



Victorian Energy Upgrades: Water Heating

Response to Consultation

December 2022



Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



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Executive Summary

On 4 July 2022, the Victorian Department of Environment, Land, Water and Planning (the department) released a public consultation enabling stakeholders to provide feedback on updates to the Victorian Energy Upgrades (VEU) program water heating activities.

Proposed updates to VEU water heating activities included:

- the introduction of new water heating activities that incentivise the replacement of inefficient gas water heaters with efficient solar electric or heat pump water heaters;
- the removal of existing upgrades which incentivise the installation of gas water heaters;
- the revision of existing activities to allow for solar electric and heat pump water heaters modelled to AS/NZS 4234:2021 to register and create Victorian Energy Efficiency Certificates (VEECs);
- using transition calculations which allow for existing registrations to AS/NZS 4234:2008 to remain on the register and continue to create VEECs; and
- introducing a threshold on the global warming potential of refrigerant used in heat pump water heaters installed in the VEU program.

Fifty-two (52) submissions were received from a wide range of stakeholders including members of the public, VEU accredited providers, industry associations and community groups, product manufacturers and energy retailers. The department would like to thank the organisations and individuals who took the time to provide feedback.

In response to feedback received, key decisions made by the department on the revision of water heating activities under the VEU program are outlined in Table 1. Further detail is provided in the relevant sections of this response to consultation.

Table 1 - Key decisions in response to stakeholder feedback

Please note that the proposed changes to this activity and the indicative dates set out below are subject to further consideration and final approval. Stakeholders are advised not to make any decisions related to water heating upgrades under the VEU program until final regulations and specifications have been approved and published.

Issue / Feedback:	Decision made:
Introduction of electrification activities (gas to electric)	• The department will introduce activities which provide incentives for the replacement of inefficient gas water heaters with efficient electric alternatives by 31 May 2023.
Removal of gas water heating activities	• Activities that incentivise the replacement of inefficient water heaters with efficient gas water heaters will be removed from the VEU program from 30 June 2023.
Incentives are too small to generate significant activity uptake. Assumed hot water load sizes are too low and not reflective of emissions savings	• The department will revise the incentives for the replacement of inefficient gas water heaters with heat pump water heaters to align with solar electric water heaters (an increase of approximately 25%). • The department will proceed with its proposal to use the 'Very Small' and 'Small' loads in AS/NZS 4234:2021 to calculate incentives. • The department will monitor activities and consider the need to provide additional incentives for larger loads where there is sufficient supporting evidence (noting that these larger products will still be eligible under the VEU program).
Refrigerant requirements - a longer transition period will be required.	• Only HPWHs which use refrigerants with a GWP less than 700 will be eligible to be installed under the VEU program. This refrigerant requirement will have a transition period and will not apply until 1 July 2024, allowing time for manufacturers to research, develop, test, and register products.

Issue / Feedback:	Decision made:
Systems need to be sized appropriately	- It is the department's expectation that all water heating upgrades in residential households under the VEU program must provide an appropriate level of service. To meet this expectation, accredited providers (and their installers) must ensure that: - the system installed is appropriate for the water heating needs of the consumer, including having regard to the level of service provided by any decommissioned product; - the consumer has been provided with appropriate guidance on system sizing (a consumer facing VEU sizing guide will be developed by DELWP and the Essential Services Commission (ESC)); - the consumer has been advised that the installed product is (or is not) consistent with the product size recommended in the VEU sizing guide; and - the consumer understands and accepts the level of service that will be provided by the new product. - The draft Specifications for hot water installations (set out at Appendix A) outline these expectations for residential upgrades. These requirements are consistent with existing requirements under the VEU Code of Conduct. Installations that do not meet these requirements will not be eligible for VEECs and may face other enforcement action. The department and the ESC will work together to develop a VEU sizing guide for hot water installations in households.
Product eligibility - adopting AS/NZS 4234:2021 for minimum efficiency requirements and calculating emissions savings	- The VEU program will transition to use the new AS/NZS 4234:2021 standard for product modelling and for the calculation of incentives. - Eligible water heating products will need to be modelled to two hot water load sizes using AS/NZS 4234:2021 – - Modelling a product at the larger of the two loads (e.g. modelling a medium VEU product to a medium load in AS/NZS 4234) determines eligibility for the activity (i.e. to ensure the product can meet the minimum efficiency requirements when operating closer to its full capacity); and - Modelling a product at the smaller of the two loads (e.g. modelling a medium VEU product to a small load in AS/NZS 4234) provides outputs about the amount of energy used by the product when it is operating at its usual capacity (these outputs are used to calculate emissions savings and incentives).
Transition calculations	- The department will implement the revised calculations proposed in the issues paper for existing product registrations using AS/NZS 4234:2008. These calculations will be introduced from 1 July 2023 and remain available until 30 June 2024 to allow for and encourage a transition to products registered to the new standard – AS/NZS 4234:2021. - The issues paper proposed that the minimum energy savings for products already registered to AS/NZS 4234:2008 would be adjusted to more closely align with the new standard (AS/NZS 4234:2021). The department will not implement this proposed energy savings adjustment for existing product registrations. Existing products registered to the 2008 standard must still meet the same minimum energy savings requirement of 60%. - Solar water heater registrations against AS/NZS 4234:2008 will remain visible to support compliance with the Plumbing Regulations 2018 for new Class 1 buildings.
The allowance of water heaters installed in-line, 'manifold systems'	The department will clarify that water heaters cannot be installed in-line, i.e. 'manifold systems' will not be eligible for VEECs.
Decommissioning	Prior to the introduction of these updates to the water heating activities, the department will work with the ESC to consider the need for additional requirements and guidance documentation for decommissioning, including requirements for the appropriate disposal of materials.

Maintaining activity integrity:

Access to efficient water heating is important for Victorian homes and business to reduce energy bills and GHG emissions. Health conditions and comfort are significantly impacted if there is not adequate water heating supplied to a premises.

A primary theme of stakeholder submissions was the need to maintain the integrity of the activity and ensure that water heating upgrades are delivered to meet consumer needs. This includes using high quality products and ensuring there is no loss in water heating service when replacing existing appliances which could contribute to poor customer outcomes.

The department will work with the ESC to monitor and ensure fit-for-purpose uptake of these new water heating activities once they are introduced. The department will continue to review the activity (once established) and work with stakeholders to ensure it is meeting the objectives of the VEU program as well as consumer needs.

Next Steps

The department will revise the draft Specifications for the water heating activities over the coming months and will provide further information on:

- Accredited provider, installer, and consumer guidance documentation and requirements to ensure appropriate system sizing; and
- Decommissioning, disposal, and installation (including installer qualification) requirements.

The department expects to publish updated Specifications for the revised water heating activities by 31 May 2023. The activity commencement date will be set out in final Specifications.

Please note that the proposed changes to this activity (including the draft regulations and specifications attached to this paper) are subject to further consideration and final approval. Stakeholders are advised not to make any decisions related to water heating upgrades under the VEU program until final regulations and specifications have been approved and published.

The department does not make any representation that the proposed changes set out in this paper will (i) take effect (ii) will take effect on or by a particular date, or (iii) will take effect in the form proposed in this paper.

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Introduction

1.1 About the Victorian Energy Upgrades program

Victorian Energy Upgrades (VEU) is a market-based program that helps Victorians to cut their power bills and reduce GHG emissions by encouraging upgrades to energy efficient technology.

The VEU program is governed by the *Victorian Energy Efficiency Target Act 2007* and has three objectives:

- reduce greenhouse gas emissions
- encourage the efficient use of electricity and gas
- encourage investment, employment and technology development in industries that supply goods and services which reduce the use of electricity and gas by consumers.

The program is making a significant contribution to Victoria's climate change and energy affordability goals. More than 2 million households and 150,000 business premises have participated in the VEU program since it commenced in 2009. The program has reduced Victoria's GHG emissions by over 75 million tonnes to date with average annual bill savings of \$110 for participating households and \$3,700 for participating businesses.



Reduced GHG emissions by over **75** million tonnes.



Approximately **2 million** households and **150,000** businesses have participated.



Participating households and businesses have saved **\$110** and **\$3,700** respectively on their annual energy bills.



Benefits all Victorians through savings made **across the system** when energy demand is reduced.

The VEU program currently includes 37 activities that can be undertaken in eligible Victorian households and businesses. Accredited providers who undertake these energy efficiency activities create VEECs. Each VEEC represents one tonne of GHG emissions saved over the lifetime of the activity or product installed. VEECs can then be sold to energy retailers, who must meet an emissions reduction target each year.

For more information on the VEU program, please see the website below or contact the VEU team on energy.upgrades@delwp.vic.gov.au.

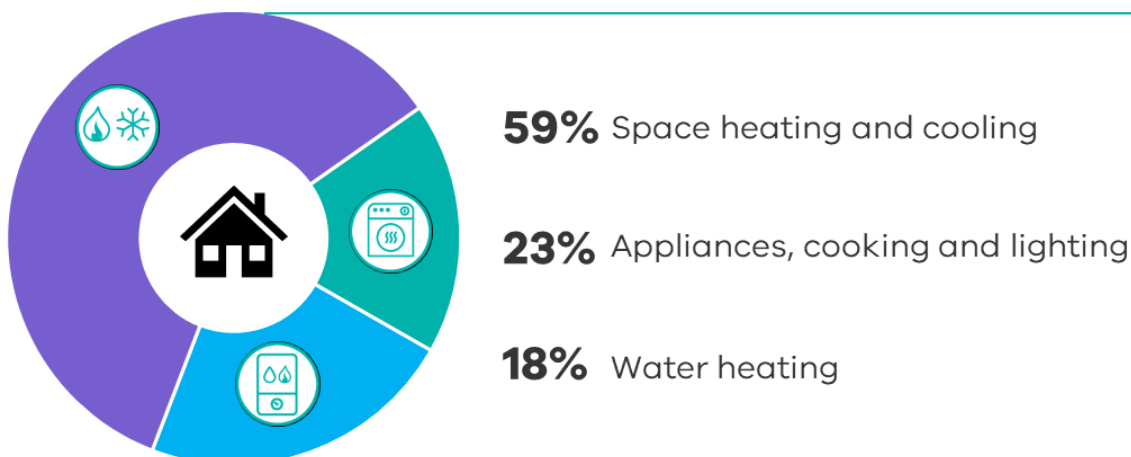
VEU website: <https://www.energy.vic.gov.au/energy-efficiency/victorian-energy-upgrades>.

The department is working on several new and revised activities for the VEU program to ensure Victorians have access to the latest energy efficiency technologies and to increase the pool of opportunity to deliver the program's targets. More information can be found at [Victorian Energy Upgrades \(VEU\) Market update and work program](#).

1.2 Water Heating

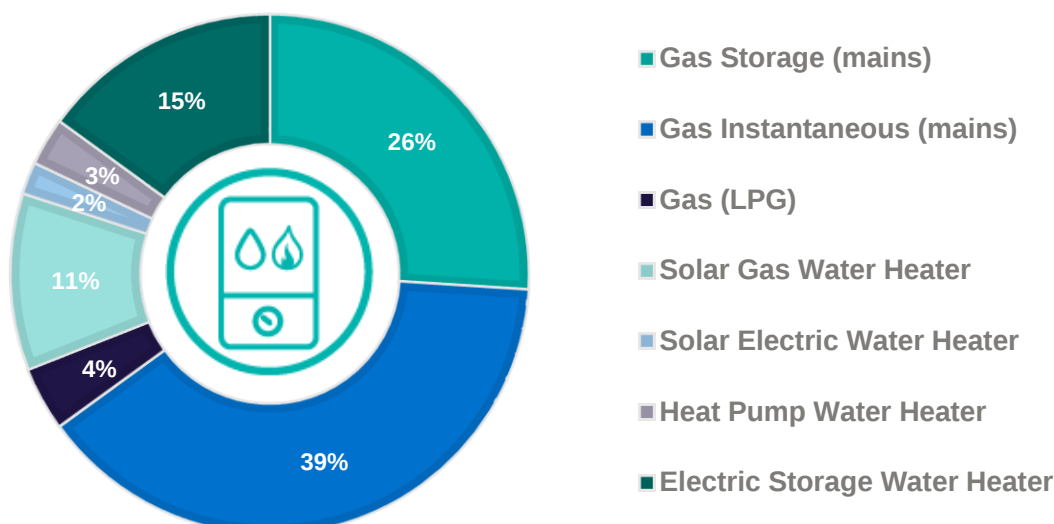
The Victorian Government is working to improve household energy efficiency. Water heating accounts for approximately 18 per cent of residential energy use in Victoria¹. Providing incentives for Victorian consumers to upgrade or purchase efficient water heaters can reduce electricity and gas demand, greenhouse gas (GHG) emissions, and energy costs for consumers.

Figure 1 - Residential energy usage by end-use



A range of different water heating appliances are used in Victorian homes and businesses, including electric resistance water heaters, heat pump water heaters (HPWHs), natural gas or LPG instantaneous and storage water heaters, and electric or gas boosted solar water heaters. The VEU program has been effective in replacing inefficient electric water heaters with around 50,000 upgrades since the activity was last revised in December 2018. Gas fuelled water heaters are the predominant form of water heating appliance in Victoria and are found in approximately 80 per cent of homes. Approximately 65 per cent of Victorian homes use either gas storage or instantaneous water heaters² (the other 15 per cent are gas boosted solar water heaters).

