Regulatory Impact Statement

Victorian Energy Efficiency Target Amendment (Prescribed Customers and Targets) Regulations 2020

VICTORIA State Government | Environment, Land, Water and Planning

Author
Department of Environment, Land, Water and Planning 2019

Editor
Department of Environment, Land, Water and Planning 2019

VICTORIA State Government | Environment, Land, Water and Planning

Table of Contents

Definition of Key Terms

Term	Definition
The Act	Victorian Energy Efficiency Target Act 2007
The current Regulations	Victorian Energy Efficiency Target Regulations 2018
The proposed Regulations	Victorian Energy Efficiency Target Amendment Regulations 2019
The PBA Regulations	Victorian Energy Efficiency Target (Project-based Activities) Regulations 2017
Accredited person (AP)	Persons and entities authorised by the ESC to create VEECs
CO_2	Carbon dioxide (a greenhouse gas)
Department	Department of Environment, Land, Water and Planning
GHG	Greenhouse gas
ESC	Essential Services Commission
MEPS	Minimum Energy Performance Standards
MT	Mega Tonnes
NEM	National Electricity Market
NPV	Net present value - for all present value calculations, a real discount rate of 7 per cent has been used, unless indicated otherwise
PBA	Project-based activity – customised (and generally large scale) project activities that improve energy efficiency at premises, for which VEECs may be created. Creation of VEECs requires a scoping approval, a project plan approval and an approved project impact report. The number of VEECs that can be created relies on a report from an approved Measurement and Verification Professional on the greenhouse gas emission reduction attributed to the project
Prescribed activity	Activities that result in improvements to energy efficiency, which are listed in the Regulations as able to create VEECs
RIS	Regulatory Impact Statement
SME	Small and medium sized enterprise
VEEC	Victorian Energy Efficiency Certificate – the certificate created by accredited person and sold to energy retailers to meet their obligation to surrender certificates. VEECs reflect the amount of GHG emissions reduction associated with each prescribed activity: 1 VEEC for each tonne of GHG reduced.
Victorian Energy Upgrades	The government program that provides incentives for households and businesses to improve the energy efficiency of their premises.

Executive Summary

This Regulatory Impact Statement (RIS) presents the rationale and likely impacts of establishing targets for the Victorian Energy Upgrades (VEU) program for the period 2021 to 2025 inclusive. The preferred option in this RIS proposes a target of 6.5 million Victorian Energy Efficiency Certificates in 2021 increasing to 7.3 million certificates in 2025, where each certificate represents a tonne of greenhouse gas avoided under the program.

What is the purpose and scope of this document?

In order to establish these future targets, the Department of Environment, Land, Water and Planning (the Department) is required to prepare a Regulatory Impact Statement (RIS) to assess the costs and benefits of different target options. A RIS is required under the *Subordinate Legislation Act 1994* for regulatory proposals that are 'likely to impose a significant economic or social burden on a sector of the public'.

The RIS structure requires proposed amendments to the Regulations to be assessed against a 'base case'. Because the *Victorian Energy Efficiency Target Act 2007* (the VEET Act) clearly envisages new targets being set, the Department has assumed a base case where targets are set as zero for 2021 to 2025. This would effectively abolish the program, not only removing its benefits but also causing structural adjustment costs as the existing industry adjusted to the abrupt removal of a market for VEECs. Therefore, the proposed amendments are compared against a constructed "reference case" of zero net impact on Victoria. This zero-impact reference case ignores adjustment costs, and provides a stable reference point for the analysis, which is simpler to understand and avoids analytical challenges estimating the true costs of setting the target to zero.

How are targets set for Victorian Energy Upgrades program?

The VEU program is a market-based program designed to promote the uptake of energy efficiency activities in residential and non-residential premises. It was established under the VEET Act and it commenced on 1 January 2009. It is legislated to continue until 2029.

The program operates by setting a greenhouse gas (GHG) abatement target to be met by the uptake of prescribed energy saving activities that generate emission reductions. The Act currently sets out annual greenhouse abatement targets until 2020 and requires that targets for the period 2021 to 2025 are set in Regulations by 31 May 2020 at the latest.

Energy efficiency upgrades result in energy savings - primarily of electricity or gas. An emissions factor is used to calculate the emissions avoided from such energy savings. Since 2015, changes in the electricity sector, including increased renewable energy uptake and the closure of the Hazelwood coal fired power station have significantly reduced emissions from electricity use. The Victorian Renewable Energy Target (VRET) and Solar Homes policy commitments are projected to drive further rapid reductions in the emissions intensity of Victoria's electricity system over the period to 2030. These changes will occur over the lifetime of appliances installed under the VEU program and, to account for this, the RIS uses a 10-year forward average emissions factor.

The proposed average ten-year emissions factors for electricity from 2021 to 2025 will be:[1]

Current	2021*	2022	2023	2024	2025
1.095	0.8055	0.516	0.473	0.433	0.393

*The emissions factor for 2021 has been adjusted as midway between the current emissions factor and the 2022 factor to allow program participants to better transition to the resulting decrease in incentives available for existing activities.

In addition to targets, what else is considered in this RIS?

Victoria's largest energy users are currently exempt from the VEU program. These businesses are not able to receive incentives under the program for undertaking energy efficiency upgrades and can avoid the pass-

[1] These are based on departmental energy market modeling, taking into account established national policies and assuming the VRET and Victorian net zero emissions by 2050 target are met.

through costs (as their energy retailer does not have a liability under the program for their energy use). In setting new targets, the Department is required to consider who participates in the program for this period. This is an opportunity to re-evaluate the rationale for exempting large energy users from the program and to consider how the program might support large energy users to successfully navigate the energy transition.

What is the case for government action?

Climate change is a major threat to our economy, way of life and environment, including through specific impacts on health, infrastructure and biodiversity. The Victorian government has committed to a target of net zero emissions by 2050. The government will set interim emissions reduction targets for 2025 and 2030 by March 2020 to set the State on the pathway to net-zero. The Victorian Energy Upgrades targets will be a cornerstone policy to contribute to reaching the interim emissions reduction targets.

Energy accounts for more than 70 per cent of Victorian emissions, and therefore emissions reduction in the energy sector is a key element of the pathway to net-zero. Energy efficiency and demand management are consistently identified as a key part of a low-cost energy transition and have various co-benefits including reducing energy without compromising service levels, thereby lowering energy bills and increasing health and comfort. The VEU program does all this while driving innovation. This RIS examines how to best drive greater uptake of energy efficiency and achieve these outcomes using the VEU program.

Many large energy users face barriers to undertaking energy efficiency and there are few other existing policies to assist them. The energy transition will continue to drive change in the energy market and energy intensive businesses will need to undertake forward planning to manage this change, particularly those energy intensive businesses who are also trade exposed and therefore have less ability to absorb costs. Energy management systems can ensure large businesses have the internal capability to identify and plan for energy efficiency upgrades and other management decisions required to navigate the energy transition.

What are the objectives of the proposed amendments to the Regulations?

The primary objective of the proposed amendments to the Regulations is to establish targets for the program for 2021 to 2025. To do this, the future breadth of activities and participants is considered. Additional amendments are proposed for large energy users that can choose whether to opt out of the program.

These amendments are designed to ensure that the VEU program, and the treatment of large energy users, achieves energy savings and GHG emissions reductions at lowest practical cost, having regard to the objectives of the Act as well as energy affordability, impacts on the electricity and gas grids and equity.

What are the proposed amendments to the Regulations?

It is proposed to set targets of:

- 6.5 million certificates for 2021
- 6.7 million certificates for 2022
- 6.9 million certificates for 2023
- 7.1 million certificates for 2024
- 7.3 million certificates for 2025.

These proposed targets mean that the program will continue to achieve increasing levels of emissions reduction, providing continuity with the targets established to date and consistency with Victoria's trajectory to achieve net-zero by 2050.

In order to meet these targets a substantially expanded range of activities will need to be included into the program.

It is proposed that large energy users who are energy intensive and trade exposed be able to opt-out of the VEU program provided that they implement an energy management system which meets the *ISO50001*

Energy Management Systems standard or equivalent. The definition of a large energy user will be aligned with existing reporting requirements to reduce red tape, see Table 1 below.

Table 1: Alignment of large energy user requirements with existing reporting requirements

	Electricity	Gas
Energy use	A facility using more than 100TJ of either gas or electricity, consistent with current reporting requirements under the National Greenhouse and Energy Reporting (NGER) legislation	
Trade exposure	A facility undertaking an Emissions Intensive Trade Exposed (EITE) activity list that is actively maintained by the federal Department of Environment, consistent with the requirements for the Renewable Energy Target (RET)	A facility undertaking a manufacturing or mining activity, consistent with the ANZSIC code used by the Australian Taxation Office and the Australian Bureau of Statistics

What other options did the Department consider?

The RIS considers five options. The proposed amendments reflect the preferred option – Option four (34.5 million VEECs). The options are summarised in Table 2 below.

Table 2: Feasible Combinations of Regulatory Design Choices

	Option 1	Option 2	Option 3	Option 4	Option 5
Target Magnitude	Low 14.3 million certificates	Medium 20 million certificates	Medium-High 27.5 million certificates	High 34.5 million certificates	Very High 38 million certificates
Target Trajectory	Decreasing	Decreasing	Decreasing	Increasing	Increasing
Types of activities	Traditional energy efficiency activities	New activity types included	New activity types included	New activity types included	New activity types included
Participation	Large energy users are exempt from the program	Large energy users are exempt from the program	Large energy users can opt-out of the program after completing ISO50001	Large energy users can opt-out of the program after completing ISO50001	Large energy users can opt-out of the program after completing ISO50001

All options were assessed on how well they met the stated objectives. Options two, three, four and five all increase the amount of energy savings delivered under the program from what is being delivered under the current target period. Only options four and five increase the amount of GHG emissions abatement delivered under the program from what is being delivered under the current target period.

Targets are set for each year within the 2021 – 2025 period. Annual targets under options one, two and three are based on a decreasing trajectory that corresponds to the decreasing emissions intensity of the electricity grid. This minimises cost as it becomes more costly to deliver certificates and emissions reductions every

year. Annual targets under options four and five are based on an increasing trajectory corresponding to an increasing Victorian emissions reduction target.

Options three and four received similar final scores and had similar net benefits (of over $4 billion). Both options are projected to equitably distribute benefits among energy consumer sectors relative to their emissions and energy profile. Both provide significant benefits to the energy grids of over $ 3 billion. Unlike option three, option four was found to have a minor impact on bills for those consumers who choose not to participate in the program in certain years but would deliver savings overall to these consumers over the period to 2031. This was determined to be justified by its increased contribution to meeting the Victorian emissions reduction targets and because, unlike option three, it was likely to significantly increase participation and the associated savings benefits for more Victorian households and businesses. Option four will also increase investment in the energy management industry and associated job benefits. It is also projected to provide significantly higher benefits to the energy grid, only some of which can be costed at this point.

Option five delivers a slightly higher amount of emissions reductions, but its impact on the energy bills of residential non--participants is considered undesirable.

Increased participation

Under option four, the program continues to deliver extensive bill savings for those who participate. If every household participated in the program during 2021-2025, both under options three and four each household is projected to enjoy total energy bill savings of $1800 dollars in total (the majority of these savings will accrue between 2021 and 2035 with additional savings expected until 2050 for some upgrades).

However, only option four is likely to drive increased participation rates meaning more consumers will enjoy increased affordability.

Increased Investment in energy efficient products and services industries

Both options three and four generate investment in the energy efficient products and services industry which can help drive jobs and transform the market for emerging technologies allowing them to be delivered at scale and at low cost. However, option three is expected to lead to a $918.5 million investment, whereas the investment under option four is expected to be almost twice as much at $1,705.3 million.

Affordability outcomes for non-participating consumers

The program will reduce energy costs even for those who do not participate as the reduction in energy demand reduces investment needed in the energy system (for option four this is valued at $3,914.80 million NPV), for example avoiding the costs of bringing on additional supply or augmenting the grid. However, if the pass-through costs of the program exceed the impact of reduced demand, energy bills will increase relative to the base case of a VEU program target of zero. For option four this is projected to occur for some years , although the impact is only significant during the period between 2023 and 2025.

This does not mean an absolute increase in energy bills should be expected by Victorian households. The Victorian government's suite of energy affordability policies and the expanding amount of renewable energy generation is projected to reduce energy bills in the near future mitigating any impacts under the VEU program.

It is assumed that even with the increased participation in option four, a minority of Victorian households will not be able to participate in the program and save money due to energy upgrades, the impacts of the program on this group is an important consideration in setting the target.

As noted, option four is considered to be justified because of the increased GHG emissions abatement achieved and the benefits of increased participation and investment. The Department also considers the option preferable given the broader affordability and climate change policy context. In recognition that some vulnerable consumers may face challenges in engaging with the program, the Department commits to

ongoing work, beyond the scope of this RIS, to explore options for further changes to the VEU program which would mitigate impacts on these consumers before 2023.

What are the expected impacts of the proposed amendments to the Regulations?

The proposed amendments to the Regulations (which are based on option four) will introduce an increased target that starts at 6.5 million in 2021 and increases yearly to 2025. Each year, the target increases by approximately 3 per cent (in terms of emissions).

Both in terms of emissions savings and energy savings, the proposed target is the most ambitious target set for the VEU program since its establishment in 2009 – this reflects the community's increased focus on energy savings and emissions reduction and builds on the established track record of the program for over 10 years.

The cumulative impact of this option (over a 30-year period) will be to avoid 40.6 Mega tonnes (Mt) of emissions in Victoria.[2] This is equivalent to planting 8.12 million trees or taking 8.82 million cars of the road for the year. The electricity savings alone resulting from the proposed target would power the Melbourne Cricket Ground for 26,000 years.

The proposed target and associated amendments to the Regulations have a net benefit compared to the reference case of $4,679.10 million (NPV – net present values).

Under the proposed amendments to the Regulations, households and businesses that participate in the program will be better off because energy upgrades will reduce their energy requirements and their energy bills. Over the 2021-2030 period, Victorian households participating in the program during 2021-2025 are expected to save $3.12 billion on their energy bills. Commercial and Industrial businesses are expected to save between $8.58 and $17.76 billion on their energy bills.[3]

Residential customers who do not participate in the program are expected to benefit overall including through bill savings across the 2021-2030 period. The modelled impact on a year to year basis shows if no other affordability measures are applied, an average household may pay an additional $15-65 for energy between 2023-2025. The Victorian Government has in place a suite of measures that are expected to bring down energy prices during those years (such as the Victorian Default Offer) and these will assist in offsetting any impact on Victorian households that choose not to participate in the VEU program.

Activities carried out under the program during 2021-2025 will ensure energy consumption in 2025 is 10 per cent lower than in 2021. In its year of maximum impact (2026), the gas savings from activities carried out during this period will be equal to 15 per cent of 2021 consumption levels. Up to 50 per cent of the 2025 target is expected to be delivered through fuel switching activities. As the emissions intensity of electricity declines due to increasing renewables, a greater proportion of the program liability will be met by gas retailers.

While the 2016-2020 target required an approximate 17 per cent increase in energy savings annually, the 2021-2025 target will require an average annual increase of 22-27 per cent.

Are there likely to be cross-subsidies?

The proposed target is projected to provide an equitable distribution of benefits across residential, commercial and industrial and exempt large energy users that matches their proportional contribution to energy usage and emissions (of 32 per cent, 57 per cent and 11 per cent respectively). This matches the outcomes of existing reviews of the program which show that the program has delivered equitably across sectors over its lifetime.

What activities are expected to deliver the propose target?

[2] The total projected GHG emissions reductions vary slightly from the estimated reductions given by the number of VEECs required to be delivered to satisfy annual VEU targets (where 1 VEEC is designed to deliver 1 tonne of GHG emissions reductions). This is because certificates are awarded based on average emissions factors, and because these are conservative, they slightly underestimate the total amount of emissions achieved. Further, the total reduction under option four includes a conservative estimate of emissions reductions projected by a requirement for large energy users to implement energy management.

[3] The uncertainty is due to the varying retail tariffs different businesses enjoy.

The proposed target is expected to be delivered by a range of activities. No individual activity is projected to contribute to more than 10 per cent of Victorian Energy Efficiency Certificates (VEECs). The program is expected to expand to provide incentives for a range of upgrades that reduce energy demanded from the grid. New areas that are expected to deliver the target include smart appliances, energy management systems and energy storage technology including where they optimise the use of solar on-site, various fuel switching measures and installations of medium scale rooftop solar.

How are the proposed amendments expected to be implemented and evaluated?

The Department will track the following principles to ensure successful implementation of the changes:

- Ensuring clearly communicated changes
- Transparent acknowledgement of the changes
- Rapid activity development
- In-depth engagement of new industries in the program

Major changes that will follow from implementation of the preferred option are:

- A transitioned reduction in the emissions factor.
- New activities will be introduced
- Amendments to the VEET Act will be ***considered***, to deal with some of the outcomes of the ambitious targets, including:
    - Establishing a clear signal as to the objective of the program going forward
    - Establishing mechanisms to ensure fluidity in the market, such as allowing creation of half certificates,
    - Establishing a mechanism that allows the Department to better deal with energy transition uncertainties and set reasonable price signals in the market.

The Department will also continue to investigate how the program can continue to deliver for low income households.

The proposed Regulations set targets until 2025. By May 2024 at the latest, the Department will need to establish a future set of targets for the 2026-2030 period. At this point, the government will review the operation of the Regulations before remaking them again in line with the requirements set out in the *Subordinate Legislation Act 1994*.

The provisions in the regulations in relation to how large energy users are treated under the program will have a significant impact. Following the first year of operation of the new opt-out mechanism, in 2022, the Department will review the practical effect of the provisions to ensure they are achieving the desired objectives.

Who was consulted in developing the proposed amendments to the Regulations?

The Department has been engaged in ongoing consultation with stakeholders since 2018 regarding establishing new targets for the program. At the beginning of the process to establish new targets, the Department consulted with key stakeholders regarding the current effectiveness and future direction of the program. An information session was held for stakeholders in October 2018 to discuss the process for setting targets for the period 2021 to 2025. Stakeholders were given the opportunity to prepare written submissions responding to a set of questions developed by the Department to help inform the process.

The Department consulted with peak industry bodies regarding the proposed changes to Large Energy Users in the program.

The Department has also consulted with the Essential Services Commission in their capacity as the regulator of the program.

Background to this Regulatory Impact Statement

The *Victorian Energy Efficiency Target Act 2007* (the Act) provides the legislative basis for the Victorian Energy Upgrades (VEU) program, a market-based incentive mechanism to encourage improvements to the energy and emissions performance of residential homes and non-residential premises. The VEU program is part of the Victorian Government's commitment to reduce greenhouse gas (GHG) emissions. It is overseen by the Department and administered and regulated by the Essential Services Commission (ESC).

Important elements of the VEU program, such as the activities that attract incentives, exemptions from the program and the number of certificates that must be surrendered by energy retailers each year (GHG targets) until 2020, are set out in the Victorian Energy Efficiency Target (VEET) Regulations 2018 (the current Regulations). GHG targets directly correlate with the scope of the scale of activity under the Victorian Energy Upgrades program. The Act requires new annual targets to be set in Regulations for the 2021-2025 period by 31 May 2020.

The amendments to these Regulations provide an opportunity to revisit whether the VEU program is still required, and if so, what its scale of activity should be for the 2021-2025 period. Before new Regulations are made, the *Subordinate Legislation Act 1994* requires:

The Department consulted with key stakeholders through the latter part of 2018 regarding the current effectiveness and the future direction of the VEU program. After these consultations, the Department prepared draft Victorian Energy Efficiency Target Amendment Regulations 2019 (the proposed Regulations) for affected parties to review. Interested parties are invited to make submissions to the Department on the proposed Regulations by **31 January 2020**.

To assist parties to comment on the proposed regulations, the Subordinate Legislation Act requires a Regulatory Impact Statement (RIS) to accompany the proposed regulations. Regulations may be exempt from this requirement if they do not impose a potentially significant economic or social burden on a sector of the public. A RIS must:

- state the objectives of the proposed Regulations
- explain the effect of the proposed Regulations
- identify other practicable means of achieving those objectives, including other regulatory as well as non-regulatory options
- assess the costs and benefits of the proposed Regulations and of any other practicable means of achieving the same objectives
- state the reasons why the other means are not appropriate.

The Commissioner for Better Regulation undertakes an independent assessment of the adequacy of RISs prepared in Victoria, in accordance with the *Victorian Guide to Regulation*. The Commissioner has determined that this RIS meets the requirements of the Subordinate Legislation Act and has issued a letter of adequacy.

The Department will consider all submissions received in response to the proposed Regulations. Following this, a notice of decision and statement of reasons will be published. Once the Regulations are made, copies of all submissions are provided to the Victorian Parliament's Scrutiny of Acts and Regulations Committee.

What is the problem being addressed?

This section of the RIS discusses the evidence supporting the need for action. Climate change, caused by an increase in carbon dioxide and other GHG emissions, is one of the most significant risks facing Victoria today. Decarbonisation of the energy sector through energy efficiency, demand side energy management and increased renewable energy generation will be necessary to achieve significant emissions reductions. However, barriers remain that prevent effective decarbonisation. There is a need for government intervention because the public value of reducing emissions is not recognised in most markets and thereby business and lifestyle decisions. Over the past ten years, various climate change policies and programs, including the VEU program, have resulted in reduced emissions. However, a gap remains, and additional emission reductions are required, through the VEU program and other policies and programs, if Victoria is to play its part in achieving emissions reductions at a level to avoid dangerous climate change.

Climate change and its impacts on Victoria – Policy Context

Climate change is the global change in climate patterns associated with a world-wide increase in average temperatures due to increasing concentrations of GHG in the atmosphere. Left unmitigated, climate change poses a serious threat for the world, including Victoria. The Intergovernmental Panel on Climate Change warns that if emissions continue to grow at the rate of recent decades, the world is at risk of food insecurity, widespread displacement of people due to extreme events, increased illness and death from heatwaves, extensive species extinction and ecosystem collapse.[4]

In Victoria, the impacts of climate change are already being felt as average monthly temperature records are consistently broken, the frequency and length of heatwaves increase, and the fire season starts earlier and lasts longer.[5]

Current projections of unmitigated climate change predict the world will be 4 degrees warmer than pre-industrial times by the end of the century.[6] In Victoria, the potential impacts of this unmitigated scenario when compared to a 2017 reference case, are likely to include:

- *Impacts on health*: Projections show Melbourne will experience double the number of days per year over 35 degrees and that there will be an extra 400 deaths per year on average by 2050 due to heatwaves, which will become more frequent and longer in duration.[7]
- *Impacts on coastal areas*: A 0.4 to 0.9 metre rise in sea level is projected for Victoria by 2100 which will cause increased flooding of low-lying adjacent areas, increased erosion and loss of coastal ecosystems.[8] The increased erosion and flooding will also damage coastal infrastructure which will

[4] Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2021-2025, 2026-2030), *Interim Emissions Reduction Targets for Victoria (2021-2030)*, Final Report (March 2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf>.

[5] Ibid.

[6] Ibid.

[7] Keating, A., and Handmer, J. (2013). Future potential losses from extremes under climate change: the case of Victoria, Australia, Melbourne: Victorian Centre for Climate Change Adaptation Research. <http://www.vcccar.org.au/sites/default/files/publications/Keating%20and%20Handmer%202013%20-%20future%20potential%20losses%20 from%20extremes%20011013.docx>.

[8] Grose, M. et al. (2015). Southern Slopes Cluster Report, Climate Change in Australia Projections for Australia's Natural Resource Management Regions: Cluster Reports, [Ekström, M., P. Whetton, C. Gerbing, M. Grose, L. Webb and J. Risbey (eds.)]. Commonwealth Scientific and Industrial Research Organisation and Bureau of Meteorology, Australia <https://www.climatechangeinaustralia.gov.au/media/ccia/2.1.6/cms_page_media/172/SOUTHERN_SLOPES_CLUSTER_REPORT_1.pdf>.

need to be built 0.8 metres higher to ensure they are not impacted excessively by the rising sea levels and increasing storm severity.[9]

- *Impacts on biodiversity*: Changes in temperature, moisture availability and fire regimes will lead to the disappearance of entire ecosystems.[10] Warmer oceans will also see a migration of marine species to the south which may impact fishers and introduce pests to new areas. Together with an increase in ocean acidification this can make it difficult for organisms to form shells and skeletons which in turn will impact food webs and ecosystems.[11]
- *Impacts on infrastructure*: An increasing number of intense and extreme weather events such as floods, fire and heatwaves will put pressure on existing infrastructure.[12]
- *Impacts on alpine areas*: a recent study estimates that alpine resorts in Victoria will receive 60-80 per cent less snow compared to recent decades and that the duration of the ski season could be reduced by 65-90 per cent compared to the start of this century.[13] In addition to tourism, the alpine environments that rely on snow cover would completely disappear.[14]
- *Impacts on water*: Projections show Victoria will face increasing water shortages as average annual rainfall declines.[15] The supply shortfall in Bendigo is expected to be twice as high as its current water demand.[16] However, when it does rain, this is expected to occur over a more intensive period, leading to greater flooding of rivers putting people and infrastructure at risk.[17]
- *Impacts on primary production*: Rising temperatures and a reduction in water supply will affect viability of crop yields and require increased investment in shelter for livestock.[18] This could lead to a significant decrease in agricultural productivity in the Murray-Darlin Basin.[19]

To date, human activities have caused 0.8°C of warming to 2015, with current emissions likely to drive up to a further 0.5°C of warming.[20] Actions taken to reduce further warming will have a major impact on the outcomes of this warming; data taken from Climate Change in Australia[21], with 1.5°C world represented by

[9] Ibid.

[10] Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2021-2025, 2026-2030), *Interim Emissions Reduction Targets for Victoria (2021-2030)*, Final Report (March 2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf>.

[11] Poloczanska, E.S., Hobday, A.J. and Richardson, A.J. (2012). Marine Climate Change in Australia Impacts and Adaptation Responses 2012 Report Card, Commonwealth Scientific and Industrial Research Organisation Climate Adaptation Flagship.

[12] Ibid.

[13] Harris, R.M.B., Remenyi, T. and Bindoff, N.L.

(2016). The potential impacts of climate change on Victorian alpine resorts. A report to the Alpine Resorts Co-ordinating Council, Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart. <https://www.arcc.vic.gov.au/uploads/publicationsand-research/The%20Potential%20Impact%20of%20Climate%20Change%20on%20Victorian%20Alpine%20Resorts%20Study_FINAL.pdf>.

[14] Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2021-2025, 2026-2030), *Interim Emissions Reduction Targets for Victoria (2021-2030)*, Final Report (March 2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf>.

[15] Ibid.

[16] Coliban Water, (2017). Urban Water Strategy 2017: Appendices. <https://www.coliban.com.au/site/root/water_security/documents/ColibanWaterUrbanWaterStrategy2017_Appendices.pdf>.

[17] Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2021-2025, 2026-2030), *Interim Emissions Reduction Targets for Victoria (2021-2030)*, Final Report (March 2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf>.

[18] Ibid.

[19] Reisinger, A., Kitching, R.L., Chiew, F., Hughes, L., Newton, P.C.D., Schuster, S.S., Tait, A., Whetton, P. (2014). Australasia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., Field, C.B., Dokken, D.J., Mastrandrea, M.D., Mach, K.J., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R. and White LL (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, USA, pp. 1371-1438.

[20] Intergovernmental Panel on Climate Change, 'Global Warming of 1.5°C: Summary for Policy Makers' (IPCC October 2018), see: <https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf>.

[21] Climate change in Australia website <https://www.climatechangeinaustralia.gov.au/en/>.

RCP2.6[22] at 2090 and 4°C world be RCP8.5 at 2090 projects the following changes for key climate variables in a 1.5°C and a 4°C world relative to 1995.

Table 3: Impacts in a world that is 4 degrees warmer

Variable	1.5°C world south of Great Dividing Range	4°C world south of Great Dividing Range	1.5°C world north of Great Dividing Range	4°C world north of Great Dividing Range
Average annual temperature change, relative to 1995 (°C)	0.4 to 1.3	2.5 to 4.0	0.6 to 1.5	2.7 to 4.5
Average annual rainfall (% change)	-7.6 to +2.1	-19.1 to +5.0	-18.6 to +2.7	-26.7 to +8.6
Days above 35°C per year	12 to 17 (Melbourne)	19 to 32 (Melbourne)	39 to 50 (Mildura)	60 to 85 (Mildura)
Sea level rise (m) (Stony Point)	0.22 to 0.53	0.38 to 0.81	-	-

Climate change impacts will be felt by all Victorians. However, some groups of the population are likely to be more affected than others. For instance, farmers and traditional owners have a stronger reliance on or connection to their surrounding ecosystems than others and will therefore be impacted disproportionately. Increasing extreme weather events such as heatwaves are likely to disproportionately affect the elderly and the sick.[23] The costs of adaptation and mitigation measures will make them less accessible to Victorians with low incomes, exposing them to greater risks from climate change. These varying impacts and abilities to pay need to be considered.

Role for government intervention in addressing climate change

As established above, greenhouse gases have environmental and social costs by contributing to dangerous climate change. However, neither the producers of GHGs or the consumers of goods and services that emit GHGs face these costs in their production and consumption choices, the costs are external to their decision. Therefore, Victorian households and businesses are unlikely to reduce their consumption of such goods and services (which include energy) to reach an 'optimal' level of emissions that fully account for the environmental and negative social impacts caused by GHG emissions. This market failure is known as a negative 'externalities' problem and it establishes a case for government intervention.

Victorian climate change policy framework

Victoria produced 110 million tonnes of GHG (carbon dioxide equivalent, or CO_2-e) emissions in 2017, the most recent year for which data is available. At 17 tonnes per person, our per capita emissions are among the highest in the world.[24]

The energy sector (excluding transport activities and fugitive emissions) produced nearly 70 per cent of Victoria's net emissions in 2017. These emissions arise from the generation of electricity and the stationary use of energy (both gas and electricity) in industry, business, homes and other activities across our economy.

In 2017, electricity generation accounted for 51 per cent of Victoria's emissions. The largest end-users of electricity were commercial services including buildings (30 per cent), followed by manufacturing (28 per

[22] RCP stands for Representative Concentration Pathway and is a greenhouse gas concentration trajectory used by the Intergovernmental Panel on Climate Change in its fifth Assessment Report in 2014.

[23] Barnett, B, Beaty, RM, Chen, D, McFallan, S, Meyers, J, Nguyen, M, Ren, R, Spinks, A & Wang, X 2013, Pathways to climate adapted and healthy low-income housing, National Climate Change Adaptation Research Facility, Gold Coast, Qld.

[24] DELWP's analysis based on the Australian Greenhouse Emissions Information System, < http://ageis.climatechange.gov.au/>.

cent), residential users (22 per cent), and electricity, gas and water services (16 per cent). Emissions from the direct combustion of fuels – mainly from gas use – contributed to a further 16 per cent of Victoria's emissions in 2017. Most of these emissions from the combustion of fuels come either from industry (45 per cent) or from commercial buildings and homes (48 per cent).

In 2017, the Victorian Government became the first state government in Australia to legislate a net zero emissions target by 2050. The *Climate Change Act 2017* also requires the government to chart a pathway to meeting this long-term target, starting with the period 2021-2025.

The Victorian Climate Change (VCC) Framework (2016) set out the initial steps the government would take to transition to net zero emissions. The government also established a target to reduce Victoria's emissions by 15-20 per cent below 2005 levels by 2020.

