Solar Hot Water and Solar Electricity – Comparing the Economics

SunWiz was commissioned to undertake an independent study comparing the financial outcome from installation of a Solar Hot Water system with that of installing a solar power system.

Methodology

For a range of locations, the hourly production of a high-performance unshaded solar (PV) power system was calculated, and an energy balance performed against hourly consumption for two typical residential load profiles. The annual financial benefit of the PV system was calculated, and then projected out over 10 years. The financial payback and Internal Rate of Return was calculated based upon industry-median system prices, and degradation and inverter replacement was accounted for.

For the same locations, the value of energy displaced by a solar water heater was calculated, based upon STC calculations of energy generation and the price and energy conversion efficiency of off-peak electricity and gas (natural gas or LPG depending on location). The financial payback and Internal Rate of Return was calculated based upon recommended retail system prices, less the value of STCs in each location. For the purposes of this study, the results associated with the best value SHW system (the AE-315-GL-MID-30) have been used.

Considerations

Discretionary versus essential service

Solar power is a discretionary service, whereas provision of hot water is considered an essential service by most Australians. As such, when a hot water system fails, the owner is faced with a choice between a conventional electric or gas storage tank (costing ~$1200) or upgrading to a solar hot water system. As such, a solar hot water system that replaces a failed boiler has a marginal cost that is $1200 lower than a discretionary retrofit solar hot water system, even if they both have the same ticket price. For this reason we present the financial outcome of both retrofit and replacement solar hot water systems.

Product lifetimes

Consider too that PV and solar hot water systems have different product lifetimes. PV panels should last 25 years, so long as the inverter is replaced should it fail beforehand. Solar Hot Water systems have an effective life of 10 years according to Clean Energy Regulator calculations. Of course, both technologies may last longer than this. Purchasing a PV system is effectively buying 25 years' worth of energy up-front, whereas purchasing a SHW system is effectively buying only 10 years. Balancing this consideration is the investment timeframe of most households, which is typically only 7 years in line with typical real-estate turnover rates. Thus while a 25-year comparison may be more balanced, a 10-year comparison may be more in line with consumer assessment timeframes. For this reason, we present results over 10 years.

Utilisation of available energy

Consider that the payback period of both technologies depends heavily on the utilisation of the received solar energy. PV households with low daytime power consumption will export a significant fraction of solar generation to the grid, with far lower value than if they had self-consumed the electricity at the time of generation. Thus households with higher consumption levels and particularly those with high daytime occupancy or energy use (e.g. those operating swimming pool

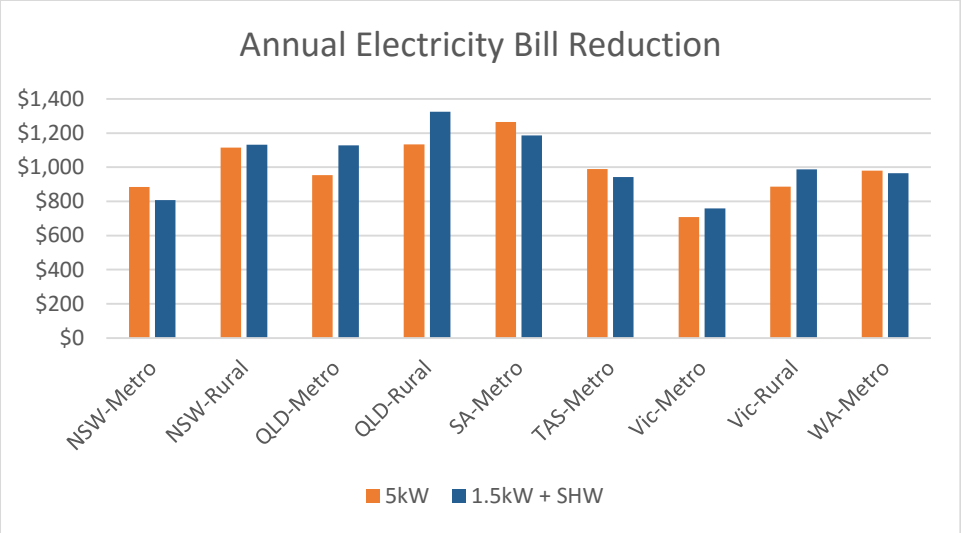
filters during the day) can have quicker paybacks than those 'average households' shown in this report. Balancing this is the tendency for larger consumers to install larger solar power systems, which export disproportionately greater amounts of energy than small solar power systems. The ability of a solar hot water system to reduce energy consumption likewise depends upon the household's consumption of hot water, which is most influenced by the frequency and length of hot showers taken. These individual circumstances are factors that can sway results heavily in one direction or another.

Bill reduction

One of the main reasons for installing a solar electricity or solar water heater is to reduce an energy bill. Even if solar hot water were to provide quicker payback, it has limited ability to reduce an energy bill past a certain point. By contrast PV can make a bigger dint in an energy bill, though this is typically associated with diminishing financial returns as exports accelerate.

Why not both?

Consider that solar hot water and solar electricity (PV) may complement each other. This study shows that Solar Hot Water often has quicker payback than solar PV, but PV systems still have strong financial outcome. Consider that a $7,500 investment may be better split between a Solar Hot Water system and a PV system, rather than 100% invested in PV. In some circumstances, the payback of a Solar Hot Water system may be worse than a small PV system but better than a large PV system – in this case it makes optimum financial sense to invest in both solar hot water and a small PV system. Furthermore, assuming you have about $7,500 to spend, you can achieve a comparable reduction in your bill by opting for a Solar Hot Water system with 1.5kW of PV, rather than buying 5kW of PV.



[1]

The PV industry is starting to consider utilising excess solar electricity to heat a hot water tank, as a better option than spilling the energy to the grid. To the extent that the PV energy is fully utilised and that boosting is never required, then offsetting the off-peak electricity value (10-16c/kWh) seems to be a higher-value energy use than exporting at 6c/kWh. Complicating this analysis is the likelihood that the household switches across to boosting their tank from peak-rates (at 23-35c/kWh), which may substantially increase costs of boosting on cloudy days. Separate analysis of PV- Hot Water Power Diverters performed by SunWiz shows that a timer switch device does not create savings – a smart diverter is required and even then savings vary widely by location.