Figure 2 – Water heater stock by type in Victoria



¹ Residential Baseline Energy Study: Australia/New Zealand, Energy Consult (2015)

² Domestic Hot Water Research and Cost Benefit Analysis for Plumbing Regulations 2018 Regulatory Impact, Energy Consult (2018)

1.3 Consultation background

The Department of Environment, Land, Water and Planning (the department) is looking to revise the water heating activities available under the VEU program to ensure the program is delivering on emissions and energy bill savings for Victorian households and businesses.

On 4 July 2022, the department opened a public consultation on the proposed revision of water heating activities under the VEU program. An issues paper was published seeking stakeholder feedback on proposed changes as well as draft Regulations and Specifications.

The consultation paper is available on the Engage Victoria website:

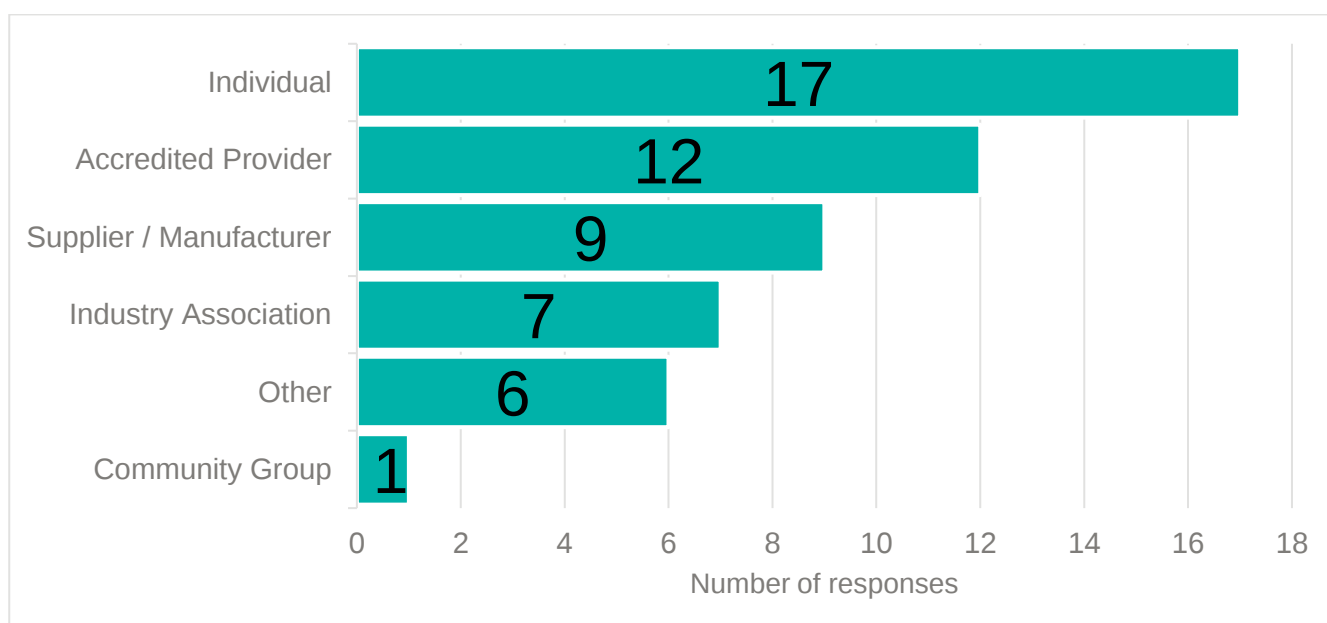
[Victorian Energy Upgrades - Water heating activities | Engage Victoria](#)

Stakeholder feedback provided in the consultation has been used to guide and inform the final design of the water heating activities. This response to consultation outlines the feedback received by stakeholders and the decisions by the department on how this feedback will be implemented.

1.4 Stakeholder submissions

A total of 52 submissions were received from a wide range of stakeholders including members of the public, VEU accredited providers, industry associations and community groups, product manufacturers and two energy retailers (included in 'other' below - Figure 3).

Figure 3: Consultation responses by stakeholder type



The department would like to thank all the organisations and individuals who took the time to review the material available on the Engage Victoria website and provide submissions. The department has carefully considered all stakeholder feedback. Responses and revisions to the proposed water heating activities, after stakeholder feedback, are detailed in the following sections.

1.5 Explanation of key concepts and terminology

‘Bs and Be’

Bs – means the annual supplementary energy used by a heat pump or solar water heater. Supplementary energy is the energy used by a gas burner, an electric element or the operation of a compressor depending on the type of water heater. It ‘supplements’ the primary energy source which is the solar energy and/or the energy from the ambient air.

Be – means the annual electrical energy used by the auxiliary equipment of a heat pump or solar water heater. This can be from equipment such as pumps and controllers. For an electric boosted solar or HPWH, Be and Bs can be added together and not treated separately.

Supplementary energy factor (SEF) – is the factor used in the VEU Specifications to modify the purchased energy used to directly heat the water in a solar water heater or heat pump (Bs). The SEF in the current VEU Specifications is used to calculate the GHG reduction and incorporates the lifetime of the product, the “post-modelling adjustment factor” (to reflect an average load), the gas emissions factor (where applicable) and the regional factor.

Auxiliary energy factor (AEF) – is the factor used in the VEU Specifications to modify the purchased electricity used to operate the auxiliary parts of a solar water heater or heat pump (Be). The AEF in the current VEU Specifications is used to calculate the GHG reduction and incorporates the lifetime of the product, the “post-modelling adjustment factor” (to reflect an average load) and the regional factor.

‘Energy Savings’

‘Energy Savings’ or annual energy savings is the “*purchased energy savings relative to the reference water heater from AS/NZS 4234*”, where the ‘reference water heater’ is the energy consumed by an electric water heater or gas water heater to meet the modelled ‘load’.

For example, a solar water heater with a 60 per cent energy savings uses 60 per cent less energy than the reference electric water heater for that load. This is because 60 per cent of the energy comes from the solar collectors.

Changes in Energy Savings are referred to as percentage point changes (i.e. a change from 60 per cent energy savings to 66 per cent energy savings is a 10 per cent improvement but a change of 6 percentage points).

‘Load’

‘Load’ is the amount of energy required to be added to cold water to bring it to the temperature required for use in residential dwellings. The loads are designated as very small, small, medium, and large in AS/NZS4234. Products are modelled to these standardised loads using modelling software to determine their energy consumption. On average, Victorian households consume hot water approximately equal to the small load.

1.6 Response to stakeholder feedback

The following sections present a summary of the stakeholder submissions received for each of the key consultation issues and the department's responses and key policy decisions for the activities.

The department's response details the changes and implementation dates for existing water heating activities in VEU, and the introduction of new activities to allow the replacement of gas water heaters. A summary of changes includes:

- The introduction of new activities that incentivise the replacement of inefficient gas fuelled appliances with efficient electric alternatives.
- The removal of activities that incentivise the installation of gas-fuelled water heaters.
- New GHG reduction calculations and product efficiency requirements to allow water heaters tested to AS/NZS 4234:2021 to more accurately create VEECs.
 - This includes new requirements for products to be tested and modelled to two load sizes to be eligible for incentives - this change was proposed to more fairly represent the energy consumption of products under typical use while ensuring they can also provide adequate hot water when required.
- Changes to incentive levels (and average load sizes) resulting from the proposed calculations – these changes reflect typical household consumption and the resulting emissions savings from upgrades more accurately.
- The need for water heating upgrades to be sized appropriately. It is the department's expectation that water heating upgrades under the VEU program must provide an appropriate level of service.
- Revised existing calculations for water heaters tested to AS/NZS 4234:2008 to align with the new calculations.
 - This allows for a slow transition to the new AS/NZS 4234:2021 standard.
 - It will also allow for existing products to remain on the VEU register until 30 June 2024 (this means that these products can continue to be used to show compliance with building regulations, where required).
- Inclusion of a new refrigerant GWP threshold to limit the GHG emissions resulting from the possible leakage or end of life loss of any refrigerants used in a HPWH.
- Clarification that multiple water heaters are not permitted to be installed 'in-line' i.e 'manifold systems'.
- Discussion on other matters including decommissioning requirements, installation limits and solar photovoltaic (PV) water heaters.

2. Introduction of new ‘electrification’ activities

The water heating consultation issues paper proposed two key policy decisions to align the VEU program with Victoria’s Gas Substitution Roadmap:

- The introduction of activities which provide incentives for the replacement of inefficient gas water heaters with efficient electric alternatives; and
- The removal of activities that incentivise the replacement of inefficient water heaters with efficient gas water heaters.

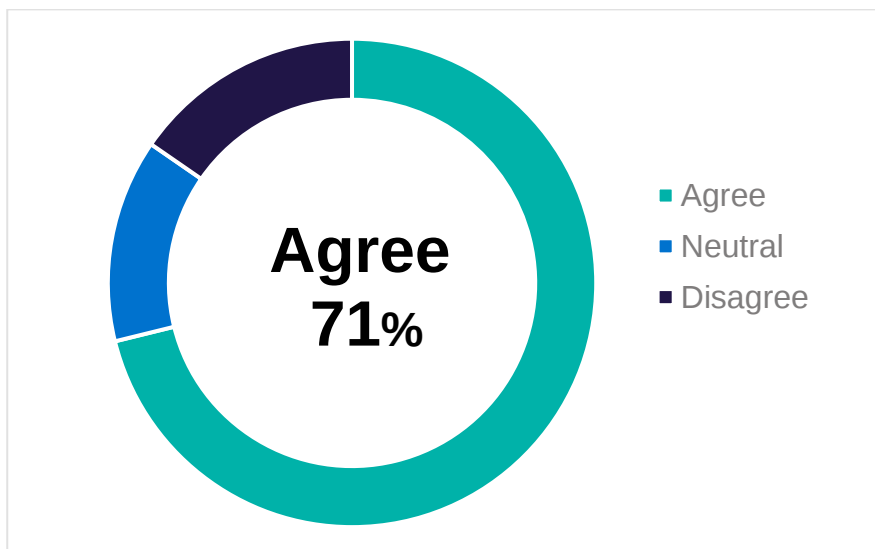
This section discusses the proposed introduction of ‘Electrification’ activities, i.e., activities which provide incentives for the replacement of inefficient gas water heaters with efficient electric alternatives.

The Victorian Government recently published the Gas Substitution Roadmap (the Roadmap), which is the Victorian Government’s strategic plan to support a coordinated and equitable transition to a decarbonised gas sector. The Roadmap details the most effective approach to substituting natural gas to help achieve Victoria’s emissions reduction targets. Analysis undertaken to inform the Roadmap found that energy efficiency and electrification will play a dominant role in reducing natural gas use and emissions.

The proposed updates to water heating activities in the VEU program aligns to the Roadmap by introducing incentives in the VEU program for replacing gas appliances with efficient electric water heaters.

Over 70% of stakeholder submissions supported the introduction of electrification upgrades.

Figure 4: What are your views on the proposed new activities allowing the replacement of gas water heaters with efficient electric water heaters?



Stakeholder feedback in support of electrification (gas to electric) upgrades under VEU included that:

- Victorian households need to transition from fossil fuels to renewably-sourced electricity;
- electrification is a necessary step towards achieving net zero GHG emissions;
- electrification should be a primary goal of VEU program activities;
- there is considerable interest from consumers in switching from gas to electric appliances;
- VEU incentives can reduce the payback time for replacing gas heaters; and

- where electric products are coupled with on-site photovoltaic (PV) generation, GHG emissions will be even lower.

One submission noted that there are a significant number of solar gas water heaters in Victoria, with many approaching end-of-life. These products will likely remain in place or possibly transition to inefficient gas water heaters when the system fails. It was suggested that these systems should be eligible for upgrades under the program.

While the department understands that households with both heat pump water heaters and solar PV can heat water from completely renewable sources, the VEU program is not currently able to provide incentives for this self-consumption (see below). When calculating the resulting emissions of these efficient electric products using electricity from the grid, they do not result in less emissions than a gas-boosted solar water heater. As such, it is not possible for efficient electric products to create incentives for the replacement of gas-boosted solar water heaters.

The VEU program is also unable to provide additional incentives for the self-consumption of solar PV. While the department acknowledges that there is significant investment and uptake of solar PV in Victoria, and that houses with solar PV will likely look to efficient electric water heaters, these emissions savings have already been accounted for when setting the electricity emissions factors for VEU activities.

Stakeholders concerned about the introduction of electrification activities provided feedback that supply of electricity may not be assured to households that electrify their home, the costs for customers to electrify their home are prohibitive and that GHG emissions from appliances which use grid electricity may be higher than gas.

The department acknowledges these concerns; however, the Roadmap scenario modelling finds that:

- At a whole-of-electricity system level, Victoria has significantly higher peak demand in summer than in winter (around two gigawatts). Whilst electrification of (predominantly winter) gas loads will increase winter peak, the Roadmap found that even with enormous levels of electrification (across residential, commercial and industrial loads), Victoria would not turn “winter peaking” or reach its historical peak until almost 2030. Electrification in the residential sector only is highly unlikely to see Victoria’s winter peak reach this historical peak for much longer, with significant time to plan and prepare.
- While upfront cost can be a significant barrier towards upgrading to efficient electric appliances, VEU incentives can help lower these up-front costs. This can lead to significant bill savings over the life of the appliance, which increase significantly should a home or business have solar panels installed; and
- The total GHG emissions outcome from using gas or electricity is a function of both the emissions intensity of the fuel source (and how these are changing over the expected life of the appliance) and importantly, the efficiency of the end appliance delivering the output energy service (e.g. hot water):
 - The emissions intensity of Victoria’s electricity system is reducing rapidly, with AEMO’s Integrated System Plan (ISP) forecasting further significant declines across all core scenarios over the coming decade. This contrasts with the emissions intensity of natural gas, given the challenges of scaling up renewable or alternative gases this decade.
 - The trajectory of the emissions intensities of electricity versus gas in the coming decade, combined with the high efficiency of the electric appliances in VEU, mean that over their appliance lives, these efficient electric appliances will be lower total emissions than gas appliances.

