

SIX STEPS TO EFFICIENCY LEADERSHIP

THE PATH TO ENERGY AND WATER
EFFICIENT HOMES AND BUSINESSES

November 2015



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01

INTRODUCTION

THE CASE FOR ACTION

From climate change, to the pressures on manufacturing and escalating social inequality, Victoria faces multiple environmental, economic and social challenges in the twenty-first century.

But there are also enormous opportunities – ways to make our cities and infrastructure more resilient, our businesses more competitive and our society more equitable.

One of the most significant opportunities, too often overlooked, is improving energy and water efficiency, which can deliver ‘win-win-win’ outcomes for Victoria’s people, environment and economy.

Saving energy and water cuts the cost of living and doing business, particularly in the face of rising utility prices. Efficient homes are more comfortable and healthier to live in, especially in extreme weather. Investing in efficiency creates thousands of jobs and postpones or avoids the need for costly and environmentally destructive additional water or power supply. And reducing consumption cuts greenhouse pollution and saves water for our rivers.

Since its election in 2014, the Andrews Government has shown encouraging signs that it understands the critical role that efficiency can play in securing Victoria’s economic and environmental future.

The Victorian government’s energy efficiency and productivity statement *Saving Energy, Growing Jobs*, the promise of a more detailed strategy, and the announcement of increased Victorian Energy Efficiency Targets to 2020 are welcome first steps.

However, after four years of inaction and backward steps under Coalition governments at the state and federal level, there is no more time to waste. It is vital that the Victorian government not only sets out an ambitious agenda, but also a clear and resourced path for implementation.



Central to an ambitious efficiency agenda for Victoria is a commitment to transform the quality of our homes. Environment Victoria, alongside our One Million Homes Alliance partners, has been working since 2009 for a commitment “that Victoria’s housing stock meets an average 5 Star equivalent and 100 litre/person/day standard within 10 years”.

This report, consistent with the Alliance’s recently released *2025 Roadmap: Overcoming the Barriers to Energy and Water Efficient Housing*,¹ sets out six ambitious yet achievable steps for achieving the housing stock goal, as well as improving non-residential building performance. The six steps are:

1. **Improve standards for residential buildings**
2. **Facilitate accessible and affordable finance**
3. **Create a culture of efficiency and provide relevant information**
4. **Deliver targeted programs to those most in need**
5. **Upgrade government buildings**
6. **Drive improvements in non-residential buildings**

These six steps address the key barriers which prevent many homeowners, landlords, renters and businesses from taking action to reduce their energy use – primarily lack of incentive, upfront costs and lack of information relevant to their home and situation.

Introducing achievable standards for homeowners and landlords will provide incentive, while improving access to affordable finance and relevant information will assist property owners to meet those standards. Importantly, clear standards also help create a stable policy environment which encourages sustained investment and jobs growth, avoiding the ‘boom-bust’ scenarios which have plagued emerging industries in the past (such as the experience of the water tank industry during the drought).²

¹ One Million Homes Alliance, www.onemillionhomes.org.au

² Environment Victoria 2009, *Victoria – The Green Jobs State: Seizing the opportunities*, p. 27

These six steps focus primarily on using energy and water more efficiently in cities through upgrading individual buildings. Wider opportunities to conserve water by making our cities, towns and neighbourhoods more ‘water smart’ and making more effective use of alternative supplies (stormwater, greywater and rainwater) are addressed in a separate forthcoming report *Six Steps to Water Leadership*.

Beyond the actions outlined in this report, a comprehensive Victorian policy agenda should also encompass advocacy for, and contribution to, national priorities such as:

- Ambitious national greenhouse emissions reduction targets and a carbon pricing scheme
- Establishment of a National Energy Savings Initiative which has stalled since 2012
- National energy market reform, including change to tariff structures which undermine incentives for efficiency
- Reinstatement of the federal Energy Efficiency Opportunities Program which drove energy efficiency improvements in large energy-using businesses nationally
- Best practice vehicle emissions standards
- Best practice national efficiency standards for appliances
- Enhanced NABERS Energy rating and Commercial Building Disclosure programs.

Making better and smarter use of precious energy and water resources represents one of Victoria’s biggest untapped opportunities and is critical to our future. But like anything worthwhile, it’s not simple. Real action will require leadership, investment and well-designed policies that create incentives for action and investment by other players.

The Andrews Government’s *Saving Energy, Growing Jobs* statement has articulated a vision for “a more efficient, productive and resilient state”. It’s time for the Victorian government to turn this promise into action with an ambitious and resourced plan to make Victoria much more energy and water efficient.



02

BENEFITS OF INVESTING IN ENERGY AND WATER EFFICIENCY

REDUCE GREENHOUSE EMISSIONS

Decades of delay in responding effectively to climate change has led us to the point where we may already be ‘locked in’ to two degrees of warming based on greenhouse emissions already in the atmosphere. Furthermore, there is growing concern that two degrees does not represent a safe ‘cap’ but that irreversible tipping points are already occurring. Victoria, like the rest of the world, faces an urgent task to reduce emissions to zero and transition to renewable energy as soon as possible.

Nearly 70 percent of Victoria’s emissions come from the stationary energy sector – the electricity and gas we use in our homes, businesses and industry. Over 80 percent of Victoria’s electricity is generated by burning brown coal, while Victorian households use far more gas than households in other states, mainly due to winter heating.³

THE INTERNATIONAL ENERGY AGENCY RECENTLY IDENTIFIED IMPROVING ENERGY EFFICIENCY AS THE NUMBER ONE GLOBAL ACTION TO ACHIEVE PEAK EMISSIONS BY 2020.

³ Department of State Development, Business and Innovation 2014, *Victoria’s Energy Statement*; Consumer Utilities Advocacy Centre 2014, *Our Gas Challenge*.

⁴ Department of Sustainability and Environment 2012, *Greenhouse Gas Inventory*.

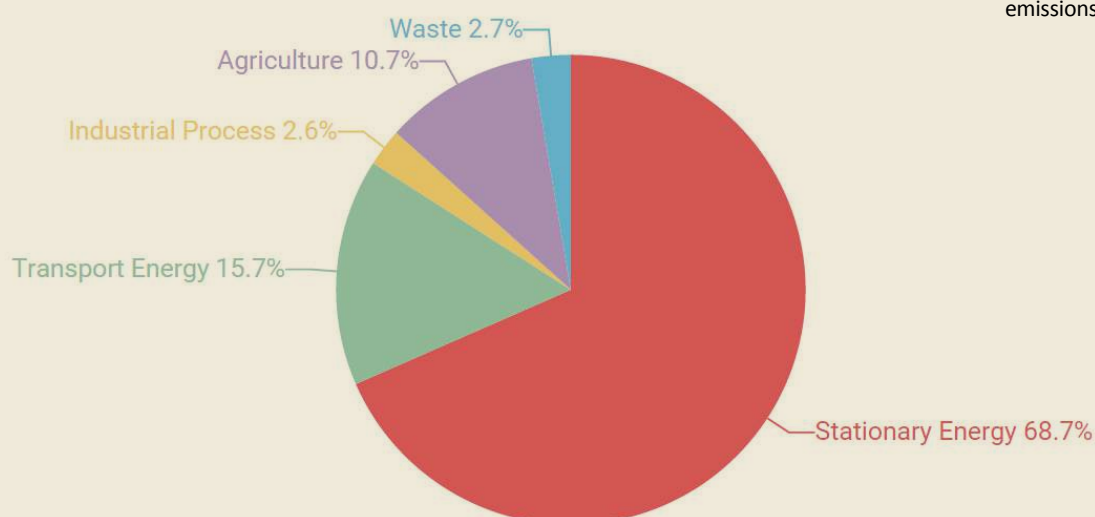


Figure 1. Victoria’s greenhouse gas emissions by sector.⁴

CHAPTER 02

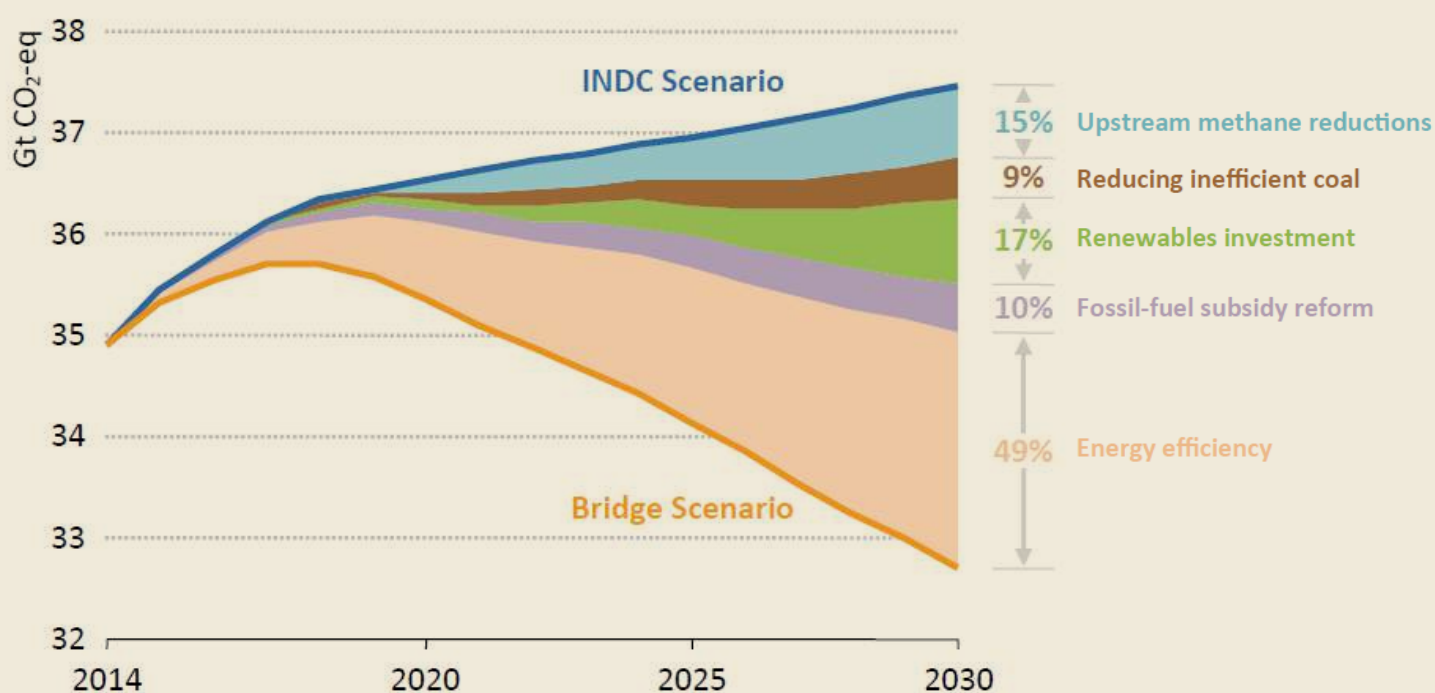
BENEFITS OF INVESTING IN ENERGY AND WATER EFFICIENCY

However, the efficiency of ducted gas heating systems can be as low as 50 percent – meaning that half of the costly and polluting gas we burn is immediately wasted.⁵ Cutting wasted energy by improving the efficiency of our buildings is therefore one of the most effective ways to reduce overall emissions. The International Energy Agency recently identified improving energy efficiency as the number one global action to achieve peak emissions by 2020 and significant declines by 2030. In Victoria’s case, the benefit of improving energy efficiency is likely to be even greater than indicated in Figure 2, due to the particularly high emissions intensity of the state’s brown coal electricity generation.

⁵ Forcey, T. 2015, *Switching Off Gas*, Melbourne Energy Institute.

