

# Evaluation of the Environmental Effects of the WELS Scheme

## Addendum:

ANALYSIS OF THE IMPACTS OF A PROPOSED NEW SHOWERHEAD WELS RATING

Prepared for the Australian Commonwealth Government Department of the Environment

Please cite as:

McKibbin, J. & Turner, A., 2015 Analysis of the Impacts of a Proposed New Showerhead WELS Rating, addendum to Evaluation of the Environmental Effects of the WELS Scheme, prepared for the Australian Commonwealth Government Department of the Environment by the Institute for Sustainable Futures, University of Technology Sydney.

# 1 INTRODUCTION

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The Australian Commonwealth Department of the Environment commissioned the Institute for Sustainable Futures (ISF) to estimate the impacts of a new '4 star' rating for efficient showerheads under the Water Efficiency Labelling and Standards (WELS) scheme as a follow-up to an overarching evaluation of the scheme, *Evaluation of the Environmental Effects of the WELS Scheme*.

The proposal is to replace the existing '3 star' shower rating covering flow rates ranging from 6 to 9 litres per minute with two bands: a narrowed '3 star' rating covering flow rates in the range of 7.5 to 9 litres per minute and a new 4-star rating covering flow rates in the range of 4.5 to 7.5 litres per minute.

The objective of this analysis was to estimate the reductions in water consumption associated with the proposal across Australia, in addition to the associated energy savings, equivalent greenhouse gas emission reductions and household bill savings.



## 2 METHODS

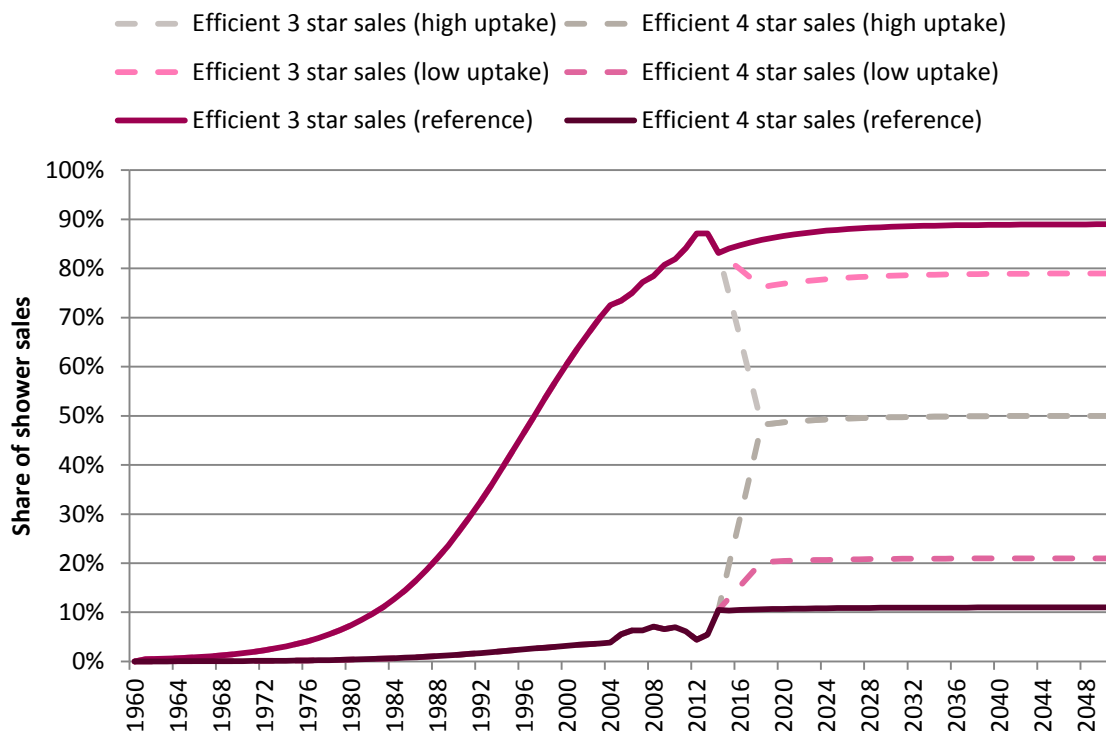
The modelling involved firstly extending the model developed for the overarching evaluation of the WELS scheme, with an additional technology type to account for the new showerhead class.

The sales of efficient showerheads were then apportioned between the 3 and 4-star rating bands based on the following assumptions provided by the WELS team.

- For the reference scenario, the split between 3 and 4-star showerhead sales would remain constant at current market shares, currently comprising 11% of efficient showerhead sales.
- For the new rating scenarios, the share of 4-star rated showerheads would increase to:
  - 20% (low uptake),
  - 50% (high uptake)

of new showerhead sales by 2020, with interim years linearly interpolated and all market gains at the expense of the 3-star models.

The sales share projection for the reference and new rating scenarios are shown in Figure 1.



**Figure 1 – Sales shares for 3-star and 4-star rated showerheads subject to the reference case and the new rating case scenarios**

The stock share projections for the reference scenario is shown in Figure 2, while the new rating scenarios subject to low uptake and high uptake assumptions are shown in Figure 3 and Figure 4, respectively.