Box 1: International climate change policy framework in Victoria

In Paris, in 2015, the international community committed to keep the rise in global average temperatures to well below 2°C above preindustrial levels, and to work towards limiting the rise to 1.5°C.[25] Global GHG emissions, which are driving climate change, need to reach net zero in the second half of the century to achieve this commitment. This commitment aims to avoid some of the worst effects of climate change ("dangerous climate change").

Victoria is a signatory to the Subnational Global Climate Leadership Memorandum of Understanding (the Under2MOU), which brings together states and regions willing to commit to reducing their GHG emissions. The Under2MOU has the goal of limiting warming to well below 2°C. Signatories commit to limiting their GHG CO_2 equivalent emissions to 2 tonnes per capita by 2050. The Under2MOU has been signed or endorsed by more than 220 jurisdictions from 43 countries. Together these represent more than 1.3 billion people and 43 per cent of the global economy.

Emissions reductions can be achieved from non-energy related areas, for instance by increasing carbon storage in our natural environment and by implementing waste reduction measures to avoid methane emissions from landfills.

Energy efficiency and demand management reduces the need for electricity – reducing our dependence on emissions intensive generation and supporting the transition to a renewables-based system – and for direct use of gas. Globally, energy efficiency has delivered the largest reductions in GHG emissions this century.[26]

The focus of this RIS is how the VEU program and large energy users can contribute to decarbonisation in Victoria in the energy sector by increasing energy efficiency and demand management.

Current energy sector decarbonisation policy framework

Victoria's largest emissions reduction policy in the energy sector is the commitment to a 50 per cent Victorian Renewable Energy Target (VRET) by 2030. Support to meet these targets includes the Victorian Renewable Energy Auction Scheme (a competitive reverse auction scheme) and the Solar Homes program. The government's Solar Homes program will invest $1.33 billion by supporting a total of 770,000 solar technology installations over ten years, specifically:

- 700,000 solar PV systems (650,000 for owner-occupiers and 50,000 for renters),
- 60,000 solar hot water systems for owner-occupiers, and
- 10,000 batteries for households that already have solar panels for owner-occupiers.

The Solar Homes program is equivalent to 12.5 per cent of the VRET target.

[25] United Nations Framework Convention on Climate Change, 2015. The Paris Agreement entered into force on 4 November 2016 and Australia ratified it on 9 November 2016.

[26] Edenhofer, O., Pichs-Madruga, R., Sokona et al. 2014, Mitigation of Climate Change. Working Group III Contribution to the IPCC Fifth Assessment Report, International Panel on Climate Change, Geneva.

Box 2: Background to energy generation in Victoria

Most of Victoria's energy emissions come from the generation of electricity by three brown coal fire power stations to meet the demand for energy by consumers. Increasingly, a greater number of 'clean' renewable generators are involved in meeting this demand (5,345 MW of renewable generation in 2018[27]). Less emission intensive gas-fired generators make up the balance.

The National Electricity Market and associated grid infrastructure spans four states, including Victoria. When it was designed, the main electricity generated was to come from large centralised generators which transport energy one direction, from generators to distribution networks and finally to customers. Once turned on, most of these generators could supply a constant load of energy to the grid at any time. Both these design elements are increasingly being challenged by the increased amount of distributed and renewable generators.

Victorian households have a high percentage of their energy consumption supplied from natural gas compared to other states in Australia. Commercial and industrial sites also use a large amount of gas. 16 per cent of Victoria's emissions come from gas. Fugitive emissions, including from the extraction, processing and transmission of natural gas account for a further 2.8 per cent of Victoria's emissions.

In Victoria, energy efficiency is another significant driver of energy emissions reduction in Victoria. Globally, energy efficiency is consistently identified as one of the lowest cost sources of GHG abatement.[28] Energy efficiency reduces GHG emissions – both directly by reducing the direct combustion of fossil fuels such as gas and indirectly by reducing demand for electricity and thereby reducing the degree to which fossil fuel powered generators operate[29]. Reducing electricity demand also reduces the amount of new infrastructure which needs to be built for a renewable energy-based energy system and therefore the cost of the transition.

Improvements in energy efficiency between 1974 and 2010 delivered more capacity to 11 major economies than any other fuel, including coal, oil and electricity.[30] As a result, the International Energy Agency (IEA) has described energy efficiency as the 'first fuel'.[31] The VEU program is one of the mechanisms for increasing energy efficiency, and energy demand management more broadly, in Victoria.

In addition to the VEU program, the Victorian Government is committed to other energy performance measures including:

- improving the energy efficiency of new homes, by strengthening building regulations and compliance of the as-built quality of homes and promoting leading-edge sustainable design through volume home builders
- introducing minimum standards for rented homes
- targeted measures to assist low-income and vulnerable households, including investing $16.9 million towards retrofitting the energy efficiency of homes through the Home Energy Assist suite of programs (Healthy Homes, Affordable Retrofits, and EnergySmart Public Housing)
- providing consumers with tailored information on how to improve the energy efficiency of their home through the Residential Efficiency Scorecard.

Box 3: National energy sector decarbonisation policies

Several national and Commonwealth Government policies also act to reduce Victoria's energy sector emissions and, where possible, Victorian policies are designed to leverage and complement these policies:

[27] VRET 2017-18 progress report, see: <https://www.energy.vic.gov.au/__data/assets/pdf_file/0025/397123/VRET-2017-18-Progress-Report.pdf>.

[28] RepuTex Carbon, 'Measuring the cost of a 2°C target under the Paris Agreement' (Carbon Markets Article, 20 May 2017), <https://www.reputex.com/blog/article-measuring-the-cost-of-a-2c-target-under-the-paris-agreement/>.

[29] International Energy Agency, Energy Efficiency 2018: Analysis and Outlook to 2040, <https://www.iea.org/efficiency2018/>.

[30] Murray-Leach, R. 2019, *The World's First Fuel: How energy efficiency is reshaping global energy systems*, Energy Efficiency Council, Melbourne <http://www.eec.org.au/uploads/Documents/The%20Worlds%20First%20Fuel%20-%20June%202019.pdf>.

[31] Ibid.

- The National Energy Productivity Plan (NEPP), agreed to by all jurisdictions, aims to improve Australia's energy productivity by 40 per cent by 2030. This includes improving the efficiency and quality of our buildings; strengthening energy efficiency standards for new appliances and equipment; removing market barriers to new technologies and services; empowering energy consumers; and supporting innovation and competition in energy markets.
- National Greenhouse and Energy Minimum Standards (GEMS) specify regulatory requirements appliances, lighting and electrical equipment must meet or exceed before they can be offered for sale or used for commercial purposes in Australia and New Zealand. Regulatory requirements range from simple energy labelling requirements on products to ensuring products meet minimum levels of energy performance.
- The National Construction Code (NCC) sets minimum energy performance standards for newly constructed (or significantly renovated) residential and commercial buildings.
- The Commonwealth Government's Renewable Energy Target (RET) is the national renewable portfolio standard designed to reduce emissions of GHGs in the electricity sector and encourage additional generation of electricity from sustainable and renewable sources by providing incentives for the generation of electricity through renewable sources. Projects supported by the Victorian government to achieve the VRET will be complementary to the Federal RET if operational before the end of 2020. Projects operational after 2020 will be additional to the Federal RET and will have to surrender any LGCs generated to the Victorian Government.
- The Commonwealth Government's Emissions Reduction Fund and the extension, the Climate Solutions Fund, is a reverse auction program which funds low-cost emissions reduction activities. This is complemented by the Safeguard Mechanism, which ensures emissions do not rise above business-as-usual levels.

Victorian Energy Upgrades program

Legislated objectives

The VEU program is established by the *Victorian Energy Efficiency Target Act 2007*. The objectives of the Act are to:

- reduce GHG 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 Act sets the targets for GHG emissions reductions under the program to 2020. The Minister must have regard to these targets when setting the reduction rate used to calculate the number of VEECs each energy retailer must surrender each year.

Details on how the VEU program operates and its legislative framework are set out in Appendix 1.

Outcomes of existing policies

Existing energy efficiency policies have led to a moderate improvement in energy efficiency, reducing GHG emissions and energy costs as well as realising some of the co-benefits (such as increased comfort) associated with energy efficiency. The review of the VEU program explores some of these co-benefits and how well the program has achieved its objectives over the past ten years.

Existing energy efficiency policy has operated in parallel with other energy policies that have delivered emissions reduction outcomes for Victoria. Renewable energy policies impacted the type of generators

delivering electricity in Victoria and that in turn has changed the dynamics of the energy market. These secondary outcomes also need to be considered as they set the context for acting, see the section on the Residual Problem.

Emissions Reductions

Victoria's emissions are generally trending downwards, but additional measures will be required to reach the government's net zero emissions target by 2050. This trajectory requires decarbonising our energy system and replacing much of the fossil fuel generated energy in Victoria with renewable energy.

Victoria is on track to achieving its 2020 emissions reduction target of 15-20 per cent below 2005 levels. Victoria's total net (carbon dioxide equivalent) emissions have decreased by 13 Mt and per person, by 7 Mt from 2005 to 2017.[32]

Most of this projected reduction is due to GHG decreases from electricity generation, attributable primarily to the closure of the Hazelwood coal powered generator as well as an increase in energy efficiency and renewable energy.

Energy mix

Renewable energy is one of the most cost-effective ways to reduce emissions. International, national and state policies in conjunction with technological progress have led to a significant transition to clean energy. In 2017, 17 per cent of Australia's energy and 16 per cent of Victoria's energy was from renewable energy.[33] In 2018, this had increased with renewable energy providing 21 per cent of Australia's total power generation, reflecting a $1,688 million investment which has led to 330 jobs.[34]

Energy prices

The increase in renewable energy generation is reducing wholesale electricity prices. The Australian Energy Market Commission (AEMC) found that this would reduce average Victorian residential electricity bills by $12.50 per year for the next two years.[35] However, the AEMC also found that ensuring cost effective new electricity generation was critical to controlling future electricity price rises.[36]

Energy Efficiency Policy Outcomes

It is estimated that major energy efficiency policy measures have led to a 127 PJ avoidance in energy consumption in the National Electricity Market since 2000. In 2015, total savings were equivalent to 10.6 per cent of total electricity and gas consumption in the residential and commercial and services sectors.[37] Because of energy efficiency, AEMO projections for consumption of NEM grid-supplied energy over the next ten years is forecast to remain flat.[38]

Victorian Energy Upgrades program outcomes

The VEU program has been a major driver of the flat levels of energy demand seen in Victoria. The program has reduced the demand of electricity by over 11,000,000 MWh and the demand of natural gas by over 8,000,000 GJ (direct combustion) over its 10-year lifetime.

---

[32] Department of Environment, Land, Water and Planning, 'Victorian Greenhouse Gas Emissions Report 2018' (State of Victorian 2018), <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0033/395079/Victorian-Greenhouse-Gas-Emissions-Report-2018.pdf>.

[33] Clean Energy Council, *Clean Energy Australia Report* 2019.

[34] Clean Energy Council, *Clean Energy Australia Report* 2019; Clean Energy Council, *Clean Energy Australia 2019 Fact-sheet.*

[35] Australian Energy Market Commission, 'Price Trends' (Report, 21 December 2018) <https://www.aemc.gov.au/sites/default/files/2018-12/VIC%20fact%20pack.pdf>.

[36] Ibid.

[37] Strategy Policy Research, 'Energy Efficiency Impacts on Electricity and Gas Demand to 2037-38' (Final Report, AEMO, 1 June 2018) <https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEM_ESOO/2018/Energy-Efficiency-Impacts-on-Electricity-and-Gas-Demand-to-2037-38-by-Strategy-Policy-Research.pdf>.

[38] AEMO '2018 Electricity Statement of Opportunities' (Final Report, AEMO, August 2018) <https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEM_ESOO/2018/2018-Electricity-Statement-of-Opportunities.pdf>.

Activities carried out under the program to date, avoid 52 million tonnes of carbon dioxide equivalent emissions from being released. The program has achieved this at an average price of $20 per tonne. Activities from VEU are equivalent to taking over 500,000 cars off the road per annum.

Due to modelling undertaken by the Department being conservative, targets usually end up being delivered at a lower cost than projected. That is, the conservative assumptions made underestimate the program participants' ability to deliver emissions abatement through energy efficiency at low cost.

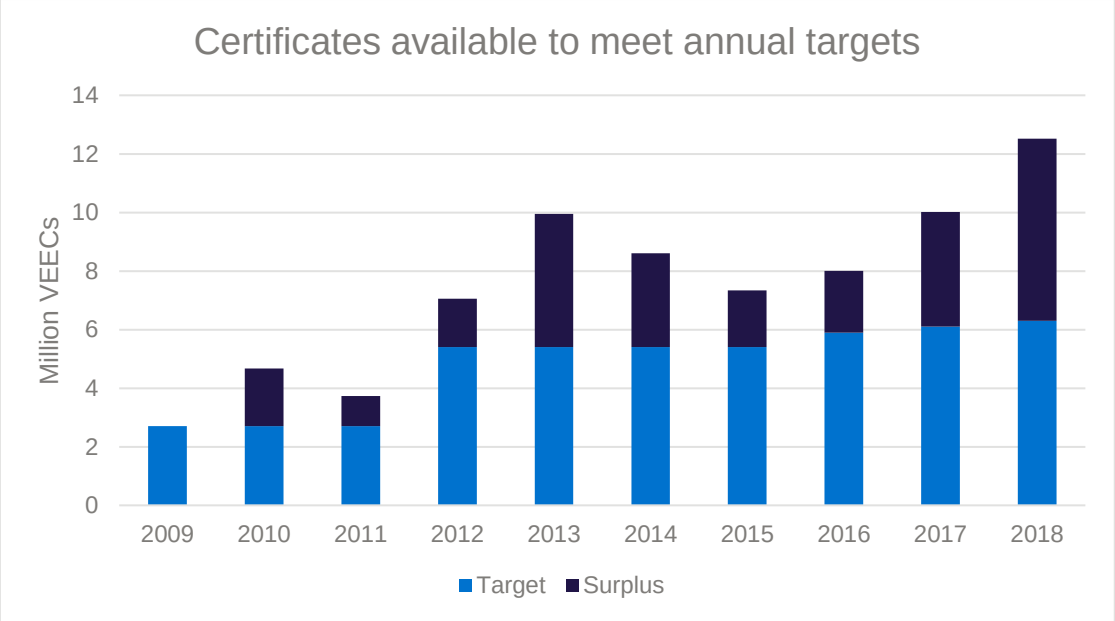
Previous targets are set out in the table below.

Table 4: Previous targets for Victorian Energy Upgrades program

Year:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Target Size (million certificates)	2.7	2.7	2.7	5.4	5.4	5.4	5.4	5.4	5.9	6.1	6.3	6.5

In general, the VEU program has achieved its targets and has done so faster than anticipated, resulting in a substantial surplus of activities created by the end of April of each year, which is when certificates must be registered and surrendered to meet the previous year's target, see Figure 1.[39]

Figure 1: Surplus of VEECs registered to meet annual targets at end of April the following year (last date by which certificates can be registered to satisfy a target period)



Over the life of the program, households that have participated in the program have saved over $2 billion on their bills as a result of carrying out upgrades.[40] Business participants, who have only been part of the

[39] There have been a few of instances of minor shortfalls in retailers meeting their target obligations primarily due to administrative errors rather than intentional non-compliance or an inability to source VEECs to meet a liability.

[40] Assuming an approximate average tariff of 25cents per MWh.

program since 2012, have saved over $750 million. This does not include the additional bill savings that result from the program reducing overall network demand and thereby avoiding additional network costs that would have accounted for the required network upgrades.[41]

In the 2018 to 2019 financial year, around 11,000 business premises and 162,000 households improved the energy efficiency of their buildings with the help of the VEU program.

Over the life of the program, participation and incentives have been distributed reasonably equally between:

- regional and metropolitan areas
- residential and non-residential consumers
- socio-economic quintiles.

Most incentives to date have been for efficient lighting upgrades. The market-based nature of the program means the lowest cost energy saving activities are delivered first, until that market is saturated. The program has also supported a significant number of water heating upgrades, weather sealing upgrades and the installation of standby power controllers and water efficient shower roses.

In recent years there has been a significant increase in commercial lighting upgrades, although the phasing out of incentives for commercial lighting has changed the trend over the course of 2019. The introduction of new activities more suited to businesses have also increased opportunities for business to undertake upgrades. A more detailed analysis can be found in Appendix 2.

The VEU program has successfully contributed to creating economies of scale for lighting products. The transformation of the lighting industry that now allows it to produce high efficiency products (LEDs) at low cost is evidence of this. By accrediting products, the program also provides a public register that ensures products are safe and of high quality and efficiency. The public register is utilised by other government programs thereby minimising the cost of administering these requirements. These outcomes are explored in more detail in Appendix 2.

The relative emissions of gas and electric appliances

For the past 10 years, the VEU program has incentivised switching from electric to gas powered appliances, reflecting their relative emissions intensity. Over that period, switching to gas achieved multiple benefits in addition to reducing GHG emissions, including reducing consumer energy bills and reducing energy system costs by reducing electricity demand.

However, these considerations are becoming increasingly complex as our energy system changes. The decarbonisation of electricity generation is bringing the emissions intensity of electricity closer to that of gas at the same time as other trends affect the relative benefits of gas and electric appliances, including:

- Over the past decade some types of electric appliances have rapidly increased in efficiency, reducing their emissions per unit output.[42]
- For homes or businesses with solar panels, electric appliances that allow them to maximise their self-consumption of rooftop solar may be more cost effective than gas appliances.[43]
- Gas prices have increased as Australia's gas market is now connected with international gas markets. The Australian Competition and Consumer Commission (ACCC) highlights that wholesale gas prices have increased partly driven by close linkage of the East-costs gas market with the international gas export market.[44]

These drivers mean that although electricity will have higher emissions per GJ than gas for decades to come, in some cases replacing a gas appliance with an electric appliance may lead to emissions reductions

[41] A complete discussion of the different types of benefits for participants and non-participants can be found in the Options and Impact Assessment sections of this RIS.

[42] For instance, see E3, 'Decision Regulation Impact Statement: Air Conditioners' (Commonwealth of Australia, Department of Environment and Energy, December 2018).

[43] Alternative Technology Association 'Household fuel choice in the National Energy Market' (July 2018), Final Report.

[44] Australian Competition and Consumer Commission 'Gas Inquiry 2017-2020: Interim report (July 2019).

and energy cost savings well before that point. It is important that any change to the way the program incentivises fuel switching be considered in conjunction with the way incentives will alter peak demand for both gas and electricity.

Views of Stakeholders

The Department held an information session for stakeholders in October 2018 to discuss the revised *Victorian Energy Efficiency Target Regulations 2018* and the process for setting the targets for the program for the period 2021 to 2025. Stakeholders were given the opportunity to prepare a written submission responding to a set of questions to help inform the target setting process. The following section sets out the key themes from stakeholder responses.

Seventeen stakeholders provided a written submission following the information session. The stakeholders who responded comprised a mix of energy retailers, peak bodies and APs. The stakeholders were all complimentary of the achievements of the VEU program thus far and there was strong support and encouragement for the program to continue to expand and move in new directions.

Numerous stakeholders supported the role of the VEU program in addressing energy affordability and this will be considered as part of this RIS. Most stakeholders supported the idea of the VEU program providing incentives for maximising roof top solar and this informed the design of options within this RIS.

Finally, there was broad support across stakeholder groups for investigating changes to the program to address some of the issues regarding the lack of participation of large energy users. The Department has undertaken analysis to better understand the barriers to participation faced by large energy users and has included this analysis in the RIS – see section on the residual problem. The Department will also explore some options to address these barriers in the options section of this RIS.

Some of the issues raised were outside of the scope of this RIS process. Several stakeholders called for the reinstatement of ceiling insulation as an eligible activity within the program. The Department, together with other agencies at both the federal and state government level, is currently reviewing the status of ceiling insulation within the program. This policy development work is well underway, but it is dependent on other processes and will not be possible to finalise this for inclusion in the regulatory amendment associated with establishing new targets.

Suggested changes that would require an amendment to the VEET Act are out of scope for the purposes of this target setting RIS, including:

- a shift away from the existing GHG reduction target to an energy saving target of some description; and
- a separate or “banded” target for low income or vulnerable households.

The Department has noted these proposals and will give them further consideration in any future legislative reforms.

Additionally, some stakeholders called for a residential customer education campaign to further highlight the benefits of a more energy efficient home and ways in which to make a home operate more efficiently.

The residual problem

Existing policies across all sectors of the Victorian economy will not be enough for Victoria to achieve net zero emissions by 2050.[45] As discussed above, the production and stationary use of energy make up the majority of Victoria’s GHG emissions. This means that the decarbonisation of the energy sector and the reduction of energy demand will have a key role to play in meeting any interim emissions reduction targets, and that significant additional measures will be required to achieve net zero emissions in the sector by 2050. While the decarbonisation of the energy sector and reduction of energy demand through energy demand management (including energy efficiency) can further reduce emissions, barriers to achieving this outcome

[45] Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2021-2025, 2026-2030), *Interim Emissions Reduction Targets for Victoria (2021-2030)*, Final Report (March 2019) <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf>.

continue to exist and are explored below. These barriers justify the need for further government action, and that new targets for the VEU program be set.

Barriers to decarbonising the energy sector

A rapid transition to clean energy is key to reducing Victoria's emissions and combating climate change – this requires significant investment in new renewable energy generation and transformation of Victoria's transmission and distribution network to support small- and large-scale distributed energy resources (see Box 4). Reducing energy demand through energy efficiency will help Victoria to achieve this transition at lowest cost, reducing the investment required in new clean generation, and transmission and distribution infrastructure.

A key factor influencing the cost of the energy transition will be how the system adapts to meet demand, particularly at peak times. Reducing demand at appropriate periods, more flexible demand and demand that is managed to optimise self-consumption of distributed energy resources (by businesses and households using the energy they generate from rooftop solar panels and storage systems) can reduce potential impacts on system security and reduce the need for additional investment in supply and grid services.

Essentially, programs like VEU that lower demand placed on the grid can reduce the cost of the transition and increase the pace of the transition without compromising service levels. The cost of the transition will depend on how technical limits are overcome and how the system adapts to meet demand, particularly at peak times. Reducing demand will lower the investment required in new clean generation, and transmission and distribution infrastructure. The Solar Homes program will significantly increase the amount of distributed energy resources in Victoria. Investment in the grid will be needed to deal with this. Reducing demand at appropriate periods and establishing a demand curve that makes optimal use of supply will reduce the investment needed to cope with any potential demand issues.

Box 4: What other changes need to happen as we add more renewables to the grid?

Renewable generators, including smaller distributed generators, are in different locations to existing fossil fuel generators. Investment in new transmission and distribution infrastructure is required to connect these new generators to the grid or alternatively demand needs to be reduced in constrained areas. If renewable uptake in an area happens faster than the grid can be upgraded to accommodate these new generators, constraints may be placed on export of electricity to the grid or alternatively demand management utilised to shift load to times of high renewable generation.

The electricity system requires that supply and demand are always matched. As renewable energy generation is variable it needs to be complemented by 'firming', changes to either supply or demand which can operate when variable renewable generation is not available. The cost of firming will be a major driver of electricity prices as renewable energy penetration increases.[46] Options for firming include the use of batteries or higher cost generation such as gas.[47] Alternatively, managing demand to match times when renewable energy generation is greatest may be more cost effective.

Barriers to energy efficiency

Modelling by the Department suggests that an energy efficiency gap continues to exist. That is, there are many cost-effective energy efficiency opportunities that have not been taken up in residential, commercial and industrial premises. Victorian households and businesses continue to face a range of barriers to investment in energy efficiency which may make it difficult for them to implement cost-effective measures that would provide ongoing relief from energy affordability pressures. Evidence of these barriers has been drawn from analysis of current literature and from recent studies undertaken by the Victorian Government.

Barriers faced by households and SMEs

[46] Australian Energy Market Commission, 'Price Trends' (Report, 21 December 2018) <https://www.aemc.gov.au/sites/default/files/2018-12/VIC%20fact%20pack.pdf>.

[47] K Lovegrove, G James, D Leitch, A Milczarek A Ngo, J Rutovitz, M Watt, J Wyder, Comparison of Dispatchable Renewable Electricity Options: Technologies for an orderly transition' (ITP Thermal Pty Ltd, commissioned for ARENA 2018) < https://itpau.com.au/wp-content/uploads/2018/11/ITPComparisonOfDispatchableREOptions_web050718r-1.pdf>.

The Department has drawn on the following recent Victorian Government studies to help identify remaining barriers across different sectors:

- The 'SME study': A 2019 market research report commissioned by Sustainability Victoria as part of the Unlocking Innovative Finance project surveyed 283 SMEs for quantitative research and 30 SMEs for further qualitative research. Although it focused on barriers to and options for financing energy efficiency measures, it also identified barriers that continue to exist for these businesses in undertaking energy efficiency upgrades.[48]
- The 'Rental Study': A 2018 Department survey of 854 residential tenants, 460 landlords and 50 property managers that sought to better understand the work that needed to be done in the area of energy efficiency for tenants.[49] The survey identified that high efficiency lighting, air conditioning, curtains, insulation and efficient showerheads had been installed in many houses but other energy efficiency measures were not in place.[50]

Barriers to energy efficiency are summarised in the table below.

Table 5: Barriers for energy efficiency in households and SMEs

Barrier	Evidence
Imperfect information: lack of information may lead to cost effective upgrades not being undertaken	In the Rental Study, property managers reported a poor understanding of health (having adequate temperatures reduces risk of colds, flu and exacerbation of other sicknesses and vulnerabilities) and financial implications of low efficiency housing to tenants, financial benefits that could be achieved for landlords and just under half were unaware of government incentives to improve efficiency.
Split incentives or principal agent relationships: One person (the agent) can make decisions or take actions on behalf of, or that impact, another person (the principal) and yet these two people have different objectives	Most tenants in the Rental Study said that they did not feel empowered to minimise energy use, make changes at the property and that the costs of making changes were too great. However, most landlords indicated a willingness to invest in energy efficiency upgrades, suggesting there is a greater perception by tenants that they will be met with resistance, than is likely to occur. The SME study found that many SME's lease premises, and this meant they were more likely to be uncertain about their future at the premises and it was less desirable to invest in energy efficiency upgrades.
Bounded rationality: Businesses or households are constrained by time, attention and ability to process information and therefore do not undertake cost effective upgrades	71 per cent of SMEs in the SME study listed 'reducing energy costs' as a benefit of being more energy efficient, and yet only half of them agreed they were doing all they can to reduce energy costs.
Up-front costs: Many households and SMEs lack the ability to pay for upgrades which have a large up-front cost and may be unable or unwilling to access finance for the upgrade	Two thirds of SMEs in the SME study commissioned by Sustainability Victoria noted that the upfront costs of energy efficiency upgrades prohibited them from undertaking such investments.
Hyperbolic discounting: The tendency to overvalue current costs and underestimate future costs may lead to cost effective upgrades not being undertaken	The SME study found that the up-front costs was the primary consideration for SMEs and paybacks needed to be less than 3 years to be considered.

[48] Quantum Market Research, 'Sustainability Victoria, Unlocking Innovative Finance, Full Qualitative Report' (2019, Sustainability Victoria).

[49] Newgate Research, 'Research Report on Energy Efficiency in Rental Properties' (2018, Department of Environment, Land, Water and Planning)

[50] Ibid.

Capability: Individuals (particularly those of a lower socio-economic status) may lack the capability to make decisions in relation to energy efficiency at their premises	Where there is a lack of capability, information barriers for low income households are exacerbated. A 2017 study found that even where there is capability, personal pride and embarrassment may result in an unwillingness to ask for help in such situations.[51]

Barriers faced by Large Energy Users

Organisations which use a large amount of energy are likely to face a different range of barriers to undertaking energy efficiency upgrades than households and SMEs, including additional organisational barriers that limit their uptake of cost-effective energy efficiency measures. Some of the major challenges were identified in the evaluation of the Commonwealth's Energy Efficiency Opportunities program, as outlined below:[52]

- Power or status/prioritisation – energy management commonly has a relatively low status and is viewed as a peripheral issue by senior management. This may constitute an organisational barrier to efficiency improvement as the lack of senior management support and influence on funding decisions limits the scope for effective action.
- Information, skills and organisational practices – businesses lack the data and technical expertise to develop a business case for energy upgrades and the business or financial expertise to evaluate the costs and benefits. The provision of information, guidance, contacts with professionals such as auditors and installers can assist organisations to identify and evaluate the energy upgrade opportunities.

These barriers mean that energy upgrades are either not identified or, in the competition for capital, energy upgrade projects lose out to other projects. Australia received the fourth lowest ranking in the OECD for industrial energy efficiency in the American Council for an Energy-Efficient Economy (ACEEE) international rating scheme in 2018[53]. This suggests that despite natural pressures (increased energy prices from the energy transition strengthen the economic case for better energy demand management), large energy users continue to face barriers when it comes to energy efficiency. It is important large energy users are appropriately incentivised, informed and encouraged to improve their energy efficiency.

Carbon and energy reporting are of growing importance in the financial system, with investors seeking action on emissions reduction and financial regulators in Australia and overseas calling for improved reporting on emissions and climate risk by publicly listed companies. The Australian Prudential Regulation Authority has called for businesses to undertake a carbon risk analysis and act to manage these risks.[54] Since 2018, this has been given further impetus through the establishment of the international Taskforce on Climate-related Financial Disclosure (TCFD) reporting framework which requires business consideration of a Paris Agreement consistent goal – typically net zero emissions by 2050.

However, this is not necessarily translating into widespread action. Analysis by Market Forces[55] found that only 24 per cent of ASX listed companies have a plan to reduce emissions and Australian Securities and Investment Commissioner, John Price, recently warned that directors were often failing to consider climate change risks[56].

[51] Liu, E, Judd, B and Santamouris, M 'Challenges in transitioning to low carbon living for low income households in Australia' 2017 *Advances in Building Energy research* DOI: 10.1080/17512549.2017.1354780

[52] Acil Tasman, 'Energy Efficiency Opportunities Program Review' (Energy Efficiency Opportunities Program End of First Full Five Year Cycle Evaluation Final Report, April 2013), <https://acilallen.com.au/uploads/files/projects/85/ACIL_EnergyEfficiencyOpportunies_2013.pdf>

[53] ACEEE, 'The 2018 International Energy Efficiency Scorecard', 10 <https://aceee.org/portal/national-policy/international-scorecard>.

[54] APRA (2019) *Climate change: Awareness to action* see: <https://www.apra.gov.au/sites/default/files/climate_change_awareness_to_action_march_2019.pdf>.

[55] Market Forces (2018) Investing in the Dark, see: <https://www.marketforces.org.au/info/key-issues/asx100-climate-risk/#findings>.

[56] Yeates, C (2018) ASIC warns on climate risk as heat turns on directors, *The Age*, see: <https://www.smh.com.au/business/banking-and-finance/asic-warns-on-climate-risk-as-heat-turns-on-directors-20180618-p4zm7j.html>.

Large energy users need specific consideration as to the type of intervention best designed to address the specific barriers they face and to leverage these emerging drivers for emissions reduction. There are currently no policies or programs which specifically target large energy users to improve their energy efficiency and productivity. This is a concern as large energy users (defined as sites using over 100 terajoules of electricity or gas annually) account for 19 per cent of Victoria's electricity consumption and 17 per cent of gas consumption.