⁶ International Energy Agency 2015, *World Energy Outlook: Special report on energy and climate change*, www.iea.org

Figure 2. Relative contribution of measures to reduce emissions, globally.⁶





Closer to home, ClimateWorks' *Low Carbon Growth Plan* provides an estimate of the lowest cost opportunities to achieve a 25 percent reduction in Australia's emissions below 2000 levels by 2020. The Marginal Abatement Cost Curve (MACC) in Figure 3 shows that improving building efficiency offers emissions reductions at zero to negative cost because efficiency investments generate cost-savings by reducing waste.⁷

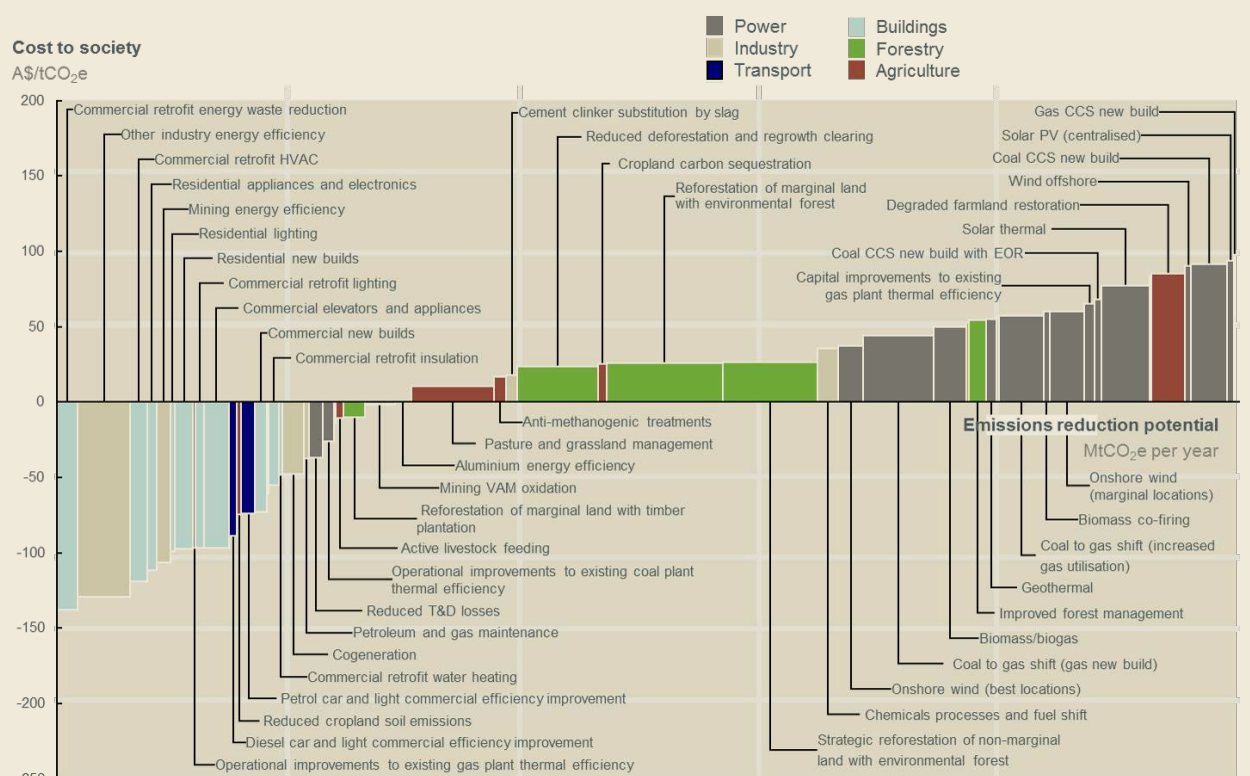
The Victorian government is in the process of setting a new renewable energy target, which needs to be significantly higher than the current 20 percent target if Victoria is to cut greenhouse pollution from its electricity supply at the speed required. Improving efficiency and cutting electricity demand, particularly peak demand, would help achieve an ambitious target faster and at lower cost.

A **Marginal Abatement Cost Curve (MACC)** is ordered left to right from lowest cost to highest cost opportunities. Those appearing below the horizontal axis offer the potential for financial savings, while those above the axis are expected to come at a net cost. See example at Figure 3 below.

⁷ ClimateWorks 2010, *Low Carbon Growth Plan for Australia*, www.climateworksaustralia.org/project/national-projects/low-carbon-growth-plan-australia

⁸ Ibid.

Figure 3. Marginal abatement cost curve, Australia.⁸



¹ Includes only opportunities required to reach emission reduction target of 249 Mtpa (25% reduction on 2000 emissions); excludes opportunities involving a significant lifestyle element or consumption decision, changes in business/activity mix, and opportunities with a high degree of speculation or technological uncertainty

AN EFFICIENT HOME CAN CUT ITS ENERGY COSTS BY 40 PERCENT, TRANSLATING INTO ANNUAL SAVINGS OF UP TO \$1000 FOR THE AVERAGE VICTORIAN HOUSEHOLD.

EASE FINANCIAL PRESSURE ON HOUSEHOLDS AND BUSINESS

Victoria's easy access to brown coal and natural gas has made efficiency a low priority for many households and businesses to date. However, rapid price rises in recent years are starting to change that. Melbourne electricity prices rose by 84 percent between 2007 and 2012,⁹ while gas prices have risen 66 percent since 2008 and are predicted to continue to rise.¹⁰

Despite having a lower population than NSW, Victoria has the highest residential energy consumption of any state, reflecting our cooler climate and greater reliance on heating compared with other states (see Figure 4).

The average Victorian household spends around \$2800 on home energy (electricity and gas) bills every year, with around one-third of those costs going on space heating (predominantly gas) alone. As prices rise, reducing consumption is an obvious and cost-effective way to manage costs.

The quality of Victoria's residential building stock is generally low, with homes built prior to 2005 (when 5 Star building standards were introduced) performing to an average of only 1.8 Stars.¹¹

While every house is different, most pre-2005 homes will see a significant improvement in performance from spending less than \$5000 on the installation or improvement of basic measures such as draught-sealing, insulation, window-shading, efficient lighting and low-flow showerheads and taps. An efficient home can cut its energy costs by 40

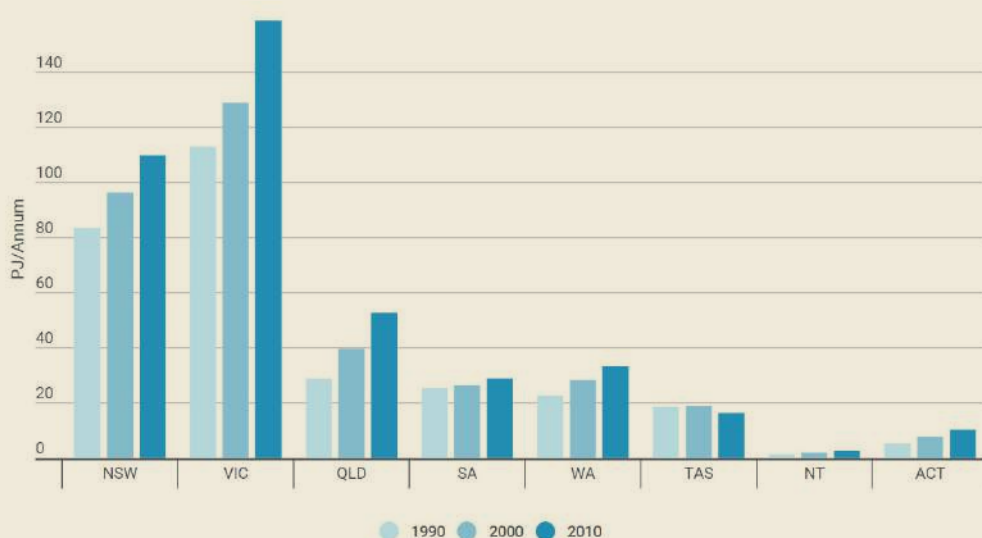
⁹ Australian Bureau of Statistics 2012, *Australian Social Trends, Household Energy Use and Costs, Publication 4102.0*.

¹⁰ Consumer Utilities Advocacy Centre 2014, *Our Gas Challenge*.

¹¹ Sustainability Victoria 2014, *Household Energy Report*, Fig. 1.

¹² Adapted from Department of Environment, Water, Heritage and Arts 2008, *Energy Use Residential Sector 1986-2020*, Table 4, p. 31.

Figure 4. Total residential energy consumption by state from 1990 to 2010.¹²





percent, translating into annual savings of up to \$1000 for the average Victorian household (See Appendix 1).

Furthermore, as the cost of renewable energy has declined while gas prices have risen in recent years, going gas-free and making homes 'zero net emissions' through a combination of efficiency and renewable energy is now a cost-effective option.¹³ Where an efficient reverse cycle air-conditioner is already in place, using this unit instead of gas for heating can save Victorian homes \$658 a year.¹⁴

There are also significant opportunities for improving business energy efficiency. Commercial buildings typically have limited natural light, inefficient artificial lighting and poor ventilation. Inefficient electrical appliances also generate large internal heat loads, which in turn mean large amounts of artificial cooling are required to maintain comfort.¹⁵

HVAC (heating, ventilation, air-conditioning) systems account for the majority of energy costs in a typical commercial building, and an efficient system can cut these costs by 40 percent. Moving to a sustainable lighting system that maximises the use of natural light can cut lighting costs by as much as 80 percent.¹⁶ Significant opportunities with low capital requirements and short payback periods also lie in improving commercial building energy management systems, such as adjusting building system controls and operations, and upgrading small appliances.¹⁷

The terms **carbon zero**, **carbon neutral**, **zero energy** or **zero emission** apply to buildings that use renewable energy sources on site to generate energy for their operation, so that over a year the net amount of energy generated on site equals the net amount of energy required by the building.

¹³ Beyond Zero Emissions 2013, *Zero Carbon Australia Buildings Plan*.

¹⁴ Forcey, T. 2015, *Switching Off Gas*, Melbourne Energy Institute.

¹⁵ Beyond Zero Emissions 2013, *Zero Carbon Australia Buildings Plan*.

¹⁶ Sustainability Victoria, www.sustainability.vic.gov.au/services-and-advice/business/resource-efficient-buildings/energy-efficient-office-buildings

¹⁷ ClimateWorks 2010, *Commercial buildings emissions reduction opportunities*.

¹⁸ Adapted from Sustainability Victoria 2014, *Household Energy Report*, Fig. 1.

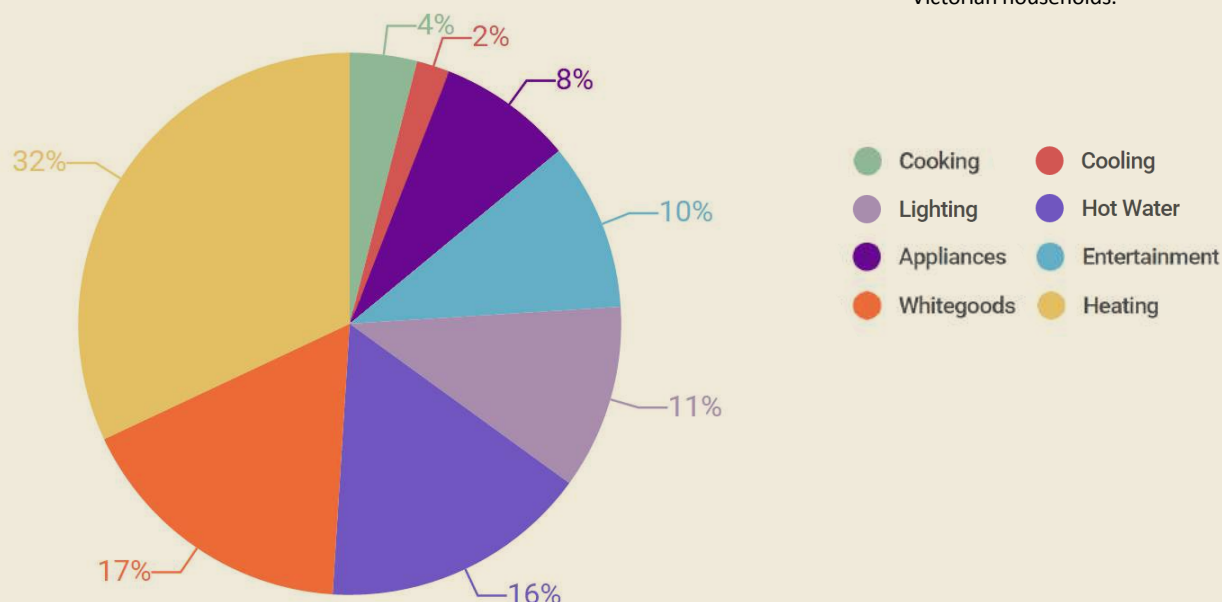


Figure 5. Average energy costs in Victorian households.¹⁸

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BENEFITS OF INVESTING IN ENERGY AND WATER EFFICIENCY

UPGRADING VICTORIA'S HOUSING STOCK TO AN AVERAGE 5 STAR STANDARD BY 2025 WOULD SUPPORT AN ESTIMATED 13,000 JOBS (GROSS) OVER TEN YEARS AND 8500 ONGOING JOBS.

CREATE JOBS

As the manufacturing sector and car industry decline, Victoria will continue to be hit hard by job losses. Predicted gas price rises, driven by the expansion of Australia's export gas industry, are also expected to drive significant job losses in gas-intensive manufacturing, much of which is located in Victoria.¹⁹

Victoria also faces a challenge to create new economic and employment opportunities in the Latrobe Valley, to ensure the transition away from coal towards renewable energy is managed in an orderly and equitable way. The Victorian government has announced a commitment to a \$20 million New Energy Jobs Fund and identified energy efficiency as a prime opportunity for jobs growth.

Upgrading Victoria's housing stock to an average 5 Star standard by 2025, through a mix of direct investment, improved standards, incentives and information (as outlined in the six steps later in this report) would stimulate an estimated \$9.6 billion of public and private investment over 10 years. This would support an estimated 13,000 jobs (gross) over ten years and 8500 ongoing jobs (see Appendix 2).

Jobs in energy efficiency tend to be in small to medium sized businesses and the community sector and cover a range of low to semi-skilled occupations in trades, services and manufacturing.²⁰ The Victorian Energy Efficiency Target scheme is estimated to be supporting at least 2000 Victorian jobs and there is scope to build on this.²¹

Right: Good quality draught-proofing is one of the most effective ways to save energy and money in Victoria's climate.

¹⁹ BIS Shrapnel 2014, *The economic impact of LNG exports on manufacturing and the economy*.

²⁰ Environment Victoria 2009, *Victoria – The Green Jobs State: Seizing the opportunities*.

²¹ Energy Efficiency Certificate Creators Association, www.eecca.org.au





Left: People on low or fixed incomes miss out on the benefits of efficiency because they can't afford the upfront costs of home improvements that cut waste and save money.

