

AIRAH SUBMISSION

Victorian construction industry - Technologies strategy discussion paper

Please find the following as AIRAH comments on the questions raised in the discussion paper prepared by the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) to help develop and inform a Victorian construction industry technologies strategy.

AIRAH has consulted with our membership base in the development of these comments. AIRAH's members work across all sectors of the built environment, from residential heating and cooling systems through to complex HVAC design and construction for larger buildings, through to the cold chain and industrial refrigeration.

The work of AIRAH's members not only impacts on construction industry productivity, it also has significant impact on the productive use of assets over their lifetime.

These comments are offered in good faith by AIRAH as a constructive submission in support of the Victorian Government's efforts to develop and support a technologies strategy for the construction industry.

1. How might technology uptake be increased in the Victorian construction sector?

All participants and actors in the construction sector need better information about what is possible in today's construction industry including information about innovative approaches that are currently being applied and working in Victoria. There are some great success stories about innovative approaches to the construction and installation of HVAC services in buildings and the design and installation of refrigeration systems associated with the Cold Chain. The construction and refrigeration industries are risk averse, and awareness of how innovation has been successfully undertaken locally can reduce perceived risk.

These stories are being told by AIRAH and other industry associations but they need to be promulgated to a much wider audience of investors, developers, owners, operators and end users in Victoria. HVAC&R is a hidden and technical supply chain industry and investment decisions in it is often controlled by non-technical people. The Victorian Government can help by assisting the HVAC&R industry reach a much wider audience to promote increased awareness of the benefits of improved practices, innovative technologies and integrated approaches to HVAC&R. This includes new approaches using BIM technologies and large-scale prefabrication of services and systems.

The advances that have been made within BIM by the Victorian HVAC&R industry are significant. The industry has invested significantly to develop the required technical and digital infrastructure and capability. The HVAC&R industry in Victoria already has the capability to deliver BIM projects and the Victorian Government should recognise and leverage this investment. There are already many benefits from the application of BIM on the ground however there could be many more benefits if the broader construction industry and other services and trades also applied the same level of BIM application.

Energy Efficiency schemes such as Victoria's State VEET scheme needs to be opened up to new technologies that can be applied to save energy and improve operational productivity. Even outside

of the VEET scheme specific technology types, which can be proven to improve productivity either in actual construction or in operation of the asset being built, should be provided with tax breaks or other financial incentives to encourage their increased uptake in the State. As innovative solutions get delivered more frequently they become business-as-usual for the construction industry.

If the upfront costs and perceived risks to business of updating technology or adopting new technologies is reduced uptake will be incentivised.

Training in new and innovative technologies should be more easily accessible to the small and mediums sized companies operating in the state. Innovation and technology uptake means changes to practices and procedures. These need to be supported in the traditionally risk averse construction industry.

2. What role can Government play in supporting technology demonstration projects?

Government can play an essential role in supporting technology demonstration on projects by supporting the development and distribution of independently verified Case Studies of actual innovative HVAC&R solutions delivered in Victoria and providing the industry with detailed benefit and cost analysis of real installations and construction methods.

The Government could partner with Victorian research institutions and industry associations to provide the market with trusted and comprehensive information on these new technologies, and new design or construction tools, that will help the sector and the buildings it delivers, operate more efficiently.

Government should be more active in procuring systems and solutions that are innovative and low emission for their own buildings and projects. Government can lead by example here and these projects can then be used to support demonstration of the technologies and processes to the wider construction industry.

Government could facilitate the delivery of demonstration/training technology to TAFEs and universities that provide training and education in the sector, so that incoming industry entrants are more technology and innovation aware. For example every Victorian university that provides training in building engineering, architecture, building physics or construction management should have a state of the art building management and energy diagnostic system operating on their premises so that their students can become familiar with these technologies.

The industry wants more recognition, engagement, promotion and support from the government. This could take the form of

- Grants to support and promote the uptake of innovative technologies;
- Alleviation of Government costs for technology start-up firms;
- Government support through the use of technologies within the supply chain that they control;
- Facilitation and support of applied research in the field that can generate commercial and other benefits for the state;
- Facilitate the development of educational tools to support new technologies.