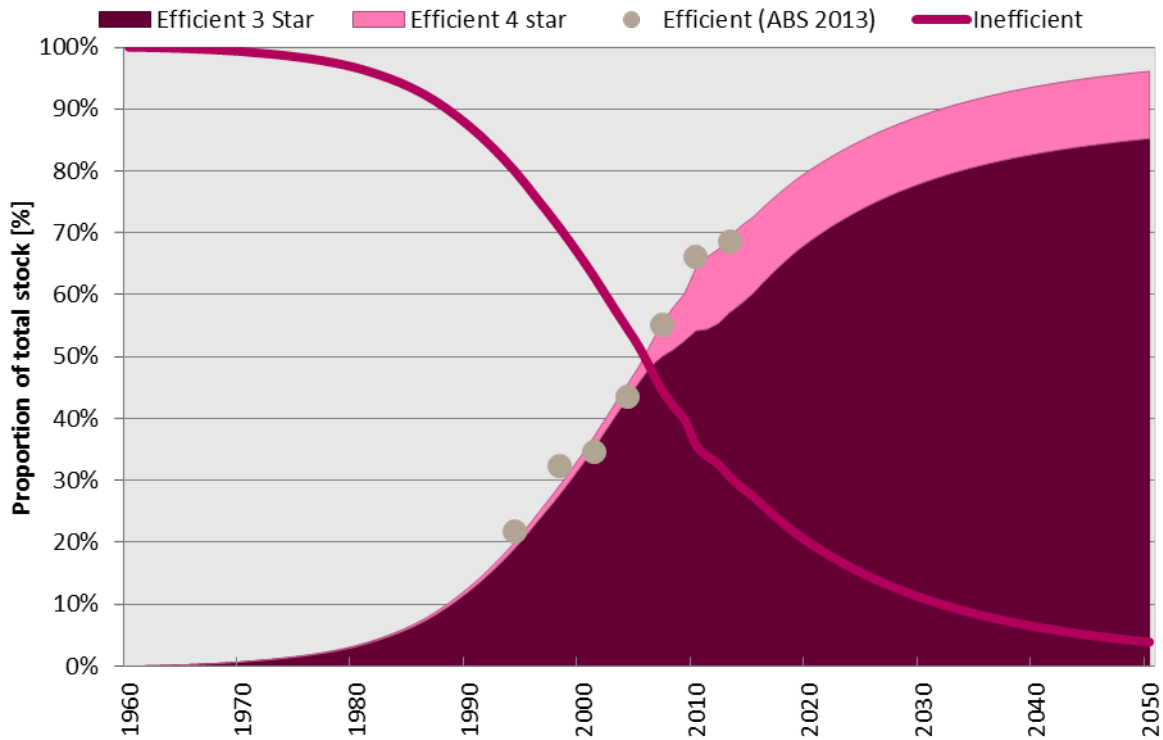


Figure 2 - Stock share of efficient 3-star and 4-star rated showerheads in the reference scenario