Box 5: Background to the treatment of large energy users in the VEU program

Currently, over 400 sites are excluded from the VEU program through a mechanism designed to target large energy users. Prior to December 2013, businesses using 100 terajoules or more of energy or more than 120 Megalitres of water per year were required to improve their energy efficiency under the Environment and Resource Efficiency Program (EREP).

The EREP program required large energy users to undertake action, including investment in improved energy performance, that reduced their energy costs and contributed to reducing system costs. Since the program has been repealed this is no longer the case.

While EREP operated, it did not make sense for these users to be part of the VEU program. However, in December 2013, the EREP program ceased to operate but these large energy users continued to be excluded from the VEU program. From 2017, these large energy users were given the option of participating or 'opting-in' to the VEU program or remaining excluded. The mechanism for this is described in detail in Appendix 1. Since 2017, 12 large energy using sites have opted in to the VEU program (a further 46 smaller energy users who were also exempt, for example a small shop in shopping centre, have also opted in).

The electricity contracts for large energy users typically include greater exposure to the wholesale electricity price – this means that as the program reduces demand and consequently wholesale prices, large energy users see this benefit more directly. Large energy users also receive a substantial portion of the benefits when reduced demand reduces or defers the construction of new network and generation infrastructure. Because these sites have been excluded from the pass-through costs of the program to date, they have been gaining the benefits without the costs.

Key considerations for large energy users regarding participation in the program are:

- they can benefit significantly from reducing energy (supported by VEU incentives) as this is a major business cost.
- they are more exposed to increases in energy costs because this is a significant portion of business costs – and the cost of the VEU program is passed through to all participating consumers on a per unit of energy basis, which will be quite costly for large energy users.

In addition, some large energy users are also trade exposed sites – i.e. sites where the product manufactured competes against import or export products and therefore the business has less opportunity to pass through the cost of energy price increases to consumers. The combination of being energy intensive and trade exposed makes sites particularly vulnerable to increases in energy prices.

Energy Affordability

In recent years, there has been widespread concern about rising energy costs for households and businesses alike. Victoria has recently experienced significant increases in retail electricity and gas prices. 2018 data released from the Essential Services Commission reported households faced an increase of 16

per cent for standard contracts for both electricity and gas in the 2017/18 financial year.[57] In the same year, small businesses faced an increase of 21 per cent for electricity and 14 per cent for gas.[58]

Energy costs represent a reasonably significant expense in low income household budgets. For instance, low income households spend approximately 6.4 per cent of their disposable income on energy, whereas, by comparison, high income households only spend 1.5 per cent (average income households spend 2.8 per cent).[59] This means low income households are vulnerable to price rises, particularly as these household's experience barriers to reducing energy costs or improving energy efficiency.

The Victorian Government is putting in place a range of measures to support energy consumers, particularly vulnerable Victorians. On 1 July 2019, the Government introduced a simple, fair price for electricity available to all Victorian households and small businesses, called the Victorian Default Offer (VDO), to replace costly standing offers. In response to the 2016 energy hardship review a new payment difficulties framework was implemented on 1 January 2019 requiring energy retailers to provide customers in debt "tailored" assistance", including information on the customer's energy use, how to reduce their use and provide advice on other available assistance". Additionally, the Government has increased the Utility Relief Grant cap from $500 to $650. This will help households and families suffering unexpected hardship - like losing a job – to pay their water, gas or electricity bills.

Barriers to energy efficiency and energy affordability can lead to people not being able to heat or cool their homes. For example, renters face significant split-incentive barriers to undertaking energy efficiency upgrades and in 2018, a survey of renters reported that over half found it difficult to maintain a comfortable temperature at their property and a third of tenants reported that during the last two years they had chosen not to heat or cool their homes due to the running costs.[60] For tenants with children, vulnerabilities relating to energy and temperature were higher, with around three quarters reporting difficulties in heating and/or cooling their home and over a third choosing not to heat and/or cool their home.

Improving energy efficiency reduces demand and energy costs – i.e. the same energy services (heating, cooling, hot water, lighting) can be provided at lower cost. This makes energy efficiency a very attractive option for achieving emissions reductions. Energy efficiency measures can deliver a range of co-benefits (affordability, comfort and improved health). Improving energy efficiency enables householders to improve the comfort of their home and delivers ongoing comfort and health benefits, without impacting affordability. Improving energy efficiency allows energy use (and consequently, emissions) to be reduced without forgoing the benefits enjoyed (e.g., heating and cooling of homes). For some vulnerable consumers, it allows them to achieve more comfort with the same amount of energy (and thereby at same cost), and this can have health benefits.

The role of the Victorian Energy Upgrades program in addressing the residual problem

The VEU program has demonstrated that it is highly effective[61] at:

- reducing emissions at low cost (by taking a market-based approach)[62]
- reducing energy use and costs while maintaining services
- promoting technological innovation – for example, the program has set new benchmarks for lighting upgrades and delivered these at scale resulting in a transformation of the lighting market in Victoria
- overcoming financial barriers to energy efficiency
- overcoming information barriers to energy efficiency

57. Essential Services Commission, 'Victorian Energy Market Report 2017-18', (ESC, 26 February 2019) < https://www.esc.vic.gov.au/sites/default/files/documents/RPT%20-%20Final%20-%20Victorian%20Energy%20Market%20Report%202017-18%20-%2020190218_0.PDF>.

58. Ibid.

[59] Phillips, Ben, 'Energy stressed in Australia' (2018, Australian Council of Social Service)

[60] Newgate Research (2018), Research Report on Energy Efficiency in Rental Properties, May 2018, unpublished.

[61] See analysis out program outcomes in Appendix 2

[62] How this changes as the grid decarbonizes remains to be seen.

- supporting upgrades to existing buildings
- delivering incentives at scale to hard to reach cohorts, households and SMEs.

While other measures can help with the remaining barriers to energy efficiency and decarbonisation of the energy sector, the VEU program has delivered these at low-cost and with a range of co-benefits such as technological innovation improved comfort and health. Table 6: How the VEU program can address remaining barriers

Barrier	How VEU could overcome
Barriers to energy sector decarbonisation	
Significant investment required to transform Victoria's transmission and distribution network to support small- and large-scale distributed energy resources	Reducing energy demand through energy efficiency, especially at peak times, will help Victoria to achieve this transition at lowest cost, reducing the investment required in new clean generation, and transmission and distribution infrastructure. The VEU program can also help match demand to times when supply is cheapest and optimise the use of distributed energy resources.
Barriers to Energy Efficiency	
Imperfect Information and capability	The VEU program incentivises accredited providers of activities to contact Victorian households and businesses and disseminate information about energy efficiency to them. This reduced or removes the need for consumers access and interpret information on what energy saving products they could use.
Bounded Rationality	Having approved products installed by accredited providers partly addresses some of the bounded rationality barriers by ensuring a product is fit for purpose and can be installed in a way that is easy for the consumer.
Upfront costs, Split incentives and Hyperbolic discounting	The program reduces or removes upfront cost for consumers. This counters the tendency for other consumers to engage in hyperbolic discounting.
Energy Affordability	
Increased retail prices	While the VEU program costs are passed on to consumers in energy bills, the program also reduces overall prices by reducing demand and thereby avoiding the need to invest in additional energy generation and transmission and distribution infrastructure.

The VEU program also addresses barriers for large energy users where they choose to participate, as can the imposition of energy management systems.

The energy transition is now well underway and managing the implications of the transition will be critical for all businesses. The Energy Efficiency Council's (EEC) briefing on the energy transition, *Navigating a Dynamic Energy Landscape*[63], notes three characteristics of the energy market transformation: change in generation mix, decentralisation and shift in the demand profile due to behind the meter solar and demand

[63] Available online at <https://www.energybriefing.org.au/>.

response. The EEC argues that change is the new 'normal' in the energy market. The briefing recommends that businesses where energy is a significant input, need to have a management approach which allows them to benefit from the opportunities in the energy transition and respond to the risks.

For those large energy users exempt from the VEU program there are currently few policies which are designed to improve energy efficiency and reduce emissions. The Commonwealth's Safeguard Mechanism is designed to prevent emissions rising above business-as-usual levels[64], rather than reducing them and uptake of energy efficiency has been low under the Emissions Reduction Fund[65]. Given the objectives of the proposed Regulations include the need for the energy transition to happen as quickly as possible and the program objective to support job creation, it is important to address the barriers identified for large energy users in undertaking energy efficiency upgrades and navigating the energy transition more broadly.

It is particularly important for energy intensive and trade exposed businesses to be planning for the energy transition. Energy and emissions intensive large energy users by definition will face significant impacts from the transition and potential climate transition risks. While the goal of net-zero carbon by 2050 may seem distant, for a business using equipment with a 15-year lifespan, it's less than two capital investment cycles away. Therefore, there is a need for these businesses to have a management system which addresses the barriers to energy efficiency and supports long term energy transition planning – alternatively they may face higher costs or need to retire equipment early.

Furthermore, trade exposed businesses have less flexibility to pass on higher costs to consumers or absorb energy price shocks as part of the energy transition. The energy transition will change the drivers of energy costs and it is particularly important trade-exposed energy intensive large energy users have a management system in place to proactively manage this change.

Table 7: Addressing barriers faced by Large Energy Users

Barrier	Victorian Energy Upgrades	Energy Management Systems
Power/Status or Prioritisation	The VEU program can help improve the payback period for energy saving upgrades, thereby making it easier for projects to meet internal investment hurdles and for individuals to promote energy efficiency within a company.	Energy management systems require board members or senior decision makers to review energy use trends and opportunities, including energy efficiency. Ensure businesses have clear management systems to determine who is responsible for energy and that opportunities for energy efficiency upgrades are reviewed regularly. Aligns with ASIC obligation to consider climate transition risk if it's material for a business.
Information, skills and organisational practices	The program prescribes activities which will save energy and approves products, providing assurance that activities will result in energy savings. The VEU program can help participants by determining cost-effective energy saving measures for them.	Builds internal capacity to analyse drivers of energy cost for businesses which may have unique processes or systems. It can also help large energy users establish sound processes for improving in-house knowledge and skills around energy management. Aligns with TCFD requirement to set climate related targets, for example emissions reduction

[64] Department of Environment and Energy (2016), The safeguard mechanism – Overview, see <https://www.environment.gov.au/climate-change/government/emissions-reduction-fund/publications/factsheet-erf-safeguard-mechanism>.

[65] Department of Environment and Energy (2019), Combined review of five commercial and residential sector energy efficiency methods under the Climate Solutions Fund.

	Accredited providers market energy efficiency directly to businesses	of energy efficiency improvement, and evaluate performance against them[66].

Within the energy efficiency sector, the Greenhouse and Energy Minimum Standards (GEMS) amendments and National Construction Code (NCC) reforms will raise the minimum efficiency standards for certain measures nationally (see Box 3). Regulation and minimum standards are designed to set the minimum requirements; however, they are not designed to drive innovation or incentivise higher performing solutions.

Further, as the NCC targets new builds and renovations, policy continues to be required to ensure existing premises are upgraded. In parallel with this RIS process the government is consulting on reforms to the Residential Tenancies Act (RTA). While, if implemented, these reforms may improve efficiency in existing rental properties to some extent, further work will be needed to drive high efficiency improvements for this sector of buildings.

In the following two sections, this RIS will consider the overall objectives of government action and the options for the program that best address remaining barriers to energy efficiency, decarbonisation and the problem of energy affordability. Objectives and options are based on the residual problem.

[66] Taskforce on Climate-related Financial Disclosure, Metrics and Targets, see <https://www.tcfdhub.org/metrics-and-targets/>.

Objectives

This section of the RIS sets out the policy context and objectives of any proposed action. The objective of the proposed Regulations is to give operational effect to the Victorian Energy Upgrades program in a way that achieves energy savings and GHG emissions reductions at lowest practical cost, having regard to the Act's objectives as well as energy affordability, impacts on the Victorian energy grids and equity.

VEET Act objectives

The objectives of the *Victorian Energy Efficiency Target Act 2007* are to:

- reduce GHG 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 Act establishes the VEU program for this purpose. The program has already proven it can overcome financial and non-financial barriers to energy efficiency, drive innovation in the energy efficiency industry and reduce GHG emissions. While the Act sets out the framework for the program, details such as the types of upgrades (activities) to be incentivised, the program's overall ambition (target) and the program participants are determined by regulations. Choices for these determine the program's success at reducing emissions and driving energy efficiency (meeting the objectives). The program drives energy efficiency both by overcoming barriers to consumers investing in energy efficiency and by increasing the capacity and capability of the energy efficiency industry.

Objectives of the proposed Regulations

As a piece of subordinate legislation, the primary objectives of the proposed Regulations are to support the Act in a manner that:

- is consistent with the Act's objectives, and
- provides the greatest benefit for the Victorian economy.

While these are the primary objectives of any piece of subordinate legislation, the Victorian Government's broader policy objectives should also be considered when comparing policy options.

As discussed in the problem statement, key policy objectives for the government are to transition to net zero carbon emissions including a substantial shift to renewable energy (through the VRET), support energy affordability, and support local jobs.

These suggest the transition should be achieved:

- as quickly as possible, given the urgency of the climate change problem and yet at lowest cost and with as many co-benefits as possible, such as increasing comfort and healthy homes
- ensuring the security and stability of our energy supply systems;
- if possible, in a manner that keeps energy affordable; and
- equitably, so no Victorians are left behind.

Options

This section of the RIS establishes the options for setting targets for the VEU program and the treatment of large energy users. While it is not an option to do nothing (the base case) because there is a legislative requirement to set targets, it is possible to set a target of zero (the reference case). Options are assessed in relation to this reference case.

Multiple design features, such as the target size, target trajectory, eligible activities and type of participants are interdependent. To set future targets for the VEU program, choices need to be made about all these design features. While there are many combinations of design choices, it is only feasible to test a few of them formally in the upcoming Impact Assessment (the next section). The combinations that are feasible to test are referred to as formal options.

Because only a limited number of combinations could be tested formally, for some design features only one choice, the most feasible, is used for all formal options. This applies to the emissions factor used, the shortfall penalty and the way in which large energy users are defined. This section explains why the choice made in relation to these features was considered the most feasible.

Regarding eligible activities, it is not feasible to continue incentives for some lighting activities which are now considered business-as-usual.

Issues that are outside of the scope of this regulatory process, as they would require legislative amendments, include: exploring banded targets, changing the emissions metric to an energy metric or setting a ten-year target.

Base Case and Reference Case

RIS processes typically assess different regulatory and non-regulatory options with reference to a hypothetical 'base case', which reflects a scenario in which the government does not intervene. In this RIS, options are instead assessed against a 'reference case' in which the program has a net impact of zero on the economy. The reasons for this are outlined below.

Hypothetical Base Case

In the hypothetical base case, no new Regulations would be made and therefore, no VEU targets would exist for the 2021-2025 period. The technical and practical implications of not setting new targets would effectively mean termination of the VEU program. Retailers would no longer be liable to surrender certificates in April each year. This would mean certificates would have a value of zero and would no longer provide an incentive for upgrades to be undertaken. Given the Act clearly requires that annual targets be set every five years until 2030, this is not a realistic assumption. Instead, a hypothetical scenario in which targets of zero is assumed for the period 2021 – 2025.

Alternatively, it could be argued that since section 32 of the Act states that the GHG reduction rates (which impose the liability on retailers) are the same as for the previous year if not remade, the hypothetical base case should assume that the liability on retailers remains the same as for the 2020 target (effectively meaning the program's impacts are the same to those that result from the 2020 target).[67] However, in remaking these rates, the Minister must have regard to the scheme target for the year and therefore it is only rational to assume that, in the absence of targets, the Minister would remake these rates and set them to zero. For consistency, the hypothetical base case therefore assumes that the Minister would remake the rates and set them to zero.

Rationale for using a Reference Case

However, the impacts of the hypothetical base case are difficult to determine. The program is legislated to continue until 2029. Setting targets of zero would lead to costs imposed on those who have invested based on the legislated timeframe of the program. For example, businesses have been established expecting to provide incentives for 10 years and liable parties may have invested in certificates to meet future obligations. Additionally, the program supports 2,200 direct and indirect jobs and on average over 54 accredited

[67] The Governor in Council, on recommendation of the Minister, is required to publish a greenhouse gas reduction rate in a Ministerial Order annually under section 32(2) of the Act regardless of whether a new target has been set.

providers of activities (of which, many employ additional contractors to carry out work) are active in the program each month and these may be threatened.

Estimating the costs of the flow-on effects that come from closing the program is more complex than simply considering the potential losses of these jobs. Businesses that participate in the program are a key part of the supply chain for many energy efficiency products. A major change to their business models would have flow on impacts to the energy efficient product supply chain and the wider economy. As it is not feasible to consider an option that does not involve the program, the costs have not been evaluated in this RIS.

As noted above, under the base case of no targets from 2021-2025, it is expected there would be a net cost to the Victorian community. Due to the analytical complexity of estimating the base case directly, the RIS uses a *reference case* to compare options. This reference case assumes a neutral impact (i.e. total impact equals zero) is the result of a target of zero. This zero impact can be thought of as the upper bound of the possible base case, and therefore a conservative starting point for analysis. The reference case is not a hypothetical scenario, rather an analytical tool to allow for the consistent comparison of options. The choice of *reference case* allows the options to be assessed in this RIS to focus on key regulatory design considerations affecting the program including:

- the magnitude of the annual target
- the trajectory of the annual targets
- the types of activities to be prescribed in future for the purposes of creating VEECs
- emissions factors
- the types of consumers that can participate in the program
- the penalty for non-compliance (the shortfall penalty).

The best option will be the same, regardless of whether it is compared to the actual base case or the reference case. The only difference in choice of base case is that for all options, the net benefit would be greater if assessed against the base case compared to the reference case.

Regulatory Design Features for which only one choice is tested

Several choices can be made in relation to each design feature. Choices regarding the magnitude of the annual target will determine the emissions related benefits of the program, whereas options for the trajectory of the target, the types of activities and participating consumers will determine the exact cost at which a specific target can be met. Choices for emissions factors will determine the accuracy of the calculation of emissions benefits and choices about the shortfall penalty will be crucial to ensuring future compliance and success of the program.

It is only feasible to fully analyse costs and benefits of a limited range of options. As such, for some regulatory design features only one choice as to that feature is tested (the most feasible). This is the case for:

- emissions factors, which will be measured on an annual ten-year average basis
- shortfall penalty, which is set slightly above the maximum projected certificate price
- defining a group of large energy users for which program participation needs to be considered separately, as users that are energy and emissions intensive and trade exposed.

The rationale for these choices is briefly discussed below.

Emissions factors

The Act requires that the annual target is set in terms of tonnes of carbon dioxide equivalent GHG emissions avoided. As discussed further in the section on non-feasible choices (below), proposals from some

stakeholders to change the method of setting the target (i.e. to set it in terms of units of energy saved) are out of scope of this RIS as they would require legislative amendments and therefore these have not been assessed.

Energy efficiency upgrades result in primarily electricity or gas savings. To calculate the emissions avoided from such energy savings, emissions factors are used. Emissions factors represent the emissions per unit of energy for different fuel types. They allow for energy savings to be expressed in terms of emissions savings. When the 2016 to 2020 targets were set in 2015, the emissions factors for the period were determined to be 1.095 tonnes of carbon dioxide equivalent emissions per megawatt hour (tCO2/MWh) for electricity and 0.0552 tonnes of carbon dioxide equivalent emissions per gigajoule (tCO2/GJ) for gas.

Since 2015, changes in the electricity sector, including increased renewable energy uptake and the closure of the Hazelwood coal fired power station have significantly reduced emissions. The VRET and Solar Homes policies are projected to further rapidly reduce the emissions intensity of Victoria's electricity system over the period to 2030.

While the emissions factor for electricity is expected to be reducing significantly over the next 10 years, the emissions factor for gas is not expected to change substantially before 2030. However, green gas alternatives such as hydrogen and biogas may have an impact beyond this date (see Box 6 below).

Box 6: Hydrogen as an energy source in Victoria

There is a substantial amount of work occurring in Victoria to develop green gas alternatives such as hydrogen. While this analysis assumes hydrogen and other green gas options are not expected to have an impact before 2030, there are several projects which the Victorian government is supporting to drive the development of the hydrogen sector, including:

- The Victorian Hydrogen Investment Program which is supporting the development of the hydrogen sector through market testing, industry development and investment.
- Through Victoria's involvement as a member of the COAG Energy Council Hydrogen Working Group, which is developing a National Hydrogen Strategy that includes investigating opportunities for hydrogen in Australian gas networks.
- The Hydrogen Energy Supply Chain pilot project, which will see liquefied hydrogen produced from Latrobe Valley brown coal transported to Japan for use in fuel cell electric vehicles and power generation.

Where the program incentivises fuel switching it needs to account for these changes over time in the relative emissions intensity of electricity and gas. The program takes a technology neutral approach to incentivising low emissions appliances and accounting for the change in emissions over the lifetime of an appliance (either electric or gas) is required to avoid bias in this analysis.

For the purposes of target-setting, projected activities supported through the VEU program have a ten-year lifetime, on average. This means that an activity carried out in 2021 will reduce energy in 2021 and every subsequent year until 2031. The emissions impact of that activity is calculated as the total energy reductions over those years multiplied by an emissions factor that is the average of the emissions factors for those ten years.

For the purposes of target-setting, projected emissions factors are used to forecast the emissions that can be reduced by saving electricity or gas. Emissions factors are a key variable in determining the volume of emissions that can be reduced within a price bracket given the energy savings that result from certain activities. While there is some uncertainty involved in forecasting emissions factors, they are the best proxy available to determine whether it makes more sense to use an electric or gas appliance in order to reduce emissions over the lifetime of that product.

For the 2021 to 2025 period, increasing the uptake of renewables means a larger amount of electricity will need to be saved to abate one tonne of greenhouse gas and generate one certificate. This will increase the cost of generating certificates. This needs to be factored in to the level of the target to avoid significant increases in the costs passed through to consumers.

Marginal v Average Emissions Factors

There is also a choice that can be made in relation to the type of emissions factor to use, marginal or average:

- average emissions factor measures the decline in emissions intensity when the fuel composition of the entire dispatched generation fleet is taken into account,
- marginal emissions factor looks at the difference in the emissions intensity of the marginal generators. Marginal generator is the most expensive and therefore the last generator to be dispatched to meet demand. Theoretically, this is the generator that will not be dispatched if demand is lower.

Historically the program has applied marginal emissions factors. The argument in favour of using this emissions factor is that the practical result of energy efficiency measures is to reduce demand for electricity by a small portion, and thereby, would likely affect only the dispatch of marginal generators.

As more renewables enter the generation mix and introduce new patterns of operation (i.e., solar farms operating during the daytime), the difference in emissions intensity of marginal generators will begin to vary substantially at different times across the day and night. For instance, while the marginal generator in the middle of the day may be a solar or wind generator with no emissions intensity, the marginal generator during the evening peak on a dark winter's day may continue to be hydro or natural gas generator. As such, in future the emissions intensity of a marginal generator will change substantially depending on time of day. For a given year, the average of this marginal emissions factor then begins to imitate an annual average emissions factor. Accordingly, it is no longer considered appropriate to use a marginal emissions factor and the analysis in this RIS is based on average emissions factors.

In addition to this, future activities under the VEU program may increase demand at evening times of peak demand in Summer to align it with times of solar generation.

The average ten-year emissions factors for electricity from 2021 to 2025 will be:[68]

Current	2021*	2022	2023	2024	2025
1.095	0.8055	0.516	0.473	0.433	0.393

*The emissions factor for 2021 has been adjusted as midway between the current emissions factor and the 2022 factor to allow program participants to better transition to the resulting decrease in incentives available for existing activities.

As discussed above, the average ten-year emissions factor for gas will stay constant at 0.0552 kg of emissions/MJ of gas.[69] The Department will monitor emissions factors over the 2021-2025 period and make changes if necessary, keeping in mind that this would change the incentives offered for particular upgrades and that certainty in this regard is preferable.

Shortfall Penalty

The VEU program imposes a penalty on retailers that do not meet their liability (being a portion of certificates representing the overall target). This is a penalty not a price cap. The equation that determines the liability of energy retailers is:

$$liability = penalty\ rate\ x\ annual\ target$$

[68] These are based on departmental energy market modeling, taking into account established national policies and assuming the VRET and Victorian net zero emissions by 2050 target are met.

[69] Gas emissions factors include fugitive emissions.

The current Regulations prescribed a penalty rate of $50 per tonne of carbon dioxide equivalent emissions abatement for which an energy retailer is liable but does not deliver a valid VEEC.

To be an effective penalty, the price must be set meaningfully higher than the expected highest market price of VEECs for each target year (the marginal certificate price), to encourage compliance. In cases where the penalty rate is too low, it offers a disincentive for liable energy retailers to engage with the program. That is, the closer the penalty rate is to the anticipated market price, the greater the incentive to disengage with the program and pay the penalty rate rather than obtain VEECs.

Rather than being a punitive instrument, it is considered that the penalty should represent the cost to society for a retailer choosing to disengage from the program. As such, it makes sense to set it at the price to society of the benefit not being delivered. For each target year, the price per tonne of carbon dioxide equivalent emissions abatement for which a retailer is liable that is not delivered is:

$$\$\, penalty\ price = \$\%\ of\ total\ benefit\ expected\ for\ society\ per\ VEEC = \$\frac{Total\ Net\ Benefit}{Cummulative\ Target}$$

The current penalty exceeds the marginal cost of certificates traded by around 50 per cent. If the penalty price for the preferred option, determined by using the above equation, exceeds the estimated marginal cost of certificates substantially (more than 50 per cent) it may place an undue burden on those who make administrative errors, and this should be a minor consideration. Minor shortfalls have been recorded in the program by retailers who have suffered either a minor shortfall because of insufficient market liquidity or administrative errors on their part rather than an intent not to comply with the program.

To calculate the penalty price for the preferred option, the total net benefit and cumulative target for the preferred option needs to be known. These are explored in the Impact Assessment section. Therefore, the calculated price is only expressed further below.

Definition of exempt Large Energy Users

This section considers how this group of consumers should be defined but not what the new process for exemption should be, as this is considered in the following section on treatment of trade exposed large energy users. In defining exemption categories and criteria, the Department determined the most feasible option and applied this to all formal options that were tested.

Retaining the current exemption criteria is not feasible

The existing definition of large energy users is no longer feasible as it is based on an outdated database of street addresses for organisations in 2013 that were part of the EREP program that ended in 2014. The database does not accurately match up to existing businesses today and new businesses or businesses where the energy consumption has grown since 2014 are not captured by this static exemption list.

The EREP program also included businesses which consumed over 120 Megalitres of water in 2013. There is also no reason to continue to exempt large water users from an energy program such as VEU.

The proposed changes include a two-year transition period for energy users who are currently exempt and would no longer be so, to provide them the necessary time to undertake any renegotiations required with their energy retailer and to undertake energy upgrades and benefit from incentives under the program.

Energy intensive and trade exposed large energy users

As noted in the section on barriers, the energy transition is going to result in continued change in the energy systems and energy intensive businesses and in particular, energy intensive and trade exposed businesses have a particular vulnerability to change and need to be proactive in managing change.

A proposed two-year transition period is expected to be sufficient for most businesses to adjust to the end of the benefit they have been receiving under the current exemption framework. However, those businesses which are energy intensive and trade exposed businesses this have limited options to respond (by definition their energy usage is a large proportion of their operating expenses, and it is difficult to adjust their pricing

due to the markets they operate in). Therefore, these trade exposed, large energy using facilities require a more flexible approach to address their barriers to energy efficiency.

Analysis has shown that including all businesses in the VEU program would drive the largest emissions reduction given the energy upgrade opportunities available for larger energy users and notes that incentives available for bespoke facility and operation upgrades through the VEU program's project-based activities (PBAs). As noted in Box 7, these excluded large energy users have been benefiting from the program's positive impact on energy prices to date for free.

However, as noted in the section on barriers for large energy users, there are some users that are energy intensive (and therefore likely to incur a significant additional pass-through cost of the program) but also trade exposed.[70]

In defining these trade-exposed, large energy using facilities, the Department also considered the impact on users that would no longer be exempt, and this impact is further explored in Box 7 below.

Box 7: The impact on previously exempt facilities

To date, all exempt energy users have benefited from the VEU program despite the fact that they do not participate. The program leads to lower energy costs by lowering overall energy demand (and consequently wholesale electricity prices) and deferring investment in grid and generation infrastructure.

This program benefit is currently enjoyed by exempt energy users, but program costs are not passed through to them. As such, any users that were exempt from the VEU program and are no longer exempt may face an increase in energy costs (if they do not take advantage of incentives from the program to reduce their energy usage) relative to what was previously the case.

While previously exempt energy users face an increase in energy costs relative to their current costs, this does not mean the program has an overall negative impact on their bills. Historically, the program has reduced the price of energy, for all consumers. What this means is that the overall benefits these users will experience from the program will decrease from what is currently the case unless they participate. If they participate, they will save more than they used to on their energy bills.

A two-year transition period is proposed to ensure current exempt businesses that will no longer be exempt will have sufficient time to plan for these changes.

Definition to align with existing reporting requirements

While there are a large range of options to define exempt large energy user facilities, the desire to keep administrative burdens to a minimum is a key consideration. The proposed change will establish a new process for large energy users which will require them to identify as such to the program administrator, the Essential Services Commission, each year. This should as far as practicable align with the thresholds and reporting requirements for existing legislation summarised in Table 8 below.

Table 8: Alignment of large energy user requirements with existing reporting requirements

	Electricity	Gas
Energy use	A facility using more than 100TJ of either gas or electricity, consistent with current reporting requirements under the National Greenhouse and Energy Reporting (NGER) legislation	
Trade exposure	A facility undertaking an Emissions Intensive Trade Exposed (EITE) activity list that is actively maintained by the federal Department of Environment, consistent with the requirements for the Renewable Energy Target (RET)	A facility undertaking a manufacturing or mining activity, consistent with the ANZSIC code used by the Australian Taxation Office and the Australian Bureau of Statistics

[70] Only 17 large energy users are not emissions intensive and trade exposed.

Large energy using consumers that meet certain energy use thresholds are already required to provide their emissions and energy data to the Clean Energy Regulator as part of the national regulatory framework. The Department considers that it is most feasible to align the definition of 'large energy using consumer' and 'trade exposed consumer' to the national regulatory framework where possible, so that the VEU program regulator can use data already provided as part of this national process to satisfy itself as to whether a facility qualifies for the new exemption process.

A large energy using consumer[71] will be defined as a facility using more than 100TJ of either gas or electricity, which is consistent with current reporting requirements under the NGER legislation and consistent with the former EREP threshold. The Commonwealth's Safeguard Mechanism is also based on NEGR data, although it has a substantially larger threshold of 100,000 tonnes carbon dioxide equivalent (CO2-e) emissions in a financial year.

In determining what constitutes a trade exposed activity, the Department will consider the Emissions Intensive Trade Exposed (EITE) activity list that is actively maintained by the federal Department of Environment for the Renewable Energy Target (RET) and which has been adopted by NSW for their Energy Savings Scheme (ESS) – a similar white certificate scheme to the VEU program.

The RET only has a liability for electricity and not gas, therefore the Commonwealth list of EITE industries may not be up to date for EITE gas industries. It is proposed to supplement the Commonwealth EITE list with criteria for what is considered an energy intensive, trade-exposed activity that consumes gas. To ensure that no trade-exposed industries are excluded, the Department will consider that any gas consuming industry that is either a manufacturing or mining industry (by ANSZIC code) is considered potentially trade exposed.

Large energy consuming industries that are not considered trade exposed such as tertiary education and retail industries will no longer have an option of being excluded from the VEU program.