[1] Only includes hot water systems retrofit to an existing off-peak hot water service

Summary of Results

SunWiz's comparative analysis of PV and SHW shows that over a 10 year timeframe, paybacks of each technology vary widely by location, electricity usage pattern, the alternative energy source used to heat water, and the age of the existing hot water tank. There is no clear technology winner over a 10 year time frame, the preferred choice of technologies depends upon individual circumstances, though it should be noted that PV systems are expected to produce benefits over a longer life span than SHW. We also encourage consumers to consider the combined benefits of a SHW and small PV system, and to make purchases that reflect their situation. We can best summarise the results over a 10 year investment period as follows:

- **NSW Metro**: if your hot water is gas-boosted, in most cases SHW has quicker returns. If you're water heater is electric boosted, then PV has quicker returns.
- **NSW Regional**: if your hot water is gas-boosted, SHW has quicker returns. If you're water heater is electric boosted, in most cases PV has quicker returns.
- **QLD Metro**: SHW makes quicker returns than a PV unit in most circumstances, though in some circumstances you can get quickest returns from a small PV unit.
- **QLD Regional**: If you're using LPG to heat your water, then you'll get quicker returns from a SHW unit than a PV system. If you're using off-peak electricity, PV or SHW may pay for itself quicker, depending on your circumstances.
- **SA Metro**: In most cases a PV unit will pay for itself quicker than a SHW unit. Consider SHW if you're using gas boosted hot water, especially if your hot water tank is reaching the end of its life.
- **TAS Metro**: If your hot water tank has reached the end of its life, SHW makes good sense in most circumstances. Otherwise PV pays for itself sooner.
- **VIC Metro**: PV pays for itself quicker than SHW in most circumstances, but if your hot water tank has reached the end of its life then SHW combined with a small PV system is the optimal combination. VEECs may make retrofitting SHW to an existing tank has comparable economics to PV.
- **VIC Rural**: If you're using LPG to heat your water then SHW pays for itself sooner than PV. If you're using off-peak electricity to heat your water, then combining SHW and a small PV system is the optimal combination when your water heater reaches the end of its life, particularly if the additional discount offered by VEECs is factored in.
- **WA Metro**: If you're using gas to heat your water, then SHW pays for itself quicker than PV if your water heater has reached the end of its life. Otherwise PV offers quicker payback, though best to combine a small PV system with SHW if you're using gas-heated water.

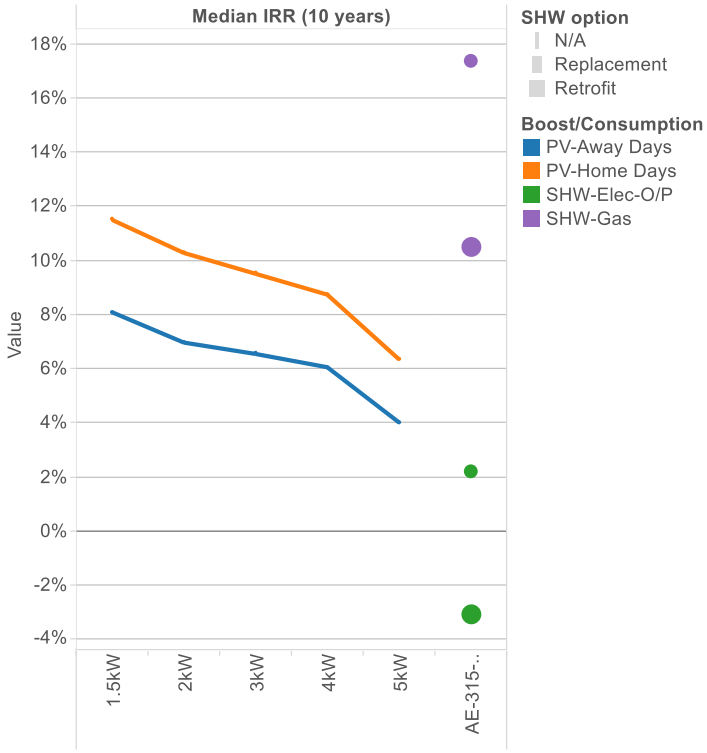
Detailed results are provided for each location in the following pages.

Results by Location

In the following tables and images, the AE-315 refers to the Apricus Solar Hot Water unit

NSW Metro

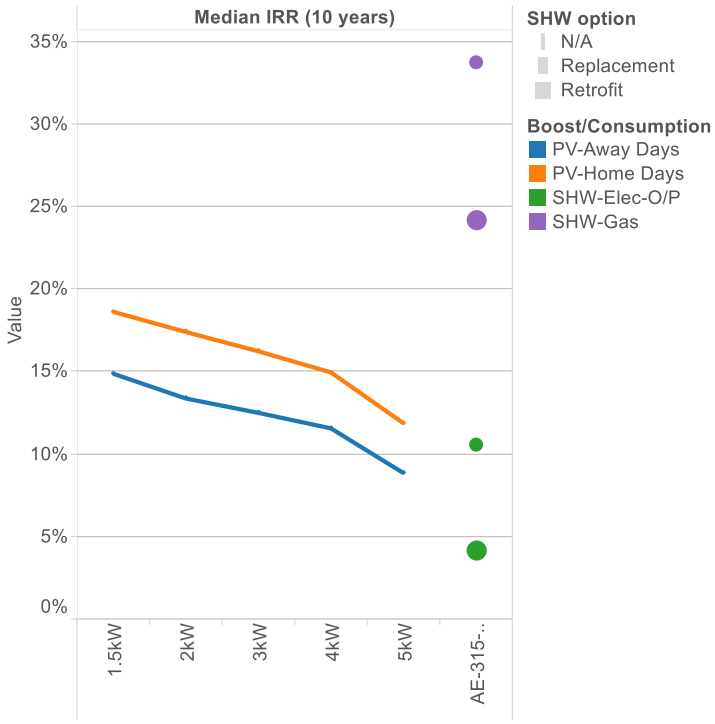
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	PV <= 2kW
		Away	SHW
Off-Peak Electricity	Replace	Home	PV
		Away	PV
	Retrofit	Home	PV
		Away	PV



