The industrial ecologist

Over the past three decades, Michael Bennett has been a champion of sustainability in Australia's HVAC&R industry. He broke bread with Ecolibrium staff writer **Mark Vender** to reflect on the transformations in our sector – and the challenges ahead.

As general manager of Refrigerant Reclaim Australia (RRA) for more than 20 years, and more recently as chair of the Australian Refrigeration Council (ARC), Michael Bennett has seen his fair share of changes in Australia's HVAC&R industry. His work has encompassed refrigerants, licensing, regulation, education, and extended producer responsibility and product stewardship, with roles in business, not-for-profit, and government organisations.

ON A DARK DESERT HIGHWAY

Bennett began his HVAC&R journey when he took a job at Commonwealth Industrial Gases (CIG), which was later taken over by the British Oxygen Corporation, now BOC. Bennett says he took the job mainly to throw gas cylinders around to stay fit for playing football, but he ended up working for nearly 20 years in industrial gases, in a variety of roles.

"I worked in Australia, in PNG, I did some consulting work for BOC in the UK, and fluorocarbons at one point were part of my portfolio," Bennett says. "It's a funny old industry. You sort of drift into it and it's like Hotel California – you don't seem to be able to get out."

In the mid-90s, Bennett decided to focus on sustainability, and left BOC to become an environmental management consultant. As well as working with the government, he became involved with RRA.

Originally, the program was run by Pacific Chemical Industries (PCI), the last Australian manufacturer of CFCs and HFCs. Realising that it had a long-term liability, the company worked with industry to create a recovery scheme. When, as a result of the CFC phase-out, the company closed at the end of 1995, the running of the scheme was handed over to their ex-managing director, Harry Harrington.

"RRA was part-time back then," says Bennett. "No offices, nothing – we were a virtual company.

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Harry handed me a small box that contained a couple of files, the company seal, a chequebook and an order book. That was it.

"And as it's a voluntary program, I spent the first few years basically knocking on doors begging people to recover refrigerant."

Despite the grass-roots nature of the campaign, it resonated with contractors, wholesalers and technicians.

"Australia's always been particularly good on ozone depletion," he says. "It's easier for us to understand ozone depletion than perhaps climate change, which is a bigger issue, but ozone depletion is linked with UV radiation and skin cancer. It's almost in our DNA that you don't want to get too sunburnt. The 'slip, slop, slap' campaign of the 80s, increasing levels of skin cancer, ozone depletion, all of these things feed into a pretty decent understanding. And our scheme, even though it was voluntary then, was still pretty good compared to the rest of the world. Now we are acknowledged as at least the equal best."

LETTER OF THE LAW

In the late 90s, Bennett was involved in a project to design a structure for refrigerant licensing in Australia. At first, the program was voluntary, but eventually it morphed into what today is the ARC and the Ozone Protection and Synthetic Greenhouse Gas Management Act.

When the Act was implemented in 2004–2005, recovery became mandatory. Suddenly, RRA was dealing with much larger volumes of refrigerant.

"We were probably at about 120 tonnes a year before the legislation came in, and by 2008 we'd hit 500," says Bennett.

Over the years, the volumes have fluctuated due to phenomena such as the GFC and the Australian carbon tax. In 2017/18, RRA recovered about 500 tonnes of refrigerant. Of that, more than 150 tonnes were reclaimed, returned to new specification, and reused rather than destroyed. This is largely driven by demand for R22, the import quotas for which are dropping as part of the HCFC phase-out, but which is still required to service a large installed base of equipment.

Overall, Bennett says that the numbers are encouraging.

"Most people, certainly in the refrigeration sector, are very good at recovery," he says. "Most recovery is done at a kilo or less at a time, so for us to get back 500 tonnes, there's over a half a million recovery operations going on in Australia every year, by contractors and technicians who want to do the right thing. And that's extraordinary!"

THE NUMBERS GAME

Although Bennett is full of praise for the industry, he also sees room for improvement.

"End of life is the area where we get back the least or we perform the poorest," he says. "In end-of-life motor vehicles, there's probably a couple of hundred tonnes we're not getting, and that's because it's a fairly unregulated sector, so people pull cars apart for parts and they're not dealing with the refrigerant properly. And then there's the split-system air conditioning sector. This is the biggest challenge that we have."

Australia has around 50,000 tonnes of refrigerant installed in the bank, and half of that is in split air conditioning systems. Most of these systems use R410A – with a relatively high GWP of 2,088.

Bennett notes that about a million split systems are installed every year, so eventually the same number must come out. Even a conservative estimate of 500,000 decommissioned units per year with a refrigerant charge of 1kg per unit would represent 500K tonnes of refrigerant.

"And we're not seeing that," he says. "We really need to grow in that sector. It's difficult to do, it's hard to enforce, but we have to find a way."