Table 2 – Summary of proposed changes and implementation dates

Activity Change	Date
New gas replacement activities (Scenario 3C and 3D) introduced into VEU.	By 31 May 2023

Policy Decision:

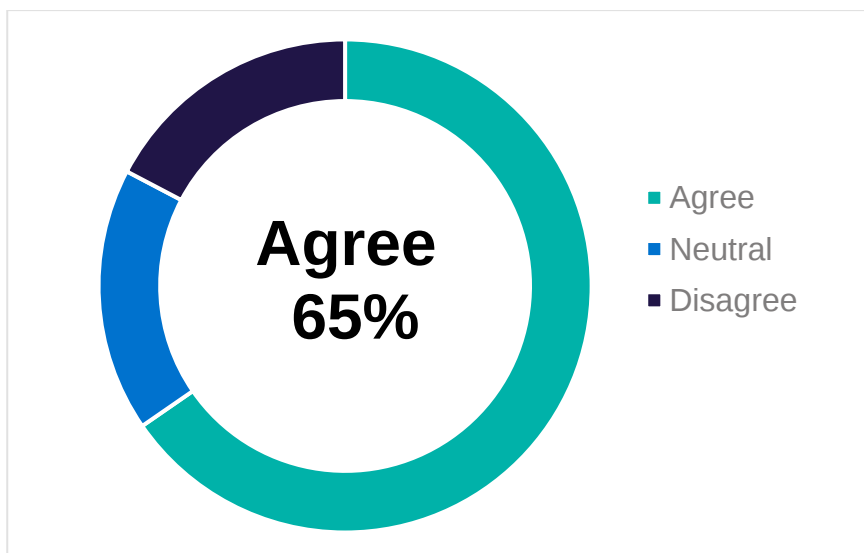
The department will introduce activities which provide incentives for the replacement of inefficient gas water heaters with efficient electric alternatives by 31 May 2023.

3. Removal of incentives for gas water heaters

The consultation proposed the removal of activities that incentivise the replacement of inefficient water heaters with gas-fuelled water heaters.

Of stakeholders who provided a response, 65% agreed with the proposed removal of gas water heating upgrade activities under VEU (1A, 1B, 1F and 3B).

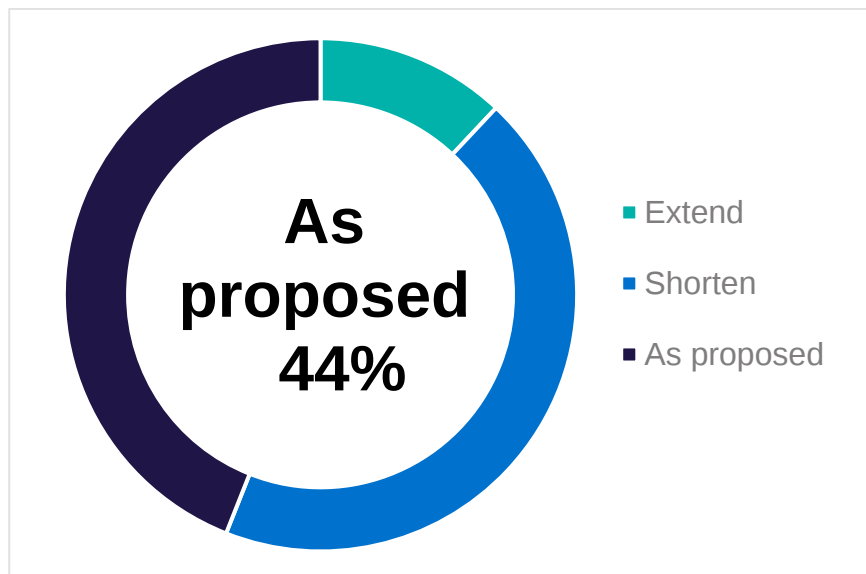
Figure 5: What are your views on the proposed removal of activities where gas water heaters can replace inefficient water heaters (1A, 1B, 1F and 3B)?



Stakeholders who did not support the removal of gas water heating upgrades stated in their feedback that the proposed changes are not technology agnostic and that some gas replacement upgrades can offer cost-effective GHG emissions reductions. Stakeholders also provided feedback that removing gas upgrades may cause damage to the local manufacturing industry and jobs, and noted the potential opportunity for future emissions savings through the use of hydrogen and biomethane.

Of stakeholders who agreed with the proposed removal of gas water heating activities, 44 per cent stated the proposed transition time was appropriate, and an equal amount stated that it should be removed sooner (Figure 6).

Figure 6: Do you have any comments on the proposed transition time for the removal of these activities?



The department acknowledges these concerns; however, the Roadmap finds the following:

- When considering the emissions intensity of the different fuel sources, their trajectories over the coming decade (in line with the AEMO ISP) and the efficiency of electric versus gas appliances, total emissions over the appliance lifetime are lower for efficient electric appliances.
- The Victorian Government recognises that renewable or alternative gases, such as hydrogen and biomethane, will play an important future role in decarbonising Victoria's gas sector, particularly in high-heat and feedstock applications, and potentially as peaking generation in the electricity sector. As part of Roadmap actions, the Government is progressing work to develop these technologies:
 - At the same time, hydrogen and biomethane are not significantly scalable this decade, and decarbonising Victoria's economy will require the gas sector to contribute by 2030. As such, energy efficiency and electrification will play the primary role this decade.
- By locking in a gas fuelled water heater for another 15 years or longer, the program would reduce the possibility that households realise bill savings and greenhouse gas savings that come from whole-of-house electrification.
- Continuing to provide incentives for these products may lock consumers into gas. These products would not be suitable for use with renewable gas fuels in future, and there is no guarantee that these households would adopt such technologies at end of life.
- Further, activities which incentivise the installation of gas-fuelled appliances currently get very little uptake through the VEU program with only 11 upgrades to gas boosted solar water heaters so far in 2022.

Gas efficiency in the VEU program

There are other opportunities currently available through VEU to drive gas efficiency.

- For larger commercial and industrial consumers, the VEU program recently updated requirements for gas boiler upgrades to help improve uptake of this important gas efficiency activity which will help reduce energy bills.
- VEU also currently supports bioenergy/biogas projects through incentives for project-based activities.

- Project-based activities are bespoke energy-saving projects at businesses and non-residential sites, typically with large energy use. Incentives for these projects are determined by comparing energy use before and after the project is implemented, using industry-standard measurement and verification techniques. A single project can include a variety of technologies so long as energy savings can be measured and verified.
- The department is open to considering how it can support low emissions gasses, including green hydrogen through project-based activities. The department has just recently closed a consultation on proposed improvements to project-based activities under the VEU program.

The department regularly reviews emissions factors used by the program. As plans to decarbonise the gas network progress, the department can revise the gas emissions factor accordingly. To provide incentives for gas-fuelled water heaters which use renewable hydrogen, the department needs to be confident that the hydrogen consumed by the water heater comes from a renewable source over the lifetime that incentives are provided. The department will continue to investigate these opportunities as innovations allow the market to develop.

From 30 June 2023, the following water heating upgrade scenarios will be removed from the VEU program and will no longer be able to create VEECs.

Table 3 – VEU water heating activities to be removed on 30 June 2023

VEU activity	Activity description
Activity 1A	Replacing an electric storage water heater with a gas or LPG storage water heater
Activity 1B	Replacing an electric storage water heater with a gas or LPG instantaneous water heater
Activity 1F	Replacing an electric storage water heater with a gas or LPG boosted solar water heater
Activity 3B	Replacing a gas or LPG water heater with a gas or LPG boosted solar water heater

Policy Decision:

Activities that incentivise the replacement of inefficient water heaters with gas water heaters will be removed from the VEU program from 30 June 2023.

4. New calculations for products modelled to AS/NZS 4234:2021

4.1 Product requirements – adopting AS/NZS 4234:2021

The issues paper proposed new GHG reductions calculations and product efficiency requirements for both new and existing activities to allow products modelled to the new AS/NZS 4234:2021 standard, published on 25 June 2021, to accurately create VEECs.

The methodology behind the GHG reduction calculation has also been reviewed and revised as part of this process. The issues paper proposed a new method for modelling water heaters by modelling to two loads:

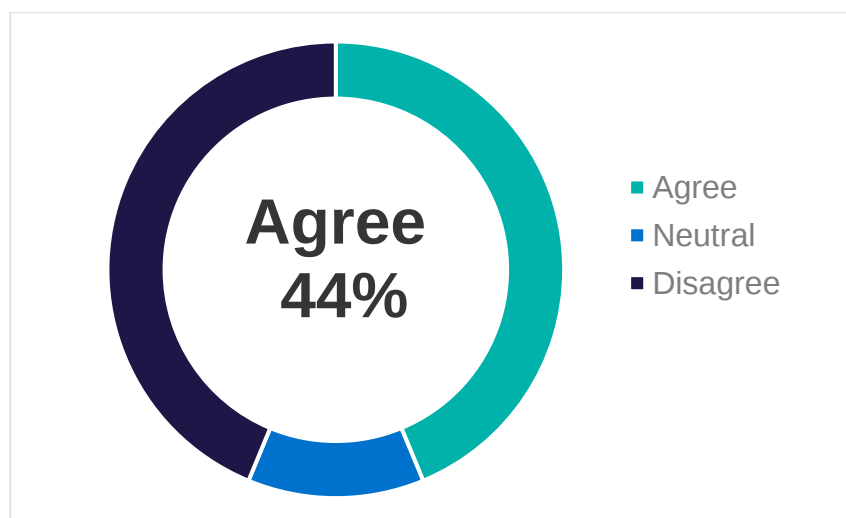
- Modelling a product at the larger of the two loads determines eligibility for the activity (i.e. to ensure the product can meet the minimum efficiency requirements when operating closer to its full capacity); and
- Modelling a product at the smaller of the two loads provides outputs about the amount of energy used by the product when it is operating at its usual capacity (these outputs are used to calculate emissions savings and incentives).

The larger of the two loads will use the load in AS/NZS 4234 that corresponds to the load size in the VEU Specifications. For example, a 'medium' activity in VEU will determine the 'energy savings' eligibility using the medium load in AS/NZS 4234. The smaller of the two loads will be modelled using the next smallest load size in AS/NZS 4234. Using the previous example, the 'medium' activity in VEU will calculate emissions savings and incentives using the small load in AS/NZS 4234.

While most submissions did not express a view on VEU adopting the new AS/NZS 4234:2021, responses from stakeholders who provided feedback were mixed, with 44% agreeing with the proposed changes and 44% disagreeing.

Two submissions noted existing concerns with delays in the product application process that would be significantly worsened if all registered products re-applied to use the new 2021 standard at the same time. The Essential Services Commission (ESC) has been working with industry to streamline this product approval process where possible. A suggestion was made to allow product applications in advance of the launch of these activities. The department will work with the ESC to investigate if it is possible to allow applicants to submit product applications prior to 31 May 2023. The department will also work with the ESC to investigate options for prioritising applications based on planned future uptake under the VEU program (e.g. where products and providers have significant activity under the VEU program).

Figure 7: Feedback on the new AS/NZS 4234:2021 and the 'very small' and 'small' methodology for calculating energy savings



Stakeholders who opposed transitioning to the new 2021 standard provided feedback that they did not support the proposal because the load sizes used from the AS/NZS 4234:2021 standard are too low. This is discussed in detail in Section 5 of this paper.

Policy Decisions:

- The new calculations using the AS/NZS 4234:2021 standard will commence in the VEU Specifications by **31 May 2023**.
- New water heating products will also need to register to the new AS/NZS 4234:2021 standard. The department will work with the ESC to investigate if it is possible allow applicants to submit product applications prior to 31 May 2023.
- This means that water heater products will need to be modelled to two loads, one to assess the eligibility of the product and the other to calculate the incentives.

4.2 Product eligibility - impact on compliance for new builds

As noted in the issues paper, the department is aware that the existing VEU water heating product register (which currently contains eligible products registered to AS/NZS 4234:2008) is leveraged by product suppliers, builders and plumbers for the purpose of compliance with requirements in the Plumbing Regulations for new Class 1 buildings.³

While new water heating products in the VEU program will need to register to AS/NZS 4234:2021 (as explained above), the department is keen to avoid any unnecessary disruption to those stakeholders who otherwise rely on the current VEU water heating product register (which is administered by the ESC).

- Therefore, any heat pump and electric boosted solar water heaters currently registered to the 2008 standard will remain publicly visible on the VEU product register and can continue to be referenced by practitioners for compliance with requirements in the Plumbing Regulations for new Class 1 homes.
- For this same reason, gas boosted solar water heaters that will be removed from the VEU program from 30 June 2023 (as part of removing activities that incentivise the replacement of inefficient water heaters with efficient gas water heaters) will remain publicly visible on the product register.
- The department is aware that this may present challenges for registration of new heat pump and solar electric water heater products with VEU for the purpose of demonstrating compliance with the Plumbing Regulations for new Class 1 homes. These products can still be installed through alternative compliance pathways⁴.

The department will work with the ESC to make these legacy registers clear and simple to follow for practitioners looking to comply with the new build requirements.