				Location			
				NSW-Metro			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,490	$373	8.9	2%
		Retrofit	AE-315-GL-26-N/L	$4,690	$373	11.0	-3%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,490	$620	5.0	17%
		Retrofit	AE-315-GL-26-N/L	$4,690	$620	6.4	10%
PV	PV-Away Days	N/A	1.5kW	$2,927	$403	6.8	8%
			2kW	$3,662	$481	7.2	7%
			3kW	$4,711	$613	7.3	7%
			4kW	$5,683	$729	7.4	6%
			5kW	$7,175	$837	8.2	4%
	PV-Home Days	N/A	1.5kW	$2,927	$466	5.9	11%
			2kW	$3,662	$555	6.2	10%
			3kW	$4,711	$697	6.4	10%
			4kW	$5,683	$819	6.6	9%
			5kW	$7,175	$931	7.3	6%

NSW Regional

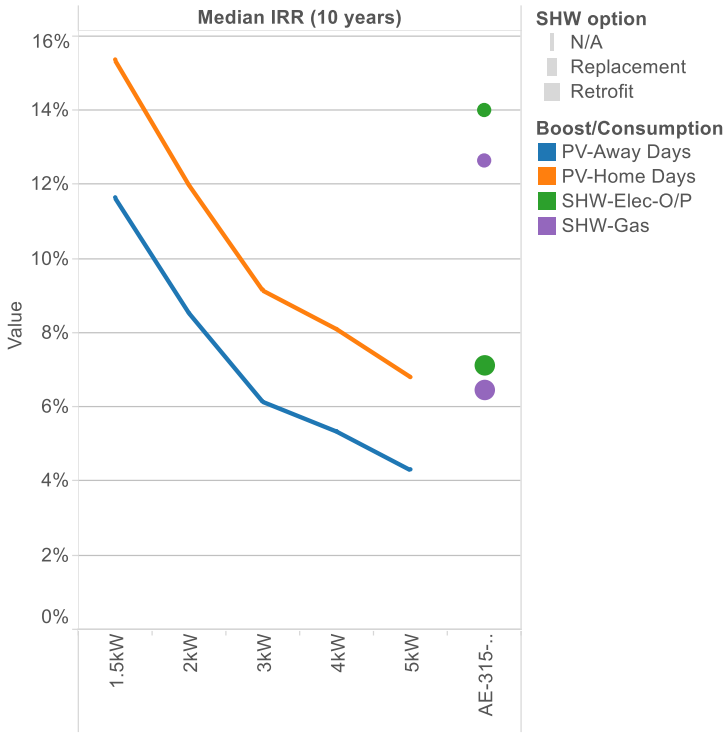
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	SHW
		Away	SHW
Off-Peak Electricity	Replace	Home	PV
		Away	PV <= 4kW
	Retrofit	Home	PV
		Away	PV



				Location			
				NSW-Rural			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,490	$556	6.1	10%
		Retrofit	AE-315-GL-26-N/L	$4,690	$556	8.1	4%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,490	$1,072	3.1	34%
		Retrofit	AE-315-GL-26-N/L	$4,690	$1,072	4.0	24%
PV	PV-Away Days	N/A	1.5kW	$2,927	$536	5.2	15%
			2kW	$3,662	$634	5.5	13%
			3kW	$4,711	$794	5.7	12%
			4kW	$5,683	$926	5.9	12%
			5kW	$7,175	$1,045	6.6	9%
	PV-Home Days	N/A	1.5kW	$2,927	$616	4.6	19%
			2kW	$3,662	$739	4.7	17%
			3kW	$4,711	$916	4.9	16%
			4kW	$5,683	$1,057	5.2	15%
			5kW	$7,175	$1,184	5.8	12%

QLD Metro

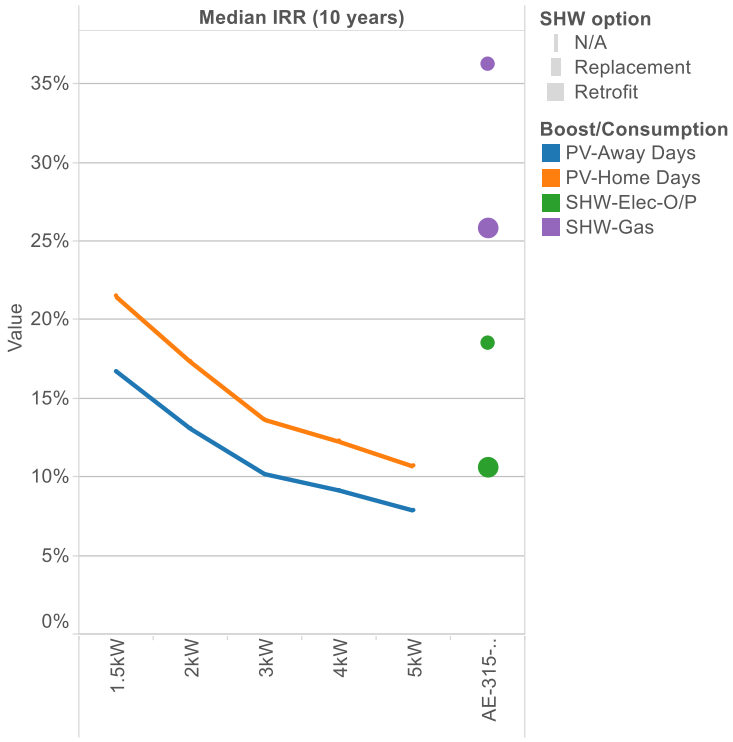
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	PV <= 1.5kW
		Away	SHW
	Retrofit	Home	PV = 1.5kW
		Away	SHW
Off-Peak Electricity	Replace	Home	PV <= 1.5kW
		Away	SHW
	Retrofit	Home	PV <= 5kW
		Away	PV < = 2kW