3. How can the uptake of Building Information Modelling (BIM) be encouraged on Victorian construction projects?

Government could take a lead role in developing the widespread use of BIM technology in the construction industry, by mandating the use of BIM on government projects.

Even without initially mandating BIM, if the Victorian government started by offering a clear view about the functional outcomes it requires on its projects from BIM, and the associated digital technologies, this would significantly move the application of BIM forward in Victoria. There is more than enough knowledge available for Government to do this and provide a clear leadership framework. A major aspect of BIM promulgation to the wider construction industry is about setting out a clear way forward for development. The HVAC&R industry is working hard to embed the outworking's of this disruptive technology into standard practice, and Government need to help to move the embedding of BIM into the entire construction industry supply chain.

Government procurement policies could favour or require specified levels of BIM for all construction projects. This would need to be supported by BIM documentation and specifications, developed by government and industry, to ensure that all parties understand what is needed to meet the requirements. Requirements would need to be phased-in overtime to reduce the shock of change. There are several examples of governments requiring BIM in their construction programs overseas, such as in Singapore where all construction projects need to use BIM.

Government could facilitate greater industry collaboration, communication and coordination to properly secure open BIM standards that can be endorsed by government agencies – in particular the agencies in transport, health and education sectors – as well as by private sector owners. This would ensure the universal acceptance and applicability of the open BIM standards which is an essential first step and firm foundation for greater uptake of BIM in construction.

The Victorian building and HVAC industry has invested very significantly in establishing BIM protocols and other technical 'infrastructure' and capability. This includes the BIM MEP AUS initiative and investment by private companies in Victoria in BIM practice development. Some Victorian firms now lead the world in some aspects of this new global technology. So far, in its application in Victoria, BIM has proven to be a significant productivity multiplier that is now getting real results and providing improved outcomes on projects.

What the industry needs at this point is support from the Government for the further development of BIM systems and technologies. This should start with recognition of the opportunities and benefits and could then lead to better engagement of the Victorian Government in BIM development leading to BIM application on all significant government projects.

One of the new frontiers for BIM technology is for industry to find ways to leverage the technology into the facility management phase of a building lifecycle (i.e. BIM beyond the construction phase). The Victorian Government is a significant building owner and facility manager, responsible for the day-to-day management of a considerable building estate. The government is well positioned to benefit from helping technology enterprises operating within the state to develop systems and applications that can leverage BIM data into computerised facility management applications.

Support from the Victorian Government could be in the form of enterprise partnerships, or permissions and financial support to trial technology solutions within specific Government buildings. Government can also support universities and TAFES to include BIM awareness raising and training in their curricula. As a minimum this should include defining various levels of competencies in association with the industry developed standards and guidelines.

4. What would be the costs and benefits of requiring the use of BIM on all significant public sector projects?

In the short term the changes to design and delivery practices in the construction sector, required for a shift to using BIM technologies and processes, would be significant. A considerable level of documentation, retraining and new technology would need to be incorporated into current practices to accommodate the required changes. All of these changes would present some initial costs to the industry, particularly in training and technology software and hardware, which would be passed through the supply chain.

HVAC and mechanical services in Victoria well progressed into BIM technologies. No new major Victorian Government. The HVAC and mechanical services industry is already there, it has invested because it had to. There are already many benefits on the ground from BIM however there could be many more if the broader construction and other services 'trade' also applied the same level of BIM application. The HVAC&R industry has invested and now would like support to firstly get a return on investment but also to further leverage the technology to generate even more beneficial outcomes, for the industry and the state.

BIM also lends itself to improved construction quality and ultimately a more energy and resource efficient building stock. In the medium to long term the benefits for accelerating the adoption of BIM processes and systems into business-as-usual practices in the State's construction sector are immense. Not only will buildings be delivered more efficiently for less cost and with less risk but the benefits will flow through to a more efficient building stock requiring less energy resources into the future.

There have been several studies into the costs/benefits of using BIM, and every time BIM comes out positive overall. There is a significant upfront cost in implementing BIM, however this is more than offset by the savings in more accurate costings, better operating processes onsite, less variations and greater use of prefabrication and design collaboration. In the HVAC industry, prefabrication and offsite construction is much easier to perform and get right on a project that is using BIM.