³ Victorian variations to energy efficiency requirements in the 2019 edition of the National Construction Code (NCC) for new Class 1 buildings are typically met by installing either a rainwater tank connected to all sanitary flushing systems, or a solar water heater system, in accordance with the Plumbing Regulations. These variations have been removed from the 2022 edition of the NCC and the Plumbing Regulations will be amended to align with updated NCC requirements. To assist with transition to updated NCC requirements, the Plumbing Regulations have been amended to clarify that AS/NZS 4234:2008 is to be used for compliance with the NCC 2019 variation. Further information on installation of solar water heaters in new Class 1 buildings is provided in Practice Note SH-01 issued by the Victorian Building Authority, available at www.vba.vic.gov.au.

⁴ Potential alternatives include voluntary adoption of energy efficiency requirements in NCC 2022 ahead of those requirements becoming mandatory on 1 October 2023, or undertaking a different compliance pathway under NCC 2019 as outlined in Practice Note SH-01.

Policy Decisions:

The VEU program will transition to use the new AS/NZS 4234:2021 standard for product eligibility and the calculation of incentives.

The VEU program will adopt the methodology of products being modelled to two load sizes.

5. Load sizes and incentive levels

A significant amount of feedback on the methodology changes identified in the previous sections was focused on load sizes and the resulting decrease in incentive levels. Nineteen stakeholders provided feedback that the load sizes specified were too low and that as a result, the incentive levels were not sufficient to drive substantial uptake of these activities. This section highlights this feedback and responds to the common themes.

5.1 Average household load size

Feedback received from seventeen stakeholders suggested that the 'small' load is not reflective of the typical household's average daily water consumption. Feedback from seven stakeholders noted that the additional cost of larger products disincentivises large households from upgrading to an efficient water heater.

Analysis of typical household hot water consumption and products installed under the program (and their energy savings) support the proposal to use 'small' loads as being more reflective of the average upgrade completed under the VEU program.

The department has modelled and analysed the performance of the products with the highest installation rates under the VEU program. While these products can satisfy the medium load, there is often limited additional hot water capacity available should household needs increase, suggesting these products are rarely used to their full capacity and on average are used to service much lower hot water loads. This is reflected in the current VEU hot water upgrade calculations which roughly adjust incentives down to represent an average Victorian load.

The average tank size installed under VEU, and the hot water delivery temperatures of the most installed products would suggest that the 'small load' (as determined in accordance with AS/NZS 4234) is the most reflective of average household hot water consumption.

The department will continue to monitor and evaluate the products installed under VEU and consider any evidence to support incentivising larger loads in future (discussed further below).

5.2 Dwelling characteristics and consumption

A total of ten submissions also noted that a 'small' load is reflective of an average household consumption which includes smaller Class 2 properties, where heat pump water heaters cannot typically be installed due to space constraints or body corporate restrictions. The submissions noted that using an average household consumption which includes apartments underestimates hot water consumption as generally only larger properties complete upgrades to solar electric or heat pump water heaters.

Class 2 properties only make up 12% of the housing in Victoria.⁵ Removing these from the sample reduces the average number of people per household by less than 5%. Water consumption studies reviewed as part of this work⁶ capture information on dwelling type and household size, however generally these studies

⁵ 2021 Census All persons QuickStats <https://abs.gov.au/census/find-census-data/quickstats/2021/2>

⁶ Smart Water Fund, Melbourne Residential Water End Uses Winter 2010 / Summer 2012

represent Class 1 dwellings, possibly due to ease of access and metering. One such study noted that the households surveyed were larger than the average household size.⁷

Approximately 10% of houses which receive a water heater through VEU also receive a low flow shower rose. Research has found that a significant majority (71%) of shower events had a flow rate of 9 L/min or less, while 90% had a flow rate of 12 L/min or less.⁸ Given the average flow rate of households in Victoria is 8.1 L/min and that only households with a flow rate greater than 9 L/min are eligible for a shower rose with a flow rate of <7.5 L/m – the actual hot water consumption by showers for water heaters installed through VEU is likely lower than that in the studies of average Victorian households. The impact of this would likely reduce the hot water consumption of the average household that receives an upgraded water heater.

5.3 Policy Decision on load size

The VEU program will provide incentives based on the energy consumption modelled to a “small” or “very small” load using the AS/NZS 4234:2021 standard.

The department will continue to monitor and evaluate the products installed and associated energy savings of the water heater activities. The department will consider the need to provide additional incentives for larger loads where there is sufficient supporting evidence, noting that these larger products will still be eligible to be installed under the VEU program.

Analysis of the water heating products commonly installed under the VEU program has indicated VEEC changes will result from applying the new calculations when compared to the current calculations using the 2008 standard:

- the average small sized electric boosted solar water heater product replacing an electric storage system (Scenario 1C) would create approximately one VEEC more;
- while the average medium sized product installed under this Scenario 1C would create approximately three VEECs less;
- the decrease in incentive for small sized heat pumps replacing electric storage water heaters (Scenario 1D) would be less than one VEEC on average; and
- medium sized heat pumps would create approximately four VEECs less.

Further details on this analysis are presented in Table 4.

Table 4: Average VEEC difference between the existing and new GHG reduction calculation

Scenario	Activity description	VEEC difference	
		Small	Medium
1C	Replacing an electric storage water heater with an electric boosted solar water heater	+1.12	-2.78
1D	Replacing an electric storage water heater with a heat pump water heater	-0.19	-3.88

Policy Decision:

The VEU program will provide incentives based on the energy consumption modelled to a “small” or “very small” using the AS/NZS 4234:2021 standard.

5.4 Incentives for replacing gas water heaters with efficient electric water heaters

Several stakeholders provided feedback that incentives for the replacement of gas water heaters with heat pump water heaters were too low to incentivise uptake. Many of these stakeholders proposed that the lifetime for calculating GHG emissions savings for gas replacement activities should be extended to 20 or 30 years.

⁷ City West Water Residential End Use Measurement Study (REUMS) September 2017 to August 2018 data

⁸ City West Water Residential End Use Measurement Study (REUMS) September 2017 to August 2018 data

The reasoning behind these suggestions were that at end-of-life, these households will not shift back to gas and will opt for another efficient electric water heater. Feedback also noted that water heaters are likely one of the more difficult appliances to upgrade and are instrumental in the transition to an all-electric house, resulting in further emissions reductions.

While water heating activity calculations do not specify a lifetime, it is incorporated in the development of the baseline abatement factor and AEF and SEF. When setting lifetime figures, the department considers both the lifetime of the baseline product, the lifetime of the upgrade product, and the likelihood that either the baseline and/or upgrade would change to a different technology or fuel source within this lifetime in the absence of a VEU intervention.

The department does not believe that a 20 year lifetime is suitable for VEU upgrades. While like-for-like water heater replacements are likely, there are too many variables to provide certainty around consumer product and fuel type preferences in the future. There is also the risk that some consumers replace HPWH at end-of-life with more affordable electric storage water heaters to quickly regain access to hot water, particularly in rental properties where market failures (split-incentives) exist.

Some stakeholders suggested that the replacement of gas water heaters could be the catalyst for further electrification activities in a household, resulting in more emissions and bill savings. The department notes this feedback and will consider further electrification incentives under VEU in the future.

The department has however considered this feedback and determined that it would be appropriate for the baseline abatement factor and the AEF and SEF for ‘gas to heat pump water heater’ upgrades to align with the ‘gas to solar electric water heater’ activity. This accounts for a range of factors including the lifetime of water heating products, continued use of efficient water heaters at end of life, and the potential for more renewable energy consumption than that reflected by the electricity emissions factor. As such, the abatement factors and the AEF and SEF for the two gas replacement activities will be aligned. This results in an approximate 25% increase in incentives for activities that replace inefficient gas water heaters with efficient electric heat pump water heaters as detailed in Table 5. The revised baseline abatement factor, AEF and SEF is also detailed in the draft Specifications in Appendix A.

Table 5 – Indicative incentives for proposed new water heating activity scenarios in the VEU program⁹

VEECs	2023	2024	2025
Activity 3C (HPWH) as proposed in the issues paper	4 – 7 VEECs	4 – 7 VEECs	4 – 8 VEECs
Activity 3C (HPWH) 25% increase	5 – 9 VEECs	6 – 10 VEECs	7 – 10 VEECs
Activity 3C (Solar Electric)	5 – 11 VEECs	6 – 11 VEECs	7 – 12 VEECs

Policy Decision:

The department will revise the incentives for the replacement of inefficient gas water heaters with heat pump water heaters to align with solar electric water heaters (an increase of approximately 25%).

5.5 Summary

The VEU program will provide incentives based on the energy consumption modelled to a “small” or “very small” using the AS/NZS 4234:2021 standard. Products of a broad range of sizes remain eligible for installation in the VEU program provided that they satisfy the minimum annual energy savings requirement.

⁹ VEEC range calculated for 3C products with energy savings ranging from 60% to 80% and for 3D products with energy savings ranging from 60% to 90%

The department will monitor and evaluate the activities that incentivise the replacement of inefficient gas water heaters with efficient electric alternatives and consider the need to provide additional incentives for larger loads where there is sufficient supporting evidence, noting that these larger products will still be eligible to be installed under the VEU program.

6. Sizing

Sizing considerations for hot water systems

It can be difficult to assess the hot water consumption pattern of a household when a gas instantaneous water heater is to be replaced. While these activities only incentivise the “medium” (modelled to both the small and the medium load) size, larger size products are also eligible provided they satisfy the minimum energy saving requirements.

Generally, the system should be sized for the dwelling, not necessarily its occupants. People sell houses and move on, but the hot water system stays. Some householders may have needs that exceed those of a typical household of their size. For example, while a house may only have 3 bedrooms there could be a large number of occupants, hot water fixtures could have high flow rates and occupants may regularly run a bath, run hot cycles on washing machines or draw other large hot water loads. Alternatively, while a couple may live in a 4-bedroom house and only require a small volume of hot water most of the year, there may be times in the year when they have family or friends stay and they require a larger hot water service to meet those peak loads. It is important that consumers' needs are met, and the capabilities of the water heater are clearly communicated to them.

There are larger products on the market registered for VEU that can comfortably meet the annual energy savings requirement for a medium load but also provide a good level of service for larger premises, when needed.

VEU sizing requirements and guidance

To address appropriate sizing, the department and ESC will develop high-level sizing guidance for accredited providers, installers and consumers. This guidance will align with typical industry ‘best practice’ to minimise the risk of inappropriately sized systems being installed.

It is the department's expectation that all water heating upgrades for residential households under the VEU program must provide an appropriate level of service and that accredited providers must ensure that:

- the system installed is appropriate for the water heating needs of the consumer, including having regard to the level of service provided by any decommissioned product;
- the consumer has been provided with appropriate guidance on system sizing (consumer facing VEU sizing guide will be developed by DELWP and the ESC);
- the installed product is consistent with the sizing recommended in the VEU sizing guidance and manufacturer recommendations for a household similar to that of the energy consumer; and
- the consumer understands and accepts the level of service that will be provided by the new product.

The draft Specifications for hot water installations (set out at Appendix A) outline these expectations. These requirements apply only to residential installations.

These requirements are consistent with existing obligations under the VEU Code of Conduct to ensure that the accredited provider (or installer) gives clear and accurate information to the consumer about the suitability of the product for their needs.

Hot water installations in residential premises that do not meet these requirements will not be eligible for VEECs and may face other enforcement action.

Policy Decisions:

The department and the Essential Services Commission (ESC) will develop guidance documentation for consumers and set requirements for accredited providers and installers to ensure hot water systems installed through VEU are appropriately sized to meet the consumer's hot water needs.

7. Revised calculations and transition for products modelled to AS/NZS 4234:2008

To mitigate the amount of effort required to re-evaluate and re-register products to the new AS/NZS 4234:2021 standard, the department also proposed a transition period and transition calculations for existing products registered to the 2008 standard.

- Once the new AS/NZS 4234:2021 calculations are introduced by 31 May 2023, all new product applications will be required to register to the 2021 standard.
- Products currently registered to the 2008 standard will remain eligible for VEU upgrades until 30 June 2024.¹⁰
- Products will not be permitted to be registered to both the 2008 and the 2021 standard at the same time.
- However, to encourage the transition to, and alignment with, the revised 2021 standard, revised incentive calculations will apply to products currently registered to the 2008 standard from 1 July 2023.

The detail of these transition calculations did not receive a significant amount of feedback from stakeholders. As the transition calculations are designed to conservatively align with the proposed new 2021 calculations, we expect that the stakeholder feedback regarding reduced incentives outlined in the previous section also applies to these proposed transition calculations.

Most stakeholders did not comment on the proposed transition period. Of those who did provide feedback, seven expressed support for the proposed transition period, five argued it should be extended and three said it should be shortened.

There was very little feedback on the proposed adjustment to the 60% energy savings requirement for existing products registered to the 2008 standard. The department notes that there is minimal benefit to the VEU program from applying this energy savings adjustment. In the interests of simplicity, the energy savings adjustment will not be applied to the 2008 registrations.

The department will continue with the introduction of the transitional AS/NZS 4234:2008 calculations. These revised transitional calculations will come into effect from 1 July 2023 and end on 30 June 2024.

¹⁰ These transition calculations allow existing electric boosted solar and heat pump water heater product registrations to remain registered to the 2008 standard to demonstrate compliance with the Victorian energy efficiency variation to the National Construction Code (NCC) 2019, while also being eligible to create VEECs.

Policy Decisions:

The department will require all new products (by 31 May 2023) to be registered to the 2021 standard.

