



## 2.5 billion reasons to invest in efficiency

*Modelling the impact of improving the energy efficiency of  
Victoria's homes on the Victorian Energy Concessions Budget*

A report  
by the **Alternative Technology Association**  
for the **One Million Homes Alliance**



September 2012



The One Million Homes Alliance partners include:





# Table of Contents

<b>Executive Summary</b>	<b>4</b>
<b>1.0 Introduction</b>	<b>6</b>
1.1 Project Context	6
<b>2.0 Methodology: Energy Use Reductions</b>	<b>8</b>
2.1 Existing Star Rating	8
2.2 Energy Use Reduction – Calculation Method	8
2.3 Energy Use Reduction: Confirmation of Method	9
<b>3.0 Methodology: Concessions Budget Savings</b>	<b>11</b>
3.1 Energy Consumption	11
3.2 Energy Demand	12
3.3 Energy Price	12
3.4 Modelled Outcomes	13
<b>4.0 Discussion of Findings</b>	<b>15</b>
4.1 Limitations of the Model	15
4.2 Further Work	16



## Executive Summary

Ahead of the 2010 Victorian election, the Liberal-National Coalition Planning policy committed to 'support the transition of all existing housing stock to meet an average of 5 star energy rating as soon as possible'<sup>1</sup>.

The One Million Homes Alliance, a coalition of Victorian-based consumer, social welfare and environment organisations, is advocating for significant investment to improve the long-term energy and water performance of Victoria's existing housing stock, as a response to rising electricity prices and the need for more efficient homes.

Improving the energy and water efficiency of Victorian homes has the potential to provide long-term savings for the Victorian State Budget via the electricity and gas concessions that support low income households, without taking any of these benefits away from those in need. These budget savings could then be used to undertake ongoing investment into improving the energy and water efficiency of our housing stock.

This report, commissioned by the One Million Homes Alliance and undertaken by the Alternative Technology Association (ATA), models the potential impact on the Victorian Energy Concessions Budget from an increase in the energy performance of existing low income households from an average of 2 Stars to an average of 5 Stars.

This analysis aims to:

- provide an accurate, defensible estimate of the potential savings over time within the Victorian Energy Concessions Budget, from a broad scale retro-fit of concession-eligible households, (there are around 1 million houses that meet this criteria) to an average of 5 Stars;
- provide supporting information regarding the likely retro-fit measures that would be required (and most cost effective) to achieve the average increase to 5 Stars; and
- take into account, within the modelling exercise:
  - both electricity and gas related savings;
  - potential retail energy price rise scenarios; and
  - a timeframe broadly in keeping with a 10 year retro-fit program (and potentially out to 2025 and/or 2030).

In conducting the modelling exercise, the ATA utilised publicly available datasets to inform the model assumptions regarding:

- likely average energy use reductions from 2 to 5 Star upgrades;
- existing energy consumption by low income households; and
- future energy demand and price scenarios.

These assumptions are clearly articulated in **Sections 2.0** and **3.0** of this report.

The modelled outcomes for concession budget savings from an upgrade in Victoria's low income housing stock from 2 to 5 Star are outlined in **Table 1** below.

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1 The Victorian Liberal National Coalition's Policy and Plans for the 2010 State Election: [http://www.liberalvictoria.org.au/siteData/uploadedData/VictorianLiberalNationalsCoalitionPlan\\_planning.pdf](http://www.liberalvictoria.org.au/siteData/uploadedData/VictorianLiberalNationalsCoalitionPlan_planning.pdf)