5. Is modular construction a viable option for Victoria's social and low cost housing requirements?

Using the modular concept in any industry will normally reduce costs in terms of design and delivery.

Any modular solution to Victoria's social and low cost housing requirements would need to be developed and delivered in collaboration with the prospective residents to ensure that social and emotional needs are also met.

Modular solutions for housing can use a diverse range of innovative designs and materials that can improve energy efficiency, durability and resilience providing a real sustainable solution for the states most needy populations.

6. What opportunities are there to establish Victoria as a centre of excellence for off-site construction?

Prefabrication and off-site construction is a good fit with the HVAC&R sector. Complex plant and distribution systems can be fabricated in a clean and controlled environment and delivered to site for final installation. Prefabrication ensures quality and accuracy leading to ease of manufacture, installation and commissioning. It reduces risk and delivers greater accuracy and control in the construction process. Integrated prefabrication offers a range of benefits including system design, coordination and performance improvements as well as safe access provisions for ongoing operation and maintenance.

The HVAC&R industry in Victoria has already lead the way and invested heavily in large scale prefabrication capacity for building services. We are aware of at least three large Victorian building services firms with this capability. Large scale prefabrication will revolutionise the installation of building services and this is just beginning. The entire construction industry in Australia and worldwide is embracing off site construction methodologies and building services are an important part of that. Prefabrication and off-site construction generates significant improvements in productivity, safety and system outcomes. Large scale prefabrication also represents a new 'manufacturing industry' opportunity for Victoria.

The Victorian Government should help by providing recognition, promotion and support for the start-up and enhancement of this new manufacturing industry.

Victoria is already on its way to being recognised as a centre of excellence for off-site construction in Australia. Victorian companies such as A.G. Coombs, A. E. Smith, Automatic Heating, D&E Engineering, Refrigeration Innovations, Wood & Grieve Engineers, and LU-VE Engineering are already pioneering innovative solutions involving off-site construction and pre-fabrication for:

- HVAC&R services risers for commercial office buildings service shafts;
- Central plantrooms for commercial and institutional buildings;
- Self-contained roof mounted or standalone plantrooms and condensing unit banks for commercial refrigeration applications;
- Modular operating theatre suites for health care buildings and applications.
- Modular ventilated ceilings for commercial kitchen ventilation.

In HVAC and mechanical services there are at least three Victorian contractors that have dedicated off site prefabrication facilities. Australia's largest ductwork manufacturing facility is also in Victoria and this is broadening its range of off-site fabrication capabilities. For comparison there may be one dedicated off site prefabrication facility in NSW, and none in the other states and territories. This Victorian industry leadership and investment should be leveraged and further developed.

These innovative Victorian approaches to off-site fabrication and modular construction have been proven to save money and time when implemented correctly. These innovative practices and the knowledge developed could provide Victoria with export income as Australian expertise and designs are delivered into regional and international centres. As a recent example, on one major building project, 120 three story building services riser modules, comprising some 16,000 individual

components (ducts, pipes, valves, etc.) were designed, fabricated, assembled, and tested in Victoria and then transported to NSW for installation.

The advent of BIM and the work carried out by BIM-MEP AUS has produced a reliable method to prototype 3D objects and its adoption is on the increase, particularly in HVAC system disciplines and supply chains. Australia is well known for its capacity in higher education, and Victoria could develop expertise in BIM training, particularly if this could be integrated closely with industry, requiring real-world experience to achieve competency. There would be significant demand for such training and practical exposure in BIM and prefabrication techniques from international candidates.

7. How can Melbourne's strong international reputation as a liveable city be capitalised on to expand market opportunities for the construction materials and technology sector?

Melbourne's reputation as a liveable city could be used to attract the highly trained and competent individuals that are needed to help update and future proof Victoria's construction sector.

There are significant skills gaps in the industry including designers and contractors with experience in the application of BIM tools and processes, technicians with installation and diagnostic capabilities for building controls and management systems, professionals with experience in building energy optimisation, and technicians and designers with experience in the application of natural refrigerant technologies (e.g. NH₃ or CO₂).

8. How can construction materials and construction technology firms build on the export success and relationships of Victorian architecture, planning and engineering firms?

It should be possible for strategic agreements and technology partnerships to be formed between Victorian architecture, planning and engineering firms and Victorian construction materials and construction technology firms. This could be facilitated through a government sponsored networking system to link manufacturing facilities and construction companies with designers and academics.