The department will continue to allow products registered to the 2008 standard to be eligible for VEU upgrades for a transitional period ending **30 June 2024**.

Transitional incentive calculations will apply to products registered to the 2008 standard to allow for a slow transition to the new 2021 standard. These calculations will be introduced 1 July 2023 and remain available until 30 June 2024.

The department will not implement the proposed energy savings adjustment for existing product registrations.

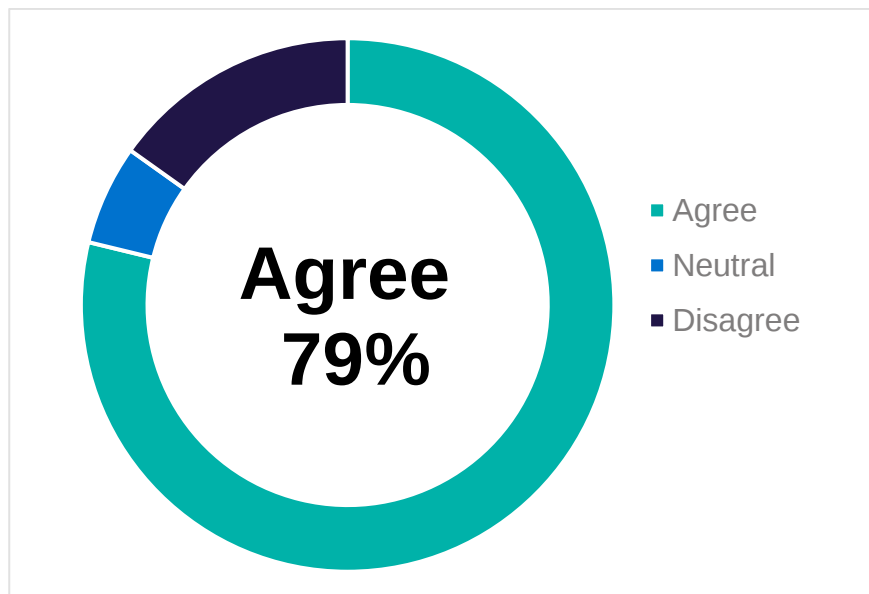
8. Refrigerant requirements for heat pump water heaters

The issues paper proposed that only HPWHs which use refrigerants with a GWP less than 700 will be eligible to be installed under the VEU program from the end of 2023. This change was proposed to minimise the emissions relating to refrigerant leakage and end-of-life loss. The change would support industry to transition to water heating products that use lower GWP refrigerants as these product types are projected to significantly grow in popularity in future, both in the VEU program and in Victoria more broadly.

8.1 Stakeholder Feedback

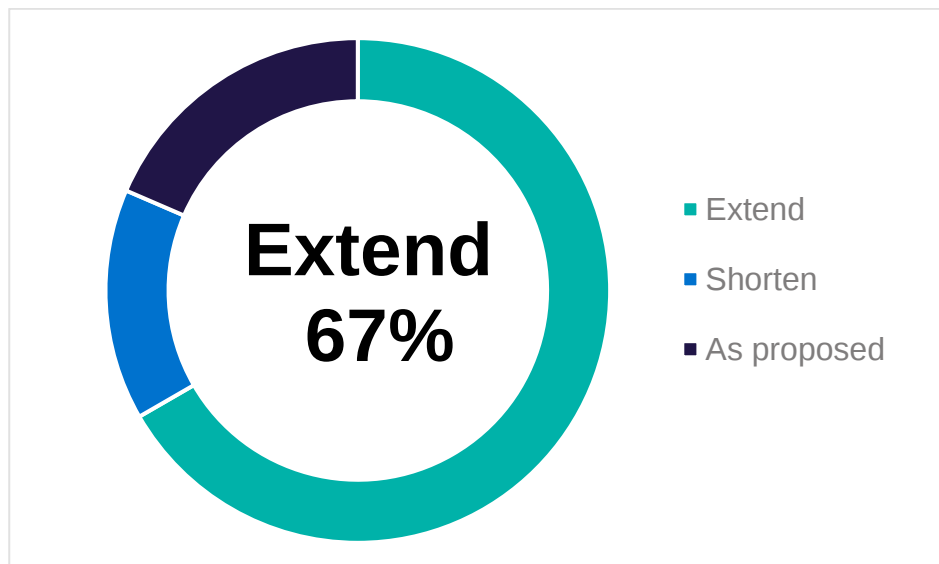
Feedback on the implementation of a threshold for refrigerants was generally positive with 26 submissions supporting the proposal.

Figure 8: What are your views on the proposed inclusion of refrigerant GWP threshold of 700 for HPWHs?



Other than general support, the most common feedback received was that a longer transition period will be required for manufacturers to research, develop, test, and register products, and update production capabilities. A total of 18 submissions requested extensions to the implementation of the refrigerant threshold. Generally, these submissions requested an additional six to eighteen months from the date proposed in the issues paper. This would provide a total transition time of two or three years from the date the issues paper was released.

Figure 9: Stakeholder views on the transition time proposed for the refrigerant GWP requirement for heat pump water heaters?



There were two submissions that noted that refrigerant leaks are unlikely to occur during the lifetime of the product as they are a sealed refrigeration system which is unable to operate once refrigerant leaks. These responses noted that much of the assumed leakage could be avoided with suitable decommissioning requirements that ensure the refrigerant is correctly captured and destroyed at the end of the product's life. Three submissions also noted that relative to the emissions reduction from these products, emissions from refrigerant leaks are comparatively low. These submissions questioned if more stringent refrigerant eligibility would reduce the emissions reductions achieved by the upgrades. A few submissions also raised concerns with the alternative refrigerants such as increased product cost and flammability.

There were five submissions that suggested the GWP threshold be set much lower, either right away or following an initial transition to GWP <700 products. These submissions suggested that only natural refrigerants or just CO2 products should be permitted. Finally, one submission noted that R32 has been reclassified in the revised IPCC AR6 and now has a GWP greater than 700.¹¹

8.2 Policy decision on refrigerants

Only HPWHs which use refrigerants with a GWP less than 700 will be eligible to be installed under the VEU program. This GWP threshold is at the same level as the GWP threshold proposed in the VEU space heating and cooling issues paper and currently used in the Victorian Government Home Heating and Cooling Upgrades program. This requirement will apply to all scenarios where HPWHs are installed (1D(i), 1D(ii) and 3C). In the future, the department may consider further lowering this threshold on the GWP of refrigerants used in HPWHs, with an appropriate transition period.

This refrigerant requirement will have a transition period and will not apply until 1 July 2024. This transition period will support VEU participants with the time needed to reconfigure business cases and source products that meet this threshold, in recognition of the impact that the refrigerant GWP threshold will have on the product eligibility of HPWHs available in the VEU program.

For the purposes of refrigerant identification, the refrigerant type must be specified on the build plate or service manual of the HPWH product and be reported as part of the product application. Existing VEU product registrations will need to register the refrigerant type to continue to be eligible to create VEECs.

As the date of introduction for this requirement is scheduled following the date that the 2008 registrations and calculations are removed from the program, only products registered to the 2021 standard will be impacted. Products that do not meet this requirement from 1 July 2024 will no longer be eligible to create VEECs.

Policy Decision:

The department will introduce a refrigerant GWP threshold of 700 for HPWHs from 1 July 2024.

9. Multiple hot water system installs - 'Manifold Systems'

The department also proposed a clarification that eligible installations must not occur in-line with another hot water system or storage tank - commonly referred to as "manifold systems".

There was limited feedback on this clarification. Five submissions were supportive of the change and one submission noted that there needs to be consideration of allowing tank sizes larger than the proposed limit of 425 litres.

Eleven submissions were opposed to the change. These submissions noted that there are benefits to these products such as increased hot water delivery and faster reheating following significant hot water consumption. Some of these submissions noted that it was more affordable to offer manifold systems to deliver large household loads and that without these options, large households will either be left out of the program or will opt for systems that are too small to satisfy household loads.

The department acknowledges that there can be benefits to these systems such as the ability to reheat faster and increased hot water capacity due to the ability to minimise stratification when configured correctly. However, there are also issues such as increased heat loss due to the additional surface area relative to volume, the number of tank connections and pipework, and lifecycle emissions of two individual products in

¹¹ The department is aware that the GWP for the refrigerant R32 has been updated in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). The GWP threshold will be set accordingly so that RCAC using R32 can be installed.

place of just one. The additional moving parts and connections also increase the number of potential points of failure.

Without these products being registered, there is no way for the department to accurately award certificates for upgrades. Installing these units while unregistered could potentially misrepresent savings. These installs may also present other issues such as increased space required, increased materials and refrigerant use, noise and cost.

It is the understanding of the department that manifold systems are eligible to be registered on the Clean Energy Regulator's (CER) register of solar water heaters for the Small-Scale Renewable Energy Scheme (SRES). However, the department is unaware of any manifold products currently registered to be eligible for Small-scale Technology Certificates (STCs).

There are larger products on the market and registered for VEU that can comfortably meet the annual energy savings requirement for a medium load but also provide a good service for larger households. It is expected that a VEU program installer will ask appropriate questions regarding household size and hot water consumption profiles to determine the appropriate size of the product to be installed.

The issues paper proposed to add the maximum tank volume limitations currently required by the SRES to the VEU Specifications. These include limits of 425 litres for heat pump water heaters and 700 litres for solar water heaters. The department has reconsidered the limit of 425 litre heat pump water heaters to enable larger tanks to be installed to meet particularly large loads. The department will set a maximum size limit of 700 litres for HPWH products. This limit aligns with the limits for electric-boosted solar water heaters and the threshold used in Part 44 – Commercial and industrial air source heat pump water heaters.

It was never the intention of the department that approved water heaters could be installed in-line with another water heater or another tank. The department confirms that water heaters installed in-line with another water heater or another tank will not be eligible for VEECs.

As outlined previously, the department will also further investigate the options for larger loads.

Two hot water systems will continue to be able to be installed at a single address where two unique water heaters are decommissioned. For example, where the premises being upgraded has an attached, self-contained dwelling with its own unique water heater; both systems are eligible for replacement.

Policy Decision:

The department confirms that water heaters cannot be installed in-line, i.e. 'manifold systems'.

10. Other Matters

10.1 Decommissioning

Feedback on the decommissioning requirements for water heater activities was mixed. Eleven stakeholders, typically those not involved with the program, either proposed products and their individual components are completely recycled or assumed that this was already what was happening with the activity.

Twelve submissions, mainly from accredited providers, suggested that the current decommissioning requirements are working well and that no changes need to be made. Some of these submissions noted that further requirements would be detrimental to the activity and highlighted challenges with further decommissioning requirements such as removing products from roof spaces. One submission highlighted the risk of asbestos and that specific asbestos advice be sought in relation to asbestos containing materials potentially disturbed, recycled or disposed as a result of VEU activities.

The department has clear expectations that where a product is decommissioned:

- the original appliance is decommissioned in a practical and safe manner, including so it cannot be re-used by the consumer; and
- where safe and practical to do so, the decommissioned product will be removed from site (including any waste generated by the installation) and appropriately recycled.

It is the department's expectation that VEU installers are aware of and comply with all relevant product handling, disposal or recycling laws that currently apply to them.

Draft decommissioning requirements have been set out in the draft Specifications at Appendix A. Prior to the introduction of these updates to the water heating activities, the department will work with the ESC to consider the need for additional requirements and guidance documentation for decommissioning, including requirements for the appropriate disposal or recycling of materials.

10.2 Installation Limits

The Regulations also set limits for the number of activities that can be completed at a particular address while also remaining eligible for VEECs. Currently, two hot water systems can be installed at a single address where two unique water heaters are decommissioned. For example, where the premises being upgraded has an attached, self-contained dwelling with its own unique water heater; both systems are eligible for replacement. For non-residential addresses, there is currently no limit.

The department will keep the current residential limit, allowing two hot water systems to be installed at a single address where two unique water heaters are decommissioned.

The department will introduce a new limit of five upgrades for non-residential premises. For example, where a large gym has multiple water heaters servicing different shower blocks, only five systems are eligible to receive incentives for replacement. These scenarios are extremely uncommon in the VEU program however the limit can assist with preserving the integrity of the program should future market dynamics result in upgrades being more than free. Where there are more products than those specified in these limits, upgrades can still be undertaken, they are just not eligible for VEECs.

The department will also introduce a limit preventing houses built within the past two years from being eligible for upgrades. This will prevent practitioners from intentionally installing inefficient water heaters with the intention of upgrading them immediately after to a better product at a reduced cost through the VEU program.

Recognising that these limits were not initially raised in the consultation, the department welcomes any views on this matter.

10.3 PV Powered Water Heaters

While not a specific question in the consultation, the department did receive six submissions suggesting that the department provide incentives for Solar (PV) powered water heaters. Three submissions noted the possibility to provide incentives for these products now and referenced the ability of the new AS/NZS 4234:2021 standard to calculate the savings. Submissions also noted the ability of these products to be equipped with smart controllers allowing them to draw power at times of low demand.

There were two submissions suggesting that additional incentives should be provided for heat pump water heaters where the activity takes place at a premises with solar PV.

While the department understands the household and grid benefits of powering water heaters with Solar PVs, and that there is significant opportunity due to the investment and uptake of solar PV in Victoria, the VEU program is not currently able to provide incentives for self-consumption of solar PV.

It may however be possible to incentivise these upgrades as packaged systems, similar to how electric-booster solar (thermal) water heaters are currently offered. The department will explore these options in the future. If any changes are considered, this will be completed through the usual consultation processes.