				Location			
				QLD-Metro			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,490	$646	5.3	14%
		Retrofit	AE-315-GL-26-N/L	$4,690	$646	7.0	7%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,490	$509	5.9	13%
		Retrofit	AE-315-GL-26-N/L	$4,690	$509	7.5	6%
PV	PV-Away Days	N/A	1.5kW	$2,879	$446	5.9	12%
			2kW	$3,895	$529	6.7	9%
			3kW	$5,440	$669	7.4	6%
			4kW	$6,592	$789	7.7	5%
			5kW	$7,845	$900	8.1	4%
	PV-Home Days	N/A	1.5kW	$2,879	$516	5.1	15%
			2kW	$3,895	$612	5.8	12%
			3kW	$5,440	$763	6.5	9%
			4kW	$6,592	$890	6.8	8%
			5kW	$7,845	$1,006	7.2	7%

QLD Regional

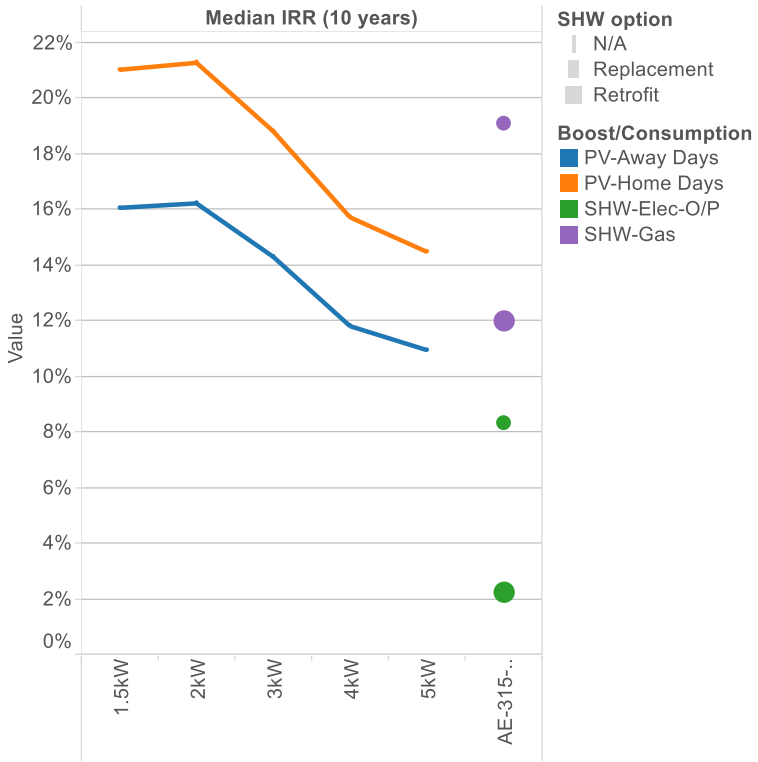
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	SHW
		Away	SHW
Off-Peak Electricity	Replace	Home	PV <= 1.5kW
		Away	SHW
	Retrofit	Home	PV
		Away	PV <= 2kW



				Location			
				QLD-Rural			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,315	$726	4.5	18%
		Retrofit	AE-315-GL-26-N/L	$4,515	$726	6.1	11%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,315	$1,092	2.9	36%
		Retrofit	AE-315-GL-26-N/L	$4,515	$1,092	3.8	26%
PV	PV-Away Days	N/A	1.5kW	$2,879	$549	4.9	17%
			2kW	$3,895	$645	5.6	13%
			3kW	$5,440	$806	6.2	10%
			4kW	$6,592	$942	6.5	9%
			5kW	$7,845	$1,067	6.9	8%
	PV-Home Days	N/A	1.5kW	$2,879	$647	4.2	21%
			2kW	$3,895	$758	4.8	17%
			3kW	$5,440	$925	5.5	14%
			4kW	$6,592	$1,068	5.7	12%
			5kW	$7,845	$1,198	6.1	11%

SA Metro

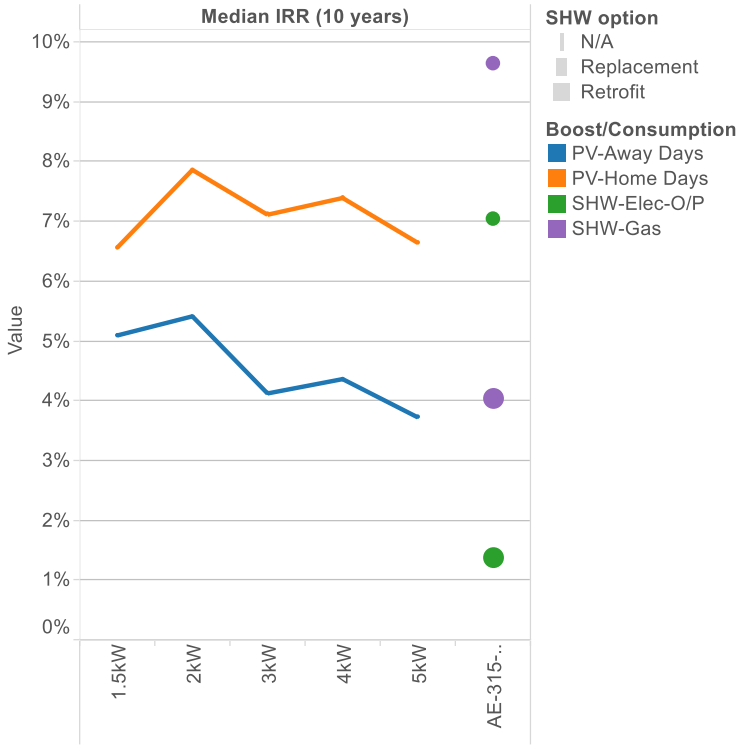
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	PV <= 3kW
		Away	SHW
	Retrofit	Home	PV
		Away	PV < = 4kW
Off-Peak Electricity	Replace	Home	PV
		Away	PV
	Retrofit	Home	PV
		Away	PV