Exemption for energy, waste and water services

In addition to the exemption for large energy users, the current regulations also exempt sites consuming gas for electricity generation. It is proposed to expand the list of exempt categories to include:

- Gas consumed in the operation of gas pipelines and gas storage facilities connected to the interconnected national gas system, and
- Electricity consumed for the purposes of generating electricity for the National Electricity Market, by register participants in that market (such as at grid-scale batteries and pumped hydro facilities, but not behind the meter storage).

The remaining large energy users in ANZSIC category D (Electricity, Gas, Water and Waste Services) are water corporations, which are already have an existing program in place for reaching net zero emissions[72]. For this reason, it is proposed to also exempt facilities using over 100TJ of energy undertaking activities in ANZSIC category D.

Having defined the group of large energy users that require separate treatment, options for how they should be treated are considered in the subsequent section.

Regulatory Design Features for which multiple choices are tested

Choice of activity, participants, target magnitude and trajectory (how the target changes over time) are interdependent. For instance, while a choice to continue with a standard set of activities may be feasible for a choice of low target, it may not be very sensible together with a choice of a larger target as it would result in

[71] This excludes large energy users who 'consume' energy by storing or transporting it for the purposes of the national gas or electricity grid. Such users are never suitable for incentives under the program as they cannot undertake energy efficiency upgrades and provide a function for the grid. These users are exempted from the program under regulation 40 of the VEET Regulation, see section on exemption for energy, waste and water services.

[72] The government has set a goal of achieving a 42 per cent reduction in the water sector's emissions by 2025 and net-zero emissions by 2050. With Melbourne's four metropolitan water corporations are actively working to achieve net-zero 20 years ahead of schedule, by 2030.

a very high cost. The Department has identified that while multiple choices are feasible for different design elements only four combinations of these choices are sensible to test formally considering the likely cost that would result. These formal options are set out in Table 9. The costs and benefits of these options will be explored in greater detail in the Impact Assessment section of this RIS.

Annual targets will be set for a five-year period. In the table below the target magnitude is expressed as the total number of certificates required to be created and surrendered over the five-year period.

Table 9: Feasible Combinations of Regulatory Design Choices

	Option 1	Option 2	Option 3	Option 4	Option 5
Target Magnitude	Low 14.3 million certificates	Medium 20 million certificates	Medium-High 27.5 million certificates	High 34.5 million certificates	Very High 38 million certificates
Target Trajectory	Decreasing	Decreasing	Decreasing	Increasing	Increasing
Types of activities	Traditional energy efficiency activities	New activity types included	New activity types included	New activity types included	New activity types included
Participation	Large energy users are exempt from the program	Large energy users are exempt from the program	Large energy users can opt-out of the program after completing ISO50001	Large energy users can opt-out of the program after completing ISO50001	Large energy users can opt-out of the program after completing ISO50001

Target Size

The target size is equal to the number of certificates that are required to be surrendered to the government by energy retailers at the end of the year. Holding everything else constant, an increase in the target will increase the overall cost of the certificates traded under the program. This is because there will be a higher demand for these certificates by the government (and energy retailers) but the total amount of opportunities to create certificates within each price bracket stays the same. A larger demand for certificates will exhaust more opportunities and therefore require opportunities to be taken up that cost more. This means that the overall cost that retailers incur to meet their liability increases (the “cost of the program”).

The declining emissions factor, discussed above, will mean that a larger amount of electricity will have to be saved to avoid one tonne of greenhouse gas and therefore create one certificate. This means that comparable to the targets for 2016 to 2020, the same size target for 2021 to 2025 will represent a much larger level of ambition in terms of energy to be saved and the likely cost of the program.

In determining target size options to test, the Department considered:

- The cost of the program, and that it would be useful to see what the targets would be if this remained the same
- The net pass-through cost of the program (this concept is explored in Box 8) to participants and non-participants, and that it would be desirable to have a positive impact on energy bills

Energy affordability is one of the objectives under consideration when establishing the targets. It is therefore prudent to examine the overall impacts of a target size where there continues to be an overall bill reduction versus a more ambitious target which may result in an increase in bills. The

Department has conservatively estimated the point at which this may occur by using energy market data from early 2019 and its own forecast of opportunities for the 2021-2025 period

- The overall benefit of the program, once emissions and energy grid benefits are taken into account and that it would be desirable to have as large a reduction in GHG as possible.

Box 8: Pass-through costs, energy affordability and overall benefits to the economy

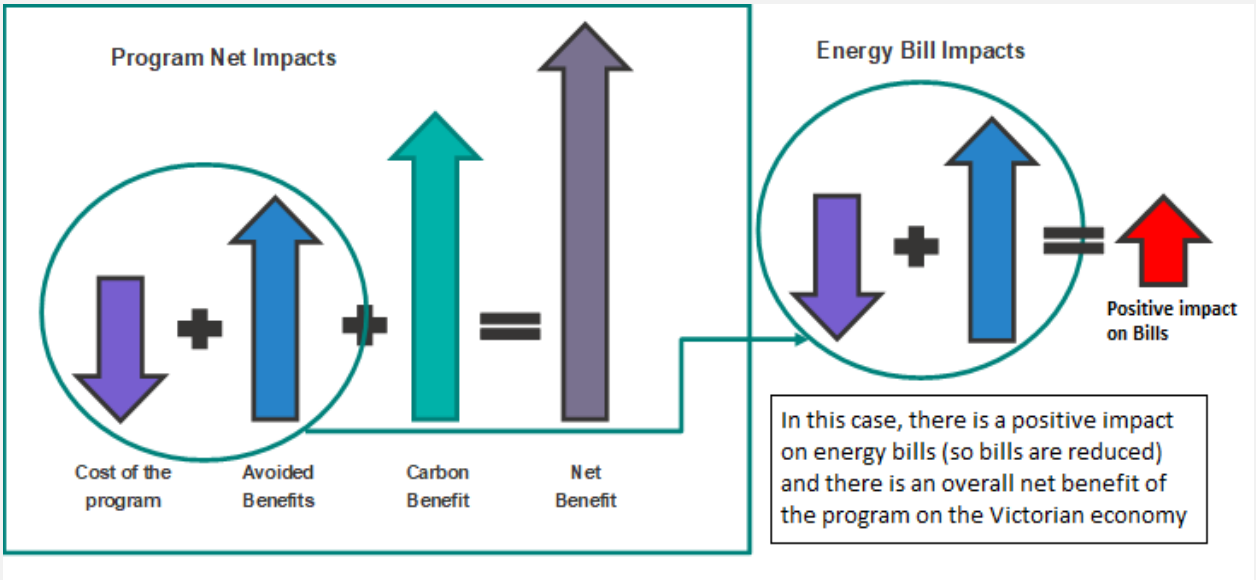
For the 2016-2020 period the annual targets required surrender of 30.2 million certificates. This set of targets was projected to deliver a net benefit in the range of $1.3 to $3.3 billion dollars, some of which has not yet been realised. The net benefit includes $1.3 billion in reduced energy market costs due to avoided infrastructure investment and fuel costs, to be delivered in a 25 to 30-year period. This exceeded the cost of the program, which accrues between 2016-2020.

The analysis found that passing on both the cost of the program and the energy market savings (within which there are wealth transfers that impact energy costs) to consumers would reduce electricity bills by an average of (0.91c/kWh) over 2016-2020, which is equal to an approximate reduction in bills by $45 per household.[73]

The benefits of avoiding GHG emissions are the largest benefits of the program – and there is a net benefit to the Victorian economy and indirectly to all Victorians. At some size of target, although there will continue to be a net benefit to the Victorian economy of the program overall given the environmental, social and health benefits of reducing emissions, the program may increase consumers' bills. The cost of abating emissions is paid through energy bills at this point. This is not necessarily inequitable, see section on equity below.

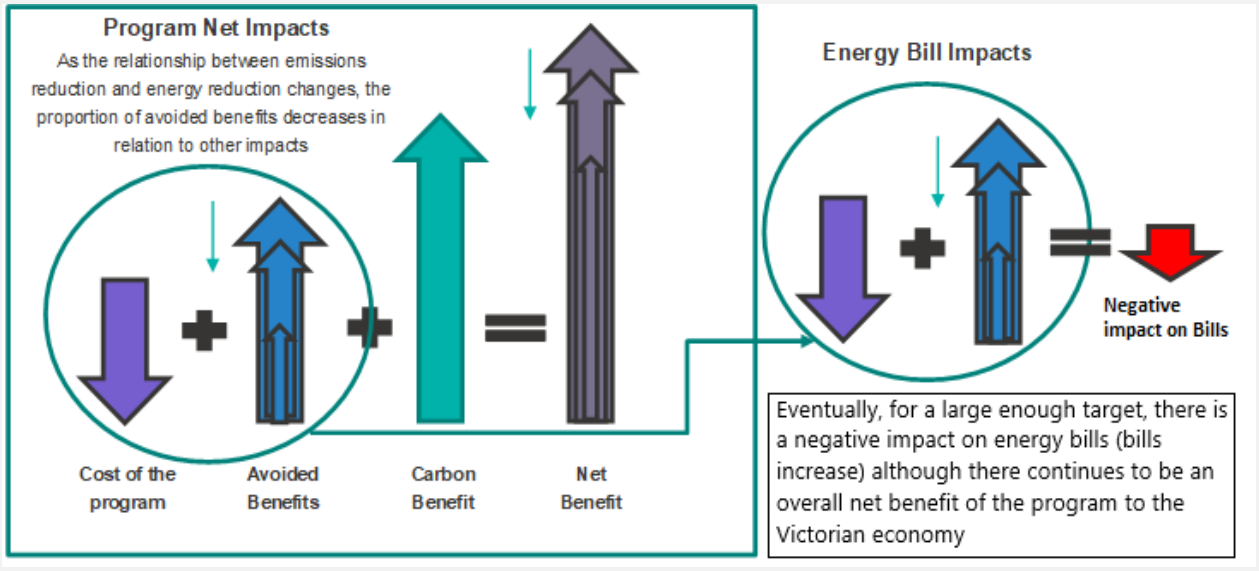
This is illustrated below in Figure 2 and Figure 3.

Figure 2: The projected relationship between emissions benefits and affordability in the case of a future high target in a scenario where emissions intensity stays the same.



[73] [73] Based on an annual consumption of a residential consumer of 4,596kWh, from: Australian Energy Market Commission, 'Price Trends' (Report, 21 December 2018) <https://www.aemc.gov.au/sites/default/files/2018-12/VIC%20fact%20pack.pdf>.

Figure 3: The projected relationship between emissions benefits and affordability in the case of a future high target in a scenario where emissions intensity decreases.



Target Trajectory Shape

The proposed Regulations are required to set annual targets for 2021-2025. However, the size of that target could be:

- static over five years, as was the case at the beginning of the program
- increasing slowly over the five years, as has been the case in recent times
- decreasing over the five years, reflecting a decrease in emissions intensity.

When the emissions factor of electricity decreases it requires a larger amount of electricity savings to generate the same emissions savings.[74] The projected emissions factor of electricity decreases sharply over the 2021-2025 period. If the target trajectory matches this emission factor trajectory, the energy savings required by the target will not increase as significantly each year. A similar ambition in terms of energy savings (i.e., a decreasing emissions target) requires a similar amount of activity to occur in the upgrades/VEEC market and would be easier for industry to adjust to and to understand. Low-cost opportunities to save energy are being exhausted over time making it more costly to save energy in each year. Because a decreasing emission target does not require a significant increase in energy savings for each year, this would minimise the cost of the program.

However, an increasing target – focused on increasing emissions reductions – may be more consistent with the need to transition to a low emissions economy and ensure that Victoria is on a pathway to achieving our net zero by 2050 Climate Change target.

It makes sense to combine choices for ambitious targets with the choice of an increasing trajectory. However, a decreasing trajectory that minimises cost should also be tested. This means the Department is assessing options that prioritise emissions reduction and also options that prioritise reducing costs and thereby energy bills for all Victorian's, even non-participants.

[74] While the emissions factor for gas will stay constant, the emissions factor for gas is considerably lower than that for electricity and therefore the majority of the target will need to be met by electricity savings.

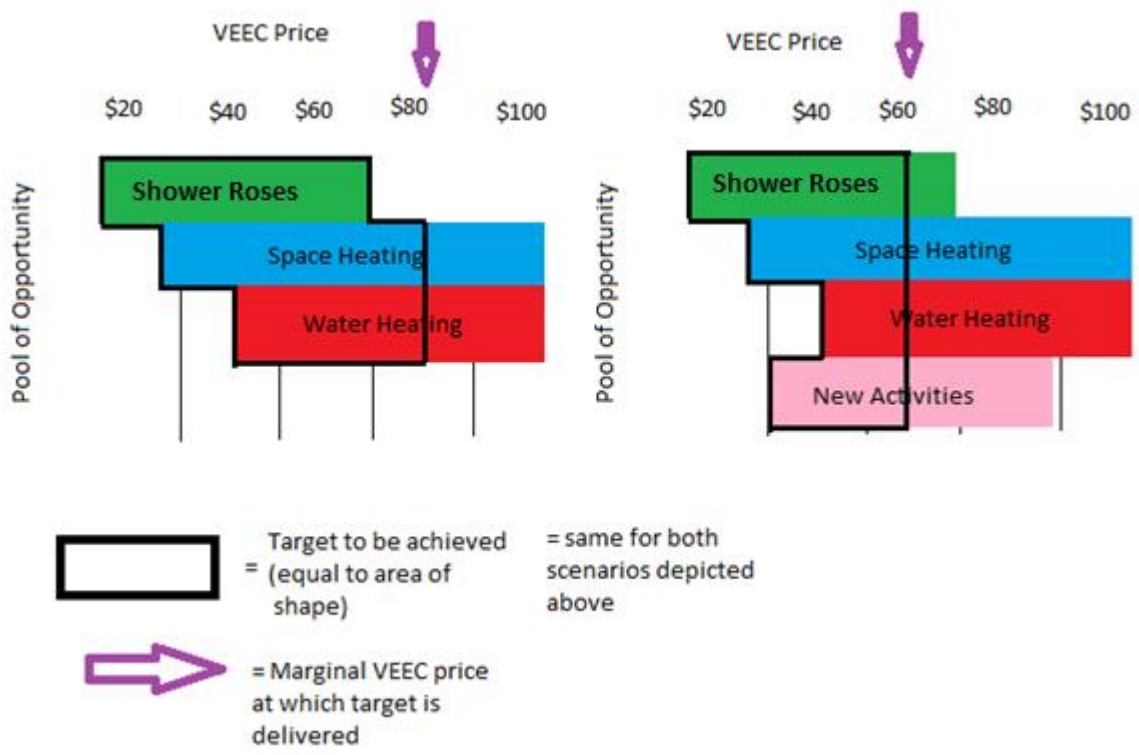
Choices for activity areas for the VEU program in 2021-2025

Section 15 of the VEET Act allows for certificates to be created for a broad range of activities including replacing inefficient equipment with efficient equipment, installing new high efficiency equipment and switching equipment from a high emissions fuel source to a low emissions fuel source.

For the past few years, most certificates under the program have been created through lighting upgrades. These opportunities have largely been exhausted and the installation of high efficiency LED lights is increasingly business-as-usual (this is discussed further in the non-feasible options section below). Therefore, there is a need to consider expanding the range of activities incentivised under the program.

Expanding the program by providing incentives for a greater variety of upgrades generally allows a higher target to be met at lower cost. Providing additional opportunities to reduce emissions expands the amount of abatement we can achieve for a certain certificate price, as long as additional opportunities also include low cost opportunities. This is demonstrated Figure 4.

Figure 4: The Impact of new activities on the cost of achieving the same target. While it is accurate that each category of activity has a range of associated costs, prices depicted are not reflective of current actual costs.



Currently, the program primarily focuses on incentivising activities that improve energy efficiency – i.e. by replacing a less efficient appliance with a more efficient one. There are new opportunities for energy efficiency arising through digital energy management. Digitalisation is one of the key trends for energy efficiency and the energy transition; the International Energy Agency (IEA) found that digitalisation and smart controls could reduce the energy use of buildings by 10% by 2040[75]. Digitalisation is likely to present a significant opportunity for the program to target between 2021-2025. Existing methods such as the residential in-home display method and the project-based activity methods currently provide limited incentives for digitalisation. Modelling shows that this is a rapidly growing area of low-cost energy savings and there is opportunity for the program to transform the 'smart' building sector in Victoria with well-designed

[75] International Energy Agency (2017) Digitalisation and Energy, see <https://www.iea.org/digital/#section-1>.

incentives. Standard practice for the program will be to develop new regulations to support this type of energy efficiency activity.

However, the program could be expanded to provide incentives for more than just traditional energy efficiency activities, in particular the following:

- Solar rooftop PV panels that are over 100kW
- Load shifting and storage activities that enable optimised use of private solar
- Fuel switching activities, including switching from gas to electrical products
- Smart charging infrastructure for electric vehicles.

While the framework for some of these activities will need to be set up in the Regulations at a later stage, the decision as to whether to expand into these areas does need to be made in order to determine the type of target that will be set. The choice to expand the program into areas other than energy efficiency is being tested in this RIS and is key to setting the target.

Rooftop solar systems

The Department considered a range of factors in determining that it was feasible to expand the program to provide incentives for rooftop solar PV systems over 100kW:

- Currently businesses contemplating the installation of solar photovoltaic (PV) systems larger than 100kilowatts (kW) on their roof to reduce the energy they are required to purchase from the grid do not have a program to support this. Systems larger than 100kW but less than 10MW have historically participated in the Large-Scale Renewable Energy Target (LRET); however, the value of the LRET incentive is predicted to drop dramatically in the next few years because projects have already been locked in to deliver the majority of the remaining target, and the current Commonwealth government has not expressed an intention to extend the target.[76]
- Other solar installations have existing programs available to support them. Eligible households can participate in the Solar Homes program and systems under 100kW can participate in the Commonwealth's Small-Scale Renewable Energy Scheme (SRES). Additionally, grid-scale systems over 10MW can participate in the Victorian Renewable Energy Target (VRET).
- Australia already has the highest per-capita deployment of distributed PV in the world[77] and that, for some businesses, it makes commercial sense to invest in solar panels even without incentives. Therefore, a steady uptake of solar over the coming years is anticipated as a matter of course (referred to as the 'business as usual' uptake).
- Incentives can bring forward these installations significantly while still accounting for the BAU uptake.

Solar optimisation

On-site solar generation can be installed together with a variety of other products that optimise the use of it on the site. These packaged upgrades work as follows:

- Solar panels are installed to generate solar energy in the middle of the day.
- Demand management software and products are used to shift the energy usage of the site to the middle of the day, where possible, and the solar energy generated onsite is directly used to satisfy this demand.
- Energy efficiency upgrades reduce this demand as much as possible.

[76] Australian Energy Market Commission, 'Price Trends' (Report, 21 December 2018) <https://www.aemc.gov.au/sites/default/files/2018-12/VIC%20fact%20pack.pdf>.

[77] International Energy Agency, Renewable Energy Medium-Term Market Report 2013, Market Trends and Projections to 2018. Paris, France: The International Energy Agency (IEA); 2013.

- Storage products such as batteries, thermal storage (hot water tanks or refrigerated spaces), and materials storage (such as frozen food) are used to capture any unused solar energy produced in the middle of the day.
- The energy stored during the day is then discharged once the sun has set, to power the remainder of the site.

The Department considered the following factors in determining that it was feasible to expand the program to provide incentives for optimisation of solar PV.

- Research suggests that the combined installation of solar PV optimisation measures with PV panels may lead to the installation of larger and more optimal PV panels, than would otherwise be the case. See Appendix 8.
- Renewable energy and load management, where solar panels are installed as part of a solar-optimising package, can significantly reduce the demand from the site, on the grid and during peak periods. When these measures are optimised to use renewable generation onsite, they can increase the total amount of renewable energy used by Victoria without requiring further upgrades to the distribution network, including investments to manage local voltage or thermal constraints. This means it could represent a cost-effective option to assist the integration of distributed energy resources as part of Victoria's energy transition. Flexible generators and loads can also provide additional benefits to the network by providing demand response to the grid, such as emergency and ancillary services, which increase the value stack for businesses investing in these technologies.
- While this type of demand-side flexibility is essential to both maximise the value of solar PV to commercial and industrial (C&I) businesses and facilitate its seamless integration with the electricity network and market, it is not commonly leveraged by Australian consumers, including C&I businesses.[78] There is agreement amongst a wide range of Australia's energy market institutions that there is significant untapped potential for low-cost load flexibility to improve efficiency, security and reliability of our energy system.[79]

Solar optimisation and electric vehicles

The Department considered it was feasible to expand the program to provide incentives for charging infrastructure associated with electric vehicles (EVs), to encourage electric vehicle owners or businesses to use smart, flexible chargers that would preferentially charge vehicles at times outside of peak demand periods e.g. during times when there is greater solar generation and less demand. Current forecasts for electric vehicle uptake in Victoria indicate much greater uptake after the 2021-2025 period and as such the Department does not envisage much uptake of this activity during the period under consideration. There are various options to manage peak demand risks that can be explored by the Department to ensure appropriate solutions are in place by the time there is significant EV uptake. The Department is not proposing that the program provide incentives for EVs at this time (see section on choices that are not feasible for testing below).

Fuel switching

As noted in the section on emissions factors, the relative emissions produced by electric and gas appliances over their lifetime is likely to change in the period 2021 to 2025. Victoria's electricity grid will substantially decarbonise over a typical 15-year lifetime of an appliance. This means that fuel-switching options which do not reduce emissions today, may do so over their lifetime and conversely options which reduce emissions now may not do so over the lifetime of the appliance. Our analysis indicates that, for the period 2021 to 2025, for several end-uses, switching from gas to electricity will result in both emissions savings and cost savings for consumers[80].

[78] See Appendix 8.

[79] ARENA/AEMO (2018) *Joint Response to AEMC Directions Paper Section 5: Wholesale Demand Response*; Australian Energy Market Commission (2018) *Directions Paper: Reliability Frameworks Review,* ,https://www.aemc.gov.au/markets-reviews-advice/reliability-frameworks-review./> ; Commonwealth of Australia (2017) *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, <https://www.energy.gov.au/sites/g/files/net3411/f/independent-review-future-nem-blueprint-for-the-future-2017.pdf>.

[80] See Appendix 6 and Appendix 7.

Electrification is just one potential pathway to decarbonising Victoria's gas use. As noted in the section on stakeholder views, some stakeholders believe that electrification represents the quickest pathway to decarbonisation and that the program should incentivise the replacement of existing gas appliances with electric ones. Other stakeholders strongly disagreed with this perspective and argued for a technology neutral approach.

The Victorian government is currently also examining the role of hydrogen (see Box 6), gas efficiency and biogas activities (see Box 9 for details for the VEU program). Given our objective for the energy transition to happen as quickly as possible given the urgency of the climate change problem, it is proposed that the VEU program expand the range of prescribed activities included under the program to, where practical, provide incentives for all these pathways on a technology neutral basis.

While in practice this expansion may promote switching from gas to electric products in some circumstances, this does not mean the program will cease offering incentives for the upgrade of gas technology. In fact, the range of incentives for gas efficiency is expanding, see Box 9 below. The Department takes a technology neutral approach that rewards upgrades-based activities that both reduce emissions and save consumers money on their energy bills. The consideration of costs will include system costs such as the infrastructure required to manage peak demand issues for both electricity and gas; these issues are considered as part of the multi-criteria analysis.

Box 9: Gas under the VEU program

The VEU program provides financial incentives to projects which can measure and verify emissions reductions through more efficient use of natural gas using the Measurement and Verification (M&V) method. The program also provided 'deemed' or up-front incentives for efficient residential scale water heaters and space heaters as well as commercial and industrial scale gas boilers, including six existing gas boiler efficiency activities. Research is currently underway to explore additional gas efficiency activities to strengthen the program.

The M&V method also supports fuel switching from natural gas to biogas. The program already has its first biogas M&V project at an 100% Australian owned beef processing facility in Tongala. They plan to capture and use biogas produced from waste in an on-site anaerobic digester to offset their current natural gas consumption. The project will save approximately 9,000 tonnes of CO2 equivalent emissions, creating heat and electricity in a new biogas fired cogeneration engine to power the site more sustainably.

Once the hydrogen industry in Victoria reaches commercial scale, the Department will examine opportunities to provide incentives for hydrogen-ready appliances, where this will reduce emissions and costs for consumers.

Treatment of exempt large energy users

Stakeholders expressed interest in the Department reconsidering the place for large energy users in the program. The Department has considered the particular requirements of trade exposed large energy users and determined that requiring them to pay the pass-through cost would have potentially significant impacts on the competitiveness of those businesses. The Department has therefore considered alternative options to address the barriers identified for these exempt large energy users undertaking energy upgrades. For other large energy users, the Department has determined that they should be included in the program. The proposed new definition of trade exposed large energy users will ensure that all businesses are clear in relation to their status (see the previous section on the definition of exempt large energy users).

The proposed exempt large energy users consume a material amount of Victoria's electricity and gas. From an emissions reduction perspective, it is therefore important to consider options which drive reductions in this sector. Additionally, exempt large energy using businesses are an important part of Victoria's economy and therefore it is important to support these businesses to address barriers they may face that prevent them undertaking energy upgrades and to support them in navigating the low emissions energy transition. The

Department has determined the criteria for defining exempt large energy users and recommends that these entities be exempt from the program.

The Department considers there are two choices to test in relation to this proposed exemption. The first is that these entities simply notify their intention to be exempt from the program. The second is to require them to implement a suitable energy management system as a basis for exemption from the program. The Department is not testing a choice that would exempt all large energy users, even those that are not trade-exposed. That means, under all proposed options, those large energy users who were previously exempt but are not trade exposed will no longer have the choice to be exempt from the program.

Energy Management Systems

Many of the barriers identified for exempt large energy users can be addressed through businesses implementing comprehensive energy management[81],[82]. The ISO 50001 Energy Management standard[11] provides a standardised framework for organisations to develop their energy management objectives, policies, measurement, reporting and planning capability for continuous improvement in energy management. The Department may also allow other equivalent energy management approaches. The structure of ISO 50001 standard is similar to the successful Energy Efficiency Opportunities (EEO) program which formerly operated as a national program.

Compliance with the ISO50001 standard carries a relatively small fixed cost for exempt large energy users and has been shown to significantly increase energy management (and lead to energy savings) of companies internationally. [83]

Changing from an opt-in to an opt-out process

Both proposed choices require trade exposed large energy users to opt-out of the VEU program, which is a change from the current process. This will simplify administration of the eligible participant register maintained by the ESC. Additionally, it will mean exempt large energy users must take the extra steps of considering the cost and benefit implications of the VEU program and make an informed decision about whether to participate.

Under both choices of exemption process, it is possible some users will decide not to opt out of the VEU program. However, the Department has proceeded conservatively and made the following assumptions:

- If trade exposed large energy users can opt out without implementing energy management, it is assumed they all will opt out
- If trade exposed large energy users can only opt out if they implement ISO50001 or energy management that meets an equivalent standard, it is assumed ten percent of them will choose to remain in the program.[84]

If more users decided to opt in to the program this would simply reduce the overall cost of delivering the program.

Option 1: Status Quo (similar activities, participants and cost)

Given that the proposals regarding large energy user participation and the inclusion of new activities are substantial changes to the program, the Department considers it necessary to include an option that makes a choice in relation to the possible size of target that can be achieved in the event these changes are not preferred.

[81] See, International Energy Agency reports: Energy Efficiency Outlook 2018: Analysis and outlook to 2040 and Energy Management Programmes for Industry, 2012

[82] United States Department of Energy (2019) Business Case for ISO50001, see: https://betterbuildingssolutioncenter.energy.gov/iso-50001/business-case

[83] The US Department of Energy has adopted ISO 50001 as a key tool to "build a culture of structured energy improvement that leads to deeper and sustained savings" https://betterbuildingssolutioncenter.energy.gov/iso-50001/what-iso-50001

[84] This assumption is based on the number of entities that will face a VEU program pass-through cost that is less than the average cost of implementing a new management system.

The status quo option – with no new activities and no additional requirements for trade-exposed large energy users – results in a low target that has a similar program cost to the present program (being the total cost at which certificates are delivered rather than the overall impact on the economy).[85]

The reason these choices as to activities and participation are only tested in combination with a low target include the decline of low-cost abatement opportunities and the substantial decrease in the emissions intensity of electricity (as discussed previously).

The status quo/low target option delivers significantly less emissions reduction than the current program targets (6.5 million tonnes of CO_2 in 2020) and these emissions outcomes are further reduced over the target period.

The low target option consists of:

- 4.42 million tonnes of CO^2 equivalent in 2021,
- 3.04 million tonnes of CO^2 equivalent in 2022,
- 2.58 million tonnes of CO^2 equivalent in 2023,
- 2.28 million tonnes of CO^2 equivalent in 2024,
- 2.05 million tonnes of CO^2 equivalent in 2025.

Option 2: New Activities

It is only feasible to combine a larger target option with a proposal to expand the range of activities for which incentives are provided under the program.

The Department undertook a preliminary pass-through cost analysis (see Box 8) to determine the target magnitude that is feasible in combination with these new activities– on the basis that consumers that do not participate in the program continue to save on their energy bills.[86]. The feasible target option to assess in further detail is a target of 4 million on average but with a downwards trajectory, in line with the decreasing emissions intensity:

- 5 million tonnes of CO^2 equivalent in 2021,
- 4.1 million tonnes of CO^2 equivalent in 2022,
- 3.8 million tonnes of CO^2 equivalent in 2023,
- 3.6 million tonnes of CO^2 equivalent in 2024, and
- 3.5 million tonnes of CO^2 equivalent in 2025.

Option 3: New Participants and Energy Management for Large Energy Users

If trade exposed large energy users are required to implement ISO50001 in order to be exempt, a small proportion may choose to participate in the VEU program instead.[87] Expanding the pool of participation in the program similarly expands the total pool of opportunity and allows a larger target to be met at the same cost.

The Department considers that a feasible option to assess is the largest target size that can be met that delivers an overall neutral impact on energy bills (with new activities and some additional participation by trade-exposed large energy users). The Department has been conservative regarding preliminary estimations on what the likely impact on energy bills will be – therefore it is likely that formal assessment of this option will actually continue to deliver energy bill savings. This can be achieved by the following targets:

- 6.5 million tonnes of CO^2 equivalent in 2021,

[85] The cost of delivering certificates under the program for the 2016-2020 target period was $120 million. Despite this cost, there was a net benefit of the program during this period.

[86] This was based on the best data available to the Department at the time.

[87] Conservative assumptions were made (only 10% uptake assumed). If uptake is higher, costs of the program would simply be lower.

- 5.6 million tonnes of CO^2 equivalent in 2022,
- 5.3 million tonnes of CO^2 equivalent in 2023,
- 5.1 million tonnes of CO^2 equivalent in 2024, and
- 5 million tonnes of CO^2 equivalent in 2025.

Under this option the costs and benefits of requiring large energy users to undertake energy management are also explored.

Option 4: Ambitious Increasing Target

The Department considers that it is necessary to examine an option that improves on current emissions reductions given the critical nature of combating climate change. This option provides a net benefit to the economy but will have an overall minor negative impact on energy bills for non-participants.

The current ambition (and trajectory) in terms of emissions is continued:

- 6.5 million tonnes of CO^2 equivalent in 2021,
- 6.7 million tonnes of CO^2 equivalent in 2022,
- 6.9 million tonnes of CO^2 equivalent in 2023,
- 7.1 million tonnes of CO^2 equivalent in 2024, and
- 7.3 million tonnes of CO^2 equivalent in 2025.