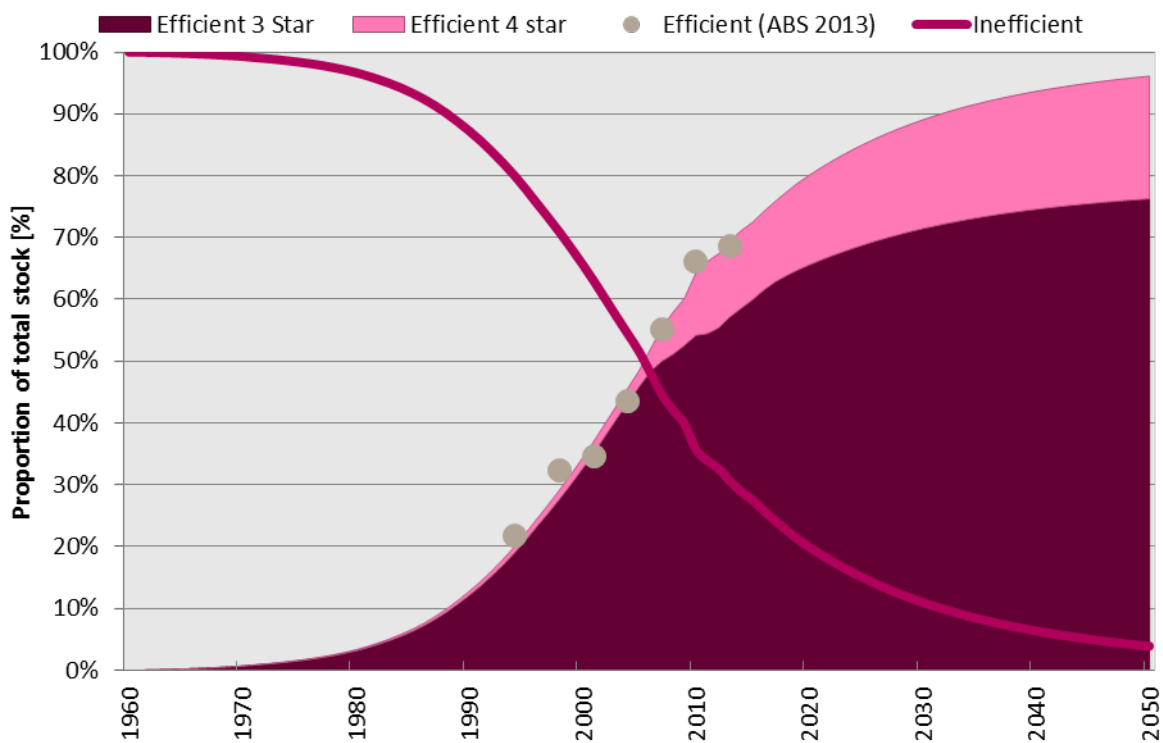
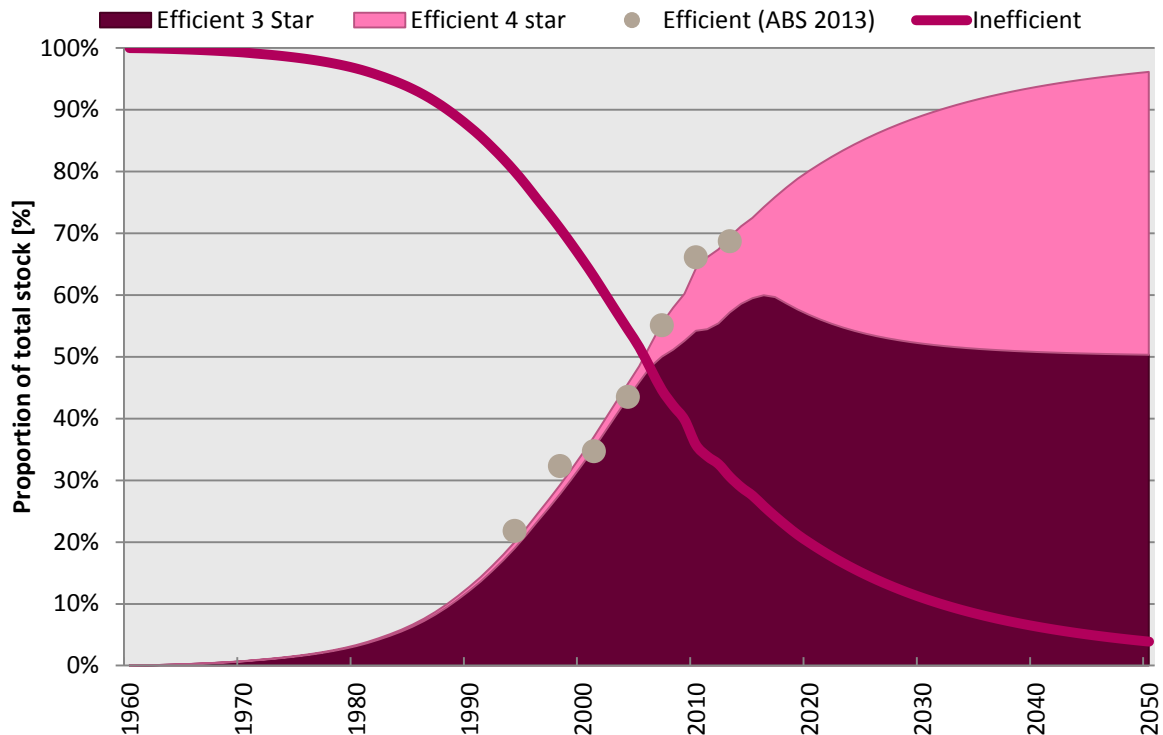


Figure 3 - Stock share of efficient 3-star and 4-star rated showerheads in new rating scenario (low uptake)





**Figure 4 - Stock share of efficient 3-star and 4-star rated showerheads in new rating scenario (high uptake)**

The operational flow rate for the new rating bands were inferred from a synthesis of recent end use measurement studies. They observed a mean operational flow rate for all showerheads 7.2 litres per minute, and mean operational flow rates for efficient showerheads at 6.3 litres per minute. No end use measurement studies have isolated the operational flow rates of the new 4-star rated showerheads so this number had to be inferred by reference to these measurements. The assumed operational flow rates for the 3-star, 4-star and unrated showerheads are shown in Table 1.

**Table 1 – Assumed operational flow rates by star rating**

Star rating	Rated flow rate range [L/min]	Assumed operational flow rate [L/min]
3-star rated	7.5 – 9.0	6.4
4-star rated	6.0 – 7.5	5.3

The water, energy, greenhouse gas emission and bill reductions were calculated using an identical modelling framework and set of assumptions to that described in the overarching evaluation of the WELS scheme (Fyfe et al, 2014). Note that the reference scenarios applied identical assumptions to the ‘WELS scenario’ as described in the report.



### 3 RESULTS

The estimated reduction in water consumption associated with the proposal, expressed both annually and cumulatively is shown in Figure 5 and Figure 6 respectively and in Table 2.