One of the issues, according to Bennett, is the lack of economic incentives for contractors working with split systems to recover refrigerant.

"You can pump it down in the condensing unit and take it back to a workshop," he says. "The good guys do that, it's not uncommon. But you go and buy your aircon from a retailer and it's a fixed-price installation. There's no allowance in there for recovery; there's no economic incentive for the installer to recover the refrigerant from the old system because he can't charge for it.

"That's got to change. We need to talk to retailers about changing it."

PASSION PROJECTS

Over his years at RRA, Bennett has been involved in a wide range of initiatives.

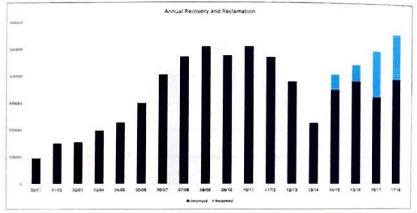
With the goal of getting better data – and lifting recovery rates – the RRA have produced an app for contractors to submit data on the refrigerant they recover.

"It's simple to use," he says, "but we're struggling to get enough people to provide meaningful data."

The app is now being amended to make it even simpler, and a relaunch is imminent.

"Once we have data we're more able to say to the Department that the current regulatory settings are insufficient to ensure recovery at end of life, and come up with other ways of encouraging compliance – either carrot or stick."

An early glimpse of the augmented reality training program.



The changing volume of recovered refrigerant in Australia.

Another project involves looking at the feasibility of breaking R410A into its constituent parts: R32 and R125. Although old R410A refrigerant can simply be destroyed, it would be more cost-effective – and environmentally sustainable – to recover the R32, for which there is a market.

"It's not easy," says Bennett. "R410A is a near azeotrope of R32 and R125 and they've got a very tight bond."

RRA is in talks with the Air Conditioning, Heating, and Refrigeration Institute (AHRI) in the US to develop a joint project.

Bennett has also been involved in an initiative to produce a flammable refrigerants guide for the automotive sector. This was published in November as part of a joint effort by the Automotive Air Conditioning, Electrical and Cooling Technicians of Australia (VASA), RRA and GHD Engineering.

"People over the years have been dropping hydrocarbons into automotive systems and not labelling them, not changing the fittings or anything," says Bennet.

"We test about 500 cars every year around Australia to look at what's in the system, and it's probably in the order of 5 per cent that are contaminated with hydrocarbon, which is dangerous."

On top of all of this, RRA has been supporting Australia's TAFE sector through the Refrigeration and Air Conditioning Training Alliance (RACTA), made up of the 86 VET teachers that deliver and assess the RAC trades qualifications across the nation.

When the government cut funding for RACTA's twice-yearly meeting, RRA stepped up to provide the money. RRA has also worked with manufacturers and suppliers to secure more modern equipment and refrigerants for the TAFEs.

Finally, Bennett is working on an HVAC&R version of Siri that he dubs Fred the Fridgie.

"So if you're on a job and you're not sure how to do something you can say, 'Fred, I've got this particular issue, what can you find me on that?', and Fred will come up with maybe what you were taught at TAFE, or here's a how-to video from a manufacturer on a TX valve or whatever."

Bennett acknowledges the scale of the project, but notes that it has already started with the development of some augmented reality videos on refrigerant recovery.

THROWING ROCKS AND BUILDING BRIDGES

Bennett says these projects have been successful because they are critical but also constructive.

"It's working with industry to be better," he says. "You need the Greenpeaces throwing rocks saying, 'Hey you bastards, stop doing this.' You need to be able to get the headlines, raise issues, and get emotive.

"But you also need to be able to work in a methodical and reasoned way to reduce environmental impact by industry. If you make a good economic argument for environmental protection, then you've got a good chance of getting it up."

And after spending much of his career grappling with problems in the HVAC&R industry, Bennett is full of praise for the way it has responded.

"This is the third major transition really," he says, "out of CFCs, out of HCFCs, now out of HFCs.

For an industry that hadn't changed in terms of refrigerant use between the 1940s and the late 1980s, to one that is now constantly changing and constantly evolving, it's pretty remarkable that it has been able to manage it and maintain all the services critical to our communities."

"And if you think of it in terms of environmental impact, in 1990 this industry was responsible for around 90 million tonnes of emissions every year. When we moved into the HFC phase-down it was based on 8 million tonnes. By the time that's finished it will be down to about 1.5 or 1. That's 20 years from now, but it's still a remarkable achievement."

With Kylie Farrelley taking over as general manager of RRA, Bennett has moved into an advisory role, and along with continuing as the chairman of the ARC he has been recently engaged as a consultant to the United Nations Environment Programme. Seems he can still hear the mission bell ring. ▮