Under this option the costs and benefits of requiring large energy users to undertake energy management are also explored.

Option 5: Very Ambitious Target

While providing a net benefit to the economy, this option will have a large impact on consumer energy bills. It may be that it is acceptable for the program to have a greater impact on energy bills providing that this is driving deep energy upgrades by consumers and delivering significant emission reductions.

The Department considers it necessary to examine an option that relies on consumers undertaking most of the identified energy saving and emissions abatement opportunities (many of which have a higher cost).

- 7 million tonnes of CO^2 equivalent in 2021,
- 7.4 million tonnes of CO^2 equivalent in 2022,
- 7.7 million tonnes of CO^2 equivalent in 2023,
- 7.9 million tonnes of CO^2 equivalent in 2024, and
- 8 million tonnes of CO^2 equivalent in 2025.

Under this option the costs and benefits of requiring large energy users to undertake energy management are also explored.

Choices that are not feasible for assessment in this RIS

Continuing existing incentives for certain lighting upgrade activities

Section 15 of the Act requires that GHG savings would not have occurred without the program (that is, they must be additional). The replacement of certain types of inefficient lighting with efficient light-emitting diode (LED) lighting is increasingly occurring without the program, specifically:

- From 2020, changes to the National Construction Code raise the required efficiency of lighting for new and refurbished commercial builds to a level that can only be met by LEDs
- From 2022, halogen general service lighting will be phased out under the Commonwealth MEPS process
- Mercury containing lamps will become increasingly less available as most countries which manufacture these lamps are signatories to the Minamata Convention on Mercury.

For those types of lighting upgrades that are likely to occur regardless of the program, it is not feasible for the Department to continue offering incentives for these lighting upgrades. If this continues, the benefits of the program would not be realised. The proposed approach to the phase-out of incentives for lighting is discussed in the implementation section and will be consulted on separately.

As the program has been operating for ten years, many Victorian households and businesses have already undertaken lighting upgrades, which have been included in the program for some time. Many of incentives which are proposed to be phased out are reaching or expected to reach a saturation point by 2021.

Ten-year targets

The Department considered setting targets for a ten-year period, rather than a five-year period. Setting targets for a longer period may provide more certainty for program participants and enable participants to plan more coherently for future periods. However, forecasting the opportunities available for 2026-2020 to the degree necessary to enable sound target options to be developed, is not considered possible given the inherent uncertainty that exists in the energy market.

Changing the target metric

The Department considered whether it was feasible to change the target metric from tonnes of emissions abated to units of energy saved, after it was suggested by numerous stakeholders. This would be a significant challenge as the target metric is established in the Victorian Energy Efficiency Target Act 2007. An amendment to the Act was not considered feasible in the time frame in which targets were required to be set. Further, such a change would make a significant statement about the purpose of the program going forward. It would indicate that the program's primary purpose is not to reduce emissions but to reduce energy consumption. The Department remains committed to investigating these issues in the future and the role the Victorian Energy Upgrades program plays in the energy transition.

Electric Vehicles

Current forecasts for electric vehicle (EV) uptake in Victoria indicate much greater uptake after the 2021-2025 target period. The Department considered whether it is feasible to explore the number of opportunities for electric vehicles and other low emissions vehicle technology. It takes considerable resources to explore the cost and number of opportunities for new areas. Due to the forecast uptake of EVs, it was not considered feasible to undertake an extensive analysis of the opportunities and their cost in the time frame in which targets were required to be set. The Department did explore opportunities for promoting smart chargers for consumers with solar panels as part of its solar optimisation work.

Further, incentives to increase EV uptake require careful strategic planning to ensure the necessary infrastructure and energy is available to meet anticipated increases in demand. Incentives for EV charging infrastructure, which promote managed charging for EVs and use of on-site solar rather than grid electricity, were considered beneficial under any strategy. Government is intending to release a zero-emissions vehicle roadmap by mid-2020 in which it will investigate barriers and potential solutions to address electric vehicle uptake.

The Department will continue to consider the place of electric vehicles in the VEU program in the coming years to complement the government's overall strategy on zero emissions vehicles.

Vulnerable Consumers

The Department is committed to considering the impact of the different target options on vulnerable consumers. This RIS examines these issues in the multi-criteria analysis in the next section.

The Department has also considered other mechanisms to address the needs of vulnerable consumers, including establishing a priority target. This would ensure a greater proportion of incentives (and program benefits) is delivered to vulnerable consumers and provide both bill savings and comfort and health benefits. This remains an ongoing issue for investigation. However, it requires an amendment to the VEET Act and therefore the Department has determined that it is not a feasible solution as part of this RIS process. However, the Department is committed to exploring options, as a further element of work outside the scope of this RIS, to support participation and mitigate the program's impact on vulnerable consumers with a view to introducing additional measures prior to 2023 when impacts may be felt.

Impact Assessment

This section of the RIS assesses the costs and benefits of the five main options identified in the previous section. The costs and benefits of each option are those that are incremental to what would occur under the reference case. Some costs and benefits have been monetized and are explored in a formal Cost-Benefit Analysis (CBA) whereas others are difficult to quantify and discussed qualitatively in a Multi-Criteria Analysis (MCA). The conclusions from this analysis are set out in the next chapter of this RIS.

Modelling the base case and options

The Department commissioned numerous consultants to investigate the low-cost abatement opportunities for different types of activities or different sectors, and to model:

- the certificate prices likely under each scenario/option; and
- the number of certificates created for each activity type.

The relevant consultants are:

- Energetics for the Commercial and Industrial energy efficiency opportunities – see Appendix 3
- Beletich Associates for the lighting opportunities – see Appendix 4
- Sustainability Victoria for the residential energy efficiency and fuel switching opportunities – see Appendix 5
- Strategy, Policy & Research for the industrial and commercial fuel switching opportunities – see Appendix 6 and Appendix 7
- Institute of Sustainable Futures (University of Technology Sydney) for opportunities to optimise use of rooftop solar behind the meter in commercial and industrial premises – see Appendix 8
- Energy Consult for smart technology opportunities for residential premises and offices and opportunities to optimise use of rooftop solar in residential premises including the installation of smart charger for electric vehicles – see Appendix 9
- Green Energy Markets for opportunities to install medium scale rooftop solar systems behind the meter on commercial and industrial sites – see Appendix 10.

The Department combined all the models to determine the total cost of certificates in delivering each option. The total cost of certificates is equal to the cost of purchasing as many certificates as are required to meet the annual target. Being market based, the certificate price also incorporates administrative costs to APs[88] and, to some extent, retailers. The cost of certificates also includes the $1 certificate creation fee, which covers ESC's costs in administering the program. The certificate fee (and hence its impact on certificate prices) is not affected by the proposed Regulations.

The model included industrial energy efficiency opportunities, some of which may occur at sites belonging to trade-exposed large energy users, who can opt out under each of the assessed target options. As discussed in the section on treatment of exempt large energy users, assumptions were made on the number of such users who would choose to remain in the program under the different target options. For options one and two where trade exposed large energy users would have the choice of opting out of the program without implementing energy management, it was assumed all such users would opt out. For options three to five where trade exposed large energy users were required to implement energy management if they chose to opt out, it was assumed ten percent of these companies would choose to remain in the program.[89] Because of this, all opportunities that were identified for sites belonging to trade exposed large energy users were excluded from the model for options one and two whereas ten percent of them were included for options

[88] Administrative costs to retailers have not been separately estimated as these are not expected to vary across the options considered (as they would still need to purchase certificates in the market, surrender certificates to ESC, and provide reports annually).

[89] As discussed, the assumption on the number of trade exposed large energy users that would choose to remain in the program is based on the number of large energy users that are likely to have a pass-through cost that is less than the cost of getting accredited to ISO50001. Such users would pay more upfront if they opt out and would additionally not be able to access incentives under the VEU program that will allow them to undertake energy efficiency upgrades more cheaply.

three to five. The Department had incomplete information on all the opportunities available on such sites, therefore this is a conservative assumption.

The combined model of the pool of opportunities also allowed the Department to determine the electricity and gas savings over time under each option.

Further, the department commissioned Jacobs to model the impacts of the base case and the alternative options in relation to:

- the likely abatement of pollutants; and
- the impact of reduced energy demand on industry costs (fuel costs, investment in generation and network capacity) – see Appendix 11.

Finally, the Department commissioned Regulatory Impact Solutions to undertake the quantitative cost-benefit analysis (CBA) of the options. The outcomes of this are discussed in the next section.

Some costs and benefits can be quantified, whereas others are too complex to attempt to cost but nevertheless are important to consider. To allow for both a quantitative and qualitative assessment, the Department decided to undertake a multi-criteria analysis (MCA). The MCA incorporates quantitative results from the CBA and uses information from the Department's analysis of opportunities. It places the greatest importance (weighting) on the results from the CBA but also explores the impact of the options on the following criteria in order of significance:

- energy affordability
- non-quantifiable impacts on electricity and gas grids
- innovation; and
- equitable distribution of incentives.

These criteria all stem directly from the suite of objectives explored earlier in the RIS and a discussion of how they were weighted is below. Through its analysis of the options against these criteria, the MCA identifies the preferred option for addressing all the objectives.

Costs and Benefits of Options

By setting a program target, energy retailers will be liable to purchase and surrender a certain number of VEECs — so for each option there is a total cost of certificates purchased. Retailers also incur additional administrative costs (in addition to the price of certificates purchased) such as the costs related to purchasing certificates (the time to purchase) and providing information for ESC. There are also other costs to government of administering the program, although it should be noted that some of these are then recovered in fees.[90]

The obligatory surrender of certificates creates demand for certificate creation, which has the benefits of reducing the total energy needed to be supplied to households and businesses. This reduces total costs on the energy sector (through lower costs of generation and supply, and need to add capacity), and provides environmental benefits by lowering greenhouse gas emissions and improving air quality due to lower energy generation.

The following table summarises the estimated costs and benefits of each option. This is the net cost/benefit to the community as a whole.[91] See Appendix 12 for a description of the methodology and assumptions used to derive these estimates.

[90] The Department will be remaking fees in the next few years, and how these fees are recovered will be explored fully in the associated Regulatory Impact Statement at that time.

[91] Distributional impacts are discussed separately below.

Table 10: Costs and benefits of assessed options ($million, NPV[92] to 2050)

	Option 1	Option 2	Option 3	Option 4	Option 5
Costs					
Costs of certificates	452.5	432.6	918.5	1,705.3	2,355.0
Administrative costs to energy retailers	8.1	11.2	15.3	19.0	20.9
Government costs of administering scheme	26.5	27.8	29.5	31.1	31.9
Costs to large energy users[93]	-	-	3.4	3.8	4.3
Benefits					
Abatement of greenhouse gases	937.1	1,288.3	1,850.3	2,299.7	2,567.6
Improved air quality	185.7	186.6	237.8	223.8	190.2
Energy system savings	1,633.0	2,258.8	3,217.4	3,914.8	4,340.8
Net benefit	**2,268.7**	**3,262.1**	**4,338.8**	**4,679.1**	**4,686.5**

Table 11 sets out other ways to consider the costs and benefits of the options.

Table 11: Other measures of the impacts of each option

Measure	Option 1	Option 2	Option 3	Option 4	Option 5
Benefit-cost ratio	5.7	7.9	5.5	3.7	2.9
Cost per tonne of CO_2 abated ($/tonne CO_2)	30.1	20.9	29.8	43.4	53.1
Measure of energy system-only net benefits[94] ($million)	1,145.9	1,787.3	2,254.1	2,159.4	1,933.0
Volume of GHG abated (million tonnes CO2e)	16.2	22.6	32.4	40.6	45.4
Volume of energy reduced (GWh)	54,933	88,429	127,029	165,117	189,107

One of the key measures in the cost benefit analysis is the value of the GHG emissions abated or avoided. Table 12 sets out the emissions avoided for each of the options:[95] While energy savings in 2030 due to activities carried out during 2021-2025 are actually greater than in 2025, they represent less emissions abated due to the decrease in the emissions intensity of the electricity grid between 2025 and 2030.

Table 12: Emissions avoided for each option

	Option 1	Option 2	Option 3	Option 4	Option 5
Cumulative emissions avoided	16.2 MT	22.6 MT	32.4 MT	40.6 MT	45.4 MT

[92] Using a real discount rate of 7%. Sensitivity to discount rate is discussed below.

[93] This is the costs to large energy users who opt-out of participation in the scheme under options 3 and 4. The cost is the estimated cost of undertaking ISO50001 certification.

[94] This is the net benefit excluding the benefits of abated greenhouses gases and improved air quality. In other words, it is the net impact on the costs of the energy sector, and an indicator of the impact on average energy bills.

[95] These are slightly greater than certificate numbers as they match annual energy savings against annual emissions factors, rather than working on ten-year average emissions factors and the assumption of ten-year lifetimes for activities (which is slightly conservative but will be how activities are 'deemed' to contribute to emissions reductions). Further, options 3 to 5 include assumptions about energy savings and emissions savings that may come from energy management requirements imposed on large energy users.

Emissions avoided in 2025	1.74 MT	1.95 MT	2.88 MT	3.45 MT	3.64 MT
Emissions avoided in 2030	0.85 MT	1.37 MT	1.80 MT	2.13 MT	2.36 MT

The estimated impacts are sensitive to a number of input assumptions. Based on upper and lower ranges for these assumptions (see Appendix 12), Table 13 and Table 14 compare the central estimate of net benefit to the potential worst case and best-case scenarios.

Table 13: Sensitivity to input parameters (net benefit, $million NPV)

Scenario	Option 1	Option 2	Option 3	Option 4	Option 5
Central case	2,268.8	3,262.1	4,338.8	4,679.0	4,686.5
Worst case	2,044.4	3,008.7	3,933.7	4,103.5	3,986.8
Best case	2,468.7	3,498.9	4,691.9	5,139.0	5,215.9

This suggests that option five provides for the highest net benefit under the central and best-case scenarios. Under the worst-case scenario, options three, four and five are broadly equal given the inherent uncertainties in the modelling.

As the estimates above are expressed in net present value terms, the estimates are also sensitive to the choice of discount rate. The following table compares the net benefit of each option using a different discount rate (see Appendix 12 for discussion on appropriate discount rates).

Table 14: Sensitivity to discount rate (net benefit, $million NPV)

Discount rate (real)	Option 1	Option 2	Option 3	Option 4	Option 5
7%	2,268.8	3,262.1	4,338.8	4,679.0	4,686.5
10%	1,759.2	2,472.5	3,266.4	3,404.2	3,323.9
4%	3,012.1	4,433.1	5,938.8	6,632.7	6,810.2

Based on the analysis of costs and benefits, and taking into consideration the sensitivities of the estimates, option five is expected to deliver the highest net benefit of the options considered. In terms of absolute impact on the Victorian community, option five gives the greatest quantified expected net benefit of $4.7 billion (NPV over 30 years). In the event the assumptions included in the model are worse than anticipated, option four would provide a higher net benefit.

Option five delivers the highest net benefit using a 4 per cent and 7 per cent discount rate. Under a 10 per cent discount rate scenario, option four is marginally better than option five however it is unlikely that this discount rate will reflect the true opportunity cost of capital in the foreseeable future and therefore represents an unlikely boundary of the estimates. Therefore, it is reasonable to conclude that option five is the preferred option under all discount rate scenarios.

Multi-Criteria Analysis

In addition to the CBA above, options were evaluated against objectives in a multi-criteria analysis (MCA) framework to assess how they meet the objectives for the proposed Regulations. These criteria are derived from the objectives stated earlier. The MCA criteria are:

- CBA: the net benefit determined by the CBA.
- Energy affordability: That there is no unreasonable impact on energy affordability for consumers that do not participate in the program. This is a result of how costs are shifted between segments of the energy market i.e. consumers, retailers and generators.
- Energy grid impacts: That this policy supports the lowest-cost decarbonisation pathway for the electricity system to incorporate increased uptake of renewables and increased distributed energy.
- Innovation: That this policy best supports ongoing innovation in the energy efficiency industry to ensure that there continue to be new low-cost opportunities to reduce GHG emissions and efficiently use energy.
- Equitable distribution of program benefits: That the distribution of the benefits of the program is equitable across a variety of sectors (businesses and households, metropolitan regions and regional areas, low income sectors)

All objectives were considered desirable and as capable of influencing the decision regarding the selection of the target. However, some objectives have more influence on the final decision than others. In particular, the net benefit of the options is paramount and weighted accordingly.

Energy affordability is a key government objective. Given the residual problem, the benefits and costs of the energy transition could be unevenly distributed unless action is taken. As discussed earlier, as well as the fact that one of the strengths of the VEU program historically has been its ability to make energy more affordable, particularly for people who carry out energy efficiency upgrades.

The residual problem also established that emissions reduction policies have led to further renewables and that the speed at which this has occurred could increase the costs for grid infrastructure. Given the theoretical capacity of the VEU program to further reduce emissions and address some of the challenges associated with more small scale and large-scale renewables, this is considered the next most important objective.

While additional innovation is less critical in resolving the residual problem, it is a legislative objective for the program and can assist to drive market transformation in the energy demand management industry, which can reduce the costs of the program. It is considered as desirable as equity.

Equity, while not an explicit objective of the VEET Act, is always highly desirable. This is particularly the case in the context of a problem such as climate change that impacts all Victorians.

Table 15 summarises the outcome of the MCA. Each option received a score from -10 to 10 when compared to the reference case, which would score 0 on all fronts. Objectives were then weighted as set out in Table 16 and the weighted score is set out in the last column on Table 15.

Table 15: Multi-Criteria Analysis scores for options for 2021-2025 VEU target

Option	CBA Outcome	Energy Affordability	Energy Grid Impacts	Innovation	Equitable distribution of benefits	Weighted total
Option 1	4.36	7	1	5	3	**64.5**
Option 2	6.26	8	5	4	7.5	**92.7**
Option 3	8.33	6	7	6.5	9	**106.15**
Option 4	8.99	5	9	8	8.5	**112.15**

Option 5	9.00	-2	9.5	8.8	8	**86.03**

Table 16: Multi Criteria Analysis Weightings

	CBA Outcome	Energy Affordability	Energy Grid Impacts	Innovation	Equity/ Fairness
Weighting	5	4	2.5	1.6	1.4

The rationale for scores is considered below.

CBA Outcome

The outcomes of the CBA are presented above. In scoring the outcomes, it was considered that since 0 suggest a net benefit of 0, each option would be awarded a positive score depending on its proportional net benefit.

Table 17: Raw MCA scores of target options based on their CBA outcome

Option 1	Option 2	Option 3	Option 4	Option 5
4.36	6.26	8.33	8.99	9

The CBA looks at the overall impacts of each of the options on the economy and does not separate these impacts by sector, see Box 10 below for more detail.

Box 10: Whole of economy benefits versus private benefits of energy efficiency

The CBA considers the energy system benefits of energy efficiency – including the avoided fuel consumption and the deferred need to build new infrastructure. The private benefits of energy efficiency for energy consumers are large than this.

As a result of the VEU program, there are significant transfers of value between different parties in the energy system, including between energy companies and consumers of energy. For example, at times of peak demand prices may spike, which ultimately results in higher energy company profits and higher energy bills for consumers. If these price spikes are avoided, this represents a transfer of value from energy companies to consumers. Additionally, supply and demand dynamics means that the reducing demand will reduce the price, particularly for the electricity wholesale market where the price varies considerably with demand. [96]

These transfers of value between parties in the energy system cancel each other out in the CBA. Consumer save on their bills because of both the transfers between parties and because of the energy system benefits discussed above (e.g., the avoided investment in distribution and generation infrastructure). The analysis below examines the total impacts on bills, as this is of most interests to stakeholders, however MCA scores have been adjusted to account for the value already given in the CBA to energy system benefits.

[96] Although how supply and demand dynamics impact the price will depend on the competitiveness of the retail market.

Energy Affordability

The cost of the program is passed-on by energy retailers to energy consumers during 2021-2025 and therefore it is important to consider the impacts of the proposed target on consumer energy bills and energy affordability. During 2021-2050 the energy savings delivered under the proposed targets also lead to energy market benefits and wealth transfers that reduce energy bills (see Box 10).

For each of the options, this section assesses the overall impact on energy bills and prices as well as the volatility (how extreme the annual fluctuations are) of energy retail prices for each of the options.

Table 18 provides a summary of how each option was scored for affordability, with detailed further discussion below. In determining the final score, all impacts were considered although the greatest factor was the price fluctuations including how large bill impacts were in any one year on non-participating consumers.

Table 18: MCA scores for VEU Target Options for Energy Affordability

Option	Score	Explanation
Option 1	7	*Energy Bills of non-participants:* This option reduces energy bills for all energy consumers. Between 2021-2050, these consumers may save $125 in total. *Electricity and Gas Prices*: Under this option, electricity prices for industrial consumers are reduced most but gas prices are reduced least. Residential and small business electricity retail prices reduce to a similar degree as under options two and three and gas prices for these sectors are impacted marginally in a similar manner as for the other options. *Energy Bills of Participants:* Under this option, all residential participants save, to a similar degree as under option two but by less than the other options. Participation may decrease. *Volatility:* Price fluctuations are minimal.
Option 2	8	*Energy Bills of non-participants:* This option reduces energy bills for all energy consumers most, even those who do not participate. Between 2021-2050, these consumers may save $174 in total. *Electricity and Gas Prices*: Under this option, electricity and gas retail prices for industrial consumers are reduced, by more than for some options but not as much as for other options. Residential and small business electricity retail prices reduce to a similar degree as under options one and three and gas prices for these sectors increase marginally and in the least. *Energy Bills of Participants:* Under this option, all residential participants save, to a similar degree as under Option one but by less than the other options. Participation may decrease. *Volatility:* Price fluctuations are minimal.
Option 3	6	*Energy Bills of non-participants:* This option reduces electricity bills for all energy consumers most, even those who do not participate. Between 2021-2050, these consumers may save $125 in total. *Electricity and Gas Prices*: Under this option, electricity and gas retail prices for industrial consumers are reduced, by more than for some options but not as much as for other options. Residential and small business electricity retail prices reduce the most but to a similar degree as under options one and two and gas prices for these sectors increase marginally, more than for options one and two but less than under options four and five. *Energy Bills of Participants:* Under this option, residential participants benefit the most. It is uncertain whether participation will increase or decrease. *Volatility:* Price fluctuations are minimal.

Option 4	5	*Energy Bills of non-participants:* This option has a slightly increased total cost for residential energy consumers who do not participate in the program – estimated at $67 in total over the period 2021-2050. *Electricity and Gas Prices*: Electricity prices for all sectors will decrease but not as much as for options one, two and three. Gas prices for households and SMEs will increase, although not as much as for option five. Gas prices for industrial users will decrease more than for options one, two and three although not as much as for option five. *Energy Bills of Participants:* Under this option, all residential participants save, to a similar degree as under option three. However, participation rates are expected to increase and the average impact over 2021-2030 is neutral. *Volatility:* Yearly fluctuations in bill impacts and prices for residents are likely to be minimal apart from during the 2023-2027 period.
Option 5	-2	*Energy Bills of non-participants:* This option increases bills for non-participating residential energy consumers the most. Between 2021-2050, these consumers may lose $287 in total. *Electricity and Gas Prices*: Electricity prices are expected to increase for households and SMEs and, for industrial consumers, decrease by less than for the other options. Gas prices for households and SMEs are likely to increase most and this will be most significant during 2021-2030. As for the other options, gas prices for industrial users will decrease and under this option savings will be the biggest. *Energy Bills of Participants:* Under this option, all residential participants save, more than under options one and two but less than under options three and four. Participation rates are expected to increase. *Volatility:* This option results in more extreme electricity retail price fluctuations and bills than option four.

The initial part of the analysis considers electricity and gas retail prices and applies to all energy consumers. The analysis on bill impacts is considered separately for participating and non-participating consumers.

The impacts explored are the impacts created by activities carried out in 2021-2025 under the program. This analysis does not capture the impact that previous program targets continue to have on the energy bills of consumers – noting that activities completed since 2009 continue to deliver energy savings. Because the cost of the program during the past ten years has already been passed through to consumers, the current impact of previous activities on bills is entirely beneficial. Historically, the program has not impacted the gas bills of non-participants and has reduced electricity bills for non-participants across all sectors. Departmental modelling of the 2016-2020 targets projected a cumulative $83 saving for non-participating residential consumers over 2021-2030 arising due to activities carried out in 2016-2020.

For an explanation of the types and numbers of consumers and socio-economic segments that have historically participated in the program see Appendix 2.

Electricity retail prices

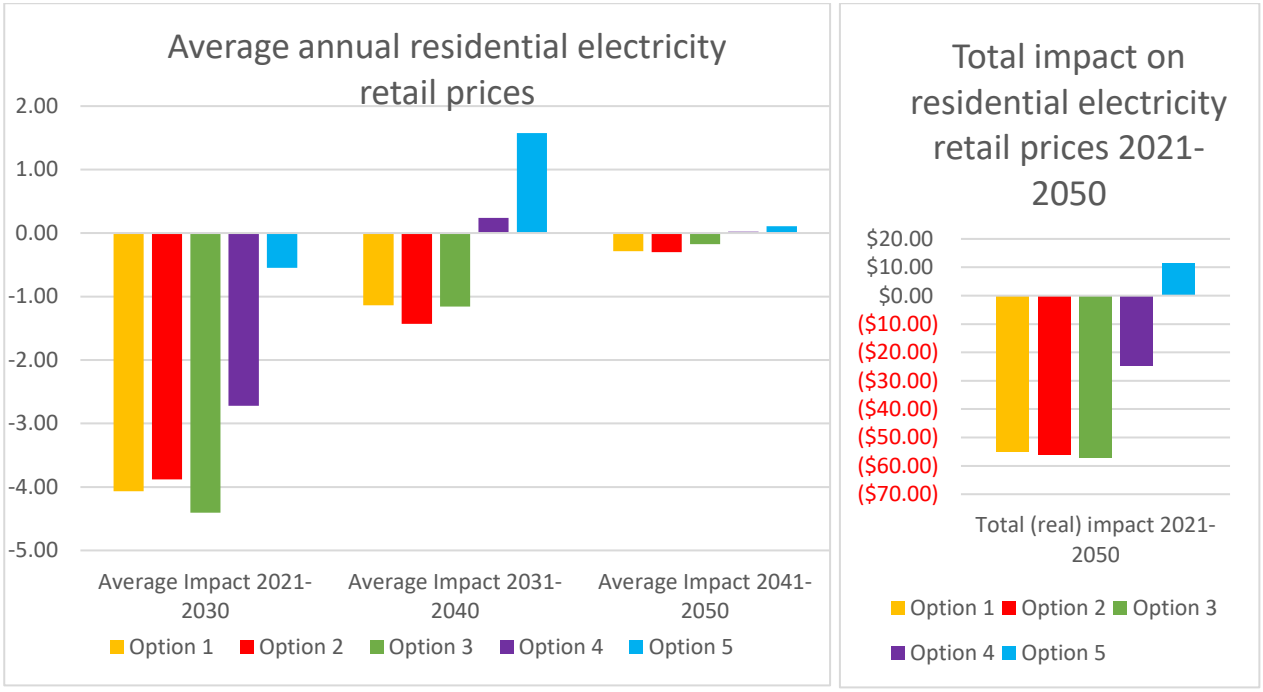
The proportion of costs and benefits varies across residential, small to medium enterprises (SMEs) and industrial consumers.

For residential consumers, all options (with the exception of option five) lead to lower electricity prices in the long term for electricity consumers, see Figure 5. This is because the demand for electricity is reduced and therefore investment is avoided in additional electricity generation and distribution infrastructure. The cost of this investment is a key part of electricity prices. Wealth transfers as outlined in Box 10 above also play a

role in reducing energy prices. Figure 5 shows both the average annual impact on electricity prices over three decades, as well as the total impact on prices over 30 years.

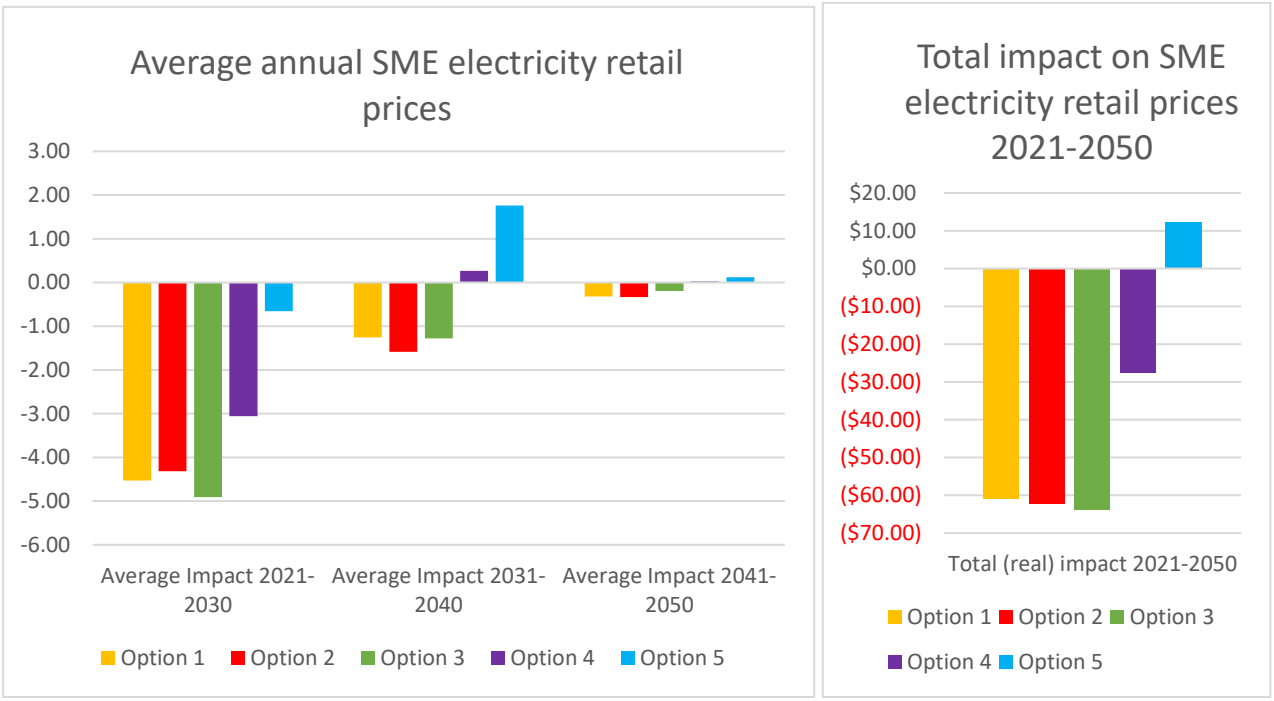
As the options become more ambitious the cost of the program increases (which is passed through to consumers). Additionally, the amount of fuel switching activity increases (which increases electricity consumption and decreases gas consumption), and therefore electricity demand is not reduced to the same extent (meaning the factor that reduces electricity prices has a lower impact). This means that the higher ambition eventually leads to higher electricity prices. For residential consumers, this impact applies to both options four and five, see Figure 5.