Year of Program	Year	Number of Homes Retro-fitted	Yearly Savings on Concessions Budget	Cumulative Savings on Concessions Budget
1	2013	20,000	\$1.8 m	\$1.8 m
2	2014	40,000	\$5.9 m	\$7.7 m
3	2015	60,000	\$12.6 m	\$20.3 m
4	2016	125,000	\$27.5 m	\$47.8 m
5	2017	125,000	\$44.4 m	\$92.2 m
6	2018	125,000	\$62.7 m	\$154.9 m
7	2019	125,000	\$82.8 m	\$237.6 m
8	2020	125,000	\$104.9 m	\$342.5 m
9	2021	125,000	\$129.2 m	\$471.8 m
10	2022	130,000	\$156.7 m	\$628.5 m
11	2023	-	\$161.4 m	\$789.9 m
12	2024	-	\$166.3 m	\$956.2 m
13	2025	-	\$171.3 m	\$1127.5 m
14	2026	-	\$176.4 m	\$1303.8 m
15	2027	-	\$181.7 m	\$1485.5 m
16	2028	-	\$187.1 m	\$1672.7 m
17	2029	-	\$192.7 m	\$1865.4 m
18	2030	-	\$198.5 m	\$2063.9 m
19	2031	-	\$204.5 m	\$2268.4 m
20	2032	-	\$210.6 m	\$2479.0 m

**Table 1: Annual & Cumulative Savings on Concessions Budget**

The estimated annual savings to the Victorian Energy Concessions Budget from retro-fitting one million low income households to a 5-Star rating over ten years grows each year from about \$1.8 million in the first year (2013) to almost \$157 million in the tenth year.

Those savings continue to grow beyond ten years (against what would have been 'business as usual' for the concession budget) as energy costs continue to rise.

The cumulative estimated savings to the concessions budget reach:

- approximately \$92 million after five years (2017);
- over \$600 million after ten years (2022);
- over \$1.4 billion after 15 years (2027); and
- almost \$2.5 billion after 20 years (2032).

These savings could be considered for re-investment by the Victorian Government to help fund a long-term retro-fit program for low income households.

*The estimated cumulative savings from retro-fitting 1 million homes to a 5-star rating is \$2.5 billion after twenty years.*

# 1.0 Introduction

Ahead of the 2010 Victorian election, the Liberal-National Coalition Planning policy committed to ‘support the transition of all existing housing stock to meet an average of 5 star energy rating as soon as possible’<sup>1</sup>.

This important commitment is strongly supported by the One Million Homes Alliance who have highlighted the energy and water savings, emissions reductions, savings to household budgets and jobs that would be delivered by a comprehensive retro-fit program for Victoria’s housing stock.

Improving the energy and water efficiency of Victoria’s housing stock would also however deliver savings for the Victorian Government’s budget via reduced expenditure on energy and water concessions for households.

This report, commissioned by the One Million Homes Alliance and undertaken by the Alternative Technology Association (ATA), models the potential impact on the Victorian Energy Concessions Budget from an increase in the energy performance of existing low income households from an average of 2 Stars to an average of 5 Stars.

For the purposes of this report we have assumed that this objective would be achieved by 2020, to match the original Victorian Climate Change White Paper iteration of the 5 star objective.

This document provides an overview of the process undertaken and the methodology used for assessment. It also presents the findings of the modelling undertaken for the project.

## 1.1 Project Context

The One Million Homes Alliance is a coalition of Victorian-based consumer, social welfare and environment organisations who are advocating for significant investment into the long-term energy and water performance of Victoria’s existing housing stock as a response to rising electricity prices and the need for more efficient homes.

Many Victorian households will choose to improve the energy and water efficiency of their homes in response to rising electricity prices and voluntary incentive programs like the Energy Saver Incentive scheme or water rebates. However these programs are typically utilised by households that can access the up-front capital required to undertake retro-fit measures.

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1 The Victorian Liberal National Coalition’s Policy and Plans for the 2010 State Election:  
[http://www.liberalvictoria.org.au/siteData/uploadedData/VictorianLiberalNationalsCoalitionPlan\\_planning.pdf](http://www.liberalvictoria.org.au/siteData/uploadedData/VictorianLiberalNationalsCoalitionPlan_planning.pdf)

*The One Million Homes Alliance is a coalition advocating significant investment into the long-term energy and water performance of Victoria’s existing housing stock.*

Lower income households, for example those eligible for energy and water concessions, are less likely to have the capital available to invest in energy and water efficiency. This study considers these concession eligible households and the likely cost savings to the Victorian Government's Energy Concession Budget from targeting energy efficiency measures at this consumer segment, as part of the Baillieu Government's efforts to improve Victoria's overall housing stock from 2 to 5 stars.