Summary of key changes post consultation

In summary, the **proposed** changes to VEU program water heating activities will:

- Implement new activities that incentivise the replacement of inefficient gas water heaters with efficient electric water heaters by 31 May 2023.
- Remove existing activities where gas water heaters can replace inefficient water heaters by 30 June 2023.
- Implement new calculations to allow products tested to AS/NZS 4234:2021 to register and accurately create VEECs.
 - These products will need to provide modelling at two loads to reflect hot water system performance at typical household consumption more accurately.
 - These calculations will come into effect in the Specifications by 31 May 2023.
- Revise existing calculations for products tested to AS/NZS 4234:2008 to align incentives with the new calculations.
 - These revised transitional calculations will come into effect from 1 July 2023 and will remain until 30 June 2024. This allows for a slow transition to the new AS/NZS 4234:2021 standard.
 - From 1 July 2024, all products will need to be registered to AS/NZS 4234:2021 to be eligible for incentives.
 - It will also allow for existing products registrations to continue to be used to show compliance with new build regulations, should this be required.
- Introduce a new refrigerant GWP threshold of 700 to limit the GHG emissions specific to the refrigerants used in a HPWH from 1 July 2024.
- Clarify that multiple water heaters are not permitted to be installed 'in-line' i.e 'manifold systems'.
- Introduce sizing guidance to encourage positive outcomes for consumers.
- The department will work with the Essential Services Commission (ESC) to consider the need for additional requirements and guidance documentation for decommissioning, including requirements for the recycling of materials.
- Introduce installation limits for non-residential upgrades.

Table 6 – Summary of proposed changes and implementation dates

Please note that the proposed changes to this activity and the indicative dates set out below are subject to further consideration and final approval. Stakeholders are advised not to make any decisions related to water heating upgrades under the VEU program until final regulations and specifications have been approved and published.

Proposed Change	Date
New activities that incentivise the replacement of inefficient gas water heaters with efficient electric water heaters introduced (3C and 3D)	By 31 May 2023
Sub-scenarios allowing products registered to AS/NZS 4234:2021 to calculate VEECs introduced into the Specifications for Scenario 1C and 1D. New products must register to the AS/NZS 4234:2021 standard with modelling at two load sizes.	By 31 May 2023
Activities incentivising the replacement of inefficient water heaters with gas water heaters (1A, 1B, 1F and 3B) removed from the VEU program.	30 June 2023
Transition calculations replace current calculations for Scenario 1C and 1D for existing registrations to AS/NZS 4234:2008.	1 July 2023
Registrations (and their associated calculations) to AS/NZS 4234:2008 no longer eligible to create VEECs in the VEU program.	30 June 2024
Only HPWH products with a refrigerant GWP <700 eligible for installation.	1 July 2024

11. Next Steps

The department will revise the draft Specifications for the water heating activities over the coming months to provide further information on:

- Guidance documentation to ensure water heating upgrades are sized appropriately; and
- Decommissioning and installation requirements.

The department expects to publish updated Specifications for the revised water heating activities by 31 May 2023. The activity commencement date will be set out in the final Specifications.

Please note that the proposed changes to this activity (including the draft regulations and specifications attached to this paper) are subject to further consideration and final approval. Stakeholders are advised not to make any decisions related to water heating upgrades under the VEU program until final regulations and specifications have been approved and published.

The department does not make any representation that the proposed changes set out in this paper will (i) take effect (ii) will take effect on or by a particular date, or (iii) will take effect in the form proposed in this paper.

Appendix A: Draft Water Heating Regulations and Specifications

PLEASE NOTE, these draft amendments to the VEU regulations and specifications (Draft Regulations and Specifications) are in draft form only.

The department does not make any express or implied representation or warranty that the Draft Regulations and Specifications: (i) will take effect; (ii) will take effect on or by a particular date; or (iii) will take effect in the current form. Neither the department, nor any other person, is or may be liable to any other person in connection with the department's decision to include the Draft Regulations and Specifications in this consultation document.

The *Victorian Energy Efficiency Target Regulations 2018* (the Regulations) commenced on 10 December 2018 and provide for deemed activities in the program. Details of the technical requirements for these regulations are contained in the publication *Victorian Energy Upgrades – Specifications* (the Specifications).

The Regulations set out the activities that attract incentives and the methodologies for calculating greenhouse gas (GHG) emissions reductions, while the Specifications document provides further technical details of the GHG emissions calculations. The technical elements in the Specifications can be more responsive to changing circumstances and be updated more frequently with more limited consultation (where appropriate).

The proposed water heating activity revisions have been defined in the draft Regulations and Specifications. Please see the following sections for:

Appendix A(i) - Draft Victorian Energy Efficiency Target Regulations 2018 – Water heating

Appendix A(ii)- Draft Victorian Energy Upgrades Specifications

- Part 1 Activity– Water heaters, replacing electric resistance water heater
- Part 3 Activity– Water heaters, replacing gas/LPG

The draft Regulations and Specifications are being consulted on as part of this process.

The department welcomes your views and any technical feedback on these documents.

Appendix A(i) - Draft Victorian Energy Efficiency Target Regulations 2018 – Water heating

Schedule 1 Preliminary

5—Definitions

decommission means either—

- (a) to comply with the specified decommissioning requirements (if any) for a prescribed activity; or
- (b) in any other case, to disable and render permanently unusable;”.

Schedule 2—Prescribed activities

10 Prescribed Activities

(1A) For the purposes of section 15(1) of the Act, an activity set out in Part 1 or 3 of Schedule 2 is a prescribed activity if the construction of the premises in which the activity is undertaken was not completed in the two year period preceding the activity.

Part 1—Water heaters—replacing electric resistance water heater

1 Prescribed activity

- (1) The prescribed activity is—

- (a) decommissioning an electric resistance water heater in accordance with the specified decommissioning requirements (if any) and the specified product disposal requirements (if any); and
 - (b) installing a product specified in subclause (2) in accordance with the specified pre-installation requirements (if any) and the specified installation requirements (if any).
- (2) The specified products are the following—
- (a) a product listed on the ESC register as belonging to a product category whose category number is specified in column 1 of Table 1.1;
 - (b) an unlisted product that complies with the criteria specified in column 2 of an item in Table 1.1.

Table 1.1—Product categories

Column 1 Category number	Column 2 Criteria applying to product category
1A	A gas or liquefied petroleum gas storage water heater that is certified by an accredited body as achieving a specified minimum star rating when tested and rated in accordance with AS/NZS 5263.1.2. – <i>[This scenario 1A is to be removed by 30 June 2023]</i>
1B	A gas or liquefied petroleum gas instantaneous water heater that is certified by an accredited body as achieving a specified minimum star rating when tested and rated in accordance with AS/NZS 5263.1.2. – <i>[This scenario 1B is to be removed by 30 June 2023]</i>
1C	An electric boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume within the specified volume range; and (d) meets any specified minimum performance requirement; and (e) meets any specified warranty requirements; and (f) meets any other requirements of the Secretary’s specifications for this product category.
1D	A heat pump water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) is modelled against the specified heat pump modelling requirements; and (d) has an insulated storage volume within the specified volume range; and (e) uses a refrigerant that meets the specified refrigerant requirements; and (f) meets any specified minimum performance requirement; and (g) meets any specified warranty requirements; and (h) meets any other requirements of the Secretary’s specifications for this product category.
1E	A product that meets the requirements of the Secretary’s specifications for this item.
1F	A gas or liquefied petroleum gas boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume within the specified volume range; and (d) meets any specified warranty requirements; and (e) meets any other requirements of the Secretary’s specifications for this product category. <i>[This scenario 1F is to be removed by 30 June 2023]</i>

Part 3—Water heaters—replacing gas/LPG

2 Prescribed activity

- (1) The prescribed activity is—
 - (a) decommissioning a gas or liquefied petroleum gas water heater in accordance with the specified decommissioning requirements (if any) and the specified product disposal requirements (if any); and
 - (b) installing a product specified in subclause (2) in accordance with the specified pre-installation requirements (if any) and the specified installation requirements (if any).
- (2) The specified products are the following—
 - (a) a product listed on the ESC register as belonging to a product category whose category number is specified in column 1 of Table 3.1;
 - (b) an unlisted product that complies with the criteria specified in column 2 of an item in Table 3.1.

Table 3.1—Product categories

Column 1 Category number	Column 2 Criteria applying to product category
3A	A product that meets the requirements of the Secretary's specifications for this item.
3B	A gas or liquefied petroleum gas boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume within the specified volume range; and (d) meets any specified warranty requirements; and (e) meets any other requirements of the Secretary's specifications for this product category. [This scenario 3B is to be removed by 30 June 2023]
3C	A heat pump water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) is modelled against the specified heat pump modelling requirements; and (d) has an insulated storage volume within the specified volume range; and (e) uses a refrigerant that meets the specified refrigerant requirements; and (f) meets any specified warranty requirements; and (g) meets any other requirements of the Secretary's specifications for this product category.
3D	An electric boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume within the specified volume range; and (d) meets any specified warranty requirements; and (e) meets any other requirements of the Secretary's specifications for this product category.

Schedule 4—Prescribed activities

1 Definitions

Relevant period means—

(ba) in respect of a prescribed activity referred to in clause 2(1A) or (3), the period beginning on 31 May 2023 and ending immediately before a product is installed as part of a prescribed activity;

2 Water heating products

(1A) A certificate cannot be created in relation to a prescribed activity involving the installation, in non-residential premises, of a water heating product specified in Part 1 or 3 of Schedule 2 if, during the relevant period, 5 or more water heating products specified in Part 1 or 3 of Schedule 2 have been installed at the same premises as part of a prescribed activity (whether or not a certificate was created for that activity).

[Note: this limit of 5 water heating upgrades per premises for non-residential premises is in addition to the existing limit of 2 upgrades for residential premises – see Schedule 4, clause 2 of the Principal Regulations.]

Appendix A(ii) – Draft Water Heating Specifications

Definitions

AS/NZS 4234:2021 means the combination of both AS/NZS 4234:2021 Heated water systems – calculation of energy consumption and SA/SNZ MP 104:2021 Miscellaneous Publication – Modelling of heated water system in accordance with AS/NZS 4234:2021, using TRNSYS, published on 25 June 2021.

AS/NZS 4234:2008 means AS/NZS 4234:2008 reissued in 2014.

$B_{e\ 2008}$ means the annual electrical energy used by the auxiliary equipment of a solar or heat pump water heater system measured in accordance with AS/NZS 4234:2008 reissued in 2014 when modelled in climate zone 4 for a solar water heater, and when modelled in climate zone HP4-Au for a heat pump water heater installed in climatic zone 4 or climate zone HP5-Au for a heat pump water heater installed in climatic zone 5. See the Location Variables list to determine what climatic zone applies to any premises;

$B_{s\ 2008}$ means the annual supplementary energy used by a solar or heat pump water heater measured in accordance with AS/NZS 4234:2008 reissued in 2014 when modelled in climate zone 4 for a solar water heater, and when modelled in climate zone HP4-Au for a heat pump water heater installed in climatic zone 4 or climate zone HP5-Au for a heat pump water heater installed in climatic zone 5. See the Location Variables list to determine what climatic zone applies to any premises;

$B_{e\ 2021}$ has the same meaning given in this document to the term ' **$B_{e\ 2008}$** ', except that the annual electrical energy used by the auxiliary equipment of a solar or heat pump water heater system is measured in accordance with AS/NZS 4234: 2021¹²;

$B_{s\ 2021}$ has the same meaning given in this document to the term ' **$B_{s\ 2008}$** ', except that the annual supplementary energy used by a solar or heat pump water heater is measured in accordance with AS/NZS 4234:2021¹³;

EEF_m means the modelled electricity emissions factor to be used in greenhouse gas equivalent emissions reduction calculations as follows—

From 1 February 2022 to 31 January 2023	$EEF_m = 0.516$
From 1 February 2023 to 31 January 2024	$EEF_m = 0.473$
From 1 February 2024 to 31 January 2025	$EEF_m = 0.433$
From 1 February 2025	$EEF_m = 0.393$

EEF_s means the smoothed electricity emissions factor to be used in greenhouse gas equivalent emissions reduction calculations as follows—

From 1 February 2022 to 31 January 2023	$EEF_s = 0.8142$
From 1 February 2023 to 31 January 2024	$EEF_s = 0.6738$
From 1 February 2024 to 31 January 2025	$EEF_s = 0.5334$
From 1 February 2025	$EEF_s = 0.393$

GWP means the global warming potential of a refrigerant gas used in a product as listed in:

- the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report, 2007 (AR4), or
- where the global warming potential of the refrigerant gas is not listed in the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report, 2007 (AR4), the Commercial and Industrial Air Source Heat Pump Water Heater Product Application Guide;

¹² From [DATE OF INTRODUCTION] TO [6 MONTHS], AS/NZS 4234:2008 reissued in 2014 will apply

¹³ Ibid.

Part 1 Activity– Water heaters, replacing electric resistance water heater – applicable from 31 May 2023

Activity description

Part 1 of Schedule 2 of the Regulations prescribes the upgrade of an electric resistance water heater as an eligible activity for the purposes of the Victorian Energy Upgrades program.

Table 1.1 lists the eligible products that may be installed, upgraded or replaced. Each type of upgrade is known as a scenario. Each scenario has its own method for determining GHG equivalent reduction.

Over time, the department may determine that there are other water heating technologies that reduce GHG equivalent emissions when replacing an electric resistance water heater. In such a case, product requirements and installation requirements for emerging technology will be listed by the department as scenario number 1E once specified.