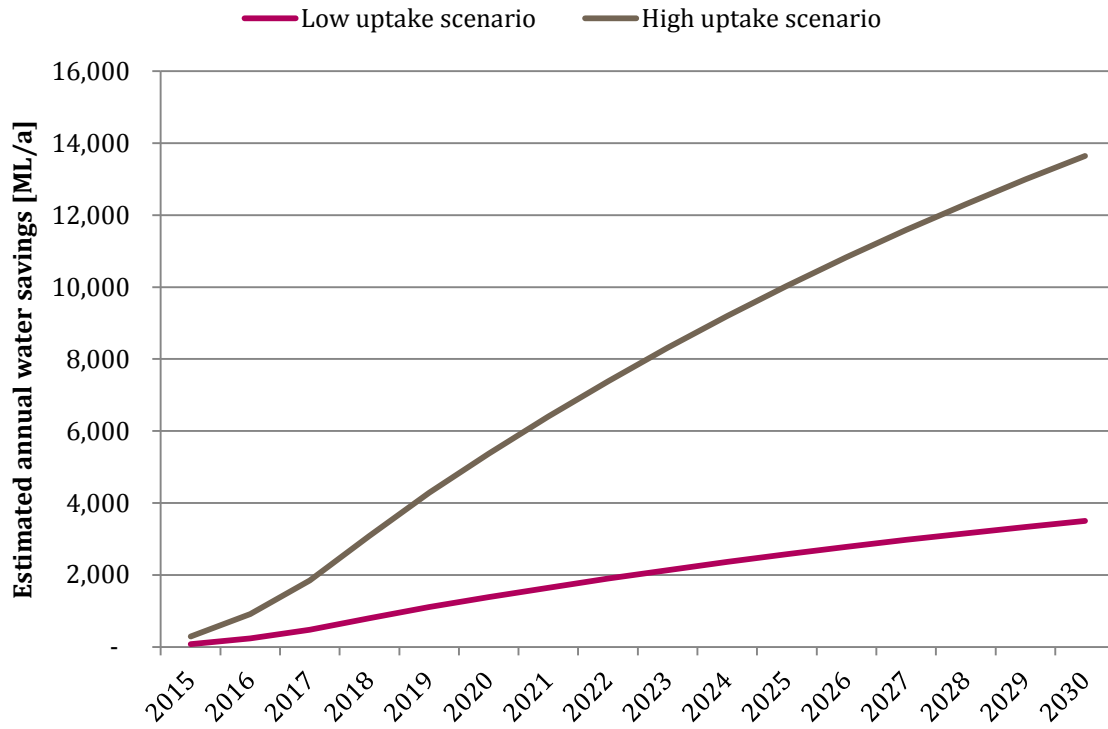


Figure 5 - Estimated annual water savings associated with the proposal



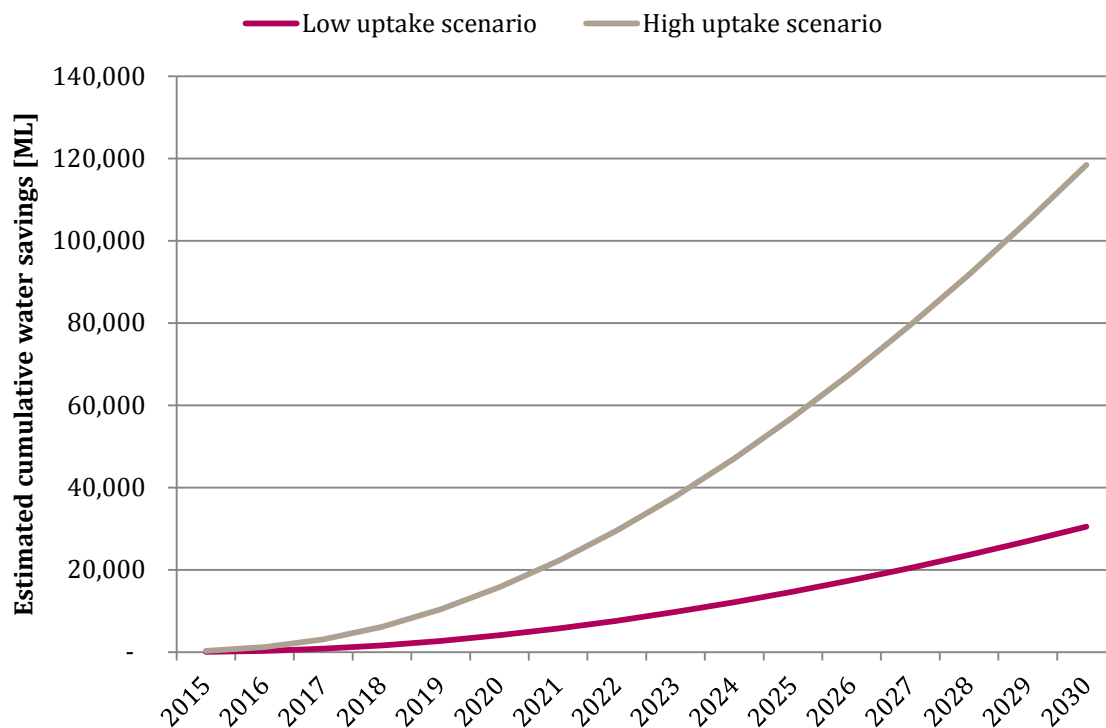


Figure 6 – Estimated cumulative water savings associated with the proposal

Table 1 - Snapshots of estimated water savings associated with the proposal

	2021	2030
<b>Low uptake scenario</b>		
Annual water saving [GL/a]	1.6	3.5
Cumulative water saving [GL]	5.7	30.4
<b>High uptake scenario</b>		
Annual water saving [GL/a]	6.4	13.6
Cumulative water saving [GL]	22.2	118.4



The estimated reduction in energy consumption associated with the proposal with low and high uptake assumptions are shown in Figure 7 and Figure 8 respectively, and in Table 3.