Figure 5: The impact of VEU Target options on residential electricity retail prices ($/Megawatt Hour)



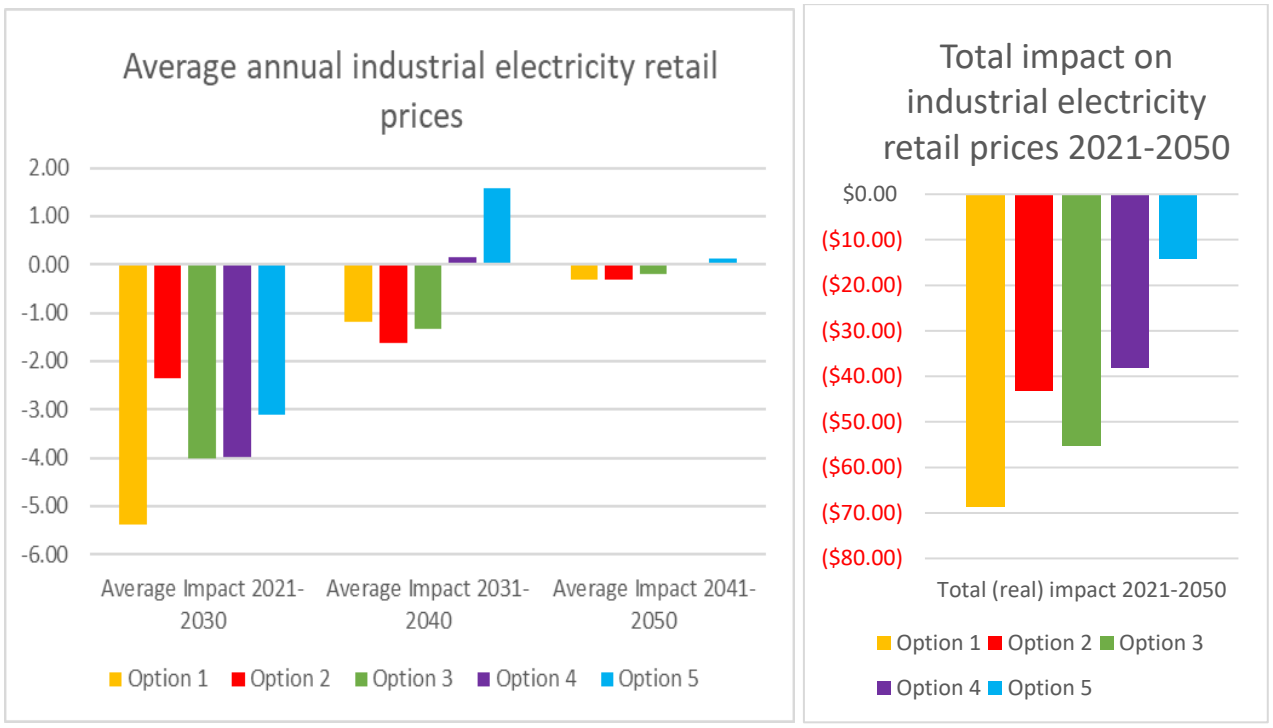
How the options vary in their impact on prices is similar for small to medium businesses (SMEs) as for residential consumers, but for each option the impact on prices is slightly more beneficial, see Figure 6.

Figure 6: Impact of the VEU Program options on SME electricity retail prices ($/Megawatt Hour)



All options reduce electricity retail prices for industry, see Figure 7.

Figure 7: Impact of the VEU Program options on industrial electricity retail prices ($/Megawatt Hour)



Gas prices

Gas prices are more inelastic in nature. Lower demand does not tend to decrease the amount of gas produced or distributed. More of the gas is simply distributed to export sites and exported overseas.[97] As such, reducing demand does less to reduce gas prices.

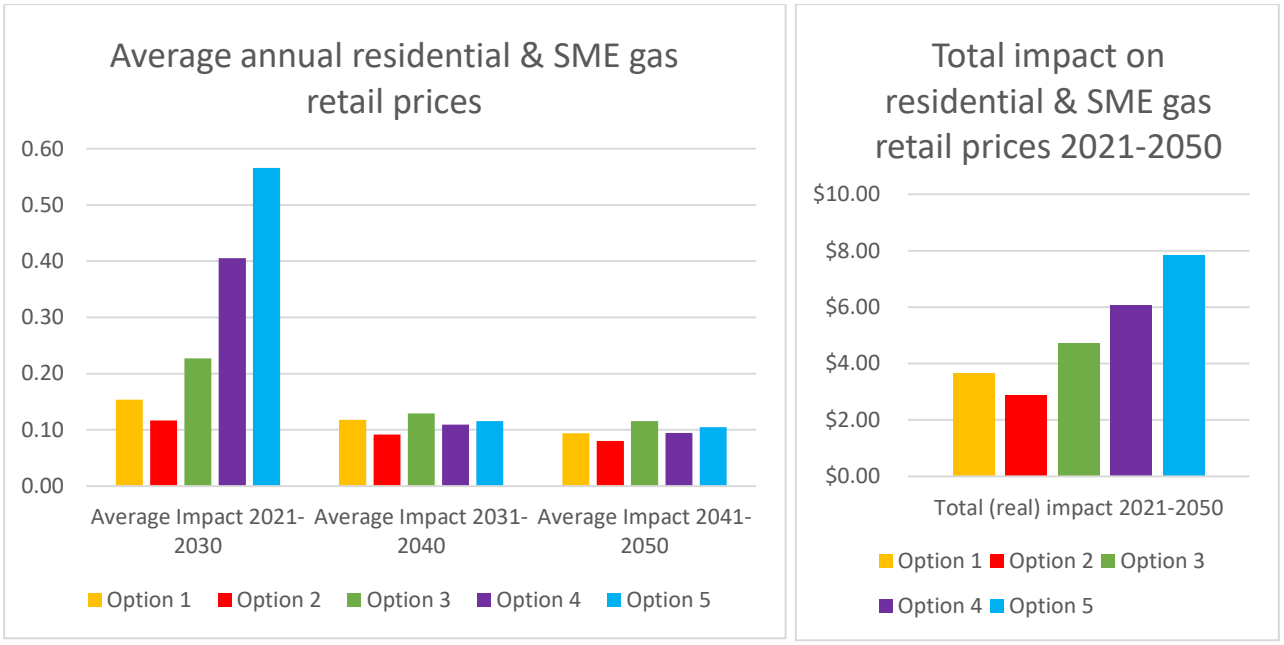
The liability to purchase certificates to meet the target is shared between electricity and gas retailers based on the proportion of emissions which come from electricity and from gas. As gas has had a substantially lower emissions intensity than electricity, gas retailers have had a lower share of the liability. For example, in 2018, the total liability for gas was 1.1 million certificates out of a total target of 6.1 million.

As the emissions intensity of electricity declines due to increasing renewables, a greater proportion of the program liability will be met by gas retailers, and therefore a greater proportion of the program cost will be passed through to consumers on gas bills.

Because of the comparative inelasticity of gas prices, all options increase residential gas prices for non-participants, see Figure 8. For gas, the Department was unable to model separate prices for residential and SME consumers.

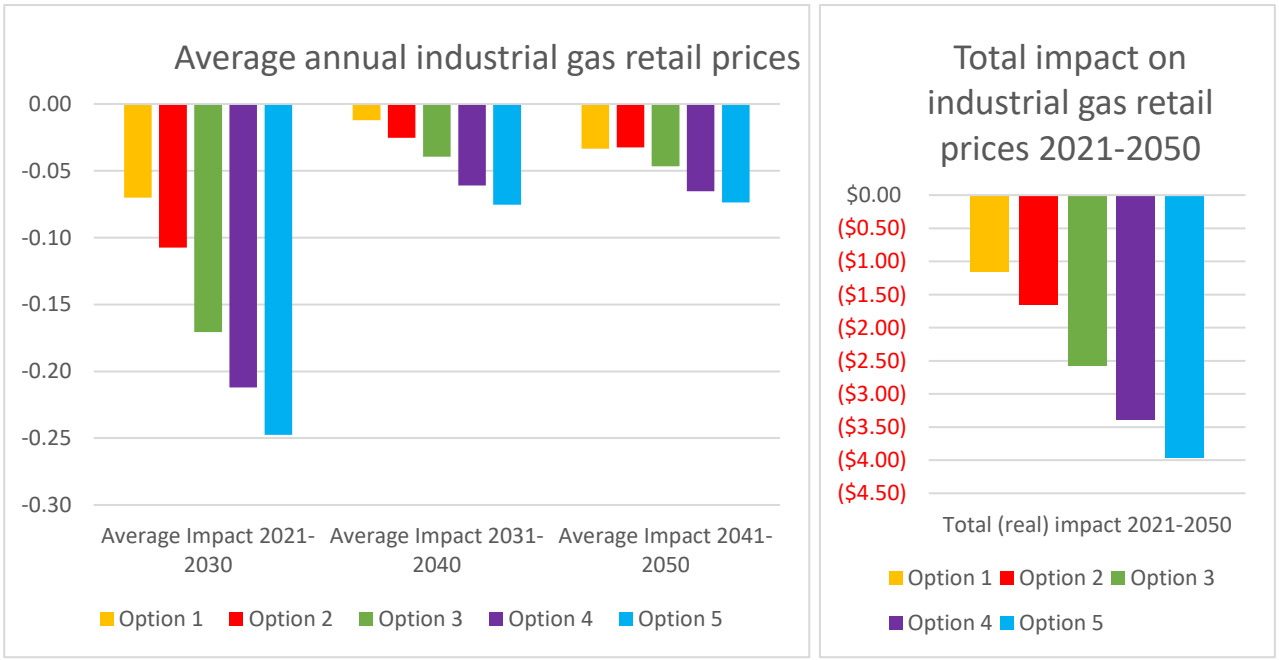
[97] From Jacobs model, see Appendix 11.

Figure 8: Impact of the VEU Program options on residential & SME gas retail prices ($/Gigajoule)



The program is projected to continue to decrease industrial gas retail prices given a lot of larger industrial gas users are not subject to the pass-through cost of the program, see Figure 9.

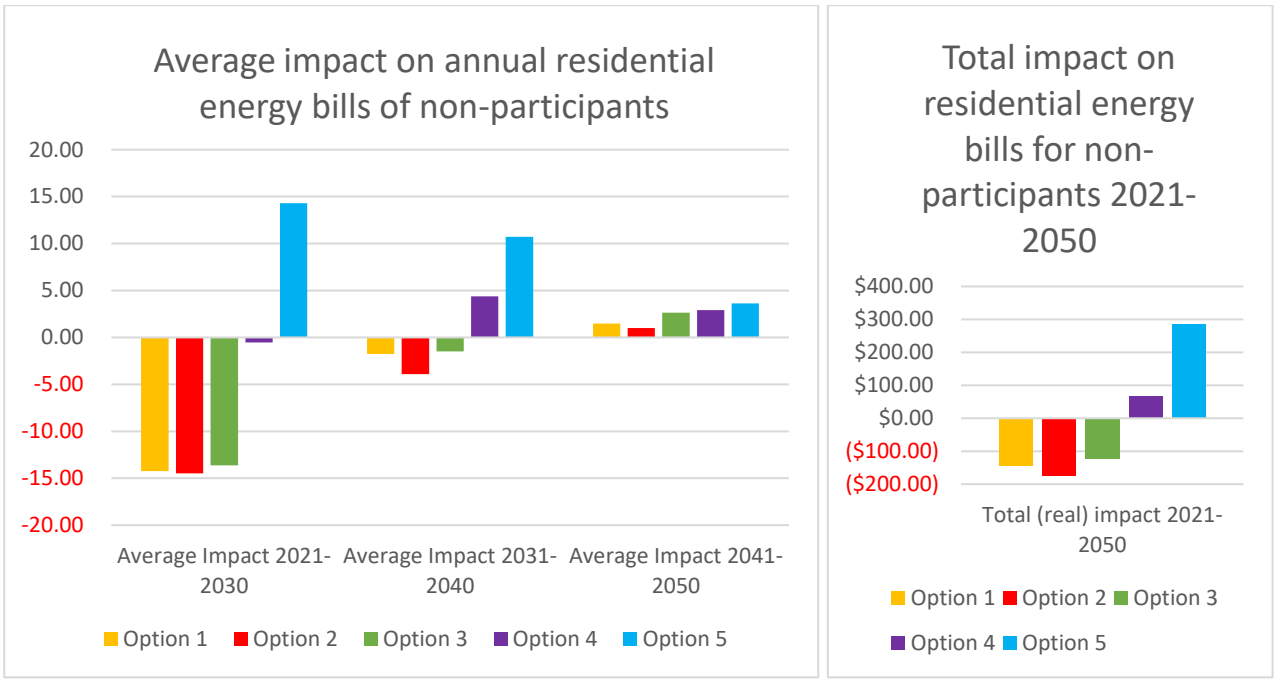
Figure 9: Impact of the VEU Program options on industrial gas retail prices ($/Gigajoule)



Energy Bills of Non-Participants

The Department considered an annual residential energy bill (for a consumer that consumes 4,627kWh of electricity annually and 81.5MJ of gas per day[98]) for a consumer that does not participate in the program, see Figure 10.

Figure 10: Impact of the VEU Program options on residential energy bills for non-participants ($)



For options one, two and three, even consumers who do not participate will receive a net benefit on their bills. For option four, these consumers will be subject to a cumulative cost of $67 over 30 years. For option five, these consumers will be subject to a cumulative cost of $287 over 30 years.

Residential energy consumption is quite variable between households, and the average will not be representative of all households. For example, households that consume less gas than an average household are likely to benefit from all options except option five, given the positive impact the program generally has on electricity bills. This may be a further incentive to switch from gas.

Because energy demand and profiles vary substantially between businesses and larger industrial players, the Department did not duplicate the analysis of the total impact on bills for these consumers.

For options three, four and five, the total impacts will change depending on how many larger energy users choose not to opt out. If more large energy users participate in the program (because they see an overall benefit in participating), the costs of the program will be more evenly distributed across consumer types and residential and SME consumers will see more savings. Larger industrial energy users that choose to remain in the program for any given year are likely to have estimated net benefits from doing so. While they may see a smaller net benefit in energy prices, they will see overall savings by reducing their energy use through participation in the program.

Impacts for participants

Consumers that participate in the program will enjoy additional energy savings and under each option they experience net bill savings. The benefits from participation greatly outweigh any other impacts of the program.

Participants of the program will experience significant bill savings. Table 19 sets out the amount residential participants (as a whole) are expected to save during 2021-2050 by undertaking activities under the program during 2021-2025. The household estimates show the amount that would be available per household, if all

[98] Based on Jacobs Modelling, see Appendix 11.

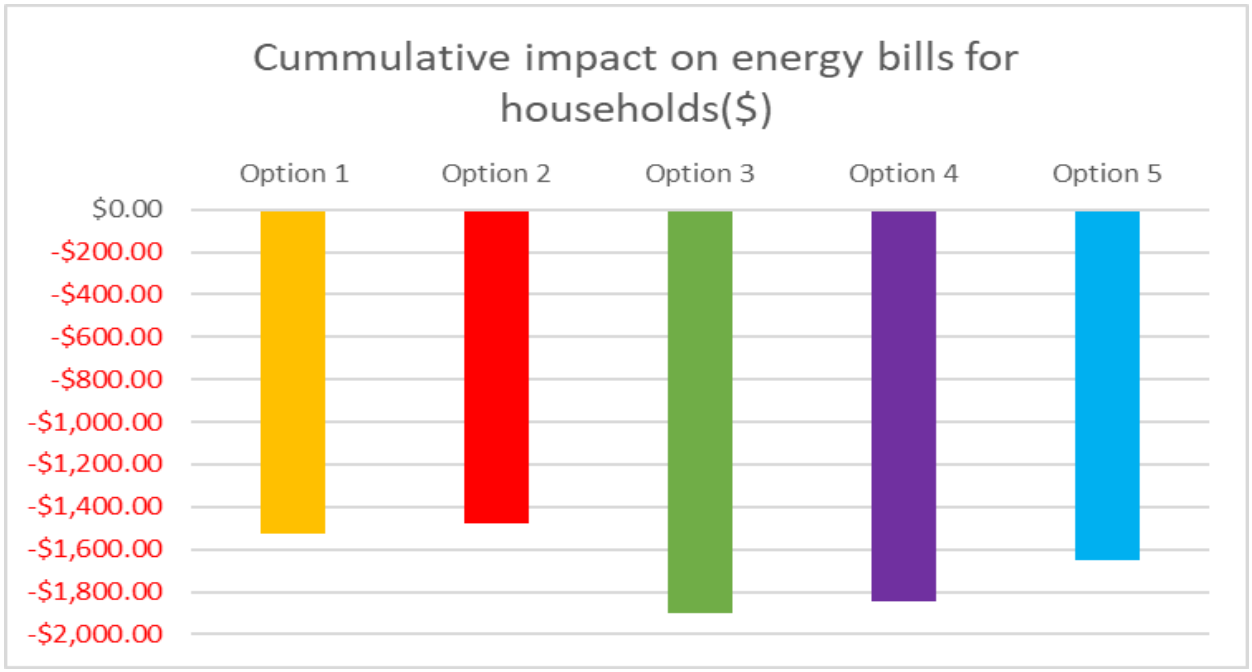
participate and the benefits were distributed evenly. Commercial and Industrial businesses are expected to save between $8.58 and $17.76 billion in total on their energy bills, although the proportion of this enjoyed by individual businesses will vary considerably as it depends on that business' energy demand profile and this varies significantly between businesses.[99]

Table 19: Bill savings expected for households if they carry out activities under the VEU program during 2021-2025[100]

	Option 1	Option 2	Option 3	Option 4	Option 5
Total savings available 2021-2050	$3.47 billion	$3.28 billion	$4.47 billion	$4.82 billion	$4.89 billion
Total savings per household	$1377	$1301	$1772	$1913	$1940
Average annual household savings 2021-2030	$81.53	$76.05	$110.78	$123.29	$122.79

Participating consumers will also be impacted by the overall pressure on prices that results from reduced demand, as discussed above for non-participants. Residential participants of the program will see net bill benefits for all options even when these impacts are taken into account, see Figure 11.

Figure 11: Impact of the VEU Program options on residential energy bills of participants ($)



[99] The uncertainty is due to the varying retail tariffs different businesses enjoy.

[100] Using ABS 2016 Census data for number of households (private dwellings) in Victoria. Bill savings are based on department price projections over 2021-2030 and projected annual energy savings expected to occur because of the program in the residential sector during this period.

It is important to note the scale of impact between those who choose to participate and not to participate in the program. All consumers have a chance to participate although some face more barriers. Historically, residential, commercial and industrial sectors have seen similar uptake rates and program benefits have been distributed equitably across socio-economic groups. Likely future participation rates are discussed further below.

Affordability and Participation Rates

In considering the bill impacts for non-participants and for participants, it is useful to understand how participation is likely to vary under each of the proposed options. It is difficult to project future participation as consumers often undertake more than one activity but the following factors will influence participation:

- If a target is greater than the current one, more VEECs are required to meet it. This means more upgrades are required, and this will likely require greater participation.
- Allowing for a broader range of activities will likely encourage a broader range of consumers to participate, as it is more likely an activity will suit them.
- The decreasing emissions intensity requires delivery of a greater amount of energy savings to meet the emissions targets. Individual upgrades will continue to deliver the same amount of energy savings therefore, for each annual target, even if it were not increasing, more upgrades will need to occur to meet the target. For increasing targets, this effect is heightened. If more upgrades need to occur, it is likely more people will participate.

Based on this, options four and five are likely to increase participation, options one and two are likely to decrease participation and the likely participation under option three is uncertain. While option four has a minor impact on non-participants and option five has a more substantial cost impact purely in terms of the amount they pay on their energy bills, both these options are also likely to drive greater participation.

Price and Bill Volatility

It is more difficult to adjust to price and bill impacts if they occur suddenly. This is especially true if the impacts lead to additional costs.

Annual electricity retail and gas prices for residential and small business (SME) consumers were quite volatile for option five and somewhat volatile for option four (see Figure 12 and Figure 13 and Figure 14). Similar patterns were demonstrated by looking at the annual residential energy bill impacts, see Figure 15.

The cost of the program is only passed through for the five years of the target period and this results in upwards pressure on electricity bills during the 2023-2025 period (for options four and five). This can be seen in Figure 15. But some of the activities carried out under the program in the 2021-2025 period will continue to reduce demand, and yield savings benefits, up until 2050.

For option four, the most extreme impact is projected for 2025, at which point non-participating residential consumers are expected to pay an additional $67 to support the program. In contrast, in 2026 they would be expected to save $42 due to the program. For option five, the most extreme impact is projected for 2025 also, at which point non-participating residential consumers are expected to pay $124 to support the program, followed by savings of $37 in the following year. Even option three will increase an annual bill by $10 in that year.

Ideally at these times consumers can look at participating in the VEU program or another government program in order to reduce bills. The Department is committed to exploring additional ways in which the VEU program can support vulnerable consumers during this period.

Both options four and five increase electricity prices early on because of the cost of the program as well as, to a marginal extent, during the 2030s due to additional demand placed on the electricity grid from fuel switching activities encouraged by the program.

Figure 12: Projected residential electricity retail price volatility demonstrated by tracking annual prices over time ($/MWh)

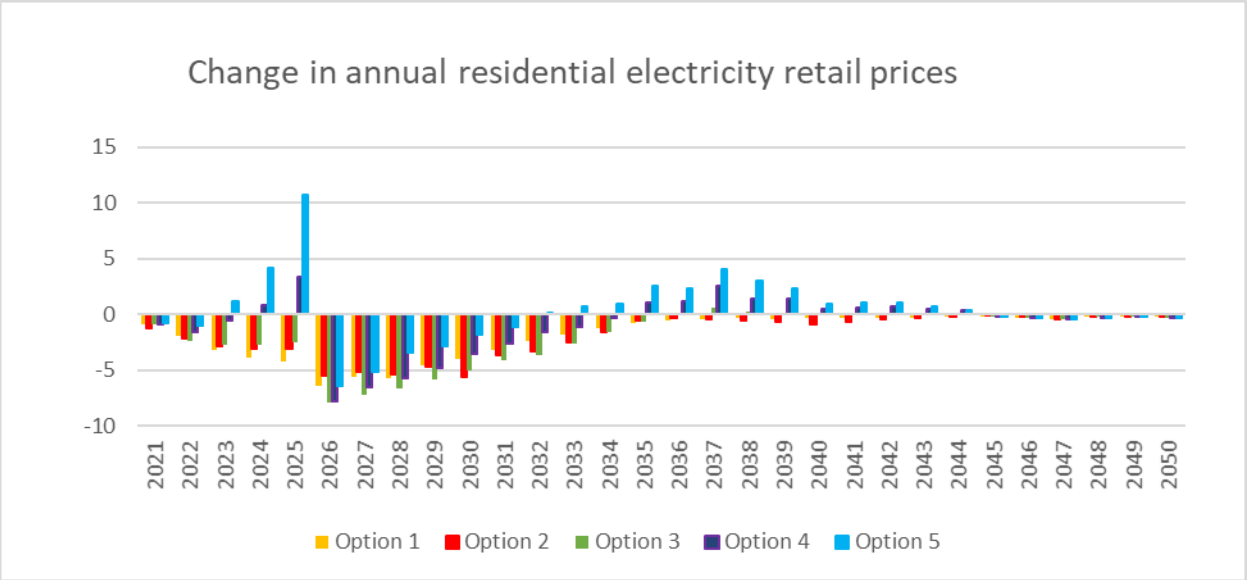


Figure 13: Projected SME electricity retail price volatility demonstrated by tracking annual prices over time ($/MWh)

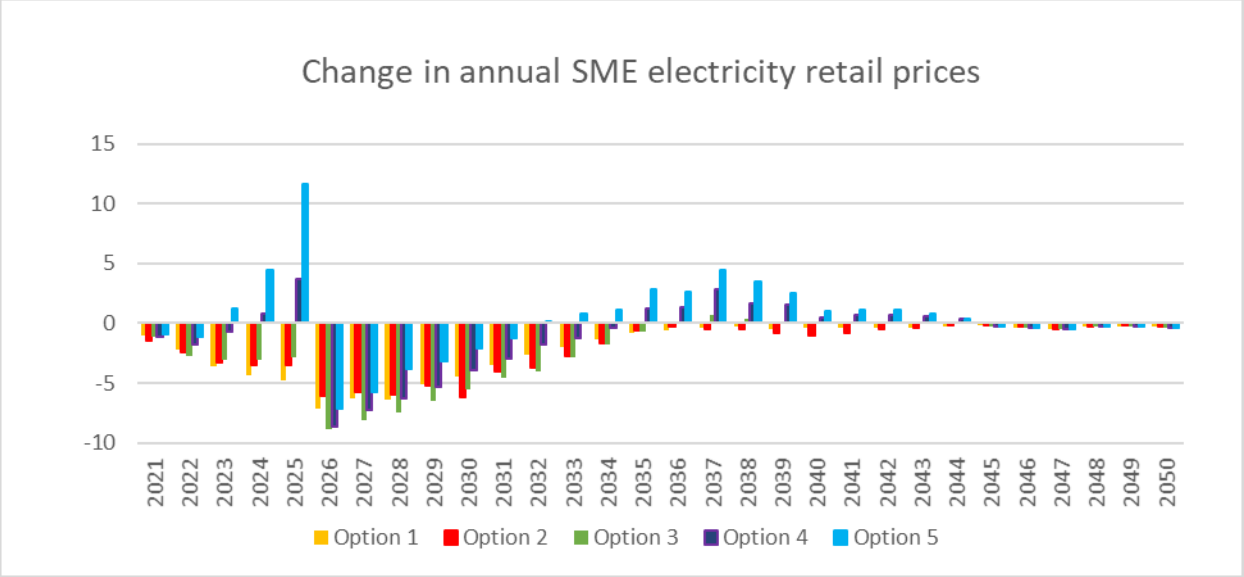


Figure 14: Projected residential and SME gas retail price volatility demonstrated by tracking annual prices over time ($/Gigajoule)

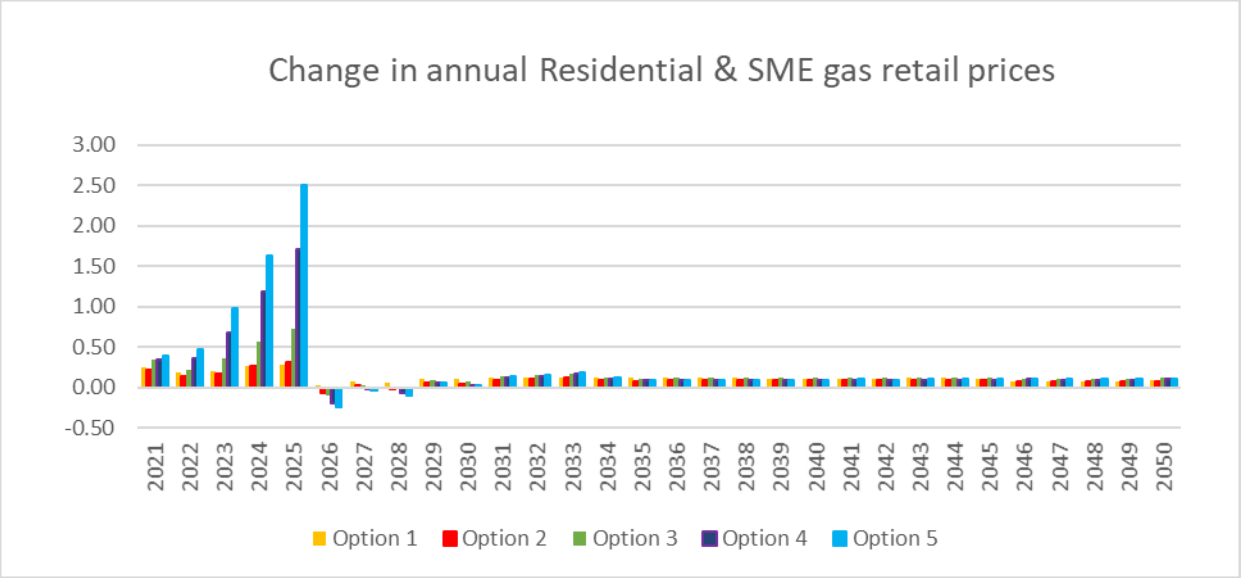
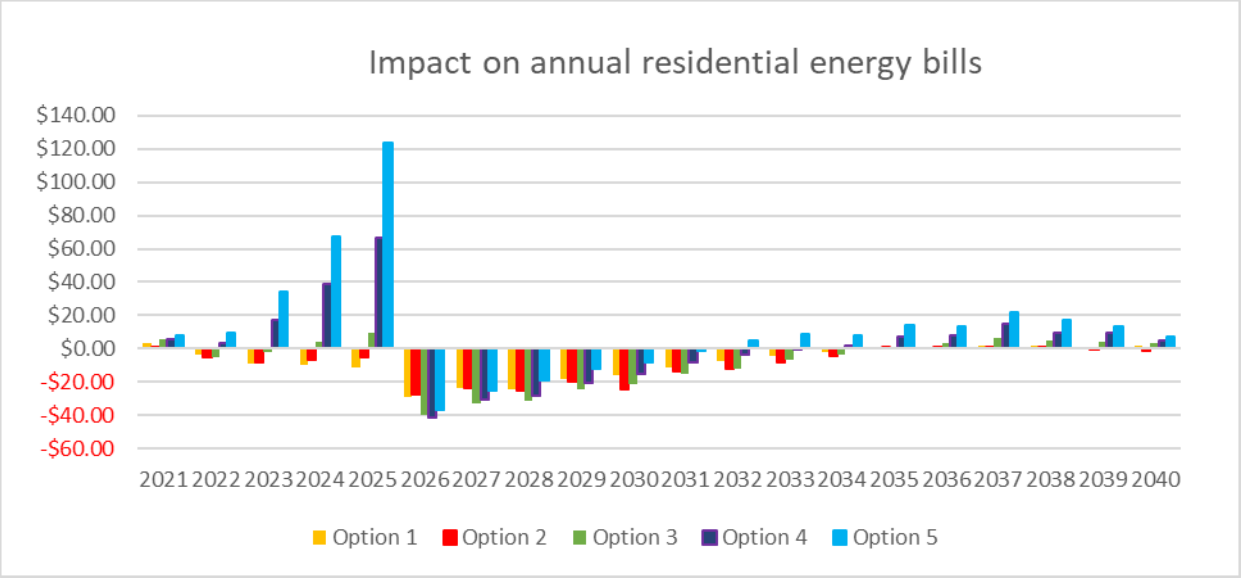


Figure 15: Projected residential energy bill volatility demonstrated by tracking annual prices over time ($)



Grid Impacts

Options two, three, four and five envisage incentives for new activities, including (in addition to energy efficiency upgrades): PV optimisation, medium scale PV systems and electrification activities. These activities will reduce emissions and grid demand. The grid impacts of reduced demand that could be costed were explored in the CBA. There are also likely to be benefits from the combined action of energy efficiency, demand management and solar optimisation that supports increased take up of distributed energy resources and electrification, reducing grid impacts associated with the energy transition. Because of the energy transition, in particular the increased amount of distributed energy resources and the range of pathways for

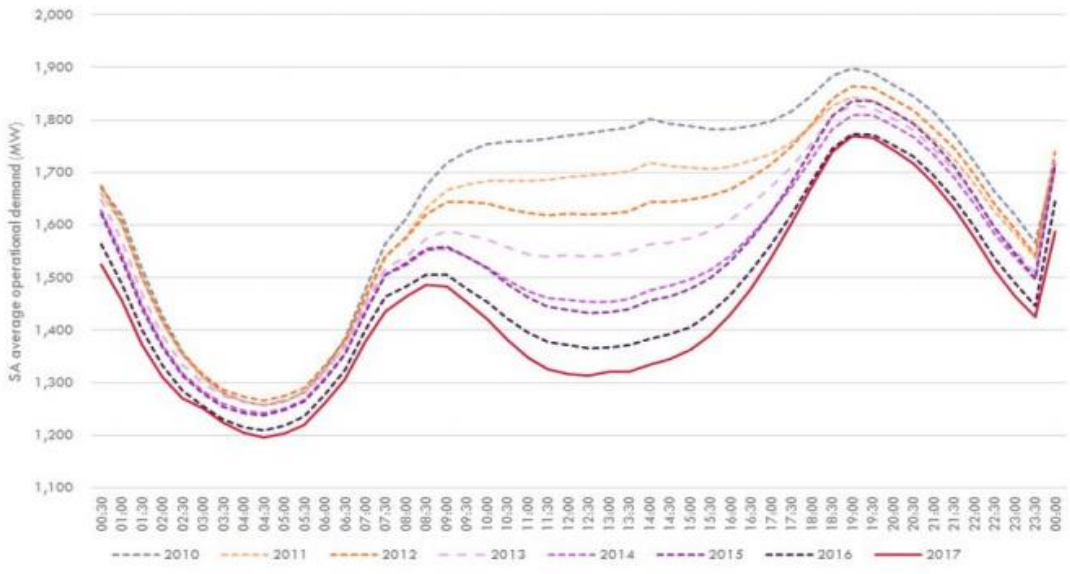
decarbonising the gas industry, there are a range of impacts that are too complex to be costed at this point that also need to be explored.