VEECs cannot be created for this activity unless products installed are listed on the ESC Register by the time VEECs are created. Products already on the register at the time of installation can be taken as satisfying all those product requirements that can be determined prior to the installation of a product.

The information in this part of the Specifications should only be used from 31 May 2023

Table 1.1 – Eligible part 1 water heating scenarios

Product category number	Scenario number	Decommissioning requirements ¹⁴	Product to be installed ¹⁵	Historical schedule number*
1A**	1A	Electric resistance water heater	A gas or liquefied petroleum gas storage water heater that is certified by an accredited body as achieving a specified minimum star rating when tested and rated in accordance with AS/NZS 5263.1.2.	1A
1B**	1B	Electric resistance water heater	A gas or liquefied petroleum gas instantaneous water heater that is certified by an accredited body as achieving a specified minimum star rating when tested and rated in accordance with AS/NZS 5263.1.2.	1B
1C	1C(i)-(ii) ¹⁶	Electric resistance water heater	An electric boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume not exceeding 700 litres.	1E
1D	1D(i)-(ii) ¹⁷	Electric resistance water heater	A heat pump water heater that— (a) has an insulated storage volume not exceeding 700 litres; and (b) is certified by an accredited body as complying with AS/NZS 2712; and	1E

¹⁴ This is only a summary of the decommissioning requirements for this activity. The decommissioning requirements set out at Schedule 2, regulation 1 of the Regulations take precedence over information contained in this document.

¹⁵ This is only a summary of the product requirements for this activity. The product requirements set out at Schedule 2, regulation 2 of the Regulations take precedence over information contained in this document.

¹⁶ See Table 1.2 setting out the different product requirements for sub-scenarios (i) and (ii).

¹⁷ See Table 1.2 setting out the different product requirements for sub-scenarios (i) and (ii).

Product category number	Scenario number	Decommissioning requirements ¹⁴	Product to be installed ¹⁵	Historical schedule number*
			(c) achieves the specified minimum annual energy savings; and (d) is modelled against the specified heat pump modelling requirements; and (e) uses a refrigerant that meets the specified refrigerant requirements (see Table 1.3 below).	
1F**	1F	Electric resistance water heater	A gas or liquefied petroleum gas boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume not exceeding 700 litres.	1F

*This is the corresponding schedule number for this type of product in the lapsed 2008 VEET Regulations

****Applicable until 30 June 2023**

Specified minimum energy efficiency

The product installed must meet the relevant additional requirements set out in Table 1.2.

Table 1.2 – Additional requirements for water heating equipment to be installed

Product category number	Requirement type	Efficiency requirement
1A and 1B	Minimum star rating	5 stars, determined in accordance with AS/NZS 5263.1.2 (to be demonstrated by appropriate certification)
1C(i)	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2021 and the Water Heating and Space Heating/Cooling Product Application Guide, when modelled in climate zone 4. For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load in AS/NZS 4234:2021 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load in AS/NZS 4234:2021.
1C(ii) <i>*These specified minimum energy efficiency requirements are only available in respect of a product:</i> - where the application to register that product is submitted prior to 31 May 2023; and - from 31 May 2023 to 30 June 2024. From 1 July 2024 all eligible products for scenarios 1C must be registered against AS/NZS 4234:2021.	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2008 and the Water Heating and Space Heating/Cooling Product Application Guide when modelled in climate zone 4. For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load under AS/NZS 4234:2008 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load under AS/NZS 4234:2008.
1D(i)*	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2021 and the Water Heating and Space Heating/Cooling Product Application Guide when modelled in climate zone: (a) HP4-Au, if the product is installed in climatic zone 4*; or (b) HP5-Au, if the product is installed in climatic zone 5*. For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load under AS/NZS 4234:2021 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load under AS/NZS 4234:2021.
1D(ii)* <i>*These specified minimum energy efficiency requirements are only available in respect of a product:</i> - where the application to register that product is submitted prior to 31 May 2023; and - from 31 May 2023 to 30 June 2024. From 1 July 2024 all eligible products for scenarios 1D must be registered against AS/NZS 4234:2021.	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2008 and the Water Heating and Space Heating/Cooling Product Application Guide when modelled in climate zone: (a) HP4-Au, if the product is installed in climatic zone 4*; or (b) HP5-Au, if the product is installed in climatic zone 5* For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load under AS/NZS 4234:2008 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load under AS/NZS 4234:2008.

Product category number	Requirement type	Efficiency requirement
1F	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2008 and the Water Heating and Space Heating/Cooling Product Application Guide when modelled in climate zone 4. For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load under AS/NZS 4234:2008 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load under AS/NZS 4234:2008.

*See the Location Variables list to determine what climatic zone applies to any premises

Other specified matters

The product installed must meet the relevant additional requirements set out in Table 1.3.

Table 1.3 – Other specified matters for water heaters

Product category number	Requirement type	Specification details
1D(i)	Heat pump modelling requirements	The product must be modelled in accordance with AS/NZS 4234:2021 so that minimum annual energy savings are determined for both HP4-Au and HP5-Au climate zones. These must be provided to the ESC.*
1D(ii)	Heat pump modelling requirements	The product must be modelled in accordance with AS/NZS 4234:2008 so that minimum annual energy savings are determined for both HP4-Au and HP5-Au climate zones. These must be provided to the ESC.*
1D	Refrigerant requirements**	The GWP of the refrigerant used in the heat pump water heater to be installed must be less than 700. ¹⁸
1A – 1D and 1F	Pre-installation and installation requirements – appropriate sizing (residential premises only)	In addition to the applicable requirements set out under the Code of Conduct (at Schedule 6 of the Regulations), the accredited person or scheme participant carrying out a prescribed Part 1 activity for an energy consumer at a residential premises must, before the energy consumer agrees to undertake that activity: (a) provide the energy consumer with a copy of the VEU Water Heating Consumer Fact Sheet; and (b) give clear and accurate information to the energy consumer about the suitability of the product for the hot water needs of the consumer and the consumer's premises; and (c) advise the energy consumer on whether or not the size of the installed product is consistent with the size recommended in the VEU Water Heating Consumer Fact Sheet for a premises of a similar size and nature to the energy consumer's premises; and (d) if the size of the installed product is not consistent with the recommended size set out in the VEU Water Heating Consumer Fact Sheet, then the accredited person or scheme participant must take reasonable steps to ensure that the energy consumer understands that the installed product is unlikely to always meet the hot water needs of a similar household to that of the energy consumer.

¹⁸ The department is aware that the GWP for the refrigerant R32 has been updated in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). The GWP threshold will be set accordingly so that heat pump water heaters using R32 can be installed.

Product category number	Requirement type	Specification details
1A – 1D and 1F	Installation requirements – manifold systems	The product must not be installed together (in- line) with an additional hot water storage tank or hot water system e.g. a ‘manifold system’.
1A – 1D and 1F	Decommissioning and product disposal requirements	The decommissioned product must be: (a) decommissioned in accordance with the Water Heating and Space Heating/Cooling Activity Guide published by the ESC; and (b) removed from the premises (along with any other waste or debris from the activity), provided removal is practical and safe to do so (as provided for in the ESC activity guide) and disposed of at a waste disposal facility that is of a class determined by the ESC under regulation 36(3); and (c) otherwise disposed of in accordance with all relevant legislation.

* See the Location Variables list to determine what climatic zone applies to any premises.

****Applicable from 1 July 2024**

Method for determining GHG equivalent reduction

Scenario 1A: Decommissioning Electric and Installing Gas Storage – applicable until 30 June 2023

The GHG equivalent emissions reduction for this scenario is given by Equation 1.1, using the variables listed in Table 1.4.

Equation 1.1 – GHG equivalent emissions reduction calculation for Scenario 1A

$$\text{GHG Eq. Reduction} = ((\text{Baseline} \times \text{EEF}_s) - \text{Upgrade}) \times \text{Lifetime} \times \text{Regional Factor}$$

Table 1.4 – GHG equivalent emissions reduction variables for Scenario 1A

Small upgrade: upgrade product has a storage capacity less than 95 litres Medium upgrade: upgrade product has a storage capacity of at least 95 and no more than 140 litres Large upgrade: upgrade product has storage capacity of more than 140 litres		
Input type	Condition	Input value
Baseline	Small upgrade	1.56
	Medium upgrade	2.67
	Large upgrade	3.39
Upgrade	Small upgrade	0.50
	Medium upgrade	0.66
	Large upgrade	0.82
Lifetime	In every instance	12.00
Regional Factor	For upgrades in Metropolitan Victoria	0.98
	For upgrades in Regional Victoria	1.04

Scenario 1B: Decommissioning Electric and Installing Gas Instantaneous – applicable until 30 June 2023

The GHG equivalent emissions reduction for this scenario is given by Equation 1.2, using the variables listed in Table 1.5.

Equation 1.2 – GHG equivalent emissions reduction calculation for Scenario 1B

$$GHG\ Eq.\ Reduction = (Abatement\ Factor + Rating\ Correction \times SRI) \times Regional\ Factor$$

Table 1.5 – GHG equivalent emissions reduction variables for Scenario 1B

Small upgrade: upgrade product has a water heating capacity @ 25°C rise of less than 18 L/min		
Medium upgrade: upgrade product has a water heating capacity @ 25°C rise of at least 18 L/min and no more than 22 L/min		
Large upgrade: upgrade product has a water heating capacity @ 25°C rise of more than 22 L/min		
Input type	Condition	Input value
Abatement Factor	Small upgrade	$(17.83 \times EEFS) - 5.63$
	Medium upgrade	$(30.88 \times EEFS) - 9.39$
	Large upgrade	$(39.25 \times EEFS) - 13.14$
Rating Correction	Small upgrade	0.34
	Medium upgrade	0.56
	Large upgrade	0.78
SRI	Star Rating Index of Product	
Regional Factor	For upgrades in Metropolitan Victoria	0.98
	For upgrades in Regional Victoria	1.04

Scenario 1C(i): Decommissioning Electric and Installing Electric Boosted Solar

The GHG equivalent emissions reduction for this scenario is given by Equation 1.3, using the variables listed in Table 1.6 for products determined in accordance with AS/NZS 4234:2021.

Equation 1.3 – GHG equivalent emissions reduction calculation for Scenario 1C

$$GHG\ Eq.\ Reduction = EEFS \times (Abatement\ Factor - (SEF \times B_{s2021}) - (AEF \times B_{e2021}))$$

Table 1.6 – GHG equivalent emissions reduction variables for Scenario 1C(i)

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2 Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2			
Input type	Condition	Input value	
Abatement Factor	For upgrades in Metropolitan Victoria	Small upgrade	30.42
		Medium upgrade	41.75
	For upgrades in Regional Victoria	Small upgrade	32.29
		Medium upgrade	44.30
SEF	For upgrades in Metropolitan Victoria		4.08
	For upgrades in Regional Victoria		4.33
B _{s 2021}	Small upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the “very small” load as defined in that standard
	Medium upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the “small” load as defined in that standard
AEF	For upgrades in Metropolitan Victoria		4.08
	For upgrades in Regional Victoria		4.33
B _{e 2021}	Small upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the “very small” load
	Medium upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the “small” load as defined in that standard

Scenario 1C(ii): Decommissioning Electric and Installing Electric Boosted Solar – Transitional arrangements available for products where the application for registration is submitted prior to 31 May 2023. These transitional arrangements apply from 1 July 2023 until end of day 30 June 2024.

Transitional arrangements

For products listed on the ESC Register in accordance with AS/NZS 4234:2008, the GHG equivalent reduction is given by Equation 1.4, using the variables listed in Table 1.7.

Equation 1.4 – GHG equivalent emissions reduction calculation for Scenario 1C(ii)

$$GHG\ Eq.\ Reduction = EEFS \times (Abatement\ Factor - (SEF \times B_{s\ 2008}) - (AEF \times B_{e\ 2008}))$$

Table 1.7 – Alternative GHG equivalent emissions reduction variables for Scenario 1C(ii) for existing registered products during the transition period

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234:2008 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2. Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2008 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2.			
Input type	Condition	Input value	
Abatement Factor	For upgrades in Metropolitan Victoria	Small upgrade	30.42
		Medium upgrade	41.75
	For upgrades in Regional Victoria	Small upgrade	32.29
		Medium upgrade	44.30
SEF	For upgrades in Metropolitan Victoria	Small upgrade	2.41
		Medium upgrade	1.96
	For upgrades in Regional Victoria	Small upgrade	2.56
		Medium upgrade	2.08
Bs 2008	Small upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “small” load	
	Medium upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “medium” load as defined in that standard	
AEF	For upgrades in Metropolitan Victoria	Small upgrade	2.41
		Medium upgrade	1.96
	For upgrades in Regional Victoria	Small upgrade	2.56
		Medium upgrade	2.08
Be 2008	Small upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “small” load	
	Medium upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “medium” load as defined in that standard	

Scenario 1D(i): Decommissioning Electric and Installing Heat Pump

The GHG equivalent emissions reduction for this scenario is given by Equation 1.5, using the variables listed in Table 1.8 for products determined in accordance with AS/NZS 4234:2021.

