

Consumer protections for heat pump water heater products

Background

Efforts to improve energy efficiency and reduce carbon emissions are driving substantial change across most parts of the economy. One major part of this shift is the move away from fossil gas which, in Victoria, is responsible for around 17% of the state's total net greenhouse gas emissions (DEECA, 2023).

A significant component of gas demand comes from water heating. Domestic hot water is responsible for about 30% of residential energy use along with a large proportion of energy used in commercial and industrial operations. A rapidly growing cohort of households is looking to play their part in reducing their emissions – while saving money – by shifting their water heating from gas to electricity. In many cases, this means switching to a heat pump water heater.

Refrigerant-based heat pump water heaters operate with a Coefficient of Performance (COP) of around 3 or 4, offering substantial energy and greenhouse savings. Further, heat pumps offer the potential to improve grid integration of variable renewable energy by acting as thermal storage, enabling demand response by taking up additional power at time of high renewable generation (or high voltage on the local distribution network) or curtailing demand at times of low generation (or low voltage). The efficiency advantage of refrigerant-based thermal storage allows for applications of excess electricity to responsive uses such as the charging of electric vehicles and other batteries, or (in industry) water pumping and hydrogen production.

The technology thus offers substantial potential public benefits, creating a strong case for policy intervention in support of its deployment. In this context, governments have an important additional role to play: policies urging increased uptake increase the importance of consumer protections beyond the usual responsibilities.

In Victoria, the Victorian Energy Upgrades (VEU) scheme is one such intervention, operating alongside the Solar Homes rebate program and policies mandating efficient water heating in new homes. The VEU rules refer to various Australian Standards to set minimum quality and performance benchmarks for products to be included in the scheme. Products are required to meet Standards for design and construction (AS/NZS 2712) which specify a range of performance-based requirements, and are required to undergo laboratory testing to characterise the energy performance of some components (AS/NZS 5125.1 and AS/NZS 4692) along with modelling to determine the overall performance of the product under various loads in different environments (AS/NZS 4234).

However, recent criticisms have suggested a range of risks, challenges and conflicting debates about the quality, reliability and durability of the products that are being installed. Policymakers have been concerned that the existing Standards and requirements may not be sufficient to ensure that products offered under the program are of sufficiently high quality to provide the durability and longevity that consumers expect. Incentivising poor-quality products would present a risk to the reputation of the technology, a lowering of consumer confidence, reputational risks to the VEU scheme, and could delay the electrification of Victorian households or present additional challenges to Victoria meeting its emissions reduction targets.

The authors were engaged by the Victorian Government Department of Energy, Environment and Climate Action (DEECA) to review evidence and better quantify the extent of challenges to the VEU scheme relating to heat pump water heater quality. The project involved undertaking an international review of requirements in other jurisdictions and engaging with product manufacturers to understand best practices in the market, followed by a review of existing VEU program requirements seeking to identify any gaps.

Our insights will help to better quantify the threats and challenges in this part of the energy transition, producing better outcomes for manufacturers, importers, policymakers and consumers alike.

Findings

Previous experiences in Australia dating back 10 or 20 years have demonstrated the outcomes of incentivising poor quality or inappropriate technologies, resulting in damage to the reputation of heat pump water heating amongst trades, industry and consumers. These sorts of issues carry a tangible risk of delaying the electrification of Victorian households and present additional challenges to our emissions reduction targets.

While we did not find any evidence of quality issues amongst the products being incentivised at present, we identified a number of concerns and made a comprehensive set of recommendations for managing them.

Most risks are currently mitigated through a combination of consumer protections (including warranties), manufacturer and supplier quality assurance systems, and technical Standards or quality specifications. However, the high level of incentives is driving the market towards low-cost products, highlighting the importance of the mandatory quality benchmarks set by policymakers and regulators in charge of the incentive schemes – the challenge is not straightforward, and creates a tension between well-proven designs with quality installation and new low-capacity products with simple plug-in installation and new innovations.

Looking internationally, we found that this is a common concern amongst policymakers around the world. However, none of the international jurisdictions that we investigated in detail – including Germany (and, by implication, the European Union), the United Kingdom and the USA – offer technical solutions that are significantly advanced beyond those currently in place for the VEU. That is, the protections created in the VEU program rules (including the relevant Australian Standards and benchmarks in the scheme) are amongst the world's best practice.

Amongst the non-technical solutions, it is clear that the role of warranties is paramount. However, these are only effective if the supplier is operational at the time of product failure. Although there is no widespread evidence of issues today, we found that the existing protections are limited, and we suggest that policymakers in Victoria could learn valuable lessons from the experience in the United Kingdom where Insurance Backed Guarantees have been applied (with limited success to date) in an attempt to mitigate the residual risks.

We also uncovered some concerning loopholes in the application of Australian Standards: certain requirements of AS/NZS 2712 relating to stability, strength, corrosion resistance, durability, serviceability, and weather resistance are not being confirmed by testing and are often overlooked by compliance bodies.

Our recommendations included the following actions:

1. Ensuring that suppliers provide comprehensive support to extend product operating life by encouraging routine servicing of installations and ensuring that warranties are supported;
2. Increasing engagement between suppliers and policymakers to inform policy using the best information available;
3. Making further efforts to reduce information asymmetry;
4. Consider and investigate a number of technical aspects of the VEU Specifications; and
5. Advocate for product labelling and consider the benefits of applying internationally-consistent product certification and labelling (such as the Heat Pump Keymark scheme which is implemented widely throughout Europe) here in Australia.

Ensuring consumers' positive experience with technology will be a key part of a successful energy transition. We look forward to supporting policymakers and the broader sector to provide better protection to consumers as we move through a rapid transition of domestic energy use.

References

DEECA, 2023, 'Gas Substitution Roadmap Update: Victoria's Electrification Pathway', The State of Victoria Department of Energy, Environment and Climate Action.

AS/NZS 2712, 'Solar and heat pump water heaters — Design and construction'

AS/NZS 5125, 'Heat pump water heaters — Performance assessment'

AS/NZS 4692, 'Electric water heaters, Part 1: Energy consumption, performance and general requirements'

AS/NZS 4234, 'Heated water systems — Calculation of energy consumption'