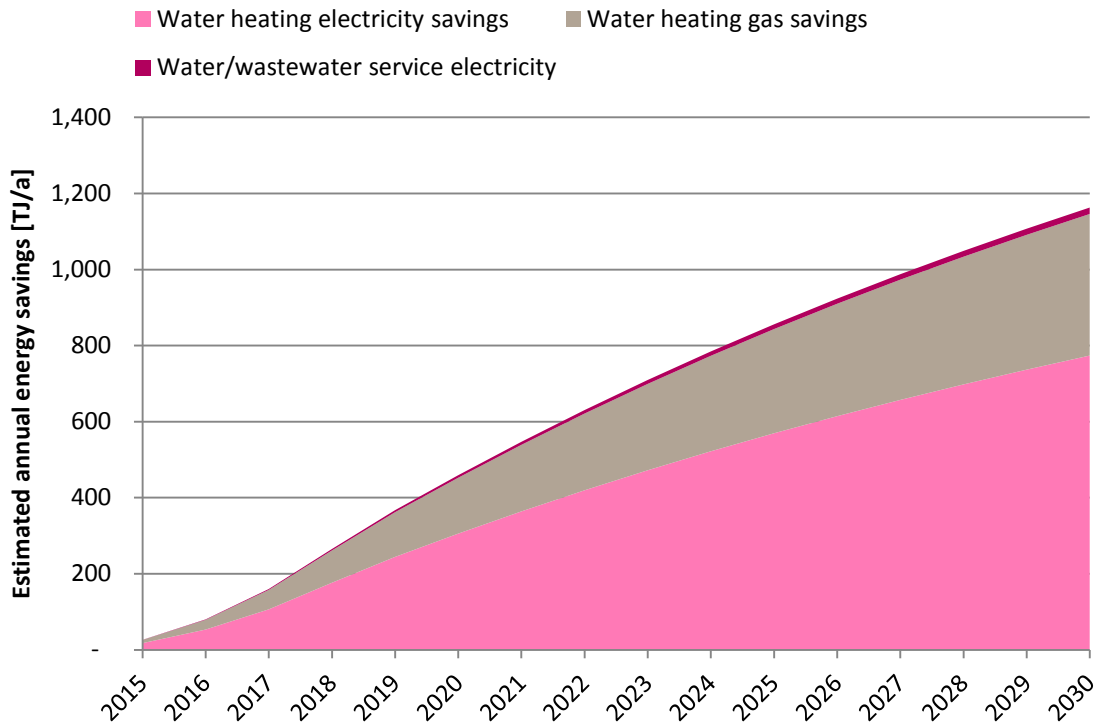


Figure 7 - Estimated energy savings associated with the proposal (low uptake)

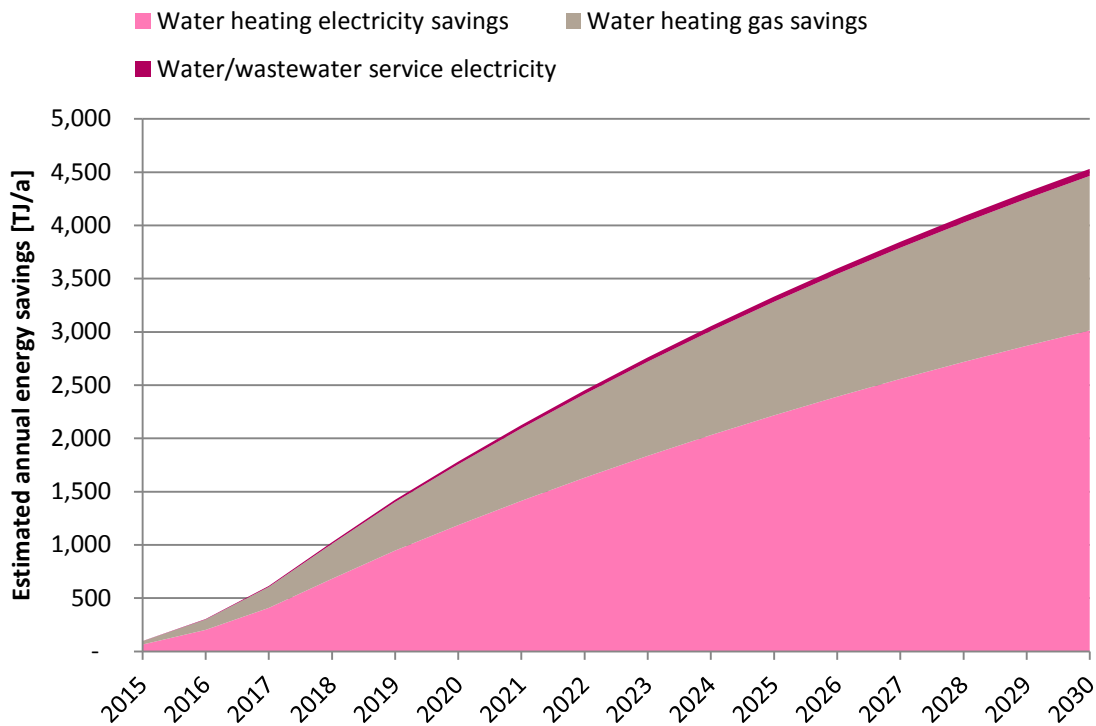


Figure 8 - Estimated energy savings associated with the proposal (high uptake)