Within the HVAC&R industry, locally developed technology would have to have special advantages to be able to compete in the export markets. A lot of HVAC&R products and equipment are manufactured in low cost Asian markets which are difficult to compete with in terms of labour costs.

If the government could provide R&D support to businesses for developing innovative technologies, this would potentially pay off in time. This is particularly relevant for building energy management and energy diagnostic software/hardware systems.

9. How can more be gained by using Victoria's design and construction capabilities in green smart building to demonstrate new possibilities?

The Government should partner with the Green Building Council of Australia to showcase Green Building successes in Victorian cities. Again the story of these successes needs to be told and the State Government is well placed to facilitate and support this narrative.

Smart buildings are great, however if any innovative or technology initiative is going to gain acceptance in the mainstream industry, it needs to make commercial sense to main-stream development.

There needs to be more emphasis on the whole of life costs of building, rather than the build cost, as this would shift the focus to green initiatives and technologies that reduce the energy consumption of buildings.

10. How can Victoria's construction materials and technology firms better capitalise on its strong research base in materials science?

There needs to be more effort made to help Victoria's construction materials and technology firms to engage with the academic and research sector. Currently co-ordination in HVAC&R research is very low (see response below for additional comment).

R&D partnerships with research organisations need to be made affordable and accessible to small businesses. The SME sector has significant barriers to participating in formal research and Government could act to remove some of these barriers such as reducing cost and improving communication between research and SME sectors.

This could also be achieved through industry partnerships with TAFEs to provide greater exposure of students to Victorian materials innovation and expertise.

AIRAH has significant oversight and engagement with the industry's research activities. Government can help firstly with engagement and recognition, then with facilitation and forums, and finally with encouragement and funding. By and large research in the HVAC&R, building physics, thermal comfort and indoor air quality fields is 'applied research' that can be turned into commercial and other benefits for the state. Government does not need to make a great 'leap of faith' investing in applied research as may be required with investment into pure or fundamental research.

11. How can better industry and research collaboration be facilitated?

There needs to be much stronger links between academic institutions and a bridge between academia and industry. Some of the activities proposed to help facilitate better collaboration include:

- A research roadmap for the HVAC&R/construction industry should be developed.
- The key HVAC&R/construction industry research needs should be identified and matched to institution research capacity.
- Findings from existing research projects should be disseminated more widely (beyond academia) while encouraging discussion and debate.
- Government/Industry could provide a platform for collaboration either through a research seminar/conference or through an Australian HVAC&R multi-institute research centre or foundation.
- State Government could liaise with Federal Government to advocate for funding to be delivered for applied research and not just fundamental research.
- State Government could advocate for Victoria for a fair share of the ARC (Australian Research Council) funding allocations (see information page on ARC).

Resources in the small businesses are stretched, so it would be beneficial if government advertised the R&D opportunities to businesses.

Government can play an important role in this by creating a focus around research in the HVAC&R, building physics, thermal comfort and indoor air quality fields as was done for medical research

some years ago. The Victorian Government could set out to make Victoria/Melbourne a world leader in this type of research by providing recognition, focus, vision, and support to the sector.

12. How can firms be encouraged and supported to develop and experiment with new processes to improve the efficiency of the building process?

Provide incentives in the form of financial tax breaks and encouragement in the form of awards and showcase material that are developed to support and promote new processes, materials, and innovations.

Small businesses often need incentive and government assistance to make the jump to some new technology or process.

Firms can be encouraged and supported by government and industry sponsored programs to evaluate innovative HVAC technologies. For optimum effectiveness HVAC&R technology demonstration and evaluation projects should:

- Include direct approaches to property owners, to determine the level of interest and the window of opportunity for potential innovative technology projects;
- Work with property owners and HVAC consultants to decide which innovative solution(s) would be most suited to particular situations.
- Ensure that potential projects and their funding requirements are individually assessed by independent HVAC consultants
- Ensure that the outcomes from the projects are individually verified and evaluated by independent HVAC consultants, and the information is shared with the wider industry (warts and all).