These figures are for 'gross' jobs created, a measure which does not make a distinction between jobs drawn from elsewhere in the economy and jobs which are additional to business as usual. However, as the energy efficiency sector is relatively more jobs-intensive than the economy-wide average, and supports jobs across a range of skill levels, it can be assumed that investment in an efficiency program would create new opportunities, particularly for low-skilled and disadvantaged workers, and draw unemployed workers into the workforce.

ENHANCE SOCIAL EQUITY

The adverse impacts of poor quality housing are not spread evenly across our community. Low-income and disadvantaged households are more likely to live in poor quality homes, rely on inefficient appliances and spend a greater proportion of their disposable income on energy.

Consequently, many low-income households are either struggling to pay their bills as prices continue to rise, rationing their energy use, or cutting expenditure on other essentials such as food.²²

The impact of energy unaffordability for many Victorian households can be seen in the alarming rise in disconnection rates – an increase of 359 percent for electricity and 239 percent for gas since 2008-09.²³ At the same time, the proportion of energy customers participating in retailer hardship programs has risen 35 percent, and average debt on entry to the programs has risen by more than 50 percent since 2009. Concessions for eligible customers are not succeeding in keeping bills affordable, while many non-concession households are also experiencing hardship

LOW-INCOME AND DISADVANTAGED HOUSEHOLDS ARE MORE LIKELY TO LIVE IN POOR QUALITY HOMES, RELY ON INEFFICIENT APPLIANCES AND SPEND A GREATER PROPORTION OF THEIR DISPOSABLE INCOME ON ENERGY.

²² Chester, L. 2013, *The impacts and consequences for low-income Australian households of rising energy prices*, University of Sydney; Australian Council of Social Service 2013, *Energy Efficiency and People on Low Incomes*.

²³ Consumer Action Law Centre 2015, *Heat or Eat*.

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BENEFITS OF INVESTING IN ENERGY AND WATER EFFICIENCY

(often large families with large mortgages and high usage).²⁴

Furthermore, a recent analysis by AGL of their hardship customers found that a disproportionately high number live in public or private rental housing. Forty-seven percent were renters, compared with the Victoria-wide rate of about 28 percent renters (see Table 1).²⁵ Tenants typically have fewer options than homeowners for reducing consumption because they face a 'split incentive': landlords have little reason to invest in building improvements or efficient fixed appliances because tenants are responsible for paying utility bills.

Because Victoria's utilities concession framework is percentage-based, rising prices and bills inevitably drive increases in the government's concessions budget. The previous government responded to these budget risks by introducing a cap on concession payments which it estimated would save \$9 million in 2013-14. However, this cap poses significant risks to the fairness and effectiveness of Victoria's concessions system.²⁶

In contrast, the One Million Homes Alliance (comprised of Victoria's leading consumer, social justice and environment organisations) estimates that addressing the root cause of rising budget demands by

²⁴ Victorian Council of Social Service 2015, *Submission to Inquiry into Financial Hardship Programs of Energy Retailers*, Table 1. p. 6.

²⁵ <http://aglblog.com.au/2015/09/effective-support-for-vulnerable-households-closing-the-gap-between-capacity-to-pay-and-cost-of-consumption-part-1/>

²⁶ Consumer Action Law Centre 2013, *Winners and Losers*.

²⁷ Alternative Technology Association for the One Million Homes Alliance 2012, *2.5 billion reasons to invest in efficiency*.

Table 1. AGL hardship program clients receiving Kildonan UnitingCare home audits.

Home tenure (Victoria)	Proportion of households
Owner – fully owned / mortgage	52% (29% / 23%)
Renter – Private housing	35%
Renter – Public / Community housing	12%

retrofitting the homes of one million low-income households would save the government's concessions budget \$2.5 billion over 20 years.²⁷



IMPROVE COMMUNITY HEALTH AND WELLBEING

Climate change presents a twin challenge. One challenge is to mitigate its cause by reducing emissions, and the other is to adapt to the impacts of more frequent and severe weather events such as droughts and heatwaves.

For example, the heatwave in southeast Australia in late January 2009 is estimated to have caused 374 excess deaths,²⁸ while a recent international study concluded that more people die from the effects of chronic cold in Australia than in Sweden.²⁹



The poor quality of our housing is a significant contributor to these weather-related adverse health impacts, which disproportionately affect low-income and disadvantaged households.³⁰ Low-income and disadvantaged households are more likely to live in more heat-vulnerable areas and to suffer from chronic health conditions, which not only contribute to higher energy usage but can be exacerbated by unhealthy living conditions.³¹

Experience in other countries has shown a positive relationship between building quality and health outcomes. New Zealand's home insulation program, for example, delivered net benefits of \$1.2 billion, largely through savings in hospitalisation costs and reduced mortality rates for vulnerable groups.³²

NEW ZEALAND'S HOME INSULATION PROGRAM DELIVERED NET BENEFITS OF \$1.2 BILLION, LARGELY THROUGH SAVINGS IN HOSPITALISATION COSTS AND REDUCED MORTALITY RATES FOR VULNERABLE GROUPS.

More frequent and severe heatwaves under climate change will increase health risks for people living in poor quality homes, particularly the elderly and those with chronic health conditions.

²⁸ Hennessy, K. January 2014, 'Explainer - what are heatwaves?', CSIRO, <https://blogs.csiro.au/climate-response/stories/explainer-heatwaves-in-australia/>

²⁹ Barnett, A. 2015, 'Cold weather is a bigger killer than heat – here's why', The Conversation, <https://theconversation.com/cold-weather-is-a-bigger-killer-than-extreme-heat-heres-why-42252>

³⁰ Barnett, G. et. al. 2013, *Pathways to climate adapted and healthy low-income housing*, National Climate Adaptation Research Facility, Gold Coast.

³¹ ACOSS 2013; Barnett, G. et. al. 2013.

³² <http://sustainablecities.org.nz/2012/05/>

REDUCING DEMAND THROUGH EFFICIENCY CAN HELP AVOID ADDITIONAL GAS, ELECTRICITY OR WATER SUPPLY, WHICH CAN BE COSTLY AND ENVIRONMENTALLY DESTRUCTIVE.

Right: On average, half the Yarra River's flows are extracted for Melbourne, leaving the river in poor health.

SAVE WATER FOR OUR RIVERS

The severe 1997-2009 drought brought Melbourne and Victoria to the brink of a water crisis. The previous Labor government's response of tight water restrictions and public education effectively shifted public attitudes in favour of conservation and achieved significant water-saving outcomes.

However, the combined effect of the end of the drought and the construction of the Wonthaggi desalination plant may have lessened public concern about water use efficiency. As a result, residential water use is again on the rise – albeit still significantly lower than prior to the drought. Residential water use in Melbourne in 2013-14 was 160 litres/person/day, up from a low of 147 litres/person/day in 2010-11.³³

The vast majority of Melbourne's water comes from our rivers. This extraction is leaving many of our river ecosystems trying to get by on half the water which would naturally be there.

Victoria has just recorded its lowest average winter rainfall since 2006, and Melbourne's water storages are now at 74 percent compared with 80 percent at the same time last year.³⁴ Continued dry conditions



³³ Melbourne Water December 2014, 'Water Outlook for Melbourne'.

³⁴ www.melbournewater.com.au/waterdata/waterstorages



combined with our growing population will only worsen the pressure on our precious rivers and wetlands, unless we maintain a strong focus on reducing consumption through efficiency.

AVOID NEED FOR ADDITIONAL SUPPLY

Reducing demand through efficiency can help to avoid the need for investment in additional gas, electricity or water supply, which can be costly and environmentally destructive.

For example, recent findings by the Melbourne Energy Institute that achievable energy savings in the buildings sector are more than enough to meet future industrial gas needs undermines the case for development of an environmentally risky unconventional gas industry in Victoria (see Figure 6 below).³⁵

Efficiency also moderates peak electricity demand, which helps avoid expensive investment in grid infrastructure that has been a key driver of price rises in recent years.

And failing to maintain a focus on water efficiency risks greater future reliance on expensive and energy-intensive desalination – with consequent impacts on household water bills and greenhouse emissions.

³⁵ Forcey, T. 2015, *Switching Off Gas*, Melbourne Energy Institute, p. 40.

³⁶ Ibid, Fig. 20.

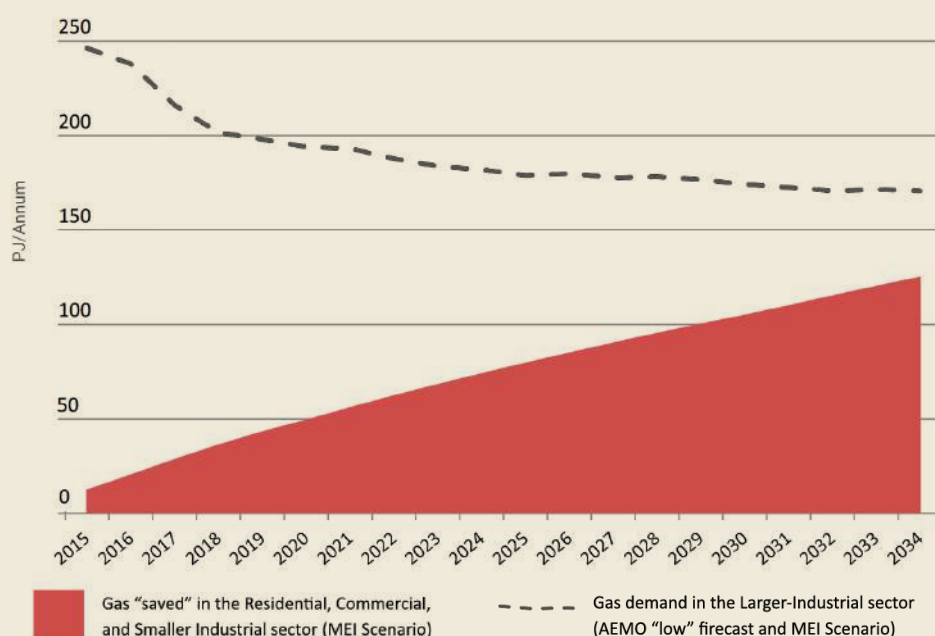


Figure 6. Demand in the larger industrial sector compared with gas 'saved' in the commercial, residential and smaller industrial sector (MEI Scenario).³⁶



03

WHAT DOES LEADERSHIP LOOK LIKE NOW?

While Victoria has made relatively slow progress, the rest of the world has been reaping the environmental and economic rewards of improved efficiency.

GERMANY

Key points:

- New buildings to be climate neutral by 2020, and entire building stock to reduce energy use by 80 percent by 2050
- Germany's state development bank's building renovation loan program has supported the efficiency refurbishment or construction of more than 3.8 million homes and 2100 municipal buildings since 2007

Germany provides a leading example of an efficiency framework that matches clear and ambitious policy objectives with the provision of affordable finance to drive implementation. The American Council for an Energy Efficient Economy (ACEEE) named Germany number one in the world for energy efficiency in its 2014 Scorecard, citing the country's comprehensive energy strategy, building codes, retrofit policies and tax credit and loan programs.³⁷

The German government has set a goal of reducing energy consumption by 20 percent by 2020 (compared to 2008) and 50 percent by 2050. Germany aims to make new buildings carbon neutral by 2020, and to reduce energy consumption across its entire building stock by 80 percent by 2050.

The *National Energy Efficiency Action Plan* outlines measures for implementation, guided by the principles 'Supply information', 'Provide support' and 'Demand action'.

A key mechanism for driving efficiency upgrades under the Plan is the CO2 Building Renovation Programme, which provides funding to

**GERMANY'S LEADING
EFFICIENCY FRAMEWORK
MATCHES AMBITIOUS
POLICY OBJECTIVES WITH
AFFORDABLE FINANCE TO
DRIVE IMPLEMENTATION.**

³⁷ <http://cleantechnica.com/2014/07/21/germany-1-world-energy-efficiency/>

THE KRANICHSTEIN PASSIVE HOUSE IN DARMSTADT (PICTURED BELOW) WAS BUILT IN 1990, AND WAS EUROPE'S FIRST INHABITED MULTI-FAMILY HOUSE TO ACHIEVE A DOCUMENTED HEATING ENERGY CONSUMPTION OF BELOW 12 KWHM² PER YEAR.



the German development bank KfW's Energy-Efficient Building and Refurbishment Program. This allows it to offer very low interest rates of 1-2 percent to fund construction of efficient new homes and to retrofit existing buildings.

The German government currently provides funding to the program of about 1.8 billion euros per year, with a further 200 million euros expected to be added from 2016, bringing total annual funding to two billion euros. More than 187 billion euros have been invested in building upgrades since 2007, with 34 billion euros of private investment in 2013 alone.³⁸

The program has supported the efficiency refurbishment and construction of more than 3.8 million homes, and more than 2100 buildings used by local authorities and welfare institutions – such as office buildings, schools and daycare centres.