Large scale investment in improving the energy and water efficiency of Victorian homes has the potential to provide long-term savings for the Victorian State Budget via the electricity and gas concessions that support low income households, without taking any of these benefits away from those in need. These are savings that could be made available to undertake the ongoing investments into energy and water efficiency housing upgrades.

Within this context, the purpose of this analysis was therefore to:

- provide an accurate, defensible estimate of the potential savings over time within the Victorian energy concessions budget, from a broad scale retro-fit of concession-eligible households, to an average of 5 Stars;
- provide supporting information regarding the likely retro-fit measures that would be required (and most cost effective) to achieve the average increase to 5 Stars; and
- take into account, within the modelling exercise:
  - both electricity and gas related savings;
  - potential retail energy price rise scenarios; and
  - a timeframe broadly in keeping with a 10 year retro-fit program (and potentially out to 2025 and/or 2030).

*An estimated 1.9 million Victorian homes built before 2004 still have energy ratings of 2 Stars or less.*



## 2.0 Methodology: Energy Use Reductions

This section outlines the assumptions, data and methods used to calculate the annual energy use reductions achieved from improving the Victorian housing stock to a 5 star average.

### 2.1 Existing Star Rating

ATA reviewed a number of publically available datasets that were considered useful in informing the modelling exercise.

An estimated 1.9 million Victorian homes built before 2004<sup>2</sup> still have energy ratings of 2 Stars or less<sup>3</sup>. Given this, the ATA has assumed that:

- the average Star rating across all of these 1.9 million homes would be no greater than 2 Stars; and
- the majority of low income households, eligible for either electricity or gas concessions (or both), would fall within those 1.9 million households and have an average Star rating no greater than 2 Stars.

ATA has therefore assumed that a conservatively high starting point for existing energy efficiency of Victorian low income households is 2 Stars. In reality, the actual average Star rating may be lower than this, which would serve to increase the final bottom line savings to the concessions budget.

ATA has then used the following method for estimating the energy use reduction from an increase from 2 to 5 Stars.

### 2.2 Energy Use Reduction – Calculation Method

ATA were not able to uncover specific data sources that provided empirical evidence of the energy use reductions from Star rating increases in the Victorian context.

The Nationwide House Energy Rating (NatHERS) has published the maximum energy consumption per unit area (MJ/m<sup>2</sup>) for each of the Star rating levels for the 69 climate regions within Australia<sup>4</sup>. Using the nine regions that cover locations in Victoria (Regions 20, 21, 22, 27, 62, 63, 64, and 66), the estimated percentage reduction in energy for moving from 2 Stars to 5 Stars was calculated at 54.7%.

This value represents the amount of energy reduction related to space heating/cooling only, since the Star rating is a rating of the thermal comfort level of the home.

In order to relate the above energy reduction in space heating/cooling to overall household energy reduction, an estimate of heating and cooling as a proportion of household energy use for Victoria has been sourced, as outlined in Table 2 below:

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2 ABS, 2004

3 Victorian Department of Sustainability and Environment, 2006.

4 <http://www.nathers.gov.au/about/pubs/starbands.pdf>



Victoria	ACT	AU
59% <sup>5</sup>	61% <sup>6</sup>	38% <sup>7</sup> / 39% <sup>8</sup>

**Table 2: Energy required for heating and cooling as a proportion of household energy use**

Based on this estimated heating/cooling energy proportion of household energy at 59%, and the reduction of heating and cooling energy of 54.7% from retro-fits that improve the house's star rating from 2 Stars to 5 Stars, the total household energy reduction from retro-fits that improve the house's star rating from 2 Stars to 5 Stars would be 32.3%.