Technology	Boost/ Consumption (copy)	SHW option	Option	Location: SA-Metro System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,490	$513	6.7	8%
		Retrofit	AE-315-GL-26-N/L	$4,690	$513	8.9	2%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,490	$664	4.7	19%
		Retrofit	AE-315-GL-26-N/L	$4,690	$664	6.1	12%
PV	PV-Away Days	N/A	1.5kW	$3,190	$614	5.0	16%
			2kW	$3,690	$718	4.9	16%
			3kW	$4,899	$891	5.3	14%
			4kW	$6,290	$1,040	5.8	12%
			5kW	$7,340	$1,177	6.0	11%
	PV-Home Days	N/A	1.5kW	$3,190	$733	4.2	21%
			2kW	$3,690	$858	4.2	21%
			3kW	$4,899	$1,051	4.5	19%
			4kW	$6,290	$1,209	5.0	16%
			5kW	$7,340	$1,352	5.2	14%

TAS Metro

Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	PV
		Away	PV <= 4kW
Off-Peak Electricity	Replace	Home	PV 4kW or 2kW
		Away	SHW
	Retrofit	Home	PV
		Away	PV

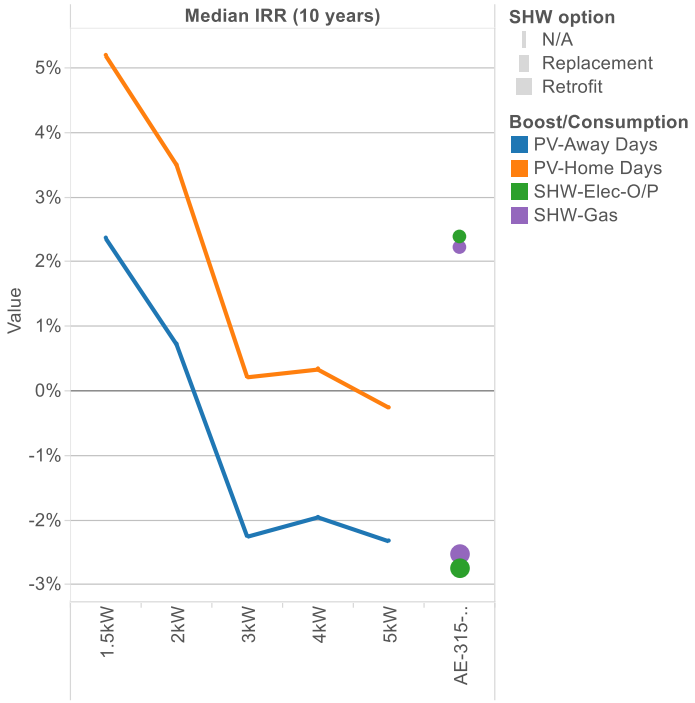


				Location: TAS-Metro			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,630	$492	7.1	7%
		Retrofit	AE-315-GL-26-N/L	$4,830	$492	9.3	1%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,630	$461	6.6	10%
		Retrofit	AE-315-GL-26-N/L	$4,830	$461	8.4	4%
PV	PV-Away Days	N/A	1.5kW	$3,685	$434	7.8	5%
			2kW	$4,385	$527	7.7	5%
			3kW	$5,990	$680	8.2	4%
			4kW	$6,990	$809	8.1	4%
			5kW	$8,185	$922	8.3	4%
	PV-Home Days	N/A	1.5kW	$3,685	$466	7.3	7%
			2kW	$4,385	$591	6.9	8%
			3kW	$5,990	$783	7.1	7%
			4kW	$6,990	$931	7.0	7%
			5kW	$8,185	$1,057	7.3	7%

VIC Metro

Note that these results do not incorporate the additional value of VEECs for SHW.

Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	PV <= 2kW
		Away	PV <= 1.5kW
	Retrofit	Home	PV
		Away	PV
Off-Peak Electricity	Replace	Home	PV <= 2kW
		Away	PV <= 1.5kW
	Retrofit	Home	PV
		Away	PV

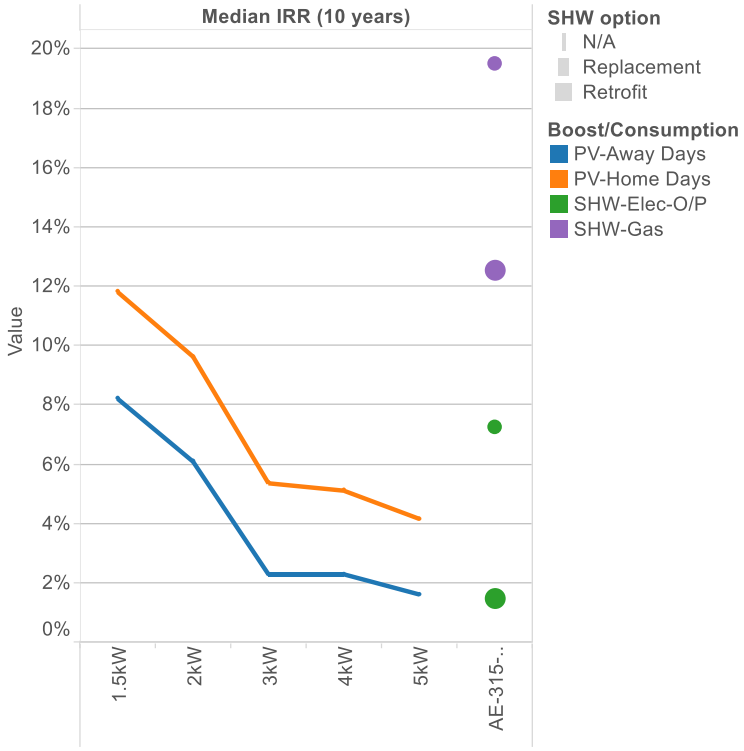


				Location			
				Vic-Metro			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,630	$426	8.8	2%
		Retrofit	AE-315-GL-26-N/L	$4,830	$426	11.0	-3%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,630	$314	9.1	2%
		Retrofit	AE-315-GL-26-N/L	$4,830	$314	11.0	-3%
PV	PV-Away Days	N/A	1.5kW	$2,990	$310	8.9	2%
			2kW	$3,890	$371	9.6	1%
			3kW	$5,885	$479	11.3	-2%
			4kW	$6,885	$577	11.1	-2%
			5kW	$8,099	$670	11.3	-2%
	PV-Home Days	N/A	1.5kW	$2,990	$356	7.8	5%
			2kW	$3,890	$427	8.4	4%
			3kW	$5,885	$547	9.9	0%
			4kW	$6,885	$651	9.8	0%
			5kW	$8,099	$746	10.1	0%

VIC Rural

Note that these results do not incorporate the additional value of VEECs for SHW.