The Action Plan also obliges large-scale enterprises to conduct energy audits and sets standards for new installations and buildings. In up to 500 energy-efficiency networks, enterprises will also be expected to define joint efficiency targets themselves and implement these as a group. Subsidies of up to 30 percent are also available for SMEs to improve efficiency through technology and equipment upgrades.³⁹

³⁸ www.gtai.de/GTAI/Navigation/EN/Meta/Press/press-releases,t=germany-tops-world-energy-efficiency-ranking,did=1051702.html

³⁹ German Federal Ministry for Economic Affairs and Energy, CO₂ Building Renovation, www.bmwi.de/EN/Topics/Energy/Buildings/co2buildingrenovation

IMPORTANTLY, AND MOST RELEVANT TO AUSTRALIA, THE CALIFORNIAN APPROACH TARGETS WATER AS WELL AS ENERGY USE.

The terms **carbon zero**, **carbon neutral**, **zero energy** or **zero emission** apply to buildings that use renewable energy sources on site to generate energy for their operation, so that over a year the net amount of energy generated on site equals the net amount of energy required by the building.

CALIFORNIA

Key points:

- All new residential buildings to be zero net energy by 2020, and all new commercial buildings to be zero net energy by 2030
- 50 percent increase in energy efficiency of existing buildings by 2030
- More than \$65 million in household bill savings and 1.5 million jobs created since the 1970s

California has been a leader in building efficiency standards, financing and retrofit programs since the 1970s. The 2008 *California Long-Term Energy Efficiency Strategic Plan* set a number of goals, including that all new residential buildings be zero net energy by 2020, and all new commercial buildings be zero net energy by 2030. Furthermore, the plan offered all eligible low-income customers the opportunity to participate in energy efficiency programs by 2020.⁴⁰

California's efficiency goals have recently been reiterated by Governor Brown in his January 2015 inauguration speech, in which he set a goal to double the efficiency of California's buildings by 2030 and transition to cleaner fuels for space and water heating. These goals have now been enshrined in legislation with the passing of a landmark climate bill package in October 2015.⁴¹

The *Existing Buildings Energy Efficiency Action Plan* was released in 2015 with a particular focus on addressing the barriers to upgrading older buildings and creating the conditions for scaling up efficiency upgrades.⁴²

California has also pioneered the use of Property Assessed Clean Energy (PACE) financing which allows local governments to offer loans for efficiency upgrades. Loan payments take the form of an assessment added to the property tax on the building, typically with a 20-year payoff period.⁴³

In 2012, California launched the US's largest PACE program – CaliforniaFIRST – offering loans to owners of office, multi-family residential, retail, industrial and agriculture properties in 14 counties and 126 cities. Eligible improvements include insulation, lighting, HVAC systems, onsite renewable energy and water-saving upgrades such as low-flow plumbing fixtures and greywater systems.

⁴⁰ California Public Utilities Commission 2008, *California Long-Term Energy Efficiency Strategic Plan*, www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/

⁴¹ <http://focus.senate.ca.gov/climate>

⁴² www.energy.ca.gov/ab758/documents/

⁴³ <https://californiafirst.org/>

CALIFORNIA GOVERNOR JERRY BROWN (PICTURED BELOW) HAS JUST SIGNED LANDMARK LEGISLATION TO COMBAT CLIMATE CHANGE BY SETTING TARGETS TO INCREASE THE STATE'S RENEWABLE ELECTRICITY USE TO 50 PERCENT AND DOUBLE ENERGY EFFICIENCY IN EXISTING BUILDINGS BY 2030.



Importantly, and unlike most other building efficiency plans around the world, the Californian approach targets water as well as energy use. This reflects the critical importance of water to California, which is currently in the grip of a severe drought, and which, like Australia, faces significant risks to water security in the hotter and drier future predicted under climate change.

To date, California's bipartisan commitment to efficiency has saved households more than US\$65 billion, helped lower residential electricity bills to 25 percent below the national average, and led to the creation of 1.5 million full-time-equivalent jobs since the 1970s.⁴⁴

⁴⁴ www.nrdc.org/energy/ca-efficiency-success-story.asp

VANCOUVER

Key points:

- Emissions from existing buildings to be reduced by 20 percent by 2020, and all new buildings to be zero net emissions by 2020
- 80 percent of priority actions have been achieved, including a 7 percent decrease in community greenhouse gases since 2007

Vancouver, Canada, has set a goal of becoming the “greenest city in the world by 2020” and has developed its *Greenest City 2020 Action Plan* (GCAP) to set a “course toward realizing a healthy, prosperous and resilient future for our city”.⁴⁵

Based on extensive community consultation, the GCAP sets goals to reduce city-wide greenhouse emissions by 33 percent by 2020 and to double the number of ‘green jobs’ over 2010 levels by 2020.

Emissions from existing buildings are to be reduced by 20 percent by 2020, and all new buildings to be zero net emissions by 2020.

The GCAP and subsequent *Energy Retrofit Strategy for Existing Buildings* outline detailed commitments to achieve these goals, including quantitative baseline indicators against which progress can be measured. The Retrofit Strategy specifically focuses on the key barriers preventing stakeholders from taking action in four priority sectors – detached houses, multi-unit residential buildings, commercial and industry – and the opportunities for government intervention to drive investment.⁴⁶

Specific actions targeted at residential buildings include:

- Improve regulations through inclusion of energy efficiency requirements in building bylaws
- Support voluntary action through rebates and incentives, and active marketing to raise awareness that they are available
- Partner with energy retailers and Landlord BC (British Columbia’s peak body representing rental property managers) to expand the Green Landlord program, evaluate its effectiveness and strengthen as needed.⁴⁷

⁴⁵ City of Greater Vancouver 2012, *Greenest City 2020 Action Plan*, p. 5.

⁴⁶ <http://vancouver.ca/green-vancouver/greenest-city-action-plan.aspx>

⁴⁷ <http://vancouver.ca/home-property-development/bank-and-utilities-incentives.aspx>

VANCOUVER'S GREENEST CITY 2020 ACTION PLAN WAS DEVELOPED THROUGH EXTENSIVE COMMUNITY CONSULTATION, SUCH AS THE GREENEST CITY CAMP.



The City has just published an implementation update which shows 80 percent of the original priority actions set in 2011 have been achieved, including a seven percent decrease in community greenhouse gases since 2007.⁴⁸

⁴⁸ <http://vancouver.ca/files/cov/greenest-city-action-plan-implementation-update-2014-2015.pdf>

A SNAPSHOT OF OTHER INITIATIVES

EUROPEAN UNION

The European Union's *Europe 2020 Strategy* set a target of 20 percent energy savings (on business as usual) by 2020, which has since been increased to 27 percent or greater by 2030.⁴⁹ Key achievements to date include:

- New buildings consume half the energy they did in the 1980s
- Energy intensity in EU industry decreased by almost 19 percent between 2001 and 2011
- More efficient appliances are expected to save consumers €100 billion annually – about €465 per household – on their energy bills by 2020.⁵⁰

NEW ZEALAND

New Zealand's Heat Smart and Healthy Homes insulation and efficient heating programs have reached 260,000 homes (around 19 percent of total housing stock), including nearly 118,000 low-income households since 2009. A recent evaluation of the Heat Smart program found it delivered net benefits of \$1.2 billion and a benefit cost ratio of approximately 4.3 to 1 – driven largely by savings in hospitalisation costs and reduced mortality rates for vulnerable groups.⁵¹

The Wellington Smart Buildings Challenge, launched in September 2015, requires participating commercial property owners to commit to a target of at least a 10 percent reduction in building energy use and attainment of a NABERSNZ rating within 12 months of joining the program, as well as year-on-year performance improvements beyond that point.⁵²

⁴⁹ http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/index_en.htm

⁵⁰ <http://ec.europa.eu/energy/en/topics/energy-efficiency>

⁵¹ <http://sustainablecities.org.nz/2012/05/evaluation-of-the-warm-up-new-zealand-heat-smart-programme/>

⁵² www.thefifthestate.com.au/property/commercial/nz-wellington-commercial-property-owners-making-buildings-smarter/78033

⁵³ www.nsw.gov.au/media-releases-premier/helping-vulnerable-families-energy-bills



NEW SOUTH WALES

The New South Wales government has recently committed \$61.5 million for an energy efficiency program, with a focus on assistance for low-income households to purchase efficient appliances. \$16 million has also been allocated to assisting business to invest in efficiency.⁵³

The *Energy Efficiency Action Plan* builds on the earlier Home Power Savings Program, which by the time it concluded in 2014 had reached approximately 225,000 households (nearly 59 percent of them in regional areas) and included 30,000 homes where English is a second language. The program has achieved estimated annual bill savings of \$36 million, while participating households are using 10 percent less power per year.⁵⁴

⁵⁴ www.environment.nsw.gov.au/resources/energyefficiencyindustry/140053hpspintev.pdf

COMMON FEATURES OF BEST PRACTICE APPROACHES

SET AN AMBITIOUS GOAL

Establish specific, time-based objectives, commensurate with the size and urgency of the problem.

ADDRESS BARRIERS TO ACTION

Target government interventions to the barriers which prevent people from taking action, so as to encourage complementary investment from a range of sources and maximise the impact of government investment.

WORK IN PARTNERSHIP

Build on the experience, expertise and relationships within local government, the community sector and retrofit industry to deliver effective programs at scale.

Homeowners

- Lack of incentive, low priority
- Lack of timely, trusted information
- Upfront cost hurdles, lack of affordable finance

Renters (public and private)

- Split incentive: Landlords responsible for upgrades but tenants pay bills
- Lack of information about behaviour impacts on usage

Business

- Access to capital
- Lack of knowledge, information
- Lack of incentive, low priority
- Insufficient scale



04

VICTORIA CAN LEAD AGAIN ON EFFICIENCY

ENVIRONMENT VICTORIA IS CALLING ON THE VICTORIAN GOVERNMENT TO RECOMMIT TO THE ONE MILLION HOMES ALLIANCE GOAL: THAT VICTORIA'S HOUSING STOCK MEETS AN AVERAGE 5 STAR EQUIVALENT AND 100 LITRE/PERSON/DAY STANDARD BY 2025.

VICTORIA CAN LEAD AGAIN ON EFFICIENCY

Under the previous Labor government, Victoria led Australia by being the first state to introduce:

- Mandatory energy efficiency target for electricity retailers, implemented through the Victorian Energy Efficiency Target (Energy Saver Incentive Scheme)
- A mandatory energy, water and waste resource efficiency program for the biggest commercial energy and water users – Environment and Resource Efficiency Plans (EREP)
- A 5 Star Energy Efficiency Standard for new homes, subsequently extended to all major renovations and increased to a 6 Star standard in 2011.

The 2010 Victorian *Climate Change White Paper* also included a commitment to “a goal of improving the energy efficiency of Victoria’s existing housing stock to an average 5 Star equivalent energy rating by 2020”.⁵⁵

However, under the Coalition government elected in 2010, not only was no progress made towards this goal, a number of backwards steps were taken.

Since its election in November 2014, the Andrews Government has shown encouraging signs it intends to once again play a leadership role in energy and water efficiency policy. Key commitments to date include:

- Increasing targets under the Victorian Energy Efficiency Target scheme and committing to further strengthen the scheme
- Extending council-rates based financing (Environmental Upgrade Agreements) for non-residential building upgrades to all Victorian councils

⁵⁵ Government of Victoria 2010, *Taking Action for Victoria's Future: Victorian Climate Change White Paper*, p. 17.



➤ Releasing an energy efficiency and productivity statement *Saving Energy, Growing Jobs* in June 2015 and committing to release a more detailed strategy in late 2015.

After four years of inaction while the rest of the world moved ahead, it is critical that the government delivers on this early promise by outlining an ambitious efficiency agenda for Victoria.

The starting point should be the articulation of a clear goal against which progress can be measured. Environment Victoria is calling on the Victorian government to recommit to the One Million Homes Alliance goal:

“That Victoria’s housing stock meets an average 5 Star equivalent and 100 litre/person/day standard by 2025.”⁵⁶

Quantitative, measurable targets in other policy areas including commercial and government buildings are also needed.