**This therefore suggests an overall energy saving of 32.3% resulting from the retro-fit of a Victorian home from 2 to 5 Stars.**

*The estimated average saving for Victorian homes retro-fitted from 2 to 5 stars is 32% of household energy use.*

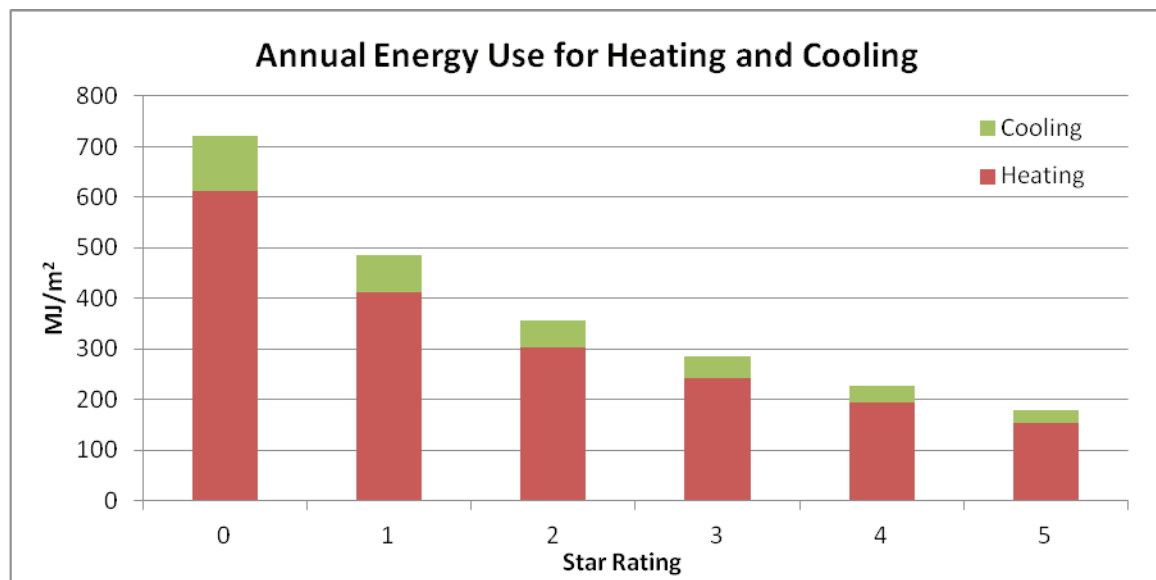
## 2.3 Energy Use Reduction: Confirmation of Method

In order to ensure the results from the use of NatHERS Star rating levels as described above are robust, the empirical energy measurements for heating and cooling in ACT households were also used to estimate the same reduction in heating and cooling associated with a move from 2 to 5 Stars.

The ACT Planning and Land Authority found that space heating and cooling end-use energy reduced from 360 MJ/m<sup>2</sup> to 180 MJ/m<sup>2</sup> when increasing an ACT home's performance from 2 to 5 Stars<sup>9</sup>, as shown in Figure 1.

The above reduction represents a decrease of 50%, indicating that the move from 2 to 5 Stars would reduce the household energy requirement for heating and cooling by half.

- 5 Victorian Energy Efficiency Action Statement, Department of Sustainability and Environment, 2006: <http://www.sustainability.vic.gov.au/www/html/1820-energy-use-by-sector-.asp>
- 6 Achieving Better Energy Efficiency in the ACT, Conservation Council ACT Region, 2008 <http://www.parliament.act.gov.au/downloads/submissions/04%20Conservation%20Council%20ACT%20Region.pdf>
- 7 Energy Use in the Australian Residential Sector 1986 – 2020, Department of the Environment, Water, Heritage and the Arts, 2008: <http://www.climatechange.gov.au/what-you-need-to-know/buildings/publications/~media/publications/energy-efficiency/buildings/energy-use-australian-residential-sector-1986-2020-part1.pdf>
- 8 ABS 4102.0 - Australian Social Trends, 2006
- 9 [http://www.actpla.act.gov.au/design-guide/acthers/eer\\_sell.htm](http://www.actpla.act.gov.au/design-guide/acthers/eer_sell.htm)