Equation 1.5 – GHG equivalent emissions reduction calculation for Scenario 1D(i)

$$GHG\ Eq.\ Reduction = EEF_s \times (Abatement\ Factor - (SEF \times B_{s\ 2021}) - (AEF \times B_{e\ 2021}))$$

Table 1.8 – GHG equivalent emissions reduction variables for Scenario 1D(i)

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234:2021 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2 Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2021 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2			
Input type	Condition	Input value	
Abatement Factor	For upgrades in Metropolitan Victoria	Small upgrade	24.34
		Medium upgrade	33.40
	For upgrades in Regional Victoria	Small upgrade	25.83
		Medium upgrade	35.44
SEF	For upgrades in Metropolitan Victoria		3.27
	For upgrades in Regional Victoria		3.47
B _{s 2021}	Small upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "very small" load
	Medium upgrade		as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "small" load
AEF	For upgrades in Metropolitan Victoria		3.27
	For upgrades in Regional Victoria		3.47
B _{e 2021}	Small upgrade		as determined in accordance with AS/NZS 4234 in GJ/year when modelled with the "very small" load
	Medium upgrade		as determined in accordance with AS/NZS 4234 in GJ/year when modelled with the "small" load

Scenario 1D(ii): Decommissioning Electric and Installing Heat Pump – Transitional arrangements available for products where the application for registration is submitted prior to 31 May 2023. These transitional arrangements apply from 1 July 2023 until end of day 30 June 2024.

Transitional arrangements

The GHG equivalent emissions reduction for this scenario are given by Equation 1.6, using the variables listed in Table 1.9 for products determined in accordance with AS/NZS 4234:2008 reissued in 2014.

Equation 1.6 – GHG equivalent emissions reduction calculation for Scenario 1D(ii)

$$GHG\ Eq.\ Reduction = EEF_s \times (Abatement\ Factor - (SEF \times B_{s\ 2008}) - (AEF \times B_{e\ 2008}))$$

Table 1.9 – Alternative GHG equivalent emissions reduction variables for Scenario 1D for existing registered products during the transition period

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234:2008 reissued in 2014 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2 Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2008 reissued in 2014 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2			
Input type	Condition	Input value	
Abatement Factor	For upgrades in Metropolitan Victoria	Small upgrade	24.34
		Medium upgrade	33.40
	For upgrades in Regional Victoria	Small upgrade	25.83
		Medium upgrade	35.44
SEF	For upgrades in Metropolitan Victoria	Small upgrade	2.78
		Medium upgrade	2.45
	For upgrades in Regional Victoria	Small upgrade	2.95
		Medium upgrade	2.60
B _{S 2008}	Small upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the "small" load	
	Medium upgrade	as determined in accordance with AS/NZS 4234 in GJ/year when modelled with the "medium" load	
AEF	For upgrades in Metropolitan Victoria	Small upgrade	2.78
		Medium upgrade	2.45
	For upgrades in Regional Victoria	Small upgrade	2.95
		Medium upgrade	2.60
B _{e 2008}	Small upgrade	as determined in accordance with AS/NZS 4234 in GJ/year when modelled with the "very small" load	
	Medium upgrade	as determined in accordance with AS/NZS 4234 in GJ/year when modelled with the "small" load	

Scenario 1F: Decommissioning Electric and Installing Gas Boosted Solar – applicable until 30 June 2023

The GHG equivalent emissions reduction for this scenario is given by Equation 1.7, using the variables listed in Table 1.10 for products determined in accordance with AS/NZS 4234:2008 reissued in 2014.

Equation 1.7 – GHG equivalent emissions reduction calculation for Scenario 1F

$$GHG\ Eq.\ Reduction = EEF_s \times (Abatement\ Factor - (AEF \times B_{e\ 2008})) - (SEF \times B_{s\ 2008})$$

Table 1.10 – GHG equivalent emissions reduction variables for Scenario 1F

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234:2008 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2 Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2008 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 1.2			
Input type	Condition		Input value
Abatement Factor	For upgrades in Metropolitan Victoria	Small upgrade	28.71
		Medium upgrade	46.01
	For upgrades in Regional Victoria	Small upgrade	30.47
		Medium upgrade	48.83
SEF	For upgrades in Metropolitan Victoria		0.35
	For upgrades in Regional Victoria		0.34
B _{S 2008}	Small upgrade		as determined in accordance with AS/NZS 4234:2008 reissued in 2014 in GJ/year when modelled with the "small" load
	Medium upgrade		as determined in accordance with AS/NZS 4234:2008 reissued in 2014 in GJ/year when modelled with the "medium" load
AEF	For upgrades in Metropolitan Victoria		1.71
	For upgrades in Regional Victoria		1.82
B _{e 2008}	Small upgrade		as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the "small" load
	Medium upgrade		as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the "medium" load

***There is no Part 2 Activity

Part 3 Activity– Water heaters, replacing gas/LPG

Activity Description

Part 3 of Schedule 2 of the Regulations prescribes the upgrade of a gas or LPG water heater as an eligible activity for the purposes of the Victorian Energy Upgrades program.

Table 3.1 lists the eligible products that may be installed, upgraded or replaced. Each type of upgrade is known as a scenario. Each scenario has its own Method for Determining GHG Equivalent Reduction.

Over time, the department may determine that there are other water heating technologies that reduce GHG equivalent emissions when replacing Gas or LPG water heaters. In such a case, product requirements and installation requirements for emerging technology will be listed by the department as scenario number 3A once specified.

VEECs cannot be created for this activity unless products installed are listed on the ESC Register by the time VEECs are created. Products already on the register at the time of installation can be taken as satisfying all those product requirements that can be determined prior to the installation of a product.

Table 3.1 – Eligible part 3 water heating scenarios

Product category number	Scenario number	Decommissioning requirements ¹⁹	Product to be installed ²⁰	Historical schedule number
3B**	3B	Gas or LPG water heater	A gas or liquefied petroleum gas boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and (b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume not exceeding 700 litres.	3B
3C	3C	Gas or LPG water heater	A heat pump water heater that— (a) has an insulated storage volume not exceeding 700 litres; and (b) is certified by an accredited body as complying with AS/NZS 2712; and (c) achieves the specified minimum annual energy savings; and (d) is modelled against the specified heat pump modelling requirements; and (e) uses a refrigerant that meets the specified refrigerant requirements (see Table 3.3 below).	N/A
3D	3D	Gas or LPG water heater	An electric boosted solar water heater that— (a) is certified by an accredited body as complying with AS/NZS 2712; and	N/A

¹⁹ This is only a summary of the decommissioning requirements for this activity. The decommissioning requirements set out at Schedule 2, regulation 2 of the Regulations take precedence over information contained in this document.

²⁰ This is only a summary of the product requirements for this activity. The product requirements set out at Schedule 2, regulation 2 of the Regulations take precedence over information contained in this document.

Product category number	Scenario number	Decommissioning requirements ¹⁹	Product to be installed ²⁰	Historical schedule number
			(b) achieves the specified minimum annual energy savings; and (c) has an insulated storage volume not exceeding 700 litres	

****Applicable until 30 June 2023**

Specified Minimum Energy Efficiency

The product installed must meet the relevant additional requirements listed in Table 3.2.

Table 3.2 – Additional requirements for water heating equipment to be installed

Product category number	Requirement type	Efficiency requirement
3B	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2008 and the Water Heating and Space Heating/Cooling Product Application Guide, when modelled in climate zone 4 For the purposes of demonstrating compliance with this requirement, a 'VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load in AS/NZS 4234:2008 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load in AS/NZS 4234:2008.
3C	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2021 and the Water Heating and Space Heating/Cooling Product Application Guide when modelled in climate zone: (a) HP4-Au, if the product is installed in climatic zone 4*; or (b) HP5-Au, if the product is installed in climatic zone 5*. For the purposes of demonstrating compliance with this requirement, a VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load under AS/NZS 4234:2021.
3D	Minimum annual energy savings	60%, determined in accordance with AS/NZS 4234:2021 and the Water Heating and Space Heating/Cooling Product Application Guide, when modelled in climate zone 4. For the purposes of demonstrating compliance with this requirement, a 'VEU product used for a 'medium upgrade' under this scenario must be modelled at the 'medium' load in AS/NZS 4234:2021.

*See the Location Variables list to determine what climatic zone applies to any premises

Other specified matters

The product installed must meet the relevant additional requirements set out in Table 3.3.

Table 3.3 – Other specified matters for water heaters

Product category number	Requirement type	Specification details
3C	Heat pump modelling requirements	The product must be modelled in accordance with AS/NZS 4234:2021 so that minimum annual energy savings are determined for both HP4-Au and HP5-Au climate zones. These must be provided to the ESC*
3C	Refrigerant requirements**	The GWP of the refrigerant used in the heat pump water heater to be installed must be less than 700. ²¹
3B – 3D	Pre-installation and installation requirements – appropriate sizing	In addition to the applicable requirements set out under the Code of Conduct (at Schedule 6 of the Regulations), the accredited person or scheme participant carrying out a prescribed Part 1 activity for an energy consumer at a residential premises must, before the energy consumer agrees to undertake that activity: (a) provide the energy consumer with a copy of the VEU Water Heating Consumer Fact Sheet; and (b) give clear and accurate information to the energy consumer about the suitability of the product for the hot water needs of the consumer and the consumer's premises; and (c) advise the energy consumer on whether or not the size of the installed product is consistent with the size recommended in the VEU Water Heating Consumer Fact Sheet for a premises of a similar size and nature to the energy consumer's premises; and (d) if the size of the installed product is not consistent with the recommended size set out in the VEU Water Heating Consumer Fact Sheet, then the accredited person or scheme participant must take reasonable steps to ensure that the energy consumer understands that the installed product is unlikely to always meet the hot water needs of a similar household to that of the energy consumer.
3B – 3D	Installation requirements – manifold systems	The product must not be installed together (in-line) with an additional hot water storage tank or hot water system e.g. a 'manifold system'.
3B – 3D	Decommissioning and product disposal requirements	The decommissioned product must be: (a) decommissioned in accordance with the Water Heating and Space Heating/Cooling Activity Guide published by the ESC; and (b) removed from the premises (along with any other waste or debris from the activity), provided removal is practical and safe to do so (as provided for in the ESC activity guide) and disposed of at a waste disposal facility that is of a class determined by the ESC under regulation 36(3); and (c) otherwise disposed of in accordance with all relevant legislation.

* See the Location Variables list to determine what climatic zone applies to any premises.

****Applicable from 1 July 2024**

Method for Determining GHG Equivalent Reduction

²¹ The department is aware that the GWP for the refrigerant R32 has been updated in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). The GWP threshold will be set accordingly so that heat pump water heaters using R32 can be installed.

Scenario 3B: Decommissioning Gas and Installing Gas Boosted Solar – applicable until 30 June 2023

The GHG equivalent emissions reduction for this scenario is given by Equation 3.1 using the variables listed in Table 3.4 for products determined in accordance with AS/NZS 4234:2008 reissued in 2014.

Equation 3.1 – GHG equivalent emissions reduction calculation for Scenario 3B

$$GHG\ Eq.\ Reduction = Abatement\ Factor - (SEF \times B_{s\ 2008}) - (EEF_m \times AEF \times B_{e\ 2008})$$

Table 3.4 – GHG equivalent emissions reduction variables for Scenario 3B

Small upgrade: upgrade product is a small system as determined in accordance with AS/NZS 4234:2008 reissued in 2014 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 3.2.

Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2008 reissued in 2014 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 3.2.

Input type	Condition	Input value
Abatement Factor	For upgrades in Metropolitan Victoria	8.88
	For upgrades in Regional Victoria	12.23
SEF	At every instance	0.35
B _{s 2008}	Small upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “small” load
	Medium upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “medium” load
AEF	For upgrades in Metropolitan Victoria	1.75
	For upgrades in Regional Victoria	1.85
B _{e 2008}	Small upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “small” load
	Medium upgrade	as determined in accordance with AS/NZS 4234:2008 in GJ/year when modelled with the “medium” load

Scenario 3C: Decommissioning Gas and Installing Heat Pump

The GHG equivalent emissions reduction for this scenario is given by Equation 3.2, using the variables listed in Table 3.5.

Equation 3.2 – GHG equivalent emissions reduction calculation for Scenario 3C

$$GHG\ Eq.\ Reduction = Abatement\ Factor - ((SEF \times B_{s\ 2021}) + (AEF \times B_{e\ 2021})) \times EEF_m$$

Table 3.5 – GHG equivalent emissions reduction variables for Scenario 3C

Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2021 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 3.2		
Input type	Condition	Input value
Abatement Factor	Medium upgrade	13.23
SEF	For all upgrades	4.17
B _{S 2021}	Medium upgrade	as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "small" load
AEF	For all upgrades	4.17
B _{e 2021}	Medium upgrade	as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "small" load

Scenario 3D: Decommissioning Gas and Installing Electric Boosted Solar

The GHG equivalent emissions reduction for this scenario is given by Equation 3.3 using the variables listed in Table 3.6.

Equation 3.3 – GHG equivalent emissions reduction calculation for Scenario 3D

$$GHG\ Eq.\ Reduction = Abatement\ Factor - ((SEF \times B_{s\ 2021}) + (AEF \times B_{e\ 2021})) \times EEFR$$

Table 3.6 – GHG equivalent emissions reduction variables for Scenario 3D

Medium upgrade: upgrade product is a medium system as determined in accordance with AS/NZS 4234:2021 based on the system's peak daily thermal energy load delivery capability characteristics as used to demonstrate compliance with the additional requirements outlined in Table 3.2		
Input type	Condition	Input value
Abatement Factor	Medium upgrade	13.23
SEF	For all upgrades	4.17
B _{S 2021}	Medium upgrade	as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "small" load
AEF	For all upgrades	4.17
B _{e 2021}	Medium upgrade	as determined in accordance with AS/NZS 4234:2021 in GJ/year when modelled with the "small" load

***There is no Part 4 Activity