⁵⁶ One Million Homes Alliance 2015, *2025 Roadmap to Energy and Water Efficient Homes*, www.onemillionhomes.org.au



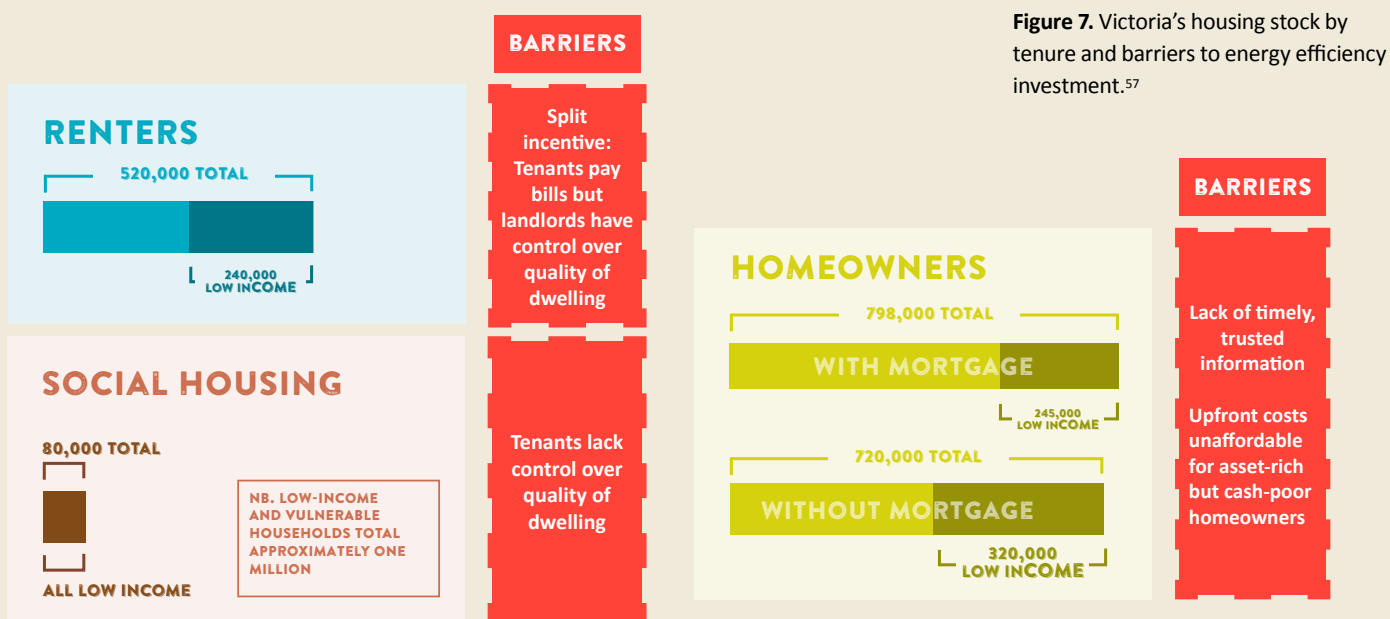
05

SIX STEPS TO ENERGY AND WATER EFFICIENCY LEADERSHIP

Achieving a ‘step change’ improvement in the quality of Victoria’s building stock within 10 years will depend on all stakeholders – home and business owners, tenants and landlords – having the incentive and practical assistance they need to take action.

Implementing these six ambitious yet achievable steps would address the barriers preventing Victorian households (see Figure 7) and business owners from investing in efficiency. Creating a stable policy environment which encourages investment, while targeting assistance to the most vulnerable, will ensure government resources deliver high-impact outcomes.

⁵⁷ Ibid





STEP 1. IMPROVE STANDARDS FOR RESIDENTIAL BUILDINGS

A VISUALLY SIMPLE RATING SYSTEM

The Victorian Residential Efficiency Scorecard promised by the Victorian government should be designed to add value to existing tools and be used as a basis for improved standards.

It should be visually simple yet technically rigorous, allowing homeowners to easily see how their home performs and what that means for running costs (for an example, see the UK rating system in Box 1 on page 32). The Scorecard should offer one rating scale, ranging from the worst-performing existing home to a zero net emissions standard for new buildings, and should incorporate both water and energy efficiency. To minimise costs, assessments could be based on relatively simple and low-cost 'tick-box' ratings at the bottom end (e.g. Does the home have insulation and efficient fixed appliances?) to more complex performance-based assessments at the top.

MANDATORY DISCLOSURE AT POINT OF SALE BY 2016

Requiring homeowners to disclose their home's efficiency rating when they sell would provide valuable information to purchasers and create a market incentive for vendors to improve their home. Full benefits can only be realised if disclosure is mandatory for all homes so that purchasers can compare 'apples with apples' and make informed decisions.



IN THE AUSTRALIAN CAPITAL TERRITORY VENDORS ARE REALISING A THREE PERCENT IMPROVEMENT IN MARKET VALUE FOR EVERY 1 STAR INCREASE IN PERFORMANCE.

IT IS TIME TO SHIFT THE BALANCE BACK IN FAVOUR OF TENANTS WHO ARE CURRENTLY SHOULDERING MOST OF THE COSTS OF OUR POOR QUALITY HOUSING STOCK.

With the median house price in Melbourne now nearly \$650,000⁵⁸ the cost (approximately \$400) of assessing and disclosing performance would represent a trivial proportion of the sale price of most homes. In the ACT, where mandatory disclosure at the point of sale has been in place since 1999, vendors are realising a three percent improvement in market value (or \$19,500 for the Melbourne median house price) for every 1 Star increase in performance.⁵⁹

More than a decade after work began to implement a national scheme, it is well beyond time to deliver this important reform in Victoria by introducing mandatory disclosure at the point of sale by June 2016.

MINIMUM STANDARDS AT POINT OF LEASE BY 2017

Disclosure alone will be of limited benefit to the more than half a million households in the private rental market in Victoria. Disclosure relies on the concept of information being used to exercise market power. However, in a tight rental market such as Melbourne, most renters, and particularly low-income renters, have little market power and few opportunities to discriminate between properties of differing quality.

The low rates of participation by landlords in recent schemes such as the federal Home Insulation Program – even when participation came at zero cost – is evidence that landlords currently have little incentive to voluntarily invest in efficiency improvements.⁶⁰ With property values in metropolitan Melbourne continuing to rise, and thousands of negatively geared investors enjoying significant tax concessions, it is time to shift the balance back in favour of tenants who are currently shouldering most of the costs of our poor quality housing stock.

Effectively addressing the split incentive faced by tenants and landlords requires the introduction of minimum standards at the point of lease by June 2016, combined with the establishment of complementary financing mechanisms to enable landlords to meet standards (see Step 2).

The minimum standard should initially be set at a relatively low and achievable level, requiring upgrade of only the worst-performing properties. This minimum standard should be increased over time through elimination of the lowest rating category by 2020, to drive improvements across our entire rental stock and ensure all renters benefit over time. Proactive steps also need to be taken to protect

⁵⁸ Wilson, A. 2015, 'House Price Report March Quarter 2015', Domain Group, www.apmpricefinder.com.au/wp-content/uploads/2015/06/Domain-Group-House-Price-Report-March-Quarter-2015.pdf

⁵⁹ Department of Energy, Water, Heritage and the Arts 2008, *Energy Efficiency Rating and House Price in the ACT*, prepared for the National Framework for Energy Efficiency.

⁶⁰ Lovering, M 2013, 'Can low-income tenants rent an energy efficient home?', AHURI Evidence Review 040, www.ahuri.edu.au/housing_information/review/evrev040



Left: The Solar Sollew House in Seaholme is a 9 Star off-the-plan home which brings high-end sustainability into the mainstream, using about one-tenth of the energy and one-third of the water of an average Victorian home.⁶²

tenants from unreasonable rent increases and evictions, for example through targeted assistance for low-income landlords.

The current review of the *Victorian Residential Tenancies Act* presents an opportunity to provide a broad power for the Minister for Consumer Affairs to make regulations for minimum standards for all residential tenancies, as well as improve compliance regimes.

SET A GOAL OF ZERO NET EMISSIONS AND WATER-EFFICIENT NEW BUILDINGS BY 2020

Progressive improvement in standards for new buildings is also needed to ensure the total stock of underperforming homes does not continue to expand.

Five years since the introduction of the 6 Star standard, and with technical assessments and building industry practice both demonstrating the viability of 7 Star homes,⁶² it is time to raise the standard for new homes to at least 7-8 stars by June 2016.

This should be followed by a further step-change in new build performance by 2020, based on a 'whole of energy and water management' approach which integrates energy efficiency, water-sensitive design, alternative water sources such as rainwater and greywater, and renewable energy.

A cross-sector taskforce should be established by early 2016 to define standards and develop pathways towards achieving the goal of zero net emissions and water-efficient new homes by 2020.

FIVE YEARS SINCE THE INTRODUCTION OF THE 6 STAR STANDARD, IT IS TIME TO RAISE THE STANDARD FOR NEW HOMES TO AT LEAST 7-8 STARS BY JUNE 2016.

⁶¹ www.positivefootprints.com.au

⁶² For example, Burbank homes at www.burbank.com.au/victoria/sustainability; Pitt&Sherry 2010, *The Pathway to 2020 for Low Energy, Low Carbon Buildings in Australia*, DCC 137/2010

CHAPTER 05

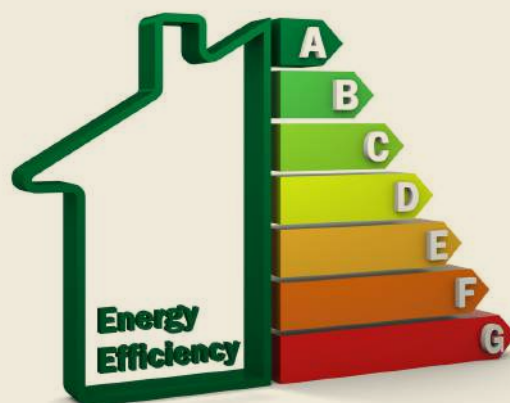
SIX STEPS TO ENERGY AND WATER EFFICIENCY LEADERSHIP

IMPROVE COMPLIANCE REGIMES

An effective compliance regime is also critical to ensuring standards deliver improved performance in practice. There are opportunities to improve Victoria's current compliance arrangements, including expanding random audits of completed buildings and imposing effective fines for non-compliance.

BOX 1. MINIMUM RENTAL STANDARDS, UNITED KINGDOM.

In February 2015, the UK Government announced that from April 2018, landlords in England and Wales will be banned from renting out the worst-performing homes which fall into the lowest Energy Performance Certificate (EPC) bands of F and G. The new regulations are expected to help around a million tenants who are paying as much as £1000 a year more than the average bill because of poorly insulated homes.⁶³



STEP 2. FACILITATE ACCESSIBLE AND AFFORDABLE FINANCE

Although efficiency upgrades save money over time, the upfront costs can discourage many homeowners from taking action.

While improving standards will create an incentive for investment, there is an important role for government in facilitating accessible and affordable finance to enable homeowners and landlords to meet standards. With bond rates at an all-time low and finance for governments so affordable, there has never been a better time to invest in infrastructure, particularly infrastructure which has such a profound effect on our quality of life, our productivity and the fairness of our community.

⁶³ www.ukgbc.org/resources/key-topics/new-build-and-retrofit/retrofit-domestic-buildings



REFORM THE VICTORIAN ENERGY EFFICIENCY TARGET SCHEME

The Victorian Energy Efficiency Target scheme represents an important source of funding for efficiency upgrades, and the recent announcement of increased targets rising to 6.5 million tonnes of greenhouse pollution reduction by 2020 is welcome.

There is now an opportunity to further strengthen the scheme by:

- Expanding allowable activities including commercial lighting upgrades, ceiling insulation and split-system air-conditioning units for heating
- Adopting project-based methodologies to support larger whole-of-house retrofits
- Broadening participation by low-income households, particularly access to higher value measures.

EXTEND ENVIRONMENTAL UPGRADE AGREEMENTS TO RESIDENTIAL BUILDINGS

On-bill financing arrangements, such as Environmental Upgrade Agreements (EUA), provide an affordable mechanism for funding integrated efficiency and renewable energy upgrades.

The Victorian government has recently announced the extension of EUA financing for commercial buildings to all Victorian councils. This is a welcome step and should be followed by an extension to residential buildings, so that all Victorian councils are in a position to offer affordable, rates-based financing for retrofits to homeowners and landlords. The City of Darebin's Solar Saver program provides a successful example of an EUA-style financing arrangement being applied in the residential context (See Box 2 on page 34).

However, for a successful roll-out of such a scheme statewide, state government will need to play an active role in brokering partnerships between councils and providers of low-cost finance, so as to ensure all councils have access to the necessary financial resources.

The introduction of improved standards (such as mandatory disclosure and minimum rental standards) will also be key to ensuring home and business owners and landlords have sufficient incentive to take advantage of the scheme.

ON-BILL FINANCING ARRANGEMENTS, SUCH AS ENVIRONMENTAL UPGRADE AGREEMENTS (EUA), PROVIDE AN AFFORDABLE MECHANISM FOR FUNDING INTEGRATED EFFICIENCY AND RENEWABLE ENERGY UPGRADES.

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SIX STEPS TO ENERGY AND WATER EFFICIENCY LEADERSHIP

TARGETED ASSISTANCE FOR LOW-INCOME LANDLORDS

In concert with introducing minimum rental standards, government needs to take steps to protect tenants from unreasonable rent increases and evictions. Provisions within the *Residential Tenancies Act* (Victorian Property Fund and the Residential Tenancies Fund) could be used to provide means-tested grants or loans to enable low-income landlords to meet minimum standards. Loans provided under the Residential Tenancies Fund could include terms and conditions protecting tenants from unreasonable rent rises (which don't reflect the costs of upgrade) and evictions.

⁶⁴ Moreland Energy Foundation at: <http://www.mefl.com.au/news-and-events/item/1146-darebin-solar-aver.html>

BOX 2. DAREBIN SOLAR \$AVER PROGRAM

During 2014, a partnership between the City of Darebin, Energy Matters and Moreland Energy Foundation coordinated the installation of almost 300 solar PV systems on the roofs of low-income (pensioner) households in Melbourne's north. Darebin Council covered the upfront cost of the installations, which households are then paying back through their rates payments over a 10 year period. The repayments have been structured so that households will save more each year on their electricity bill than the amount by which their rates are increased, so that they start to financially benefit as soon as the installation is complete.⁶⁴





STEP 3. CREATE A CULTURE OF EFFICIENCY AND PROVIDE RELEVANT INFORMATION

Most Victorians are unaware of how their homes perform, how much money they could save by investing in efficiency, and which measures will deliver the most cost-effective improvements. While energy literacy is generally low, investing in retrofitting will remain a low priority for most busy households.