**Figure 1: ACT Energy Usage by Star Rating<sup>10</sup>**

Given their temperate climate conditions, ATA considered that the ACT would have similar household heating and cooling requirements to much of Victoria, with potentially slightly greater cooling requirements, and slightly less heating requirements for Victoria.

As in the previous section, applying the ACT reduction to the proportion of household energy required for heating and cooling (59%) we arrive at an estimate of 29.5% for the total household energy reduction for retro-fitting the home from 2 to 5 Stars.

This result of 29.5% is within 10% of the 32.3% reduction calculated using the NatHERS Star rating levels in the previous section, and therefore ATA considers 32.3% to be a robust estimation of the household energy reduction due to retro-fits that improve a house's energy star rating from 2 to 5 Stars.

## 3.0 Methodology: Concessions Budget Savings

ATA then developed a financial model to estimate the annual savings that would accrue to the Victorian Government as a result of the retro-fit of homes receiving electricity and gas concessions.

According to the relevant papers within the Victorian State Budget<sup>11</sup>, the 2012/13 target for Victorian homes that will receive a concession on their energy bill is:

- 879,200 – for electricity;
- 807,000 – for gas.

The model has extrapolated target forecasts into future years using the most recent projections for households in Victoria<sup>12</sup>.

As households can move into and out of concession programs we have assumed a total of one million homes will be targeted by a retro-fit program.

For the purposes of the model, a feasible quantity of retro-fits per year has been chosen. Starting with 20,000 homes in the first year, the model increases steadily the number of retro-fits per year, and 125,000 homes are modelled to be retro-fitted in years 4 to 10 of the program. This would allow for a 'pilots and trials' type approach in the early years to build capacity and confidence in the program, and allow for refinement where necessary.

The model takes into account the reduction in concessions provided by the Victorian Government due to the Australian Government's carbon price related concession for energy bills. From 1 July 2012 the 17.5% concession will not apply to the first \$171.60 of the concession household's electricity bill<sup>13</sup>, and also will not apply to the first \$62.40 of the concession household's gas bill during winter<sup>14</sup>.

### 3.1 Energy Consumption

For estimated household energy use, the model uses 5,267 kWh/year for electricity in electric-only households; while in households with both electricity and gas connected the estimated modelling inputs used were 4,712 kWh/year for electricity and 49.97 GJ/year for gas.

The electricity and gas consumption input figures have been derived from average household consumption figures for Melbourne<sup>15</sup>, and have then been slightly discounted due to the evidence surrounding slightly lower electricity and gas use by low income households.

*The Utility Consumption Survey*<sup>16</sup>, conducted by the Victorian Department of Human Services, suggests that low income Victorian households consume only 88% of the electricity of the average Victorian household; and 94% of the gas. As these are 'average' figures across both electric only and dual fuel households, a conservative assumption has been made to include only a reduction of 88% across both electric only and dual fuel households.

11 2012/13 Budget Paper No. 3, Chapter 2. [http://www.budget.vic.gov.au/CA2579B200132B63/WebObj/BP3Ch2DHSWord/\\$File/BP3Ch2DHSWord.doc](http://www.budget.vic.gov.au/CA2579B200132B63/WebObj/BP3Ch2DHSWord/$File/BP3Ch2DHSWord.doc)

12 Department of Planning and Community Development, Victoria in Future 2012. <http://www.dpcd.vic.gov.au/home/publications-and-research/urban-and-regional-research/census-2011/victoria-in-future-2012>