Impact of new PV optimisation activities

PV optimisation activities reduce the impact om the grid of rooftop solar behind the meter, by lowering the average export ratio[101] of new and existing distributed solar, shifting electricity demanded that would have occurred when the PV system is not operating to during sunshine hours.

High levels of distributed rooftop solar is associated with a phenomenon known as the 'duck curve' (see Figure 16 below). This figure illustrates the significant change in average daily operational demand in recent years reflecting the increase in distributed rooftop solar – the grey line is the operational demand in 2010 before significant uptake of rooftop solar and the red line is the operational demand in 2017 with high levels of rooftop solar.

Figure 16: Duck curve exhibited in average daily operational demand in South Australia, courtesy of AEMO 2018



Distributed solar exported back to the grid is 'seen' by the electricity wholesale market as negative demand rather than a source of generation, resulting in a midday lull in demand from the grid. The midday lull in demand that forms the arched back of the 'duck curve' is predicted to continue to decrease until demand in the middle of the day becomes the typical daily minimum in some regions[102].

In some local areas there may even be periods of negative gross demand where distributed solar export exceeds use[103]. If left unmanaged, this can cause systemic problems such as reverse power flows at transmission connection points, voltage and frequency excursions outside safe limits (impacting on system security[104]) and mass solar inverter tripping. Reverse power flows are when there is net flow of power backwards to the transmission connection points. Voltage and frequency excursions refer to when the voltage level (which is energy per unit charge) or frequency level (alternating current cycles per second) move above or below safe limits. Solar invertor tripping means that the solar system disconnects itself from

[101] The ratio of generated energy that is exported back to the grid compared to the total energy generated

[102] South Australia experienced its lowest electricity demand for several years at 13:30 on 2 October 2017. (AEMO 2018 "AEMO observations: Operational and market challenges to reliability and security in the NEM").

[103] Kardina East transmission connection point, 25/12/2014 (Energy Networks Australia 2019 "Open Energy Networks Interim Report").

[104] The National Electricity Rules require the power system to be in a 'secure' state – meaning that the frequency and voltage at all switchyards and substations, the current flows on all transmission lines and all other key system components are within safe defined limits. System Security also means that the system can rapidly return to a secure state in the event of a failure of generating units or transmission infrastructure.

the network in order to protect itself from damage, usually in response to voltage or frequency variations outside of their operational limits, usually in response to voltage or frequency variations outside of their operational limits.

Zone substations form the boundary between the transmission and distribution networks. The risk of reverse flows from distributed solar into these substations governs in part the need for costly upgrades. CSIRO found that reverse flows are common if distributed solar penetration reaches 40 per cent of load.[105] Many zone substations in South Australia have already exceeded this threshold, while east coast states like Victoria are forecast to reach it in the 2030s.

PV optimisation works by shifting energy use to when the sun is shining or storing surplus generated energy for use at times when it isn't. In a residential setting, automating a dishwasher to run at midday rather than 9pm is an example of the former, whereas battery storage and hot water storage are an example of the latter. In that sense it makes best use of the solar available at a building and reduces the amount of solar exported back to the grid.

Without PV optimisation, additional distributed solar connections and energy exports will increase the infrastructure costs associated with accommodating the two-way flows. This cost will ultimately be borne by all consumers, even those without solar, through the network component of retail electricity charges. With residential solar uptake set to triple over the next 10 years to around 50 per cent of households by 2028, PV optimisation can play a significant role in managing export constraints and reducing pressures for grid augmentation (and reducing costs for all consumers) and ensuring that households investing in solar maximise the benefits through self-consumption. Given the cost of buying energy from the grid is higher than the feed-in tariff for energy exported, it makes financial sense for households to use the energy they generate rather than export it. PV optimisation increases the amount of distributed solar that can be installed.

PV optimisation also encourages the deployment of more demand responsive technology and this is likely to have flow on benefits by building consumer engagement with voluntary demand response measures that can greatly reduce prices and avoid load shedding required on critical peak demand days. While options two, three, four and five all include PV optimisation, the higher the ambition of the target, the more PV optimisation is forecast to occur.

Impact of new PV activities

The proposed new activities (in options two, three, four and five) also include expanded incentives for solar PV systems for systems greater than 100kW+ and below 10MW, that allow them to be installed with potential to export to the grid. Feasibility studies are required to connect these larger systems to the grid[106] and it is likely that not all will be set up to export to the grid – in many case businesses will be keen to proceed with a zero-export solar connection because of the time and cost of these feasibility studies.

These activities will bring forward some of the grid issues associated with distributed solar systems. However, in conjunction with PV optimisation activities, the impact of these systems can then be reduced substantially. Ultimately by providing subsidies for both renewable energy and optimisation measures, more renewable energy can be brought online with less challenges for the grid.

Impact of new electrification activities

Electrification activities will, of course, add demand to the electricity grid. Additionally, the usage patterns of some end uses will align with peak demand periods, increasing peak demand However, for all of the options tested, the program activities cumulatively reduced electricity annual demand, peak demand, and reduced the cost of the grid and generation infrastructure required to be built. While options two, three, four and five all include electrification activities, the higher the ambition of the target, the more electrification is forecast to occur.

The energy market modelling undertaken by Jacobs (Appendix 11) found that for all options modelled, the impacts of energy efficiency activities in reducing peak demand outweighed the impact of electrification activities in increasing it. This analysis was limited to state-wide peak demand levels. There could be local

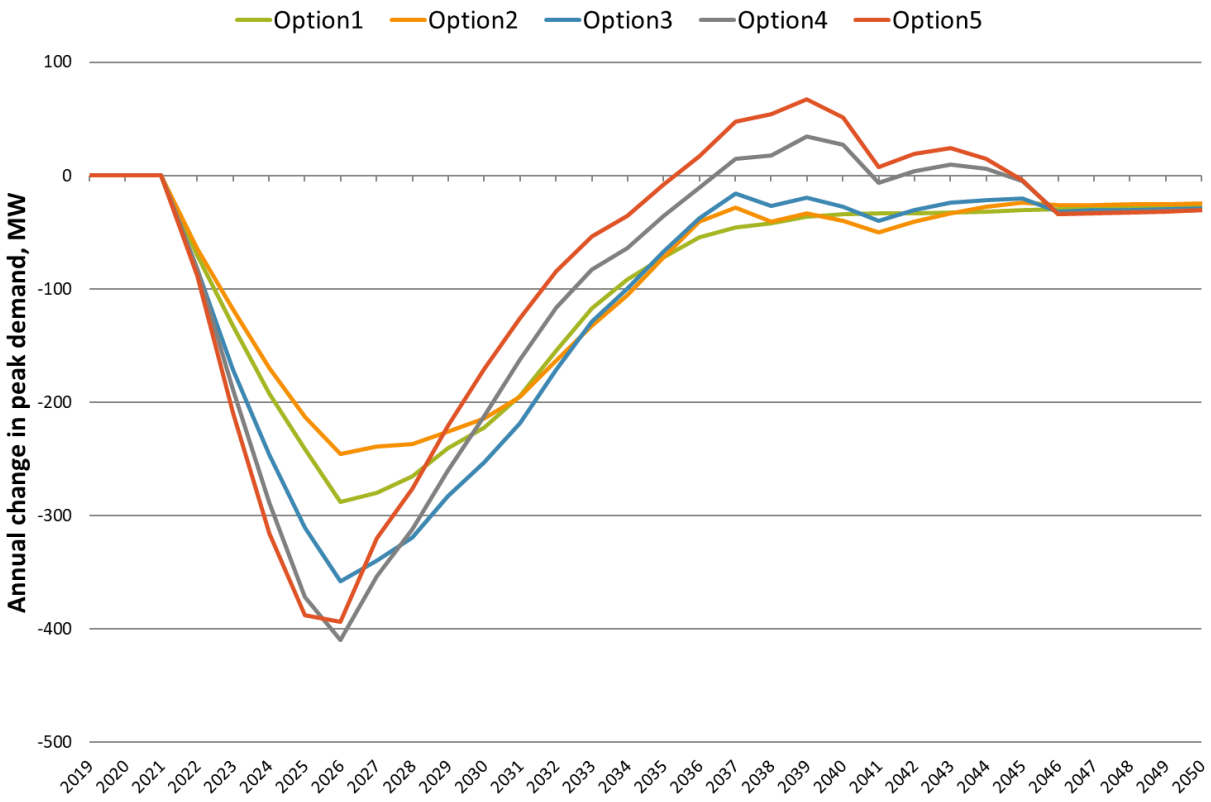
[105] 2017 CSIRO "Electricity Network Transformation Roadmap".

[106] See Appendix 10.

level impacts to peak demand if the energy efficiency upgrades and the electrification upgrades have different geographic distributions. However, this analysis also did not consider the impact of technical solutions to ameliorate any peak demand impacts, for example, the Australian Capital Territory (ACT) Energy Efficiency Improvement Scheme requires appliances installed under their electrification activities to be demand-response enabled[107].

The scope of this RIS only considers energy efficiency activities which occur up to 2025. Further energy efficiency and demand management activities will be required to prevent electrification from increasing peak demand post 2035 (the end of the lifetime of many activities installed from 2021 to 2025), see Figure 17.

Figure 17: Annual change in peak demand for Victoria



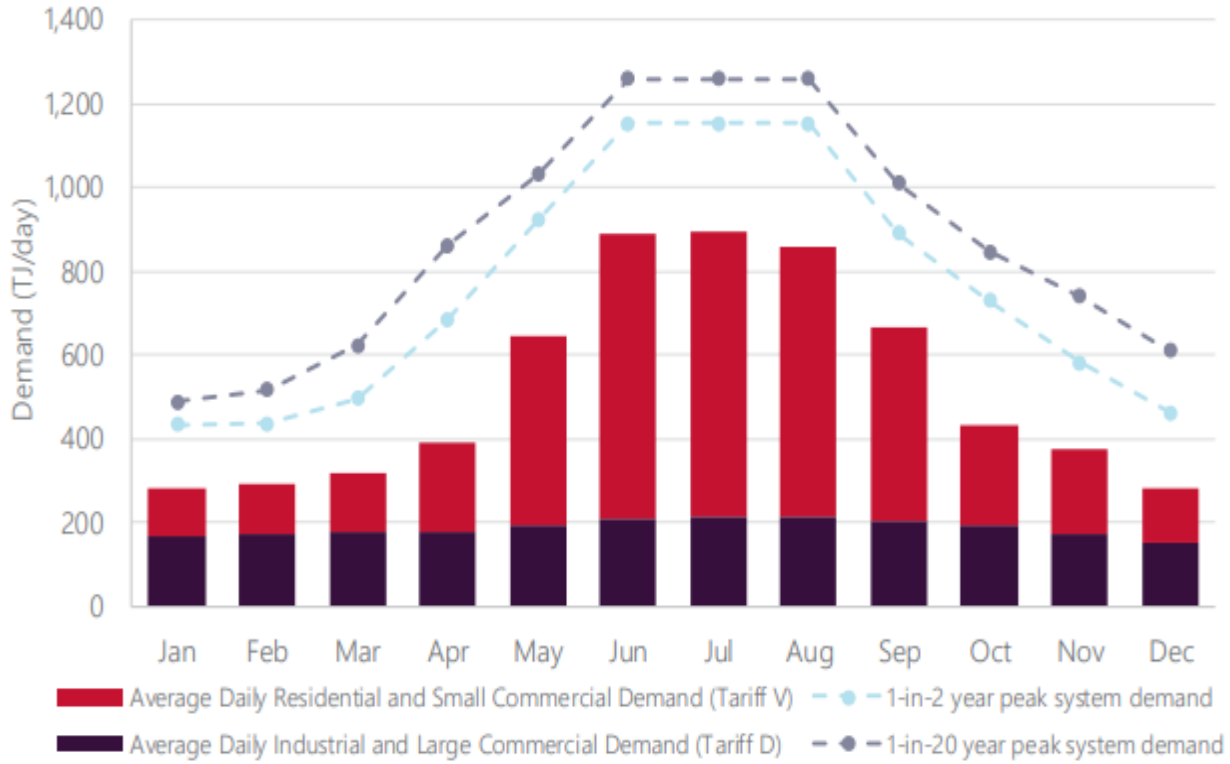
Peak demand for gas is also an increasingly important driver of consumer energy costs. AEMO are predicting a tightening of demand-supply balance, with possible winter shortages by 2024[108]. Without a change in gas demand, remedying this potential shortfall may involve costly upgrades to interstate gas transmission pipelines into Victoria or importing liquified natural gas (LNG). These costs can result in higher gas prices for consumers.

Victoria experiences significant winter peak demand for gas due to widespread use by residential and small commercial sectors (see Figure 18) By contrast, large commercial and industrial sectors maintain a reasonably constant demand through the year. Electrification in the residential and small commercial sectors can therefore reduce these winter gas demand peaks, and ease pressure on Victorian gas supply.

[107] ACT Government, Energy Efficiency (Cost of Living) Improvement (Eligible Activities) Determination 2019, See <https://www.legislation.act.gov.au/ni/2019-501/>.

[108] AEMO 2019 "Gas Statement of Opportunities".

Figure 18: Average daily Victorian gas demand by month[109]



There is also a long-term increasing trend in the percentage of gas-fired generation used in the Victorian electricity market. Gas-powered generators play an important role by supplying rapidly variable power to meet peaks in electricity demand (often termed 'grid-firming'). AEMO recently released its Victorian Gas Planning Report, which noted that supply for gas on peak winter days is forecast to tighten and without additional gas supply capacity, gas supply restrictions and curtailment of gas-powered generation may be necessary for peak winter days from 2023 onwards.[110] Therefore, if adoption of electrification can reduce natural gas demand, it can help ensure continued supply for gas-fired generation to firm electricity grid demand and support the transition to a higher proportion of variable renewable energy generators..

Summary

More ambitious targets will deliver greater benefits for consumers from the additional activities (including new types of activities). This is reflected in the ranking of options – noting that option one has minimal impacts because it does not involve new activities:

- option one – 1 point,
- option two – 5 points,
- option three – 7 points,
- option 4 – 9 points, and
- option five – 9.5 points.

Innovation

One of the key objectives of the program is to support innovation, investment and technology development for energy saving goods and services. Innovation is key for a market like the VEEC market because without

[109] AEMO 2019 "Victorian Gas Planning Report".

[110] AEMO, 'Gas Transmission Network Planning for Victoria' (2019) <https://www.aemo.com.au/-/media/Files/Gas/National_Planning_and_Forecasting/VGPR/2019/2019-VGPR-Full-Report.pdf>.

a constant drive to create new opportunities of low-cost emissions abatement, the price of certificates (being proxies for carbon) will simply increase.

Innovation can come in the form of technological advances for existing products and the development of entirely new products that deliver energy savings. Innovation can also come in the form of organisational and process change that allows existing products to be delivered at lower costs and at greater scale.

Economic theory recognises both that innovation is required to drive long term economic growth and that government investment in innovation is needed.[111] This is because innovation by private firms often produces new knowledge that benefits others and these benefits are 'non-rival' and 'non-excludable' goods. Something is non-rival if the consumption of it by one person does not prevent or lessen consumption of it by another person. Something is non-excludable if it is not possible to prevent a person from accessing it, even if they have not paid. For a non-rival, non-excludible intangible good like innovation, the value of it to society is larger than the value attributed by a private firm choosing to engage in innovation. As such, the amount the private firm chooses to invest in it is unlikely to lead to socially optimal levels.[112] Due to this, there is an underinvestment in innovation by private firms and governments are required to step in to ensure socially optimal levels of investment in innovation.

The Department considers innovation because it is a specific object of the Act and also because it is crucial to ensure the program is delivered at lowest cost. Without encouragement and investment in new ideas and technologies, as each low-cost opportunity is taken up, there will be no new low-cost opportunity to take its place and the cost of the program will quickly rise.

In the context of the Victorian Energy Upgrades program, three key considerations have been considered as important to support innovation:

- policy certainty: both in respect of the amount of financial investment that will be available long term and the liabilities or requirements imposed on particular parties;[113]
- quantity of investment: to make the research and development of new low-cost abatement opportunities worthwhile; and
- flexibility and inclusiveness: how incentives are offered to allow for new and emerging technologies and abatement opportunities to be captured by the program.

Table 20 below summarises how the different options impact innovation in the program. Overall, all options will continue to lead to innovation by making increased finance available for development of the energy management sector. Option five is predicted to have the largest impact, followed by options four, three, one and two in descending order of impact.

Table 20: Summary of Impacts on innovation and rationale for MCA Raw scores

Option	Policy Certainty (3 points available)	Investment in energy efficiency (4 points)	Flexibility (3 points available)	Total points
Option 1	Low target and reliance on existing activities will make certificate price predictable 3 points	$452.5 million in investment 1 point	No new activities 1 point	5
Option 2	New activities will make certificate price less predictable	$432.6 million in investment 1 point	Wider range of activities Technology neutral approach	4

[111] Solow, R. 'A contribution to the theory of economic growth' (1956) *The quarterly Journal of* Economics 70(1), 65-94.

[112] Ben Westmore, Policy incentives for private innovation and maximising the returns (2014) *OECD Journal: Economic Studies*.

[113] Ibid.

	1 point		2 points	
Option 3	New activities will make certificate price less predictable Energy management at exempt large energy user facilities will identify opportunities for innovation 2 points	$918.5 million in investment 1.5 points	Wider range of activities Technology neutral approach Choice for exempt large energy users 3 points	6.5
Option 4	New activities will make certificate price less predictable Energy management at exempt large energy user facilities will identify opportunities for innovation 2 points	$1,705.3 million in investment 3 points	Wider range of activities Technology neutral approach Choice for exempt large energy users 3 points	8
Option 5	New activities will make certificate price less predictable Energy management at exempt large energy user facilities will identify opportunities for innovation 2 points	$2,355 million in investment 3.8 points	Wider range of activities Technology neutral approach Choice for exempt large energy users 3 points	8.8

Policy Certainty (3 points)

All options set targets for a five-year period and thereby provide a level of certainty in respect of government policy for investors. However, options two, three, four and five increase the amount of new activities for which incentives are available. This makes it more difficult to forecast the prices of certificates on the market. Governments consistently underestimate the speed at which technological change is achieved, as well as the capacity of the market to bring new products to scale and distribute them at low cost.

This uncertainty makes it more challenging for stakeholders to predict the certificates offered under the program in future years and respond appropriately. This may reduce businesses willingness to invest in innovation. By contrast, while it may be easier to predict the certificate price with a low target based on existing activities, this is likely to result in a lower amount of investment and innovation than a higher target with a less predictable certificate price.

The inclusion of larger energy users may send a signal to private companies to find innovative ways to deliver energy savings for bespoke energy environments. For a private company, its worth investing in this space if there is an understanding there will be demand for their services. Options three to five include large energy users, unless they choose to be exempt. However, even in that case an energy audit (likely to lead to further energy investment) needs to be carried out. As such, there will be a clear signal that innovation in this area will reap rewards.

When it comes to policy certainty:

- option one is likely to be the strongest option – 3 points,
- options three, four and five (due to the signal sent to large energy users) – 2 points, and
- option two is weakest – 1 point.

Quantity of Investment (4 points)

The quantity of government investment (only 'government' in the sense that it is the direct result of a government program) is directly linked to the forecast cumulative cost of certificates under the program which are restated below:

Table 21: Quantity of investment forecast to occur under target options

Option 1	Option 2	Option 3	Option 4	Option 5
$452.5 million	$432.6 million	$918.5 million	$1,705.3 million	$2,355 million

When it comes to quantity of investment:

- option five has the highest program cost and therefore, under this option, the largest amount of investment in the energy industry is forecast – 3.8 points,
- option four also represents a significant investment – 3 points,
- option three – 1.5 points,
- option two has the lowest program cost and therefore will drive innovation the least – 1 point, and
- option one is similar to option two – 1 point.

Flexibility (3 points)

A flexible and inclusive regulatory framework is required to promote innovation. By setting a target that incentivises a broad range of demand side energy management upgrades (rather than just energy efficiency upgrades), options two, three, four and five can boost research on innovative and holistic solutions to energy management. The proposed new activities ensure the program has a technology neutral approach. For example, a business may choose to reduce the amount of electricity bought from the grid through by installing either energy efficient equipment or behind the meter solar.

As noted in the section on emissions factors, it is important for the program to have a technology neutral approach to choices between electric and gas-powered appliances, based on the emissions on each appliance over their lifetime, and the costs to consumers. The propose new activities will give consumers and technology providers more flexibility – as the program will have incentives available for both installing high efficiency gas appliances and high efficiency electric appliances.

Research and development by government can also encourage private sector innovation.[114] The research and development of future opportunities by the Victorian Energy Upgrades policy team in order to support the program may in turn drive further research, development and innovation in the private sector.

Options three, four and five also require larger energy users to improve their management of their energy use, whether that's being part of the VEU program or becoming accredited to the ISO50001 energy management standard. It is the Department's view that this will drive innovation in the energy management industry by providing more work and opportunities to tackle energy management for bespoke processes and specialised technology.

When it comes to flexibility:

- options three, four and five – 3 points,

[114] Ben Westmore, Policy incentives for private innovation and maximising the returns (2014) *OECD Journal: Economic Studies*.

- option two – 2 points, and
- option one – 1 point.

Equitable Distribution of Program Benefits

In determining the equitable distribution of incentives under each option, the Department considered how the costs, benefits and opportunities are distributed across sectors. This assists in determining whether cross-subsidies are likely to result from the program.

There are many forms of equity and only the following will be considered:

- The projected split of VEECs (and thereby incentives) over the residential, commercial and industrial (C&I) sites and how this relates to the contribution of these sectors to energy demand and energy emissions
- Within each of these sectors, the projected split of incentives for different activities
- The likely impact of future targets on low income households, given they may have less capacity to cope with any adverse impacts.

Distribution of VEECs across consumers

For the energy sector, latest internal figures show that the proportional split of emissions across the residential, exempt large energy users, and other commercial & industrial consumers is 32%, 11% and 57%. The proportional split of energy use has similar proportions for these three sectors (31%, 11% and 58% respectively.[115])

Table 22 below sets out the proportion of VEECs that are projected to be created for the residential, commercial & industrial (not including exempt large energy users) and exempt large energy users sectors for each of the options. As noted above, only 5% of exempt large energy users were expected not to opt out of the program.

VEECs provide a better understanding of how program benefits are contributed than participation rates or number of upgrades undertaken. Each VEEC represents:

- a tonne of emissions avoided
- an amount of investment in energy demand management goods and services
- a proportion of the overall net benefit of the program appreciated by all energy consumers[116]

From an emissions perspective, it makes sense that the proportion of VEECs delivered by each sector is equal to their proportional responsibility for emitting carbon. However, the cost of the program is passed through to consumers depending on the quantity of energy they use (rather than the amount of VEECs that are created in a sector). From this perspective, it makes sense that the benefits from each VEEC are also distributed proportionally to energy use.

Given the proportion of energy use and emissions is similar across the sectors (despite the different quantities of gas and electricity used), a similar proportion of VEECs across the sectors is desirable from both perspectives. While the nature of the program (delivering upgrades at scale) means that in a given year we may see a greater proportion of benefits in one sector over another than modelled, the overall contribution of activities over five years is a good indication of the overall distribution of benefits.

The following table summarises how VEEC creation is distributed across the options – with each sector's share of VEECs compared to their level of energy use and contribution of CO_2 equivalent emissions.

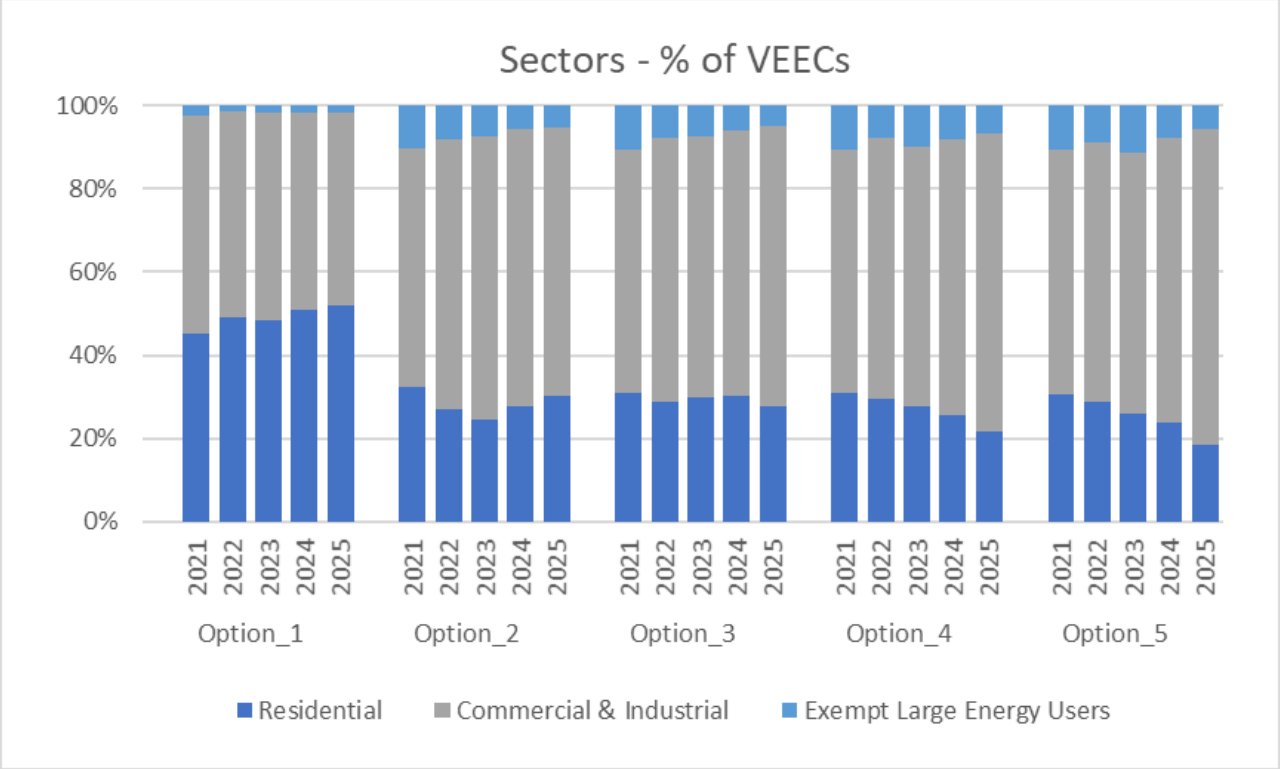
[115] Australian Government, Australian Energy Statistics 2019, < https://www.energy.gov.au/government-priorities/energy-data/australian-energy-statistics>.

[116] The overall net benefit of the program also takes into account likely energy savings from exempt large energy users that opt out of the program and the associated grid and emissions benefits. This is not captured by VEECs.

Table 22: Equity of target options based on distribution of VEEC benefits

	Option 1	Option 2	Option 3	Option 4	Option 5
Residential	Higher share of VEECs	Share of VEECs slightly less in some years	Share of VEECs equivalent to their energy use and emissions contribution	Share of VEECs slightly less in some years	Share of VEECs less in some years
Exempt large energy users	Share of VEECs low	Share of VEECs less in some years	Share of VEECs less in some years	Share of VEECs little less in some years	Share of VEECs little less in some years
C&I	Share of VEECs low	Share of VEECs nearly equivalent to their energy use	Share of VEECs nearly equivalent to their energy use	Share of VEECs little high in some years	Share of VEECs little high in some years

Figure 19: Proportion of VEECs projected to be created across different sectors for VEU options



Under all options, except option one, the creation of VEECs is quite well distributed across all sectors – residential, C&I and exempt large energy users. Options four and five predict a higher take up of incentives by exempt large energy users than options three and four. For those options the average annual prices of VEECs are higher and a greater number of higher cost opportunities need to be taken advantage of.

For all options, the proportion of VEECs going to exempt large energy users is lower because only a few of them are expected to remain in the program. For options three, four and five, exempt large energy users

would be required to undertake ISO50001 and thereby there will likely be additional energy savings and emissions reductions delivered from this sector – but these will not be reflected in VEECs.

The optimal option is option three although only by a margin over options two, four and five. Option one, while still delivering a division of VEEC benefits, does not deliver them in a similar proportion to energy use and emissions contribution of the different sectors.

Division of VEECs across activities

As a market-based program, most certificates naturally flow to the lowest-cost opportunities. This can influence the distribution of activities across consumer groups and the comparative participation rates. Some low-cost opportunities are mainly available in specific sectors – for example, low and no cost upgrades of lighting and showerheads in households or high-bay lighting upgrades in warehousing and other commercial/industrial facilities.

A quick look at the spread across industries is also illustrative in determining the likely investment in particular technologies. Historically, the program has primarily invested in the lighting industry. There is a benefit to a large amount of investment in one area as it can drive market transformation of that technology, however there are also benefits associated with diverse investment, one of these is that it leads to a more equitable distribution of benefits.

The likelihood that larger targets will drive greater participation and activity overall is considered in the section on energy affordability and the total amount of investment under each option and how the quantity of investment increases with target size is explored in the section on innovation. In contrast, this section considers:

- how well benefits are distributed across different industries and
- how this will impact the ability for different consumer groups to participate.

Modelling projects a more diverse distribution of benefits across industries and technology types under options two, three, four and five for the commercial, industrial and residential sectors (see Figure 20 and Figure 21). As the target ambition increases, an increasing amount of activity is expected to be delivered in the space heating and cooling sector. This has the potential to drive market transformation and deeper retrofits of households and buildings. Space heating and cooling upgrades are likely to drive wide-scale participation as all consumers can engage with such upgrades. Water heating upgrades and energy management system upgrades (including smart appliances) which can also be undertaken by a wide range of consumers are also projected to provide a modest amount of VEECs, for all options.