A mass public education push in the tradition of successful road safety, water conservation and public health campaigns is needed to build public support for efficiency and improved standards. In particular, it will be important to clearly communicate the implications of improved standards to home and business owners, landlords and the real estate sector, so as to minimise confusion and ensure all property owners are aware of their responsibilities and the assistance available.

Mass public education to achieve a widespread shift in public sentiment doesn't lead to action on its own. Such a campaign needs to be complemented by accessible local services to provide property owners with technical advice or financial assistance.

Victoria's local government, environment, community and energy efficiency sectors have a wealth of experience in delivering advice and retrofit services, and engaging diverse groups in efficiency. Government should work with these trusted, local organisations to fund information and advice services across the state, delivering online, face-to-face and phone advice about retrofit options and referral to assessment, finance and installation services.



STEP 4. DELIVER TARGETED PROGRAMS FOR THOSE MOST IN NEED

The first three steps – Standards, Finance and Information – will effectively address the barriers hindering most property owners from investing in efficiency improvements.

However, a significant number of disadvantaged and low-income Victorian households face additional barriers to engaging with efficiency programs, and need targeted interventions from government to ensure they don't miss out.



CHAPTER 05

SIX STEPS TO ENERGY AND WATER EFFICIENCY LEADERSHIP

Right: Environment Victoria's Future Powered Families project uses a peer-to-peer model to deliver energy and water efficiency training to low-income parents from migrant and refugee backgrounds.



These households include public and community housing tenants, concession card holders, the elderly, utilities retailer hardship program participants (often larger families with large mortgages and high energy use), energy-rationing households, Aboriginal Victorians, culturally and linguistically diverse communities, and people living with disabilities.

Effective participation by these groups in energy efficiency programs relies on proactive targeting and recruitment through existing trusted relationships with established local government and social sector service providers.

MANY DISADVANTAGED AND LOW-INCOME VICTORIAN HOUSEHOLDS FACE ADDITIONAL BARRIERS TO ENGAGING WITH EFFICIENCY PROGRAMS, AND NEED TARGETED INTERVENTIONS FROM GOVERNMENT TO ENSURE THEY DON'T MISS OUT.

FUND A VICTORIAN LOW-INCOME ENERGY EFFICIENCY PROGRAM

There is already a solid foundation of experience and expertise in engaging with diverse groups in Victoria, including programs funded by the federal government's Low-Income Energy Efficiency Program (LIEEP), which is due to end in June 2016.

By their completion in 2016, Victorian LIEEP projects will have reached almost 15,000 Victorian households in both metropolitan and regional areas. Engagement methods range from educational workshops, to training participants, to delivering home energy assessments, to installation of minor and major retrofits.

The imminent closure of the LIEEP scheme risks losing the valuable expertise and on-ground relationships which are critical to the effective



delivery of programs to ‘hard to reach’ segments of the community. Such a loss would jeopardise the successful delivery of similar programs in Victoria in future.

There is a significant opportunity for the Victorian government to build on the solid foundation created by LIEEP, by funding a comprehensive low-income energy efficiency program for Victoria encompassing behaviour change, building upgrade and appliance replacement assistance.

The cost of delivering a Victorian LIEEP scheme of a similar scale to current programs operating in Victoria, but over a four year period instead of two to three year projects, would be around \$32 million.

PARTNER WITH UTILITY RETAILERS TO CO-FINANCE RETROFITS FOR HARDSHIP PROGRAM PARTICIPANTS

Victorian utilities retailers have a significant and growing problem with customers experiencing financial hardship who are unable to pay their bills. In particular, customers on payment plans which are below the cost of their bills are building up debt they have little chance of paying off.⁶⁵

Without intervention to increase these customers’ capacity to pay (through increased assistance), and/or to reduce consumption (through retrofitting and appliance replacement), energy hardship and disconnection rates are likely to continue to worsen.

While providing assistance for customers in temporary hardship is an appropriate role for retailers, tackling chronic unaffordability and the underlying causes of high usage should be a responsibility shared with government. Furthermore, given that a significant proportion of hardship customers live in private or public rental housing, opportunities for retailers to act alone are limited.

Government should explore opportunities for partnering with retailers to co-finance comprehensive efficiency and renewable energy retrofits for customers experiencing hardship. A number of innovative funding models are now being implemented around Victoria, e.g. the Darebin Solar Saver scheme targeted at low-income homeowners (see Box 2) and the St Kilda Community Housing Clean Energy Package which has been designed for social housing (see Box 3 on page 40).

There is an opportunity to build on this work to design a jointly financed retrofit implementation model which is suited to the needs of a range of customer and tenure types.

GOVERNMENT SHOULD EXPLORE OPPORTUNITIES FOR PARTNERING WITH RETAILERS TO CO-FINANCE COMPREHENSIVE EFFICIENCY AND RENEWABLE ENERGY RETROFITS FOR CUSTOMERS EXPERIENCING HARDSHIP.

⁶⁵ <http://aglblog.com.au/2015/09/effective-support-for-vulnerable-households-closing-the-gap-between-capacity-to-pay-and-cost-of-consumption-part-2/>

INVEST IN SKILLS AND TRAINING

Jobs created by the energy efficiency industry are embedded across a wide range of existing industries including manufacturing, construction, finance, retail and services. Furthermore, more than 40 percent of water and energy efficiency jobs are likely to be semi-skilled, potentially opening up opportunities for unemployed workers.

A program implementing comprehensive retrofits should include opportunities for skills training to ensure workers with relevant skills are available. Retrofit programs can also be designed to provide training and employment opportunities for disadvantaged workers (see Box 3).

Appropriate investment in skills training, as well as a rigorous regulatory regime to ensure workplace safety, is also critical to ensure risks associated with home retrofit programs (such as experienced in the Federal Home Insulation Program) are appropriately managed and minimised.⁶⁶

⁶⁶ Australian National Audit Office 2010, Green Loans Program, Performance Audit No. 9 2010-11.

⁶⁷ Environment Victoria 2009, *Victoria – The Green Jobs State*, adapted from Table 1, p.23.

Table 2. Work involved and skills audit for a typical home retrofit.⁶⁷

Retrofit activity	Skill needs	Labour (hours)
Audit	Trained assessor	2 - 3
Upgrade lighting	Unskilled	0.25
Weather-sealing	Semi-skilled	2 - 3
Ceiling insulation	Semi-skilled	2.0
Replace shower-head	Semi-skilled	0.25
Hot water – electric to solar	Plumber	4.0
Hot water – electric to heatpump	Electrician	2.0
Fridge upgrade	Unskilled	0
Dual flush toilet	Plumber	3.0
Install tap flow controllers	Semi-skilled	0.5



STEP 5. UPGRADE GOVERNMENT BUILDINGS

The Victorian government can demonstrate leadership by investing in upgrading its own buildings and operations.

The government should reinstate and strengthen the successful Greener Government Buildings (GGB) program which was scrapped by the previous Coalition government. As of June 2012, the program had delivered 26 separate energy efficiency projects covering public buildings and infrastructure responsible for more than 20 percent of the Victorian government's annual greenhouse emissions. Outcomes included:

- Annual direct cost savings in utilities and maintenance bills of \$32.17 million identified
- Projected avoided cost savings of \$46.8 million by 2020 due to utility price rises
- Estimated avoided capital expenditure of \$81 million over the next four budget periods.⁶⁸

In reintroducing the program, government should reverse the de-centralisation of funding to individual departments and agencies as has occurred under the subsequent Efficient Government Buildings program, and reinstate Treasury's role in financing energy saving projects that deliver substantial returns on investment.

State government should also provide information and support to assist local government and universities to access the GGB framework to upgrade the efficiency of their buildings and operations.

The other significant group of government-owned building stock is social (public and community) housing. There are more than 80,000 social housing dwellings in Victoria, of which approximately 65,000 are public housing dwellings.⁶⁹

More than 40 percent of public housing stock is over 30 years old and substantial maintenance is required to avoid the closure of approximately 10,000 properties (approximately 14 percent of the portfolio) over the next four years.⁷⁰

With many of Victoria's most disadvantaged citizens living in social housing, and with climate change likely to exacerbate the adverse impacts of poor quality housing, the government has a duty of care to ensure it provides safe and affordable shelter for those most in need, now and into the future.



THE VICTORIAN GOVERNMENT CAN DEMONSTRATE LEADERSHIP BY INVESTING IN UPGRADING ITS OWN BUILDINGS AND OPERATIONS.

⁶⁸ Department of Treasury and Finance 2012, *Greener Government Buildings Performance Report 2009-2012*.

⁶⁹ www.aihw.gov.au/housing-assistance/haa/2015/social-housing-dwellings/

⁷⁰ Victorian Auditor General's Office March 2012 *Access to Public Housing*.

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SIX STEPS TO ENERGY AND WATER EFFICIENCY LEADERSHIP

THE GOVERNMENT HAS A DUTY OF CARE TO PROVIDE SAFE AND AFFORDABLE SHELTER FOR THOSE MOST IN NEED.

Government should set a goal to upgrade Victoria's entire public housing stock by 2025. This would require:

- Increasing the Office of Housing budget to support the delivery of a comprehensive audit and retrofit program to a minimum of 10 percent of public housing dwellings per year. This could be delivered in conjunction with existing asset management and maintenance (including re-letting upgrades). As the current rate of renovation is approximately 2000 properties per year, this would represent a fourfold increase.
- Raising the performance standard for new buildings to 8 Star immediately to ensure this long-lived building stock meets the needs of the future.
- Reforming the appliance replacement policy to require appliances to meet an efficiency standard irrespective of fuel type (for example, due to technological change electric reverse cycle heaters/coolers are in many cases now more efficient than gas heaters).

The Victorian government should also support community housing operators to access information, advice and finance to implement comprehensive efficiency and renewable energy upgrades.

⁷¹ <http://energyforthepeople.com.au/content/st-kilda-community-housing-transition-zero#sthash.9h9TfmCe.dpuf>

BOX 3. ST KILDA COMMUNITY HOUSING CLEAN ENERGY PACKAGE

St Kilda Community Housing has recently partnered with Energy for the People to transition 20 buildings (337 rooming house units) to zero net emissions over a two-year period. The project is designed to be cash-flow positive from the first year, and includes a more competitive retail tariff, installation of up to 150kW of solar plus battery storage, energy management technologies, LED lighting and hot water upgrades for space heating and shower facilities. It also includes a complete transition away from natural gas.

The package is expected to save more than \$900,000 over 20 years, the retained funding being invested in lowering costs and providing education and training opportunities for social housing tenants for 20-plus years (the life of the solar panels). An additional \$30,000 per annum will be saved through the new retail tariff.⁷¹





STEP 6. DRIVE IMPROVEMENTS IN NON-RESIDENTIAL BUILDINGS

Commercial electricity use is responsible for nearly half of Australia's total emissions from the buildings sector. Significant opportunities exist for improving the energy and water efficiency of non-residential buildings across Australia (Figure 8) and Victoria, delivering substantial cost savings and emission reductions.⁷²

The majority of improvement achieved in Australian commercial buildings over the last 10 years has occurred in large offices, consistent with the greater policy attention this sector has received to date.⁷³

However, significant opportunities available in smaller mid-tier office and retail buildings have received less attention.

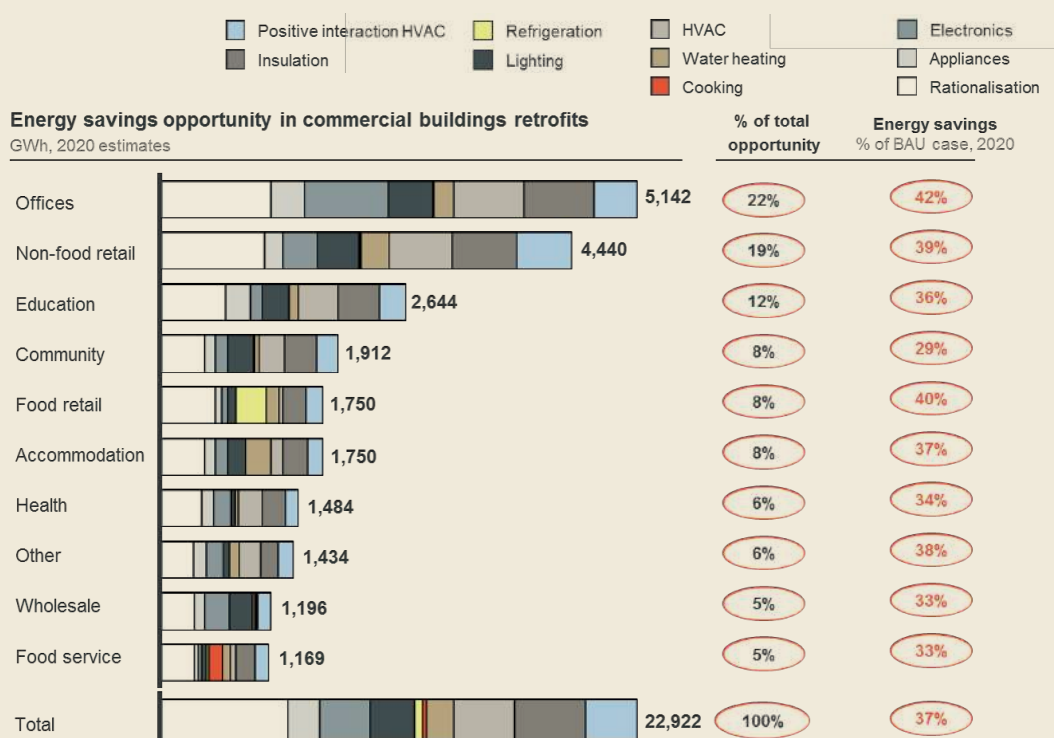


⁷² ClimateWorks 2010, *Australian Carbon Trust Report: Commercial building emission reduction opportunities*; Sustainability Victoria 2013, *The Next Wave: Retrofitting Victoria's office buildings*.