13 <http://www.dhs.vic.gov.au/for-individuals/financial-support/concessions/energy/annual-electricity-concession>

14 <http://www.dhs.vic.gov.au/for-individuals/financial-support/concessions/energy/winter-energy-concession>

15 <http://www.ausgrid.com.au/Common/About-us/Newsroom/Discussions/Syd-v-Mel-household-energy-bills.aspx>

16 Department of Human Services: Victorian Utility Consumption Household Survey 2007. 10 April 2008 at [http://www.dhs.vic.gov.au/\\_\\_data/assets/pdf\\_file/0010/606871/victorian-utility-consumption-survey-2007.pdf](http://www.dhs.vic.gov.au/__data/assets/pdf_file/0010/606871/victorian-utility-consumption-survey-2007.pdf)

As outlined by the methodology above, the reduction in estimated energy use resulting from retro-fits that improve a Victorian home's star rating from 2 to 5 Stars is 32.3%. This energy reduction was applied to each of the retro-fit households and the reduction in their concession requirement was calculated for each year.

## 3.2 Energy Demand

Household demand for both electricity and gas are assumed to remain constant (i.e. no increase) over the 20 year period. ATA made this conservative assumption for two reasons:

- Average electricity demand has decreased in recent times – 5.4% in 2008-09, followed by a 1.2% decline in 2009-10<sup>17</sup>;
- Given the increasing focus on electricity prices and energy efficiency, this trend may continue into the future. In the event that average demand returns to growth, this will only serve to increase the savings to the Victorian Energy Concessions Budget, as compared with the outputs of this model.
- Low income households however typically have constrained ability to significantly reduce demand due to having less discretionary energy consumption and less access to capital for efficient appliances.

On the balance of these three factors, ATA chose to include constant demand over the modelled period.

The ATA also conducted sensitivity analysis within the model for a range of different demand projections (increase and decrease of 1%), with the modelled outcomes not being significantly sensitive to demand projections. This sensitivity analysis is included in **Section 3.4 – Modelled Outcomes**.

In any event, irrespective of the actual demand over time, any long-term program would need to monitor and adjust to actual demand outcomes as necessary, and preferably on an annual basis.

Should demand significantly increase over time, this will simply mean that the savings to the concession budget will increase, whilst at the same time, the costs to undertake the retro-fit program would also increase. The reverse would obviously apply should demand decrease, but the value proposition to the Victorian Government should remain broadly the same.

## 3.3 Energy Price

A flat electricity tariff of 26.8c/kWh has been used, and a flat gas tariff of 1.93c/MJ.

The electricity tariff is based on both the energy and fixed charge components of the average of the cheapest annual electricity bill costs available in each of the five distribution regions in Victoria. The values for each annual electricity bill cost have been derived from the St Vincent de Paul tariff calculator<sup>18</sup>.

The gas tariff is based on both the energy and fixed charge components of the average of the current tariffs available in the Envestra and Multinet distribution areas. The tariffs were sourced using the Victorian Government's Your Choice website<sup>19</sup>.

17 Pears, Alan: Powering down – has Australian electricity consumption hit its peak? 30 August 2011 at <http://theconversation.edu.au/powering-down-has-australian-electricity-consumption-hit-its-peak-3044>

18 <http://www.advocacypanel.com.au/documents/AP496StVdPWB1ElectricityStandingOfferstoJan2012.xls>

19 [www.yourchoice.vic.gov.au](http://www.yourchoice.vic.gov.au)



The 17.5% Victorian concession applies to the entire bill – i.e. incorporating both fixed and energy (volumetric) charge.

In reality, the average tariff outcome across the state may be higher than this. This would mean simply that both the provided average concession and the average savings would be higher than stated by the model.

Note that the choice of gas distribution areas results in a conservative gas tariff for the modelling. For example, the Envestra Murray Valley distribution area, which has not been used, has significantly higher gas tariffs and higher fixed charges than other parts of the state.