**Table 2 - Snapshots of estimated annual energy savings associated with the proposal**

	2021	2030
<b>Low uptake scenario</b>		
Water heating electricity savings [PJ/a]	0.36	0.77
Water heating gas savings [PJ/a]	0.17	0.37
Water / wastewater service electricity [PJ/a]	0.008	0.017
Total energy savings [PJ/a]	0.55	1.16
<b>High uptake scenario</b>		
Water heating electricity savings [PJ/a]	1.41	3.01
Water heating gas savings [PJ/a]	0.68	1.45
Water / wastewater service electricity [PJ/a]	0.03	0.07
Total energy savings [PJ/a]	2.13	4.53



The estimated reduction in greenhouse gas emissions associated with the proposal with low and high uptake assumptions are shown in Figure 9 and Figure 10 respectively, and in Table 4.

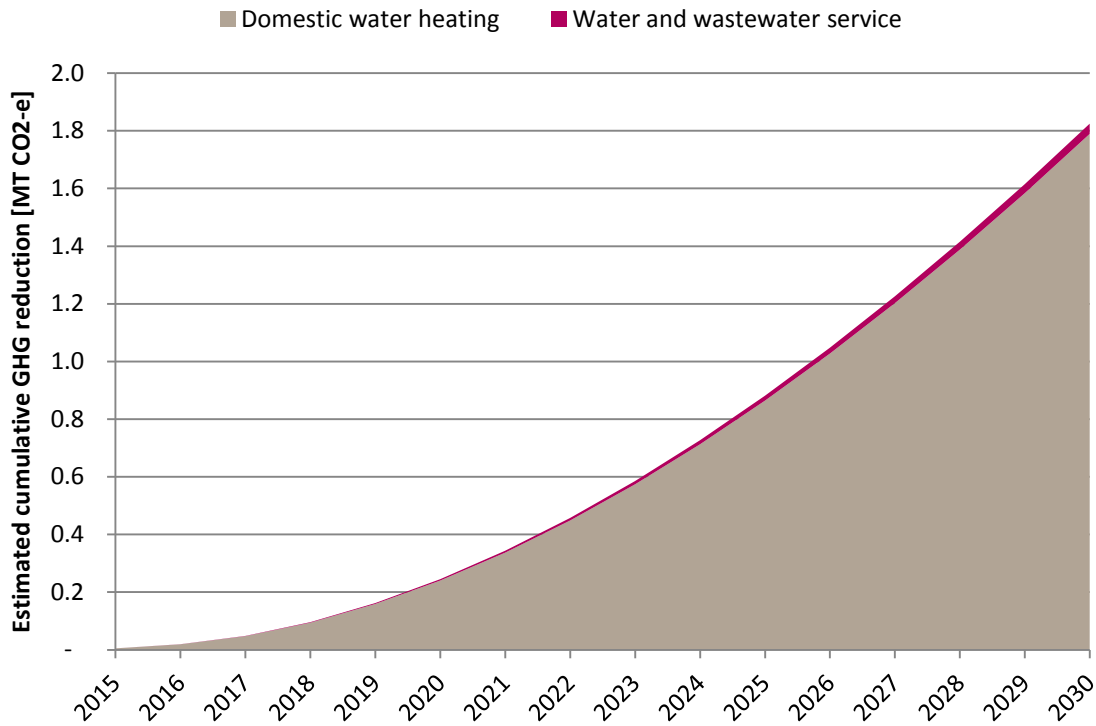


Figure 9 - Estimated cumulative GHG savings associated with the proposal (low uptake)