⁷³ ClimateWorks 2013, *Tracking progress towards a low carbon economy: Buildings*.

⁷⁴ Ibid.

Figure 8. Energy savings opportunities in commercial buildings retrofits, Australia.⁷⁴



¹ Commercial buildings represent 58% of the total 28 MtCO₂e opportunity in the Buildings sector, with residential new builds comprising the remaining 11.8 MtCO₂e of the total opportunity
SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (p.9)

THE PIXEL BUILDING IN CARLTON (PICTURED BELOW) IS THE FIRST CARBON AND WATER-NEUTRAL OFFICE BUILDING OF ITS KIND IN AUSTRALIA, UTILISING ENERGY AND WATER EFFICIENCY MEASURES, RENEWABLE ENERGY, RAINWATER HARVESTING AND GREYWATER TREATMENT AND RE-USE.⁷⁵



⁷⁵ Sustainability Victoria, www.sustainability.vic.gov.au/~media/resources/documents/services%20and%20advice/business/srsb%20eeob/srsb%20eeob%20case%20studies/srsb%20eeob%20case%20study%20pixel.pdf



In consultation with industry, Environment Victoria has identified the following recommendations for this sector. The Victorian government should develop a 10 year plan for upgrading the large number of lower quality 'mid-tier' office and retail buildings. A staged approach based on action research and stakeholder collaboration could begin by introducing an incentive program in 2016-17, potentially based on differential council rates. This would be followed by the introduction of minimum lease standards in 2019-20, complemented by access to affordable finance. There is also a need for a state mandatory efficiency scheme covering large energy and water users to be reinstated. EPA's Environment and Resource Efficiency Plans (EREP) program, which was closed by the Coalition government in 2013, required large energy and water-using sites to identify and implement resource efficiency actions.

Over 270 commercial and industrial sites participated in the EREP program from a diverse range of industry sectors including manufacturing sites, hospitals, retail centres and sporting facilities. Prior to closure it was expected to save over 7000 terajoules of energy, 7500 megalitres of water, 100,000 tonnes of solid waste, and \$120 million per year.⁷⁶

**THE VICTORIAN
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BUILDINGS.**

⁷⁶ www.epa.vic.gov.au/our-work/programs/past-programs/erep-program



06

CASE STUDY: RETROFITTING FOR VULNERABLE REGIONS

Several Victorian regions are facing the twin challenges of economic transformation triggered by the decline of key industries, and entrenched socio-economic disadvantage. Investment in a comprehensive retrofit program for these regions could stimulate economic activity and jobs growth, while helping to ease cost of living pressures for vulnerable households.

Government should work with key groups in each region, including local government, the community sector, unions, retailers and large employers to design a comprehensive household retrofit program with the twin aims of boosting local economic activity, and improving the affordability and liveability of the homes of the region's most vulnerable citizens.

Programs and investment could be targeted at public housing tenants, concession card holders, retailer hardship program participants, the long-term unemployed and those facing redundancy. Opportunities for attracting renewable energy investment, including support for community solar projects and the establishment of mini-grids, should also be explored.

While this section focuses on geographic communities as an example of how retrofitting could achieve multiple benefits, there are equally other communities of need across the state, including the elderly and those with chronic health conditions, where targeted government investment could deliver significant economic, social and health benefits to Victoria.

GEELONG

Geelong has been hit hard by the loss or imminent closure of key industries in the last couple of years. Three hundred jobs were lost when Qantas closed its Avalon maintenance facility in Avalon, another 800 went when Alcoa shut its Point Henry operations, and a further 500 jobs will go when Ford closes its doors in late 2016. Other big employers such



as Target and Boral have also shed staff, and all of these direct job losses have wider impacts on jobs and businesses down the supply chain.

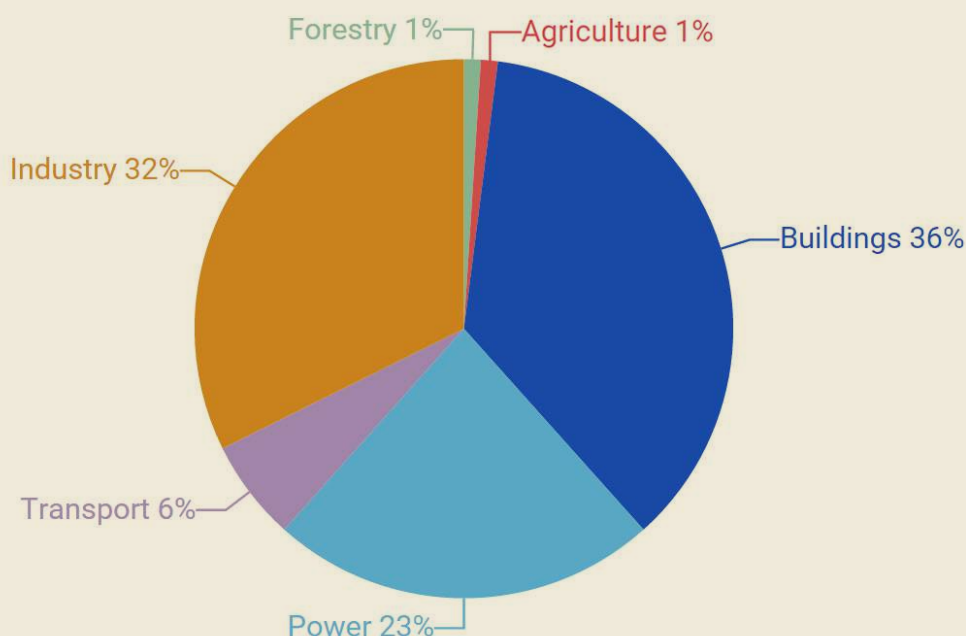
The impact of these job losses is compounded by Geelong's status as a relatively disadvantaged community. Unemployment is currently six percent, while youth unemployment sits at 19.4 percent. Corio is within the top six most disadvantaged postcodes in Victoria, and Barwon-Western District is the third most economically vulnerable region in Australia.⁷⁷

ClimateWorks' *Low Carbon Growth Plan for Geelong* identified building efficiency upgrades as offering significant cost-effective opportunities for reducing Geelong's greenhouse emissions, as well as stimulating economic activity.

⁷⁷ www.enterprisegeelong.com.au/unemployment-rate-data; Dropping Off the Edge at www.dote.org.au/findings/victoria/; Circelli, M and Stanwick, J 2014, *Economic vulnerability in Australia 2002-12*, National Centre for Vocational Educational Research.

⁷⁸ ClimateWorks 2015, *Low Carbon Growth Plan for Greater Geelong 2015 Update*, adapted from 2015 graph on p. 6.

Figure 9. Share of total emissions reduction opportunities by sector in Geelong, 2015.⁷⁸



CHAPTER 06

CASE STUDY: RETROFITTING FOR VULNERABLE REGIONS

The Geelong Region Innovation and Investment Fund (GRIIF) has been established as a \$29.5 million grants program focused on encouraging investment in new business opportunities and jobs growth, in recognition of the economic and social impact of Ford's exit. A comprehensive retrofit program for vulnerable households should be considered a priority for support under this Fund.

MELBOURNE'S NORTHERN SUBURBS

Melbourne's northern suburbs will also be hit hard by Ford's exit, with the closure of its Broadmeadows plant resulting in the loss of 650 jobs.⁷⁹ A further 700 full-time and part-time jobs are set to go when Woolworths relocates its Hume distribution centre, while a raft of smaller manufacturing businesses in Melbourne's north such as Betta Foods continue to shed staff.

Melbourne's north is also a hotspot of socio-economic disadvantage, with an unemployment rate of 7.2 percent and a youth unemployment rate of 14.7 percent.⁸⁰ Three northern suburbs postcodes – Broadmeadows, Coolaroo and Campbellfield – are within the top 12 most disadvantaged postcodes in Victoria.⁸¹

A Melbourne's North Ford Response Joint Taskforce has been formed to develop a regional strategy to minimise the impact of the Ford closure on the regional economy and generate new jobs. A \$24.5 million Melbourne's North Innovation and Investment Fund has been established to "support innovative job creation projects that strengthen and diversify the regional economy and employment base".⁸²

Implementing a regional home retrofit program with a particular focus on low-income and disadvantaged households should be considered a priority for investment from this Fund.

LATROBE VALLEY

If Victoria is to meet the challenge of reducing greenhouse emissions and transitioning to a low-emissions economy in an orderly manner which shares the costs fairly, we must invest in new economic opportunities for coal-dependent communities such as the Latrobe Valley.

The Latrobe Valley is already one of Victoria's most disadvantaged and economically vulnerable regions, and in many ways is still recovering from the impacts of the poorly managed electricity sector privatisation process of the 1990s. The unemployment rate is currently 5.4 percent, while Morwell and Moe are within the top 14 most disadvantaged

⁷⁹ <http://www.abc.net.au/news/2013-05-23/ford-to-close-geelong-and-broadmeadows-plants/4707960>

⁸⁰ <http://vcoss.org.au/blog/vcoss-snapshot-youth-unemployment-in-victoria-and-northern-metro/>, Table 2 and Table 3

⁸¹ Dropping Off the Edge, www.dote.org.au/findings/victoria/

⁸² www.rdv.vic.gov.au/regional-development-australia/northern-melbourne/media-releases/minimising-the-economic-effects-of-the-ford-closure



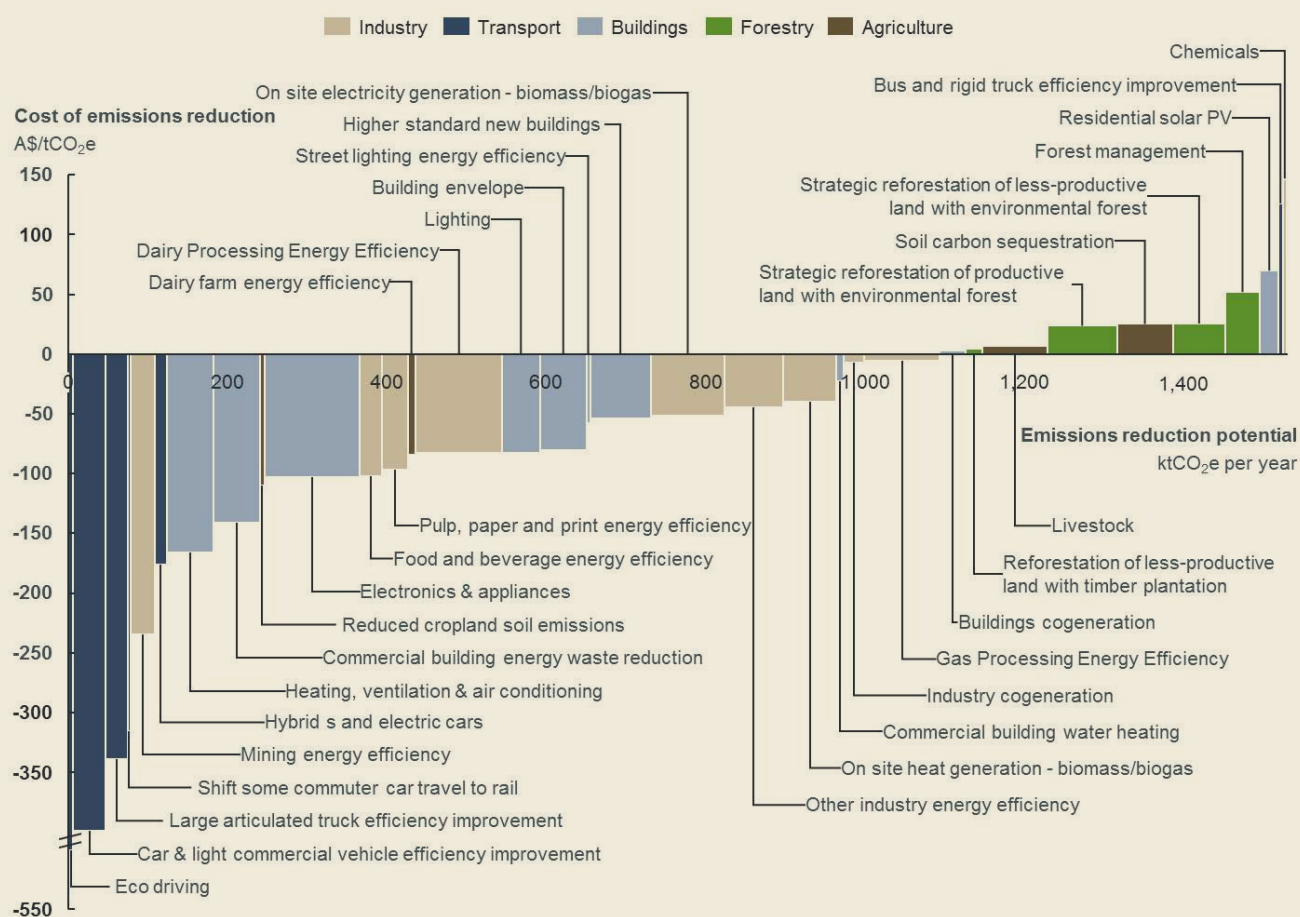
postcodes in Victoria. The Latrobe Valley also has one of the highest rates of lung cancer and cardiovascular disease in Victoria – a situation which may have been significantly exacerbated by the 2014 Hazelwood mine fire which blanketed the community with toxic fumes for more than a month.⁸³

Consistent with other studies, the ClimateWorks Low Carbon Growth Plan for Gippsland identified improving building efficiency as offering significant cost-effective opportunities for cutting emissions and boosting economic activity. It found that Gippsland's households could save \$22.9 million each year by retrofitting their homes to improve energy efficiency, building more efficient new homes or choosing new cars that consume less fuel.