Electricity price increases are based upon the middle scenario presented in the CSIRO report *Intelligent Grid*<sup>20</sup> and are broadly in keeping with the most recent short-term AEMC projections<sup>21</sup>. Gas price increases are conservatively locked at 3%, representing the minimum increase related to CPI.

### 3.4 Modelled Outcomes

The modelled outcomes for concession budget savings are outlined in **Table 3** below.

Year of Program	Year	Number of Homes Retro-fitted	Yearly Savings on Concessions Budget	Cumulative Savings on Concessions Budget
1	2013	20,000	\$1.8 m	\$1.8 m
2	2014	40,000	\$5.9 m	\$7.7 m
3	2015	60,000	\$12.6 m	\$20.3 m
4	2016	125,000	\$27.5 m	\$47.8 m
5	2017	125,000	\$44.4 m	\$92.2 m
6	2018	125,000	\$62.7 m	\$154.9 m
7	2019	125,000	\$82.8 m	\$237.6 m
8	2020	125,000	\$104.9 m	\$342.5 m
9	2021	125,000	\$129.2 m	\$471.8 m
10	2022	130,000	\$156.7 m	\$628.5 m
11	2023	-	\$161.4 m	\$789.9 m
12	2024	-	\$166.3 m	\$956.2 m
13	2025	-	\$171.3 m	\$1127.5 m
14	2026	-	\$176.4 m	\$1303.8 m
15	2027	-	\$181.7 m	\$1485.5 m
16	2028	-	\$187.1 m	\$1672.7 m
17	2029	-	\$192.7 m	\$1865.4 m
18	2030	-	\$198.5 m	\$2063.9 m
19	2031	-	\$204.5 m	\$2268.4 m
20	2032	-	\$210.6 m	\$2479.0 m

**Table 3: Annual & Cumulative Savings on Concessions Budget**

20 Intelligent Grid, CSIRO, 2009. <http://www.csiro.au/files/files/ptyb.pdf>

21 Possible Future Retail Electricity Price Movements: 1 July 2011 to 30 June 2014, using the scenario including a price on carbon. <http://www.aemc.gov.au/Media/docs/Master%20document%20-%20CoAG%20Pricing%202011%20-%20Final%20Report%20-%20EPR0025%20as%20at%2012%20December%202011-569fdd7a-1de6-433b-96b0-a0334d2-9095d-2.PDF>

As mentioned, ATA conducted sensitivity analysis for both a 2% increase and a 2% decrease in energy demand over the 10 year retro-fit period. The results, in terms of cumulative savings after 10 years, are presented in **Table 4** below:

Gas Usage – Annual	Electricity Demand – Annual Change			
	Electricity Decrease of 2% p.a.	Electricity No Change	Electricity Increase of 2% p.a.	
	Gas Decrease of 2% p.a.	\$537.22m	\$612.99m	\$700.14m
	Gas No Change	\$552.73m	\$628.51m	\$716.26m
	Gas Increase of 2% p.a.	\$570.67m	\$646.45m	\$734.20m

**Table 4: Sensitivity on Cumulative Savings to Concessions Budget Over 10 Year Period**

The sensitivity analysis demonstrates that for a 2% increase or decrease in either electricity or gas demand, or both (as compared with the no demand change factored into modelled outcomes in **Table 3**), the value proposition to the Victorian Government with respect to cumulative savings over 10 years is still strong.

Under a low demand scenario, should both electricity and gas demand reduce by 2% each from the zero change modelled outcome over the 10 year retro-fit period, then the cumulative savings to the Victorian Government would still reach \$537 million.

Should both electricity and gas demand increase by 2% each from the zero change modelled outcome, then the cumulative savings to the Victorian Government would increase to \$734 million over the 10 year retro-fit period.

## 4.0 Discussion of Findings

The estimated annual savings to the Victorian Energy Concessions Budget from retro-fitting one million low income households to a 5-Star rating over ten years grows each year from about \$1.8 million in the first year (2013) to almost \$157 million in the tenth year.