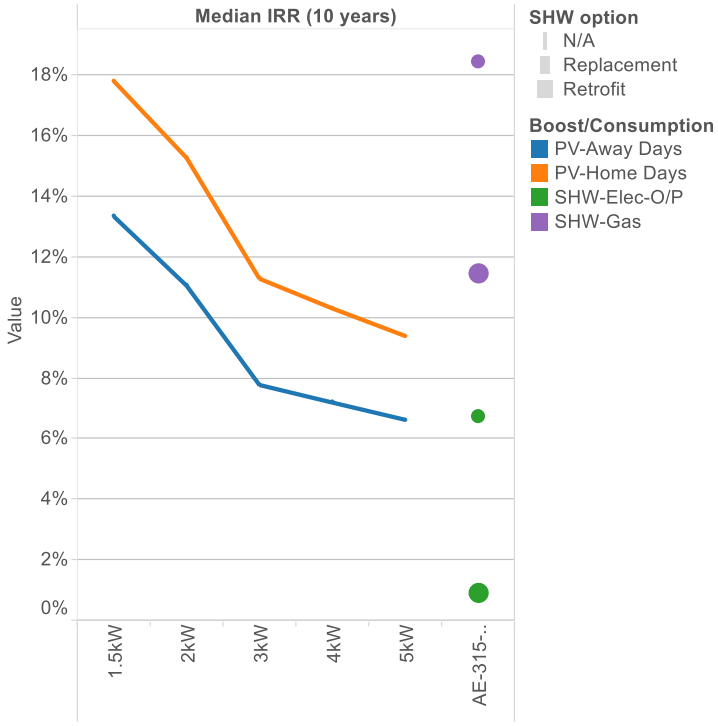
Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	SHW
		Away	SHW
Off-Peak Electricity	Replace	Home	PV <= 2kW
		Away	PV <= 1.5kW
	Retrofit	Home	PV
		Away	PV



				Location			
				Vic-Rural			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,630	$540	7.0	7%
		Retrofit	AE-315-GL-26-N/L	$4,830	$540	9.3	1%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,630	$702	4.6	20%
		Retrofit	AE-315-GL-26-N/L	$4,830	$702	5.9	13%
PV	PV-Away Days	N/A	1.5kW	$2,990	$413	6.8	8%
			2kW	$3,890	$489	7.5	6%
			3kW	$5,885	$616	8.9	2%
			4kW	$6,885	$727	8.9	2%
			5kW	$8,099	$831	9.2	2%
	PV-Home Days	N/A	1.5kW	$2,990	$482	5.9	12%
			2kW	$3,890	$573	6.4	10%
			3kW	$5,885	$715	7.7	5%
			4kW	$6,885	$833	7.8	5%
			5kW	$8,099	$940	8.1	4%

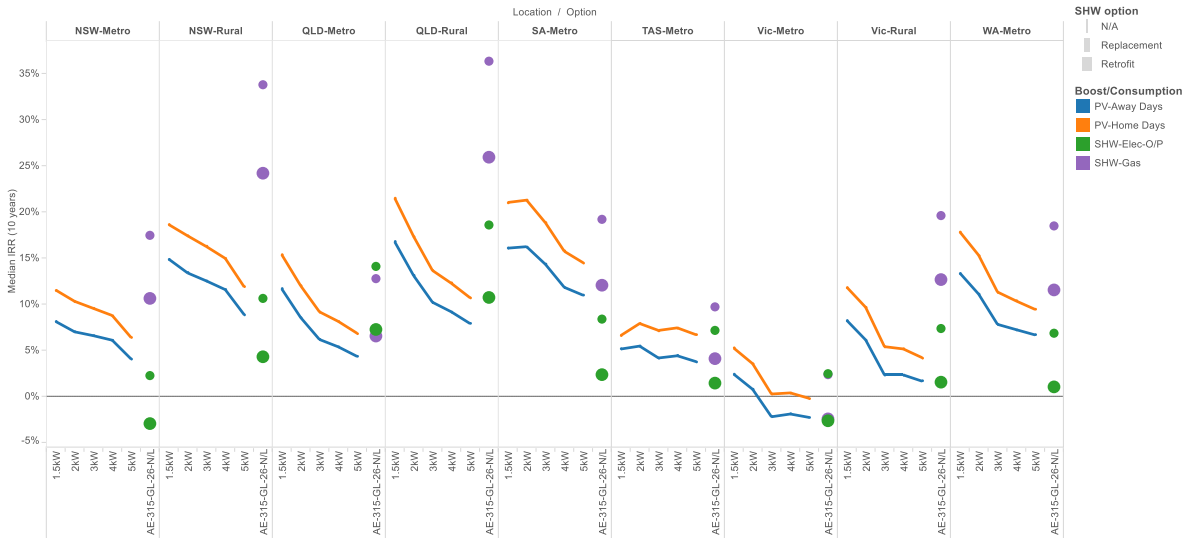
WA Metro

Hot Water Source	Replacing Hot Water or Retrofiting?	Weekday Daytime Occupancy	10 Year Timeframe
Natural Gas or LPG	Replace	Home	SHW
		Away	SHW
	Retrofit	Home	PV <= 2kW
		Away	PV <= 1.5kW
Off-Peak Electricity	Replace	Home	PV
		Away	PV
	Retrofit	Home	PV
		Away	PV



