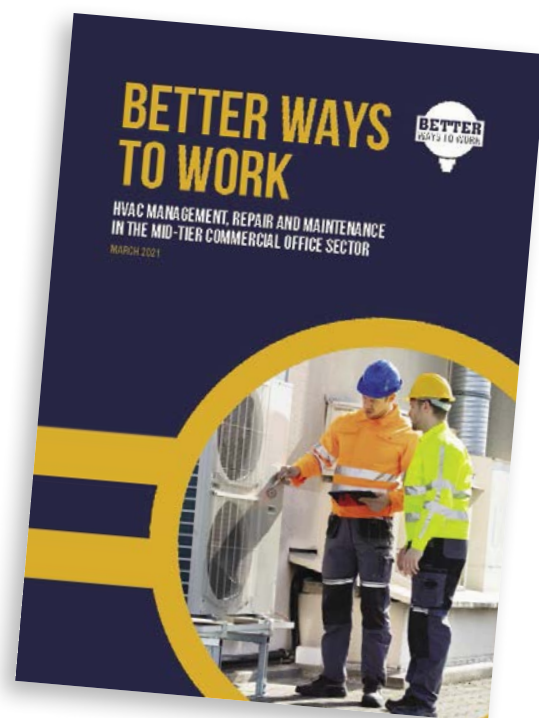
“But there’s a massive amount of components in a building that it needs to function properly,” he says.

Ward believes the knowledge needs to be “channelled up” from the trade experts to the FM and then upwards to the building owner. This must occur across the board.

“It’s all about the awareness,” he says, “good reaching out and getting the FMs aware, making the building operators aware.”

There are multiple benefits to be gained from improving the mid-tier, Precious says. It not only offers environmental benefits in terms of reduced energy-related emissions, but also has the opportunity to deliver economic benefits and broader community benefits.

“There is an opportunity to make them safer buildings not only for the people who work in those buildings but equally, safer for the technicians and service personnel that visit those buildings and make their way around to the plant rooms. They’re safer through having guards



on equipment, safer by eliminating confined spaces, safer by ensuring switchboards are kept locked.

“There are a whole range of ways that buildings can be made safer. They can be made more comfortable and more productive by ensuring the air conditioning is performing effectively and allowing people to get on with their work.”

Precious says the task is to divert the money currently being wasted on problems like excessive energy use into the maintenance function.



## POWER TO THE TECHNICIANS

The Better Ways To Work research found that the HVAC contractors and trades do hold a significant amount of power to effect change, because of their depth of knowledge.

Some quick facts from the research:

- HVAC is the largest end use of energy in commercial buildings – when it works more efficiently, energy bills go down.
- The majority of contractors in commercial building HVAC are small and medium enterprises, and the average contractor or tradesperson has more than 11 years of experience in the sector. Most also hold trade qualifications.
- Close to half (42.7 per cent) of all mid-tier buildings survey respondents work on have the original HVAC system in place, with no significant upgrades carried out since installation.
- Central plant is only slightly more common than a mix of central and split systems, and many buildings have only split systems, indicating that splits may be “patching up” under-performing systems.
- Cost is a deciding factor when it comes to upgrade and maintenance – but while contractors focus on up-front cost, the majority of facilities managers reported being more concerned about life-cycle cost.
- The majority (81 per cent) of maintenance or repair callouts are initiated due to tenants’ reports that the system is not providing the level of heating/cooling required, or that it has broken down.
- Contractors rely on their own experience, their peers and industry associations for knowledge and ongoing learning – FMs rely on the contractors to provide information.

The opportunity for contractors is to educate FMs and building managers about the benefits of improving systems, according to the researchers.

“There is a lot of expertise in the sector, but [HVAC&R contractors] can be their own worst enemy with a lowest cost approach,” UOW’s Dr Carr says.



It is the technicians who go onsite who ‘know what good maintenance looks like, and what a good job looks like’

She says contractors should see what they do as providing a service that includes building manager and tenant education, maintenance and providing comfortable buildings.