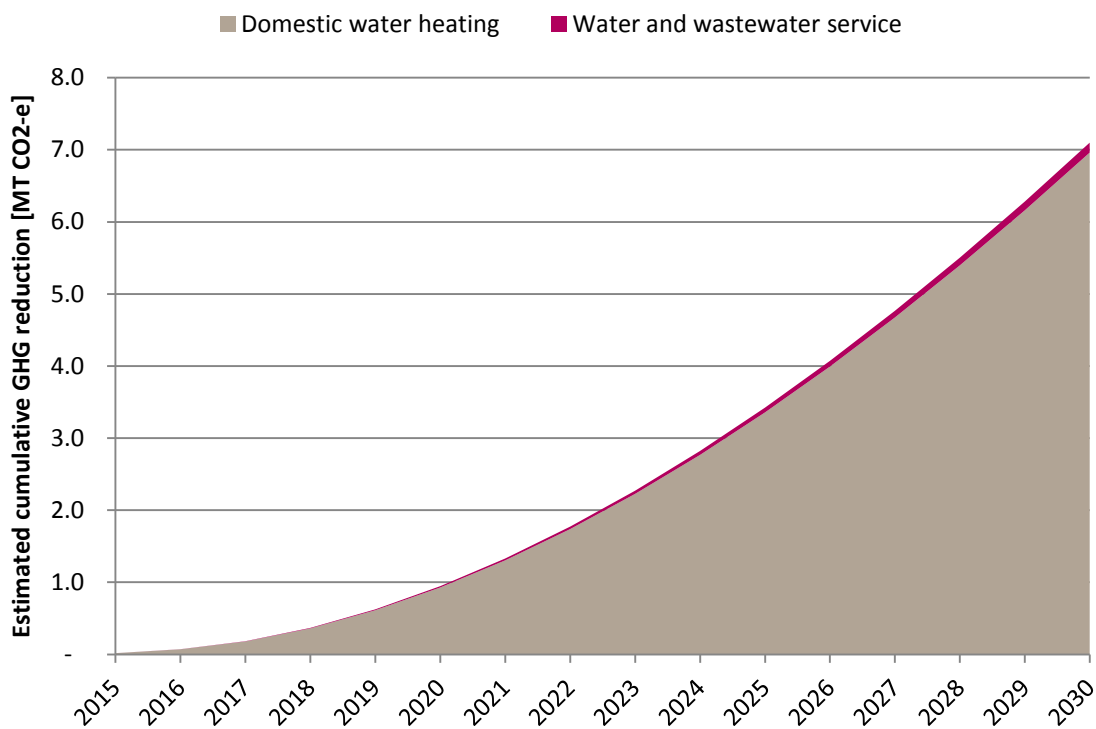


Figure 10 - Estimated cumulative GHG savings associated with the proposal (high uptake)



**Table 3 - Snapshots of estimated cumulative GHG savings associated with the proposal**

	2021	2030
<b>Low uptake scenario</b>		
Cumulative GHG savings associated with avoided domestic water heating [MTCO <sub>2</sub> -e]	0.34	1.8
Cumulative GHG savings associated with avoided water / wastewater services [MTCO <sub>2</sub> -e]	0.007	0.036
Total cumulative GHG savings [MTCO <sub>2</sub> -e]	0.34	1.82
<b>High uptake scenario</b>		
Cumulative GHG savings associated with avoided domestic water heating [MTCO <sub>2</sub> -e]	1.3	7.0
Cumulative GHG savings associated with avoided water / wastewater services [MTCO <sub>2</sub> -e]	0.026	0.14
Total cumulative GHG savings [MTCO <sub>2</sub> -e]	1.3	7.1



The estimated reduction in household bills associated with the proposal with low and high uptake assumptions are shown in Figure 11 and Figure 12 respectively, and in Table 5.

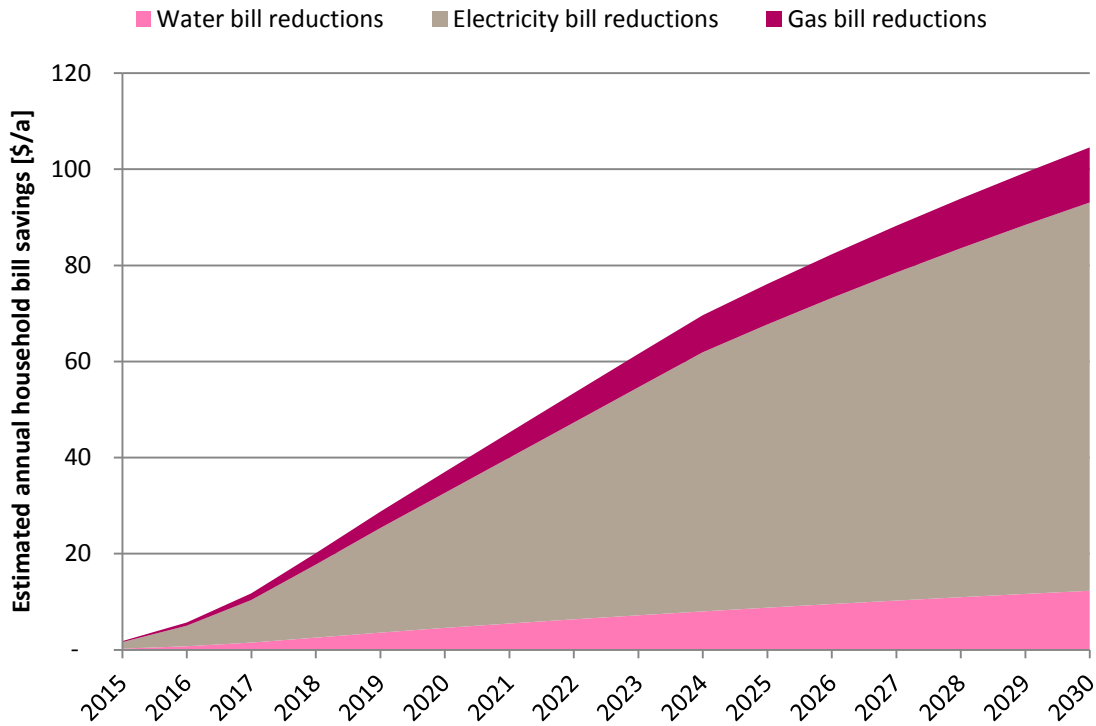


Figure 11 - Estimated household bill savings associated with the proposal (low uptake)