⁸³ Teague, J Catford and S Petering 3 September 2014, *Hazelwood Mine Fire Inquiry Report 2014*, Hazelwood Mine Fire Inquiry.

⁸⁴ ClimateWorks 2011, *Low Carbon Growth Plan for Gippsland*.

Figure 10. Low Carbon Growth Plan for Gippsland, Marginal Abatement Cost Curve.⁸⁴





07

CONCLUSION

As the Andrews Government approaches the end of its first year in office, there have been encouraging signs that it appreciates the myriad benefits that investment in efficiency can deliver for Victoria's people, environment and economy.

The energy efficiency and productivity statement *Saving Energy, Growing Jobs* released in June 2015 articulated a vision for "a more efficient, productive and resilient state", and a more detailed strategy has been promised. Increased Victorian Energy Efficiency Targets to 2020 have been announced, while processes to set a Victorian Renewable Energy Target and develop a renewable energy action plan are underway.

However, the task now is to set ambitious goals which are underpinned by sufficient funding and policy reform to ensure delivery.

As we head towards the Paris climate summit in late 2015, the Andrews Government has an opportunity to demonstrate it understands the scale of the challenges we face, and is prepared to take action. Any credible strategy to both mitigate and adapt to climate change and rapidly transition to renewable energy will have a focus on water and energy efficiency.

Efficiency, particularly improving the quality of our building stock, is also fundamental to delivering on other core commitments made by the Andrews Government prior to the 2014 election – growing jobs, enhancing health and wellbeing, and creating liveable, inclusive and sustainable communities.⁸⁵

Victoria could achieve an efficiency transformation within 10 years. But it will take a sustained commitment from government to invest in meaningful assistance for Victoria's most vulnerable households, while creating a stable policy environment which encourages private investment in the rest of our building stock.

⁸⁵ Victorian Labor 2014, www.viclabor.com.au/wp-content/uploads/2014/05/Victorian-Labor-Platform-2014.pdf



Over the coming months and years, Environment Victoria will track the progress of the Andrews Government and future state governments against the six steps to efficiency leadership we have outlined in this report.

Delivering on this agenda would see Victoria reclaim its leadership status and set us on a path towards greater social equity, economic prosperity and environmental sustainability. But there is no more time to waste – delivery needs to start now.

08

APPENDICES



APPENDIX 1. HOME RETROFIT COSTS AND SAVINGS

HOW DO VICTORIAN HOMES USE ENERGY?

The average Victorian household spends around \$2800 on energy bills every year, with more than a third of costs going on heating (predominantly gas) alone.⁸⁶

Household energy use is influenced by:

- The quality of the building shell (thermal performance)
- The efficiency of lighting and appliances, particularly space water heating
- Behaviour, or how we use lighting and appliances.

WHAT DO HOUSEHOLD UPGRADES COST?

The average Victorian home built before 2005 averages less than 2 Stars (1.81) in terms of energy rating performance. A recent Sustainability Victoria investigation of retrofit options and cost-effectiveness across 60 pre-2005 homes in Victoria concluded that an improvement of 3.69 Stars could be achieved through building shell upgrades alone (excluding double-glazing) at a cost of \$2570 per 1 star increase in performance (see Table 3).

Incorporating lighting and appliance upgrades should lower costs further as lighting and appliance upgrades are more cost-effective overall than building shell upgrades.

And, as the cost of renewable energy continues to decline while gas prices have risen in recent years, going gas-free and making homes 'zero net emissions' through a combination of efficient appliances (e.g. reverse cycle air-conditioners used for both heating and cooling), efficiency measures and renewable energy is now a realistic option.⁸⁷

⁸⁶ Sustainability Victoria 2014, *Household Energy Report*.

⁸⁷ Beyond Zero Emissions 2013, *Zero Carbon Australia Buildings Plan*, www.bze.org.au/buildings



It is important to note that the study found a wide diversity energy savings achieved in different houses, and that occupant behaviour played a significant role. Hence, undertaking a comprehensive assessment to determine the most appropriate mix of measures and educate householders about energy and water-saving behaviour is likely to deliver the most cost-effective outcomes.

Furthermore, taking the opportunity to incorporate energy and water-saving measures as part of renovations can drive costs down even further. About 20 percent of homes are renovated each year, but several key efficiency opportunities are routinely missed, including improving insulation, draught-sealing, and choosing efficient windows and doors, lighting and appliances.

⁸⁸ Sustainability Victoria 2014, *Household Energy Report*, adapted from Table 3, p. 10.

Table 3. Average costs and energy savings for modelled building shell upgrades.⁸⁸ (Upgrade measures modelled applied in a specific order and costed at commercial rates. Changing the order could affect the outcomes.)

Measure	Star increase	Gas	Elec	Total	Av. Cost (\$)	Av. Saving (\$/yr)	Payback (yrs)
Draught-sealing	0.69	7.942	225	8.167	\$1,037	\$157	6.6
Ceiling insulation (easy)	0.84	8.210	277	8.487	\$1,130	\$165	6.8
Ceiling insulation (difficult)	1.14	4.891	204	5.095	\$1,119	\$102	11.0
Wall insulation	1.02	5.561	136	5.697	\$4,167	\$108	38.6
Drapes and pelmets	0.58	2.209	54	2.263	\$2,036	\$43	38.6
		Av. Energy saving (MJ/yr)					

HOW MUCH CAN A RETROFITTED HOME SAVE IN BILLS?

The Sustainability Victoria study found that an efficient household could save around 40 percent of an average household's energy cost. Applying all practical energy efficiency upgrade measures (building shell, lighting and appliance upgrades) could achieve annual average savings of:

- 35,800 MJ of energy
- \$990 on energy bills
- 3.4 tonnes of greenhouse gases.

Furthermore, for homes in Victoria which already have an efficient reverse-cycle air-conditioner installed, using this unit for heating instead of gas could achieve savings of \$658 a year.⁸⁹ When paired with rooftop solar, 'fuel-switching' can contribute to greenhouse emission reductions as well as cost savings.

APPENDIX 2. EFFICIENCY AND JOBS

Energy efficiency investment creates jobs in two ways:

- As a consequence of direct investment during program implementation (i.e. manufacturing, trades and services resulting from one-off work to retrofit)
- As a consequence of money saved from energy bills being available for spending in other parts of the economy.⁹⁰

This analysis estimates that achieving the goal of Victoria's housing stock meeting a 5 Star, 100 L/p/day energy and water efficiency standard by 2025 (as outlined in the *One Million Homes 2025 Roadmap*),⁹¹ would support:

- between 7,040 and 12,800 jobs (gross) during each year of the 10-year program. ('Gross' job figures do not account for jobs moving from other parts of the economy); and
- 8,500 ongoing jobs (net) as a consequence of redirected household savings. ('Net' job figures represent the effect of redirecting spending away from the relatively less jobs-intensive utilities sector to the relatively more jobs-intensive overall economy.)

⁸⁹ Forcey, T. 2015, *Switching Off Gas*, Melbourne Energy Institute.

⁹⁰ Anderson et. al 2014, *Assessing National Employment Impacts of Investment in Residential and Commercial Sector Energy Efficiency*, Prepared for US Department of Energy, PNNL_23402.

⁹¹ www.onemillionhomes.org.au



HOW MUCH INVESTMENT COULD RESIDENTIAL RETROFITTING STIMULATE?

Victoria has approximately two million residential dwellings, 80 percent of which were built prior to 2005. This pre-2005 housing stock averages 1.8 Stars in terms of performance.⁹² Upgrading Victoria's housing stock to an average 5 Star, 100 L/p/day standard by 2025 would require these dwellings to be upgraded by an average of 3 Stars.

- (1) 1.6 million dwellings need to be upgraded by an average of 3 Stars.

Sustainability Victoria estimates that a 4.3 Star increase can be achieved at an average cost of \$2222 per star via building shell upgrades alone.⁹³ (Particular types of upgrades cost more or less per star, but as the mixture required across Victoria is unknown we consider a flat average appropriate.) Sustainability Victoria also notes that lighting and appliance upgrades are more cost effective overall than the building shell upgrades.

We consider an estimate of \$2000 per star conservatively reflects the cost of improvements using building shell, lighting, and appliance upgrades. This is 10 percent lower than the cost of building shell upgrades alone.

- (2) Improving a residential dwelling's energy performance costs approximately \$2000/star
- (3) From (1) and (2): The package of measures outlined would stimulate investment of: $1,600,000 \times 3 \times \$2000 = \$9.6$ billion
- (4) Over 10 years: $\$9.6b / 10 = \960 million per year

This investment will be leveraged from a range of sources including government, homeowners and utilities retailers through a mix of regulation, incentive and program measures.

JOBS SUPPORTED THROUGH 10-YEAR IMPLEMENTATION PHASE

International estimates for the number of gross jobs supported during the investment phase of energy efficiency range from 11 jobs/US\$1 million to 20 jobs/US\$1 million, for regions including the USA, EU and OECD (See Table 4). (Australian estimates are not available.)

To account for international differences in conditions, we have converted the proposed (Australian) expenditure to the relevant currency using the OECD's latest purchasing power parity indicators.⁹⁴ As energy efficiency activities span a range of categories, we have chosen the economy-wide

⁹² Sustainability Victoria 2014, *Household Energy Report*.

⁹³ Sustainability Victoria 2014, *Household Energy Report*, Table 3, excluding double glazing.

⁹⁴ OECD 2011, 'PPP benchmarking', available at stats.oecd.org/Index.aspx?DataSetCode=PPP2011. C.f. Tables 1.2, 1.12, and 2.2.

indicator in each case.

Based on the international studies presented in Table 4, the upgrade of Victoria's housing stock can be reasonably expected to support between 7000 and 13,000 jobs per year. This is an estimate of gross jobs, not net additional jobs across the economy, and so at least some of these jobs would be drawn from elsewhere in the economy. However, given that many trades and services roles associated with retrofits are low or semi-skilled, efficiency investment provides significant scope for expanding opportunities for unemployed workers.

Table 4. Estimates of gross job support using international studies.

Author	For region	(A) Jobs/money	(B) AUD investment [from (4)]	(C) PPP conversion ⁹⁹	(D) Regional equivalent [(B)/(C)]	(E) Jobs supported [(D)*(A)]
Anderson ⁹⁵	USA	11 jobs/USD1m	960 million	1.5	640 million	7040
ACEEE ⁹⁶	USA	20 jobs/USD1m	960 million	1.5	640 million	12,800
EEIF ⁹⁷	EU	19 jobs/EUR1m	960 million	2	480 million	9120
OECD ⁹⁸	OECD	13 jobs/USD1m	960 million	1.44	667 million	8667

ONGOING JOBS SUPPORTED THROUGH HOUSEHOLD SAVINGS

Ongoing jobs are supported by resources freed up by household savings; money not being spent on energy bills will be available for spending elsewhere in the economy and create ongoing jobs beyond the life of the direct efficiency investment.

- (5) The average annual household energy bill is \$2800
- (6) A 5 Star home can cut bills by 40 percent compared with business as usual¹⁰⁰

⁹⁵ Anderson 2014, *ibid*.

⁹⁶ American Council for an Energy Efficient Economy 2011, 'How does energy efficiency create jobs?', <http://aceee.org/sites/default/files/pdf/fact-sheet/ee-job-creation.pdf>

⁹⁷ Janssen, R. and D. Staniaszek 2012, *How many jobs? A survey of the employment impacts of investment in energy efficiency of buildings*, Energy Efficiency Industrial Forum

⁹⁸ OECD 2012, *Energy: OECD Green Growth Studies*, OECD Publishing, p. 75.

⁹⁹ OECD 2011, *ibid*.

¹⁰⁰ Sustainability Victoria 2014, *Household Energy Report*.

¹⁰¹ Anderson et. al 2014, *ibid*.



(7) From (5) and (6): Average household savings = \$1000 per year

(8) From (1) and (7): Annual consumer bill energy savings = \$1.6 billion per year

Anderson et. al, (2014) estimates a net gain of 8 jobs per US\$1 million of consumer savings.¹⁰¹

(9) From (8) and Table 4 (PPP conversion): $AU\$1,600m / 1.5 * 8 = 8,533$ ongoing jobs (net) beyond the life of the direct efficiency investment.

IMAGE CREDITS

Page 12: ecoMaster Pty Ltd; Photographer: Paul Rovere

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Page. 19: Passive House Institute, www.passiv.de

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