With this approach property owners would install the most appropriate technology, while clearly understanding the risks involved. Over time property owners and technical service providers would become comfortable with the new approaches, and be more open to considering new technologies and practices. Demonstrating changes in attitude is often as important as demonstrating the technologies themselves, particularly in the risk averse construction industry. The measurement of costs and savings by independent consultants would generate the accuracy of information required.

Again, the Victorian Government could encourage and support firms that promote efficiency buildings and processes by providing recognition, focus, vision, and support to the sector.

13. Is the IT research base in Victorian being fully utilised to develop new smart products for the construction industry?

There is a lack of co-ordination in research which can lead to duplication of effort and waste of resources. Again a central co-ordinating hub and center of information would assist with better communication within this diverse industry and in promoting the use of smart products.

New technologies, processes, and practices generally need to be validated for the construction industry before uptake becomes widespread due to the attitude and response of the industry toward risk and change.

AIRAH is very much in the middle of this in our industry. The Victorian Government can play an important role in this by creating a focus around research in the HVAC&R, building physics, thermal

comfort and indoor air quality fields, all of which can be enhanced by applying smart products and technologies.

For example Government could do more to realise full value from the smart meter roll out in Victoria. It could commence by adopting a system to provide much easier access to electricity consumption data, such as Green Button. Facilitating easy access to electricity interval data across all building classes is an enabler for the development of products and services to both improve the energy performance of existing buildings, and to understand what opportunities might exist for new buildings through analysis of large data sets.

14. Are there regulatory or attitudinal barriers that inhibit the uptake of new materials or processes on Victorian construction projects?

There are significant regulatory and attitudinal barriers to the uptake of Natural Refrigerants. More training needs to be developed and delivered to assist industry meet the needs of the States construction industry.

Local government and state government planning rules need to be revisited with regard to mixed commercial/residential developments in high density areas. In most cases

The construction industry on the whole does not like change. There is a preference to deliver tried and tested solutions and a general tendency to “do it the same way as we did it for the last project”. This is largely due to economic and time related budget pressures as well as a general tendency for the industry to be risk averse and time poor. Change needs to be incentivised and the Victorian government has a role to play in this.

The comparatively low cost of energy is often a prohibitive factor in the acceptance of energy saving HVAC equipment. Also there is a split incentive between the developer or builder and the owner or operator because the entity that pays for the innovation is not the same as the entity that benefits from its installation.

15. Are there opportunities to increase materials innovation by providing information and advice on how to achieve a regulatory approval?

Absolutely. Providing fair and transparent advice on the required regulatory process will help industry have some surety when developing new and innovative materials or alternative building solutions. Where there are question marks over the regulatory approval processes, this generates uncertainty within the industry which increases risk and reduces innovation.

The Government also needs to be more active in ensuring that these regulatory approvals are not simply ignored or falsified.

Product regulatory approvals: There is a significant issue in the industry with non-compliant products and with copies and fakes of compliant products. This has occurred in many product lines in the construction industry including electrical wiring, so called ‘green’ HVAC retail products, flexible ductwork, thermal insulation and air filters. These low quality copies and fake products undermine the economic viability of Victoria’s manufacturing sector as compliant products are undermined. Refer to the work by the Australian Industry group on this topic.

Planning regulatory approvals: Over the last few years we noticed an increasing development of apartment buildings that have a retail space allocated to them on the ground floor. The developers make no allowance for the installation of refrigeration systems into these very noise sensitive sites.

We would like to see some regulation introduced that a suitable space must be allocated if there is to be a food retailer installed in that space, it is no use having noise complaints after the store opens, despite installing plant with all of the noise reductions available.

Regulations and innovation for HFC phase-down: We believe that Government should actively engage with representatives of the refrigeration industry, either at local authority level and/or state level, to work together with some constructive ideas for ensuring the transition to non HFC systems is made as smoothly as the industry transitioned from CFC to HFC refrigerants.

Government can also help by ensuring that retailers are aware of the refrigeration industry solutions, and by offering incentives to save energy, thereby making the changeover process more of a carrot than a stick.

Beyond regulatory approval there is also a role for state government to raise awareness of financial enablers of improved practices and materials, most notably the recent Local Government Legislation Amendment (Environmental Upgrade Agreements) Bill 2015. This enables local governments to offer rate payers access to financing for building improvements that save energy or water.