				Location: WA-Metro			
Technology	Boost/ Consumption (copy)	SHW option	Option	System Price	Saving Year 1	Payback (years)	IRR (10 years)
SHW	SHW-Elec-O/P	Replacement	AE-315-GL-26-N/L	$3,490	$471	7.2	7%
		Retrofit	AE-315-GL-26-N/L	$4,690	$471	9.5	1%
	SHW-Gas	Replacement	AE-315-GL-26-N/L	$3,490	$648	4.8	18%
		Retrofit	AE-315-GL-26-N/L	$4,690	$648	6.2	11%
PV	PV-Away Days	N/A	1.5kW	$2,700	$451	5.5	13%
			2kW	$3,489	$534	6.0	11%
			3kW	$5,058	$677	6.9	8%
			4kW	$6,100	$804	7.1	7%
			5kW	$7,130	$923	7.2	7%
	PV-Home Days	N/A	1.5kW	$2,700	$534	4.7	18%
			2kW	$3,489	$629	5.1	15%
			3kW	$5,058	$783	6.0	11%
			4kW	$6,100	$915	6.2	10%
			5kW	$7,130	$1,036	6.4	9%

National comparison



Other Solar Water Heaters

Option	Boost/Consu..	SHW option	Location															
			NSW-Metro		NSW-Rural		QLD-Metro		QLD-Rural		SA-Metro		TAS-Metro		Vic-Metro		Vic-Rural		WA-Metro	
			IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)	IRR (10 years)	Payback (years)
AC-400-GL-26N-44	SHW-Elec-O/P	Replacement	-1%	11.0	7%	7.1	10%	6.1	11%	6.0	5%	7.8	4%	8.3	-1%	11.0	4%	8.2	4%	8.3
		Retrofit	-4%	11.0	3%	8.8	5%	7.6	6%	7.5	1%	9.7	0%	11.0	-4%	11.0	0%	11.0	-1%	11.0
	SHW-Gas	Replacement	14%	5.7	28%	3.5	9%	6.7	26%	3.8	15%	5.4	6%	7.6	-1%	11.0	15%	5.3	15%	5.5
		Retrofit	9%	6.9	22%	4.3	5%	8.1	20%	4.6	10%	6.5	2%	9.0	-4%	11.0	10%	6.4	10%	6.6
AE-250-GL-MID-22	SHW-Elec-O/P	Replacement	-1%	11.0	7%	7.1	10%	6.1	12%	5.7	5%	7.8	3%	8.5	-1%	11.0	3%	8.4	4%	8.3
		Retrofit	-6%	11.0	1%	9.6	4%	8.4	5%	7.8	-1%	11.0	-2%	11.0	-6%	11.0	-2%	11.0	-2%	11.0
	SHW-Gas	Replacement	14%	5.7	28%	3.5	9%	6.7	28%	3.6	15%	5.4	6%	7.8	-1%	11.0	15%	5.5	15%	5.5
		Retrofit	7%	7.4	19%	4.7	3%	8.7	19%	4.8	8%	7.0	0%	9.9	-6%	11.0	8%	7.1	8%	7.2
AE-315-GL-MID-30	SHW-Elec-O/P	Replacement	2%	8.9	10%	6.1	14%	5.3	18%	4.5	8%	6.7	7%	7.1	2%	8.8	7%	7.0	7%	7.2
		Retrofit	-3%	11.0	4%	8.1	7%	7.0	11%	6.1	2%	8.9	1%	9.3	-3%	11.0	1%	9.3	1%	9.5
	SHW-Gas	Replacement	17%	5.0	34%	3.1	13%	5.9	36%	2.9	19%	4.7	10%	6.6	2%	9.1	20%	4.6	18%	4.8
		Retrofit	10%	6.4	24%	4.0	6%	7.5	26%	3.8	12%	6.1	4%	8.4	-3%	11.0	13%	5.9	11%	6.2
AE-400-GL-MID-44	SHW-Elec-O/P	Replacement	1%	9.6	9%	6.6	12%	5.7	12%	5.7	7%	7.2	5%	7.6	1%	9.5	6%	7.6	5%	7.7
		Retrofit	-3%	11.0	4%	8.2	7%	7.1	7%	7.2	2%	9.0	1%	9.5	-3%	11.0	1%	9.4	1%	9.7
	SHW-Gas	Replacement	15%	5.3	31%	3.3	11%	6.3	27%	3.6	17%	5.0	8%	7.1	1%	9.6	17%	5.0	16%	5.1
		Retrofit	10%	6.5	24%	4.1	6%	7.6	21%	4.5	12%	6.1	4%	8.5	-3%	11.0	12%	6.0	11%	6.3
RL32-AUSTRALIS	SHW-Elec-O/P	Replacement	-3%	11.0	4%	8.0	7%	6.9	9%	6.5	3%	8.8	9%	6.3	5%	7.9	10%	6.3	1%	9.4
		Retrofit	-7%	11.0	-1%	11.0	2%	9.1	3%	8.5	-2%	11.0	3%	8.4	-1%	11.0	4%	8.3	-4%	11.0
	SHW-Gas	Replacement	11%	6.3	25%	4.0	7%	7.5	24%	4.0	12%	6.0	12%	6.0	4%	8.3	23%	4.2	12%	6.1
		Retrofit	5%	8.0	17%	5.0	2%	9.3	16%	5.2	6%	7.5	6%	7.7	-1%	11.0	15%	5.4	6%	7.7
RL32-TITAN	SHW-Elec-O/P	Replacement	3%	8.7	11%	5.9	15%	5.1	19%	4.3	9%	6.5	7%	7.1	2%	8.9	7%	7.0	7%	7.0
		Retrofit	-3%	11.0	5%	7.9	8%	6.8	11%	5.9	3%	8.6	1%	9.3	-3%	11.0	1%	9.3	1%	9.3
	SHW-Gas	Replacement	18%	4.8	35%	3.0	13%	5.8	37%	2.8	20%	4.6	10%	6.7	2%	9.1	19%	4.7	19%	4.7
		Retrofit	11%	6.3	25%	3.9	7%	7.4	27%	3.7	13%	5.9	4%	8.4	-3%	11.0	12%	5.9	12%	6.0

Appendix

PV System Pricing (after STC discount)

PV system pricing was taken as median pricing from the Solar Choice Dataset of October 2014.