There is expected to be modest uptake of VEECs for the installation of solar panels (by commercial and industrial consumers) and equipment that optimises use of solar (by residential as well as commercial and industrial consumers) under options two, three, four and five. Solar optimisation opportunities are captured under the building EMS category for households. Solar related incentives are more likely to be taken up by consumers that have long term property contracts (as opposed to short term leases) and greater benefits are seen with larger solar systems which suit larger sites. When consumers install solar or optimise the use of solar, they forego more of the costs of the program (given these are passed through in energy bills), leading to them increasing for other consumers. This is an issue that will need to be managed. Then again, by providing incentives, the VEU program will make it easier for more people to install solar and enjoy these benefits than would otherwise be able to.

After the 2021 target year, lighting upgrades are not expected to contribute many VEECs providing an opportunity for transforming other markets and industry with VEU incentives.

Figure 20: Number of VEECs created under each VEU Option for commercial and industrial activity types (including exempt large energy users)

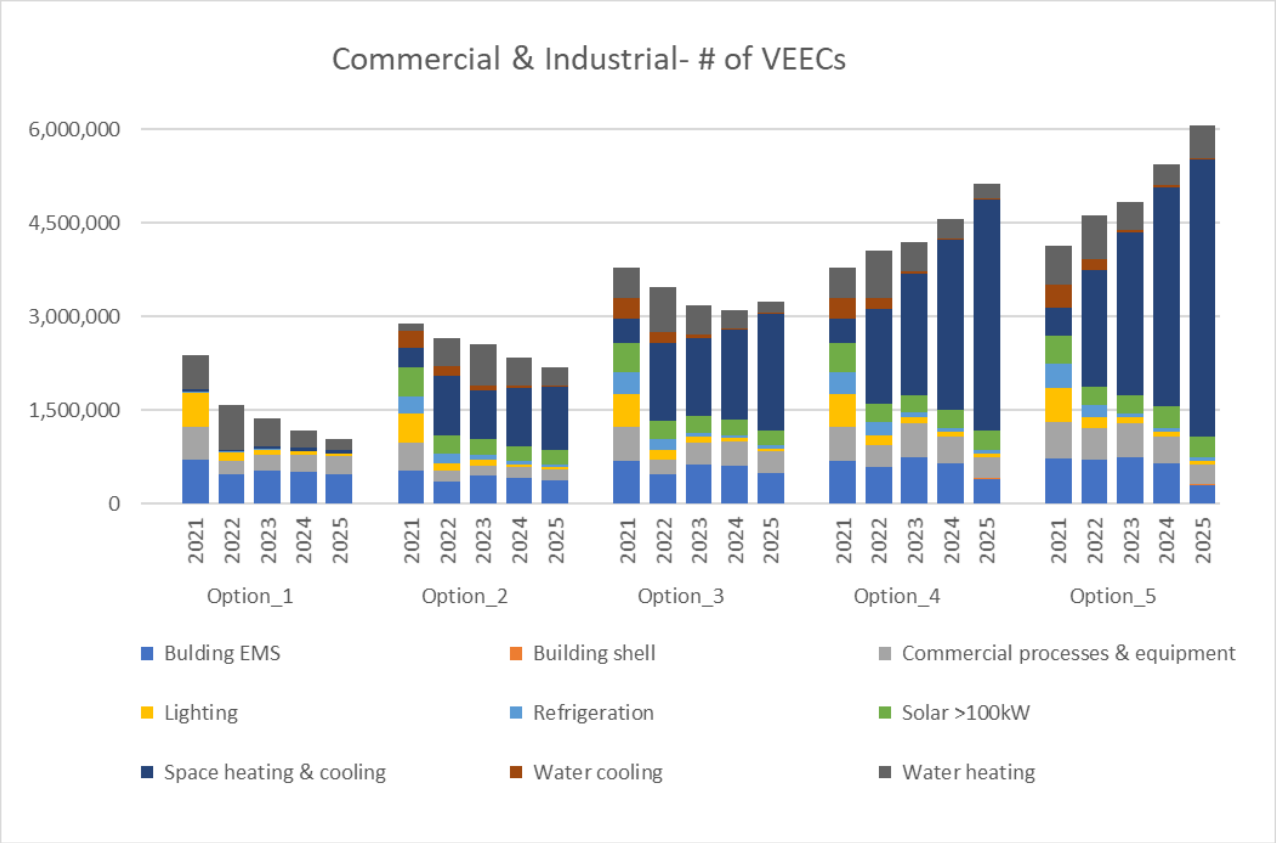
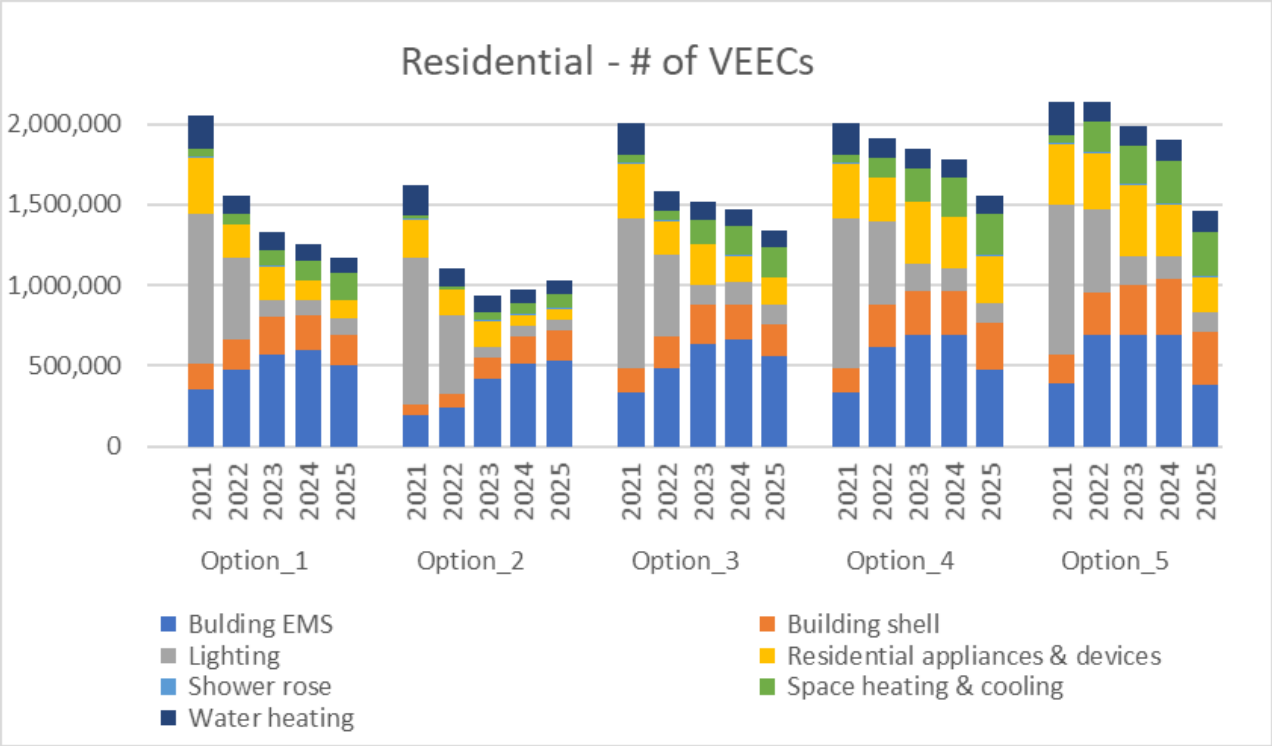


Figure 21: Number of VEECs created under each VEU Option for residential activity types



Access to upgrades for households

The above section briefly considered how the division of VEECs across activities impacted participation of consumer groups. This section elaborates on the impact of the target options on low income households both because of the division of VEECs across activities (and the upfront cost of activities) and the total number of VEECs expected to be delivered in the residential sector.

The upfront cost of upgrades – even with VEECs – can be a barrier to some consumers. Lighting, installation of shower roses, and weather sealing upgrades have historically been low cost/free activities that benefit low-income consumers who might otherwise struggle to overcome any financial barrier. While future activity projections for the residential sector show that there will be fewer lighting upgrades available, low income houses are likely to continue to be able to access VEU incentives for high efficiency shower roses and weather sealing. The financial assistance available for space heating upgrades will also be much higher in later years, and this may assist low income households to undertake these types of upgrades.

Residential energy management systems are expected to be a newly emerging activity that will be delivered at low cost. However, currently smart housing systems (for instance smart phone appliances that manage energy use in the house) often require either smart technology or more complex understanding by householders of their energy use. This may be a barrier to access for some households, including low income or vulnerable households – and further assistance may be required for them to access these benefits.

Overall options four and five deliver substantially more VEECs for the residential sector in comparison to the other options. This means that more households will receive upgrades through the program – and these upgrades will make a more substantial impact on improving the condition of Victoria's existing building stock (e.g. through improvements to building shell) and to consumer health and comfort (e.g. upgrades of heating and cooling). These options also deliver more incentives for space heating, which will likely become financially viable even for low income households as certificate prices increase. Further, these options will

deliver more of these activities at lower total cost to consumers because incentives are likely to be higher (due to the average certificate price being higher).

Equity impacts for gas and electricity users

If consumers do end up paying to reduce emissions through their energy bills this is equitable if their share of the cost matches their contribution to the overall emissions from the energy sector. As already noted, there is an alignment between the share of costs and emissions for each consumer sector (industrial, commercial and residential). Below it is considered whether costs for consumers reflect the emissions associated with their use of either gas or electricity.

The cost of the VEU program that is passed through on gas and electricity bills reflects the relative emission contribution of one fuel over the other. This means that consumers that primarily consume gas, which is less emissions-intensive per unit, have typically borne a lower pass through cost for the program. However, gas appliances are also generally more energy intensive (that is, they use more units of energy to deliver the same service) and going forward modelling projects that some gas appliances are more emissions intensive over their lifetime than their corresponding electrical appliance.

Over the 2021-2025 target period, there will be a higher pass through cost of the program for gas consumers reflecting the increased proportional contribution to emissions by gas consumers. For electricity consumers, the pass-through cost is offset by price reductions that result from decreased electricity demands. However, because gas prices are relatively inelastic relative to electricity prices (as discussed in the section on affordability) in response to a reduction of demand, the overall impacts on gas prices will be greater. These impacts need to be considered in assessing the relative merits of the different options. Options four and five provide greater opportunities for consumers to mitigate impacts by switching from gas appliances to electric appliances in circumstances where this is appropriate, than the other options. However, they also pass-through a greater cost for gas consumers. Because of these competing impacts, there is no preferable option under

Summary

This section suggests that the VEEC benefits, and overall program benefits, are likely to be distributed equitably among residential, commercial, industrial and large energy using consumers over the next target period for all options except option one. Further, VEEC benefits are likely to be distributed across a broader range of activities and drive more diverse opportunities for participation.

Nevertheless, within the residential sector, low-income consumers may find it harder to participate in the VEU program than used to be the case because of a potential decline of ‘free’ upgrades that do not require energy literacy or existing smart technology. However, some space heating upgrades that would be very beneficial to low-income consumers may become so cheap that they are accessible to even low-income consumers.

To some extent other policies such as the setting of minimum rental standards may overcome some of the energy efficiency barriers that typically impact low-income households. Many low-income households rent. Minimum rental standards will likely increase the participation of renters in VEU across all options. These standards will likely require landlords to make upgrades on behalf of their tenants and allow tenants to make more types of upgrades without requiring permission by their landlord.

It should also be noted that this government policy will be among a suite that provides options and solutions to assist with energy affordability. Where this policy may become slightly less suited to low-income households, other policies such as the Victorian Default Offer may increasingly target these more vulnerable consumers. Nevertheless, the Department accepts that for all options, there needs to be continued consideration on how incentives can be better targeted and delivered to low income consumers or alternatively, how some of the pass-through costs of the program can be mitigated.

The following points are awarded:

- option 1 – 3 points,

- option 2 – 7.5 points,
- option 3 – 9 points,
- option 4 – 8.5 points, and
- option 5 – 8 points.

Conclusions

This section of the RIS explains the choice of the preferred option, based on the costs and benefits discussed in the previous section. This section also examines whether the preferred option is likely to affect competition and reduce red tape.

Preferred option

The benefits of the CBA are summarised in Table 23. The Multi-Criteria Analysis (MCA) results are summarised in Table 24. The MCA considers how all objectives, including the quantifiable net benefit to Victoria, are met by the options. The preferred option is best at meeting the stated objectives. Both the CBA and the MCA suggest option four must be the preferred option.

Table 23: CBA Results for Target Options

	Option 1	Option 2	Option 3	Option 4	Option 5
Costs					
Costs of certificates	452.5	432.6	918.5	1,705.3	2,355.0
Administrative costs to energy retailers	8.1	11.2	15.3	19.0	20.9
Government costs of administering scheme	26.5	27.8	29.5	31.1	31.9
Costs to large energy users[117]	-	-	3.4	3.8	4.3
Benefits					
Abatement of greenhouse gases	937.1	1,288.3	1,850.3	2,299.7	2,567.6
Improved air quality	185.7	186.6	237.8	223.8	190.2
Energy system savings	1,633.0	2,258.8	3,217.4	3,914.8	4,340.8
Net benefit	**2,268.7**	**3,262.1**	**4,338.8**	**4,679.1**	**4,686.5**

Table 24: MCA Results for Target Options

Option	CBA Outcome	Energy Affordability	Energy Grid Impacts	Innovation	Equitable distribution of benefits	Weighted total
Option 1	4.36	7	1	5	3	**64.5**
Option 2	6.26	8	5	4	7.5	**92.7**
Option 3	8.33	6	7	6.5	9	**106.15**
Option 4	8.99	5	9	8	8.5	**112.15**
Option 5	9.00	-2	9.5	8.8	8	**86.03**

Option four is closely followed by option three. Both these options provide significant net benefits of over $4 billion. While option three has a very similar, although slightly lower, net benefit than option four it has both significantly lower program costs as well as lower greenhouse gas abatement benefits. Because of the lower program cost, option three is estimated to result in overall bill savings for households, even for non-

[117] This is the costs to large energy users who opt-out of participation in the scheme under options 3 and 4. The cost is the estimated cost of undertaking ISO50001 certification.

participants, although it does increase gas prices for residential and small business consumers. In contrast, option four has a marginal total impact on the energy bills of household who do not participate although the net impact is $67 over 30 years. Its average impact on these households during 2021-2030 is neutral. It also increases gas prices for residential and small business consumers (while decreasing them for industrial consumers).

However, for consumers who participate, both options three and four provide for significant opportunities to save on bills Under option four, more than $3.12 billion in energy savings are available to residential participants alone. If all households in Victoria took part in the program to the same degree, each household could save $1913 on their energy bills between 2021-2050 and reap the additional benefits of lower greenhouse gases and pollutants. This highlights the importance of complementary measures that support Victorian households, particularly low-income households and others experiencing barriers to access, to participate in the program. While demand profiles for businesses vary significantly making it difficult to estimate impacts on energy bills, they will also enjoy significant savings if they participate. Unlike option three, option four is likely to drive increased participation.

The greatest challenge under option four will be to navigate some volatility during the next ten-year period as residential consumers may face bill increases up to $65 during 2023-2025 followed by similar savings during 2026-2028. It is during these consumers will hopefully look towards the VEU program and other government initiatives to mitigate any impacts. The Department is committed to exploring options, as a further element of work outside the scope of this RIS, to support participation and mitigate the program's impact on vulnerable consumers with a view to introducing additional measures prior to 2023 when impacts may be felt.

Unlike option three, option four will increase the amount of emissions abatement achieved under VEU. It will also drive significantly more investment and participation than option three, making it more likely the program will further transform the energy management industry. Businesses would see additional benefits with growing markets for energy demand management products and services. Over 1.7 billion dollars will be invested in the energy demand management industry over 2021-2025, with flow on benefits in jobs for the economy as a whole. The increased cost of the program may mean that it drives more significant and expensive upgrades than it has previously – and these deeper retrofits are very much needed.

Option four is the preferred option. For this option, the cost of creating certificates is more than offset by the overall network benefits. Given the historical delivery of program targets at lower price than projected (see section on Victorian Energy Upgrades program outcomes) and incomplete data on the entire pool of opportunities available in the demand management sector,[118] this cost (and thereby the impact on bills) is considered to be a conservative estimate.

The preferred option presents a significant increase in ambition, in particular in amounts of energy saved. The Department has determined this option is feasible. The track record of the program is strong, and participants have shown engagement with a diverse range of activities and been able to adjust to a continually evolving environment. The implementation section below explores how the Department will assist with implementing this target.

Box 11: Option 4 – Exactly how ambitious is it?

- Option four is the largest target, in terms of emissions and energy savings that the program will ever have had. Each year, the target increases by approximately 3 per cent.
- The energy savings in 2025 from activities carried out during 2021-2025 will be equal to 10 per cent of energy consumed by Victorians in 2021. In its year of maximum impact (2026), the gas savings from activities carried out during this period will be equal to 15 per cent of 2021 consumption levels.

[118] Details can be found in the attached reports. For instance, the report prepared by the Institute for Sustainable Future on Solar Optimisation Upgrades (Appendix 8) recommends further exploration of HVAC opportunities in schools and water pumping opportunities in agriculture.

- While the 2016-2020 target required an approximate 17 per cent increase in energy savings annually, the 2021-2025 target will require an average annual increase of 22-27 per cent.
- Electricity savings under the preferred option could power the MCG for 26,000 years.[119]
- The cumulative emissions (40.6 MT) are equivalent to planting 8.12 million trees or taking 8.82 million cars of the road for the year.[120]

Rising VEEC prices

The Department projects rising certificate prices over the 2021-2025 period for the preferred option. This signifies the reduction in no and low-cost abatement opportunities. While it may mean that there are less 'free' products available through the VEU program, it also means that the upfront cost of other upgrades such as space heating will significantly reduce. The Department expects this to be beneficial, as it can allow the program to better target other areas of homes and businesses that are underperforming from an efficiency perspective, such as space heating.

Each certificate will require a greater number of energy savings to be delivered because of the decreasing emissions intensity of electricity. This means fewer certificates are available for the same upgrade. This issue could have various practical implications on delivering upgrades. The department will explore ways to deal with these in the future, including assessing whether the creation of half certificates will need to be permitted.

Main activities projected for the 2021-2025 period

The proposed target is expected to be delivered by a range of activities. No individual activity was projected to contribute to more than 10 per cent of Victorian Energy Efficiency Certificates (VEECs). The program is good at effecting market change and delivering technology at scale. It is difficult to predict and forecast this type of market transformation for an individual activity. If the program delivers one of the activities at scale it will change the proportion of VEECs projected to be delivered by that activity. It will also significantly reduce the projected cost of the program.

Some of the key cost-effective measures identified were:

- Replacing a non-ducted gas heater with a variable refrigerant flow (VRF) air to air heat pump or split system air to air heat pumps
- Replacing a heating hot water (HHW) gas boiler with either a ground to water heat pump, an air to water heat pump or a water to water heat pump
- Installing a 100kw+ rooftop solar photovoltaic (PV) system
- Replacing a low-efficiency gas boiler with a high efficiency gas boiler
- Installing smart thermostats for ducted gas space heaters
- Integrated and disaggregated whole of building energy management and information systems (EMS).
- Upgrading or introducing electricity meter interface and appliance/webs services
- Introducing smart diverters for electric hot water storage systems to utilise excess solar energy produced by behind the meter rooftop solar PV systems.
- Upgrading IT equipment linked cooling systems
- Upgrading refrigeration EMS.

[119] Based on an annual total consumption of 360,000kWh and a running time of 400 hours over a twelve-month term (Total power consumption at any given time is approximately 1800kilowatts), sourced from Melbourne Cricket Ground, 'Home of sport is (carbon) neutral territory for September' (17 September 2018) <https://www.mcg.org.au/whats-on/latest-news/2018/september/mcg-goes-carbon-neutral>.

[120] Based on five trees to sequester one tonne of Co2. Car numbers based on average cars emitting 4.6 tonnes of carbon each per year.

Replacement of compact fluorescent lamps (CFLs) or incandescent general lighting service (GLS), known by current participants as activity 21A, is expected to deliver a portion of VEECs for the 2021 target year, but incentives for this type of activity are expected to be removed and not significantly deliver for the 2022-2025 targets.

While deemed methods will likely be developed for some of the above activities, the project-based activity methodology is expected to deliver an increasing number of VEECs in the 2021-2025 target year.

Future participation in the program

It is difficult to project future participation as consumers often undertake more than one measure. However, the preferred target option (option four) is likely to impact participation as follows:

- The preferred target is greater than the current one, meaning more VEECs are required to meet it. This means more upgrades are required, and this will likely require greater participation.
- Allowing for a broader range of activities will likely encourage a broader range of consumers to participate, as it is more likely an activity will suit them.
- The decreasing emissions intensity requires delivery of a greater amount of energy savings to meet the emissions targets. Individual upgrades will continue to deliver the same amount of energy savings therefore, for each annual target, even if it were not increasing, more upgrades will need to occur to meet the target. If more upgrades need to occur, it is likely more people will participate.

Shortfall Penalty

The shortfall penalty will be:

$$\$\,penalty\ price = \$\%\ of\ total\ benefit\ expected\ for\ society\ per\ VEEC = \$\frac{Total\ Net\ Benefit}{Annual\ Target} = \$112$$

The current penalty exceeds the estimated cost of certificate by around 50 per cent but only for the initial years. As such, the Department has determined that this penalty is feasible.

Impact on competition

This section considers whether the proposed Regulations are likely to lead to a material impact on competition in any market.

All regulatory proposals need to be thoroughly scrutinised to assess whether it may have an adverse impact on the ability of businesses and/or individuals to enter or participate in a given market. Victoria is party to the Competition Principles Agreement, which requires that any new primary or subordinate legislation should not restrict competition unless it can be demonstrated that:

- the benefits of the restriction outweigh the costs; and
- the objectives of the legislation/regulation can only be achieved by restricting competition.

This is the ‘competition test’ which must be applied when making or amending regulations. It is important to note that the competition assessment does not preclude any option being selected as the preferred option, rather it requires that any decrease in competition should ensure that the benefits outweigh the costs and that the desired objectives can only be achieved by affecting competition.

In some cases, regulation can affect competition by preventing or limiting the ability of businesses and individuals to enter and compete within particular markets. The primary cost of a restriction on competition is that it reduces the incentives for businesses to act in ways that benefit consumers, that can result in lower innovation and productivity, reduced choice of products and/or higher prices.

The types of regulations that may be regarded as affecting competition either directly or indirectly are set out in Table 25.

Table 25: Types of regulation that may affect competition

Category of restriction	Examples
Barriers to entry or exit	Governs the entry and exit of businesses or individuals into or out of markets. Creates or protects a single buyer or seller. Limits the number of businesses that can carry out a particular activity. Restricts who can own or operate a business. Gives existing businesses access to information that is not available to new market participants.
Conduct Restrictions	Controls prices or production levels. Restricts certain activities (e.g., advertising). Imposes requirements on product quality. Restricts the quality, quantity or location of goods and services available. Restricts access to inputs used in the production process (e.g., infrastructure and employment standards), restricts the price of or type of inputs used in the production process. Limits consumer access to particular goods or services. Restricts advertising and promotional activities.
Increase in business costs	Imposes specific levies and/or imposts on a particular industry. Imposes high administrative or compliance costs.
Advantage for some firms over others	Imposes requirements on certain firms, but not on competing businesses. Sheltering some activities from the pressures of competition. Advantages government businesses over the private sector. Gives one business access to infrastructure, but not others.

Source: Based on Assessment against the Competition Test, guidelines published by NSW Department of Finance, Services and Innovation, 2017, with additional examples from Legislation Impact Assessment Guidelines published by Tasmanian Department of Treasury and Finance December 2016.

Some regulatory arrangements may impose more than one restriction, and some restrictions may fall into more than one category.

Do the proposed Regulations restrict competition?

The competition assessment considers the proposed Regulations against a base case of not making the Regulations. Under the base case scenario, no program targets would exist and therefore the VEU program would cease to operate. Therefore, the proposed Regulations enhance competition by creating a market in which there is greater demand for energy-efficient products and services by APs.

However, by making the proposed Regulations, a liability on energy retailers is also created. This adds a cost to energy retailers' operations. The additional cost to retailers is considered small in the context of their normal operating costs and the retailers have the ability to pass on the costs (and savings) of the program to their customers. As the program is expected to result in a net reduction in energy costs, the proposed Regulations are not expected to impose a net cost on the retailers. As the liabilities are in proportion to the amount of energy each retailer supplies to their customers, the Regulations do not alter the relative competitive positions of retailers. Therefore, the impact of the proposed Regulations on the energy retail market is not expected to result in a material reduction in competition.

The proposed Regulations also introduce a new requirement for some large energy users (LEUs) who opt out of the scheme to achieve certification of ISO 50001 Energy Management Standard. This is expected to

cost approximately $100,000 on average per LEU. The obligation to incur these costs only arises if a LEU makes the decision to out of the program and this is only likely to occur where the cost of the ISO certification is less than the costs to the LEU to remain in the program.

A related competition risk may arise in the market for ISO 50001 certification providers. There is currently one organisation in Victoria which is accredited to conduct these audits. The Department understands there are a number of other organisations either in the process of undergoing ISO 50001 accreditation or commencing it in the near future. The Department anticipates that by the time the proposed Regulations take effect for 2021 there will be several providers available in the market to undertake ISO 50001 audits.

Are the restrictions on competition justified?

The impost on energy retailers is small, relative to their scale, and unlikely to materially affect their ability to compete. Further, other savings associated with the proposed Regulations reduce the overall costs to the energy sector, putting downward pressure on energy prices.

The number of exempt large energy users that will choose to opt out of the program and be obliged to achieve ISO 50001 certification, is currently unknown. 83 exempt large energy users will be eligible to opt out and become accredited to ISO 50001. The Department maintains that most exempt large energy users that undertake ISO certification will identify other ways to reduce their energy costs. Therefore, any small impact on competition requiring ISO certification is justified on the basis that the benefits outweigh the costs.

Any potential impacts on competition are considered justified given:

- The proposed Regulations are expected to result in net benefits that outweigh the costs; and
- The benefits (which are driven by improvements in energy efficiency) can only be achieved by the Regulations giving operational effect to the program established under the Act by setting a target necessary to result in emissions abatement.

In addition, the proposed Regulations create a robust market in certificates that supports the objectives of the Act to encourage investment, employment and technological innovation in industries that supply goods and services which reduce the use of electricity and gas by consumers. In the absence of the proposed Regulations, these activities would not occur.

Red tape reduction

Regulations that impose compliance costs on businesses can prevent businesses from taking up opportunities, thereby reducing competition in the market.

The preferred option includes a measure that is expected to reduce regulatory costs. The proposed change to the exemption of large energy users, significantly simplifies the processes that retailers follow in order to meet their obligations. Retailers are required to surrender a certain number of certificates, depending on the number of scheme acquisitions (purchases of energy) that their customers make. Scheme acquisitions only accrue for the consumption of energy by customers that are subject to the program. As such, retailers need to understand who these customers are to meet their obligation.

As discussed in previous sections, the exemption register is based on participation in the EREP program prior to 2013. As this information has become increasingly out of date it has been progressively more complex and burdensome for exempt energy users and energy retailers to clearly identify site boundaries and establish how much energy consumed on that site is exempt from the program. Further, retailers only receive an indication of who these participants are during the compliance year for a given annual target, meaning they need to estimate the certificates to be purchased (their demand) based on an incomplete understanding of their liability and then adjust numbers later in the year before surrendering certificates. This uncertainty prevents completely competitive engagement with the VEEC market. The uncertainty of the process also increases the resources retailers dedicate to it.

The preferred option changes this process. It requires customers to opt out, notifying ESC of their intention and making it straightforward for the ESC to supply up to date information to retailers. Retailers will also receive this information for a particular compliance year, before that compliance year commences.

The preferred option also improves the usefulness of the information on the public register that states which sites and customers are in the program and out of the program. This benefits retailers as well as Accredited Persons who use the register to understand which energy consumers they can and cannot create certificates for.

For the customers impacted, the additional opt out process is estimated to cause minor impact. Existing data that customers release to the Commonwealth as part of the requirements under the NGERS Act will be harnessed by the ESC in determining who is eligible to opt out and the only additional requirement on customers will be to provide a simple notice to the ESC stating they wish to opt out of the VEU program.

As the ESC will rely on existing databases to determine whether thresholds for exemption have been met, the process is not expected to significantly increase their workload.

Implementation and review

This section of the RIS explains how the preferred option will be implemented and reviewed. In assessing the effectiveness of the preferred option, the Department will consider whether the desired objectives outlined in this RIS have been met.

Implementation

The Department recognises the changes in the preferred option for the proposed Regulations will have an impact on stakeholders participating in or engaged with the program. Impacts are not just attributed to the immediate setting of the target, but how the program can be further developed to best meet these targets. The Department will track the following principles to ensure successful implementation of the changes:

- Ensuring clearly communicated changes
- Transparent acknowledgement of the changes
- Rapid activity development
- In-depth engagement of new industries in the program

The Department will ensure that changes are communicated on multiple occasions and in various forms, including through face-to-face meetings and events, by publishing informative documents online, and by creating short media clips if necessary.

Major changes that will follow from implementation of the preferred option are:

- A transitioned reduction in the emissions factor.
- New activities will be introduced
- Amendments to the VEET Act will be ***considered***, to deal with some of the outcomes of the ambitious targets, including:
    - Establishing a clear signal as to the objective of the program going forward
    - Establishing mechanisms to ensure fluidity in the market, such as allowing creation of half certificates,
    - Establishing a mechanism that allows the Department to better deal with energy transition uncertainties and set reasonable price signals in the market.

The Department will also continue to investigate how the program can continue to deliver for low income households.

New Activities

The Department continuously works to ensure incentives are available for new types of technology that can better manage consumer demand. As such, there is an ongoing process to introduce new activities. Given most of the options envisage a large ramp up of ambition (in terms of energy savings) and a range of new activity areas, the Department has already begun the process to look into how such new activities can be delivered.

As such, stakeholders can expect to engage with the Department on new activities on a continuing basis. Initial consultation for the first tranche of new activities is expected to occur early 2020.

The Department intends to consult regularly with a variety of energy efficiency experts on new types of activities and actively encourages proposals and feedback on the program.

Phase out of incentives for lighting

The Department recognises that in moving the VEU program away from lighting, a variety of stakeholders will be impacted. As such, the Department will engage in a separate process with these stakeholders to ensure this transition is managed in the best way possible.

Review

The proposed Regulations set targets until 2025. By May 2024 at the latest, the Department will need to establish a future set of targets for the 2026-2030 period. At this point, the government will review the operation of the Regulations before remaking them again in line with the requirements set out in the *Subordinate Legislation Act 1994*.

The provisions in the regulations in relation to how large energy users are treated under the program will have a significant impact. Following the first year of operation of the new opt-out mechanism, in 2022, the Department will review the practical effect of the provisions to ensure they are achieving the desired objectives.

It is expected that the review of the effectiveness of the program at these times will draw on evidence including:

- the number of certificates created for each type of activity and the level of surplus certificates
- market information on the prices of VEECs
- the number of households and businesses that participate in the program
- how low-income consumers are engaging with the program
- consultation with community on the operation of the program.

This evidence aligns with past reviews. For example, in 2015, the Department used the following key performance indicators to measure progress (these map directly to the objectives of the Act):

- reduction in GHG emissions attributable to the program
- improvements in energy efficiency
- employment levels in relevant businesses.

The Department will also continue to work closely with the ESC on the data generated by the program. This includes the number of product registrations before and after the change, and a survey of compliance costs of the registration process. This data will help with measuring the benefits of red tape reductions resulting from program changes.

Table of Figures