Those savings continue to grow beyond ten years (against what would have been 'business as usual' for the concession budget) as energy costs continue to rise. Should energy consumption rise above what has been modelled, then those projected budget savings would also increase.

The cumulative estimated savings to the concessions budget reach:

- approximately \$92 million after five years (2017);
- over \$600 million after ten years (2022);
- over \$1.4 billion after 15 years (2027); and
- almost \$2.5 billion after 20 years (2032).

These savings could be considered for re-investment by the Victorian Government to help fund a long-term retro-fit program for low income households. Obviously, the required upfront investment to establish any long-term retro-fit program would need to be managed by Government in the early program phase.

*The estimated annual savings from retro-fitting 1 million low income households to a 5-star rating over ten years grows from about \$1.8 million in the first year to \$157 million in the tenth year.*

### 4.1 Limitations of the Model

#### Water

The model does not take into account water related savings that would be realised when improving the building stock from 2 to 5 Stars. This would likely have additional savings for the Victorian Government's Water Concessions Budget, but would need to be a separate modelling exercise.

#### Other Concession Budget Savings

Due to time and budgetary constraints, the model does not include additional savings under a number of the smaller, more specialist Victorian energy concessions that are included under general 'mains electricity concessions'. These include (using 2010-11 budget figures):

- The Medical Cooling Concession (\$500k for 7,500 households);
- The Off-peak Concession (\$7.6m for 167,600 households);
- The Non Mains Energy Concession (\$3m for 22,814 households, 2010/11 DHS Annual Report). This is a rebate program for users of LPG, firewood, cooking oil, and generators as well as non-mains embedded network concession households. ATA's understanding is that this rebate is relatively heavily weighted toward energy costs that would be addressed by efficiency upgrades, should off-grid

*The retro-fit program should include a behaviour change element to ensure residents understand the efficiency measures in their homes.*

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properties be eligible to participate in any retro-fit program.

Upgrades in homes that were eligible for one or multiple of the above concessions would provide further savings to the Victorian concessions budget.

## Star Ratings & Energy Consumption

In order to provide indicative figures for translation into financial savings, ATA has had to draw upon software-derived predictions regarding energy use reductions under the NatHERS framework.

These software modelled energy use reductions may or may not be accurate when compared against actual energy use reductions from actual building upgrades undertaken as part of any retro-fit program.

Ultimately, in order to realise the financial savings indicated by the model, any retro-fit program would have to ensure that in the order of 30% actual energy use reductions are achieved as an average across the subject building stock. This may mean upgrading some buildings to higher than 5 Stars (or higher than average energy use reductions) to compensate for those older houses that are inherently difficult to upgrade to 5 Stars.

In addition the retro-fit program should include a behaviour change element to ensure recipients are provided with a greater understanding of the efficiency measures within their home, and the skills to work with those efficiencies to further reduce their bills.

## 4.2 Further Work

Further work needs to be done to quantify the costs of the building envelope and potentially appliance-based solutions required to upgrade Victoria's building stock from 2 to 5 Stars and realise these potential concession budget savings.

Using a mixture of both State Budget and targeted market based 'off-budget' approaches (e.g. the Victorian Energy Efficiency Target [VEET]), it is possible that a broad-scale retro-fit program could be developed for no net cost to Victorian tax-payers when these concession budget savings are taken into account.

In the majority of circumstances, and provided that ceiling insulation is re-introduced into the VEET scheme (currently under review), the most cost effective thermal measures will likely be those that are incentivised under VEET. These include:

- Ceiling, underfloor and wall insulation;
- Weather sealing; and
- Energy efficient lighting; and
- High efficiency showerheads.

Appliance based measures incentivised under VEET and of relevance to such a broad scale retro-fit program include (but not necessarily limited to):

- Electric storage replacement with solar hot water system or heat pump;
- Energy efficient fridges;
- Standby power controllers; and
- In-home displays.