Location	1.5	2	3	4	5
NSW-Metro	2,927	3,662	$4,711	$5,683	$7,175
NSW-Rural	2,927	3,662	$4,711	$5,683	$7,175
Vic-Metro	2,990	3,890	$5,885	$6,885	$8,099
Vic-Rural	2,990	3,890	$5,885	$6,885	$8,099
QLD-Metro	2,879	3,895	$5,440	$6,592	$7,845
QLD-Rural	2,879	3,895	$5,440	$6,592	$7,845
WA-Metro	2,700	3,489	$5,058	$6,100	$7,130
SA-Metro	3,190	3,690	$4,899	$6,290	$7,340
TAS-Metro	3,685	4,385	$5,990	$6,990	$8,185

SHW System pricing and STC quantity and performance

SHW pricing and STC number was provided by Apricus. SHW System performance was assumed to be as per STCs allocation for each chosen location. $1500 installation cost was added to each of the prices below.

		REC Zone & STCs			
System	Price	1	2	3	4
AE-250-GL-MID-22	$3,905.00	29	31	29	25
AE-315-GL-MID-30	$4,485.00	39	42	37	33
AC-400-GL-26N-44	$5,940.00	43	44	43	38
AE-400-GL-MID-44	$5,865.00	44	45	45	40
RL32-AUSTRALIS	$4,500.00	30	32	30	36
RL32-TITAN	$4,500.00	39	43	38	33

SHW REC Zone

Location	REC Zone
NSW-Metro	3
NSW-Rural	3
Vic-Metro	4
Vic-Rural	4
QLD-Metro	3
QLD-Rural	2
WA-Metro	3
SA-Metro	3
TAS-Metro	4

Value of offset and export solar electricity

Electricity prices were as per Origin Energy's published price sheets as of October 2014. The flat rate was chosen; the greatest marginal tariff was chosen where an inclining block tariff exists – see the table below for summary prices. Off-peak pricing was obtained from the same source. Note that discounts on the electricity prices can be obtained through retailer competition.

Location	Offset	Export
NSW-Metro	$0.2285	$0.06
NSW-Rural	$0.2835	$0.06
Vic-Metro	$0.2127	$0.06
Vic-Rural	$0.2636	$0.06
QLD-Metro	$0.2538	$0.06

QLD-Rural	$0.2792	$0.06
WA-Metro	$0.2460	$0.06
SA-Metro	$0.3779	$0.07
TAS-Metro	$0.2472	$0.06

Annual electricity price rises

kW	2015	2016	2017	2018	2019	Beyond
NSW-Metro	1.50%	1.77%	1.00%	0.50%	0.60%	1.00%
NSW-Rural	1.50%	1.77%	1.00%	0.50%	0.60%	1.00%
Vic-Metro	-6.00%	1.00%	0.50%	0.20%	0.40%	1.00%
Vic-Rural	-6.00%	1.00%	0.50%	0.20%	0.40%	1.00%
QLD-Metro	1.15%	1.56%	0.90%	0.40%	0.50%	1.00%
QLD-Rural	1.15%	1.56%	0.90%	0.40%	0.50%	1.00%
WA-Metro	1.15%	1.56%	0.90%	0.40%	0.50%	1.00%
SA-Metro	0.80%	1.00%	0.50%	0.20%	0.40%	1.00%
TAS-Metro	1.80%	1.90%	1.00%	0.70%	0.80%	1.00%

Replacement Inverter prices in year 15

Size (kW)	1.5	2	3	4	5
Inverter Replacement Cost	$300	$400	$600	$800	$1,000

SHW Fuel Pricing

For off-peak electricity, standing offers from Origin Energy were used in most cases. For the price of gas and natural gas, a phone survey was conducted. Natural gas prices were used in metropolitan areas; LPG was chosen otherwise. A gas-to-heat conversion efficiency of 80% was assumed; (electric heating was assumed to be 100% efficient).

Hot Water Fuel Pricing	Gas	Elec-Off-peak
NSW-Metro	$ 0.168	$ 0.101
NSW-Rural	$0.290	$ 0.150
Vic-Metro	$ 0.095	$ 0.129
Vic-Rural	$0.213	$ 0.164
QLD-Metro	$ 0.138	$ 0.175
QLD-Rural	$0.260	$ 0.173
WA-Metro	$ 0.175	$ 0.127
SA-Metro	$ 0.179	$ 0.139
TAS-Metro	$ 0.140	$ 0.149

PV Generation and Export

A standard-performance north facing system tilted at 20° in each of the was used. Hourly generation was compared to hourly consumption from representative consumption profiles within Ausgrid's 300 gross metered solar consumer sets. Consumption was scaled to the average 3 person household (15-20kWh/day, though far higher in Tasmania), as informed by the EnergyMadeEasy government website.

kW	1kW Production (kWh/year)	Consumption (kWh/day)
NSW-Metro	1580	17.5
NSW-Rural	1627	20.1
Vic-Metro	1330	15.7
Vic-Rural	1468	15.7
QLD-Metro	1605	17.5

QLD-Rural	1810	18.7
WA-Metro	1746	17.0
SA-Metro	1599	16.6
TAS-Metro	1312	28.7

Location	Boost/Consu..	1.5kW	2kW	3kW	4kW	5kW
NSW-Metro	PV-Away Days	35%	45%	59%	67%	73%
	PV-Home Days	19%	31%	48%	59%	66%
NSW-Rural	PV-Away Days	29%	40%	54%	63%	69%
	PV-Home Days	14%	25%	43%	54%	62%
QLD-Metro	PV-Away Days	35%	46%	59%	68%	73%
	PV-Home Days	20%	33%	49%	59%	66%
QLD-Rural	PV-Away Days	35%	46%	60%	68%	74%
	PV-Home Days	19%	32%	50%	60%	67%
SA-Metro	PV-Away Days	40%	50%	62%	70%	75%
	PV-Home Days	24%	36%	52%	61%	68%
TAS-Metro	PV-Away Days	14%	25%	40%	50%	57%
	PV-Home Days	6%	12%	26%	37%	46%
Vic-Metro	PV-Away Days	38%	48%	61%	68%	73%
	PV-Home Days	23%	34%	50%	59%	66%
Vic-Rural	PV-Away Days	37%	48%	61%	69%	74%
	PV-Home Days	22%	34%	50%	60%	67%
WA-Metro	PV-Away Days	40%	50%	63%	70%	75%
	PV-Home Days	23%	35%	52%	62%	68%