“Tradies are at the centre of this question,” she says. “And contractors are really important in regional locations.”

Dr Daly from UOW says that at the start of the research the team was aware that a lot of contractors and FMs knew what they should be doing to improve buildings, and many also knew what they wanted to be doing to their buildings. But it is the technicians who go onsite who “know what good maintenance looks like, and what a good job looks like.”

“We did ask (survey) respondents to tell us about a time where they had been able to do better than like-for-like replacement,” says Daly. “The most common reason to improve a system was that the existing system was obsolete and therefore an alternative solution was required.”

“However, the second most common reason, and the most common reason for the FMs we surveyed, was that the life-cycle cost was more favourable for an upgraded system.

“This suggests that contractors have an important role to play in communicating the full life-cycle costs and benefits of different strategies, and that FMs and owners are receptive to this information. Other common reasons given were contextual factors, such as HFC refrigerant phase-down, or changes to the building’s use over time.”

## EXPERIENCE PLUS KNOWLEDGE IS A SUPERPOWER

Carr says the human capital of experience-based knowledge is often under-rated.

“There is a lot of knowledge in trades, we can forget that,” she says, “especially when it comes to HVAC. It is an electromechanical system – it is right up there as far as complexity goes.”

She says that having a sector with such a wealth of knowledge and experience is an asset, and the task now is to equip contractors to better communicate the benefits of improved maintenance that increases efficiency to owners and tenants.

As she points out, it is the tenants who bear the cost of poorly maintained, under-performing systems, both in loss of comfort and in their energy bills.

“The key is really getting that message out there that preventative maintenance is a better value proposition in the long term.”

The federal government is looking at resources it could develop to help with this, Carr says. This could also involve some form of training for contractors around communicating the benefits of improvements to owners and FMs. She notes that ideally, this kind of training would fit with existing workloads and commitments and build on the kind of information-sharing that already happens within the industry.

“We want it to work in with the ways people are already doing things, not work against it.”

Another aspect to the lengthy experience of many survey respondents is it raises an issue around ensuring knowledge is passed on to the incoming generation of tradies.

“The survey highlighted that there are some concerns around an ageing workforce in the HVAC sector, which has implications for bringing people into the trade and how contractors keep up with their professional development,” Carr says.

“This is really important as we begin to see a positive shift in looking at energy efficiency.

“The demand for comfortable buildings isn’t going anywhere, and there is potential for HVAC contractors to become seen as an expert workforce, but this can only happen if we keep building the industry’s skillsets.



“We’re currently working on a project in the training and skills space to look at what’s needed here, and the experience of organisations like AIRAH and FMA are key to this work.”

## WHAT HAPPENS NEXT?

Daly says one of the research team’s biggest takeaways was that contractors in HVAC are “really engaged.”

“They are keen to have their voices heard. The survey got a fantastic response rate, which shows a lot of engagement and a lot of interest in doing things better.”

The research team now is continuing to look at how to equip the HVAC sector to help improve mid-tier building performance.

“We’re now working on three projects where we’re spending a bit more time with those respondents who said they were available to talk in more detail about the issues they see and what options are on the table for doing things better,” Carr says.

“One of those is looking at key points in the procurement process, like the point of upgrade. A second project is looking at how the findings might translate across other building types like aged care and the retail sector. A final project is looking at training and skills, and how we can work with the way the industry is structured to understand how to best target upskilling.

“So, the project is still very much active, and we’ll be looking to keep these conversations going, keep shining the light on the plant room for a while yet. We’ll be publishing our findings along the way on the Better Ways to Work website.” ■

## CHECK OUT THE SURVEY RESULTS

UOW has created a detailed report and also an interactive dashboard with information about the roles of those working on HVAC&R systems, where they work, maintenance routines, and barriers to better maintenance. It’s a treasure trove of information.

Go to [betterwaystowork.com.au](http://betterwaystowork.com.au)