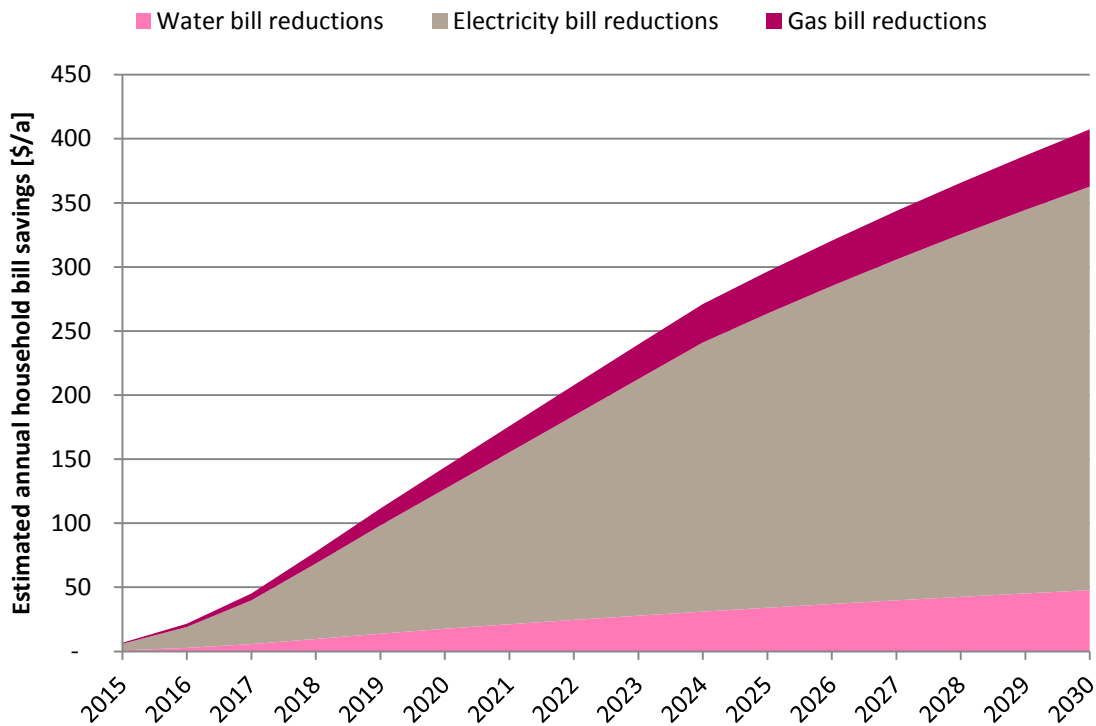


Figure 12 - Estimated household bill savings associated with the proposal (high uptake)



**Table 4 - Snapshots of estimated annual household bill savings associated with the proposal**

	2021	2030
<b>Low uptake scenario</b>		
Household water bill savings [m\$/a]	5	12
Household electricity bill savings [m\$/a]	34	81
Household gas bill savings [m\$/a]	5	11
Total household bill savings [m\$/a]	45	105
Total cumulative household bill savings [m\$]	150	879
<b>High uptake scenario</b>		
Household water bill savings [m\$/a]	21	48
Household electricity bill savings [m\$/a]	134	315
Household gas bill savings [m\$/a]	20	45
Total household bill savings [m\$/a]	176	407
Total cumulative household bill savings [m\$]	582	3420



## 4 DISCUSSION

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In the evaluation of the showerhead component of the WELS Scheme it was noted that registered products predominantly lie within the upper flow rate band of the existing 3-star rating range. It is anticipated that adding an additional rating level will provide improved consumer information to differentiate more efficient products and ultimately increase their market share.

The level of uptake of showerheads in the new 4-star rating band will depend on a wide range of factors such as consumer purchasing preferences, prevalence of water and energy efficiency programs, building codes, regulations and rating schemes, and tenancy laws (for further detail see Chapter 3 of the overarching evaluation of the WELS scheme (Fyfe et al, 2014)). More specifically, there are a number of energy efficiency incentive schemes that are currently proposed or in development by state governments that could have a significant impact on both the level of showerhead replacement overall, and the split of 3 and 4-star showerheads. The new assessment rule under the federal Emission Reduction Fund could also have a significant impact. Implementation of such incentive schemes could assist in pushing the proportion of 4-star showerheads towards the high (50% scenario).

The estimated levels of water, energy, greenhouse gas emissions and household bill reductions are relatively small compared to estimated reductions across the WELS Scheme. This is a reflection of the significant reductions that have already been achieved as a result of the existing 3-star rating.

The new 4-star showerhead rating will serve to deepen the already significant water, energy, greenhouse gas emissions and household bill savings benefits achieved by the WELS Scheme.

