The viability of electrical energy storage for Lochiel Park households

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Acronyms

CO2	Carbon dioxide
kWh	kilowatt-hour
PV	Photovoltaic
REC	Renewable Energy Certificate
RoI	Return on investment

Executive Summary

Distributed electrical energy storage has the potential to reduce the CO2 emissions of electrical energy use by enabling greater use of distributed generation such as from rooftop photovoltaic (PV) systems. But our electricity distributions systems were not designed to allow flow of power from consumers; as a consequence there can be limits to how much power can be exported from rooftop PV systems, particularly when there are many PV installations in an area. Furthermore, falling feed-in tariffs mean that it is becoming more cost-effective to store excess PV energy on site rather than export excess energy to the grid and then import it later at a higher cost.

To determine the impact and viability of distributed electrical energy storage systems for residential consumers with rooftop PV systems, we use PV generation and household load for thirty-eight households at Lochiel Park in South Australia, simulate the operation of energy storage, and calculate the impact on the amount and cost of imported electricity.

The Return on Investment (RoI) for PV and energy storage systems depends on many factors, including the cost of PV, the cost of energy storage, the cost of electricity, the price paid for exported energy, the power generated by the PV system and how and when energy is used by the household. Our analysis of households at Lochiel Park in Adelaide shows that returns of up to 20% are possible. Furthermore, our analysis method can be used to reveal different configuration options that will give the same RoI.

Decreasing feed-in tariffs and decreasing cost of energy storage will lead to an uptake of energy storage system over the next few years. While storage can be used to reduce household electricity cost, it does not lead directly to reductions in CO2 emissions. However, household energy storage will enable greater use of rooftop PV, and ultimately can be used to match household demand to variable supply from renewable energy sources.

Introduction

Distributed electrical energy storage has the potential to reduce the CO2 emissions of electrical energy use by enabling greater use of distributed generation from sources such as from rooftop photovoltaic (PV) systems. But our electricity distributions systems were not designed to allow flow of power from consumers; as a consequence there can be limits to how much power can be exported from rooftop PV systems, particularly when there are many PV installations in an area. Furthermore, falling feed-in tariffs mean that it is becoming more cost-effective to store excess PV energy on site rather than export excess energy to the grid and then import it later at a higher cost.

To determine the impact and viability of distributed electrical energy storage systems for residential consumers with rooftop PV systems, we use PV generation and household load for thirty-eight households at Lochiel Park in South Australia, simulate the operation of energy storage, and calculate the impact on the amount and cost of imported electricity.

Lochiel Park is a housing development of about 100 homes in Adelaide, designed to demonstrate housing with low energy and water consumption. In addition to energy-efficient design, each house has at least 1 kW of PV panels for each 100 square metres of habitable floor area. Each household’s use of electricity, gas and water is logged; the electricity logs include PV power and total electrical load at one-minute intervals.

Figure 1 An aerial view of some homes at Lochiel Park.

We use the following terminology:

- *load* is the total power being drawn by electrical appliances in a household
- *generation* is the total power being generated, usually by a rooftop photovoltaic system
- *demand* is the power that must be imported from the electricity distribution network.

Load, generation and demand are related by:

demand = load – generation.

If generation exceeds load then demand is negative, and power is exported to the grid.

With electrical energy storage, the relationship becomes

demand = load + storage - generation

where storage is positive when power is stored and negative when power is retrieved.

We have analysed the load, generation and demand of each of 38 households at Lochiel Park. The households were selected because they had (mostly) complete data for 2013, and detailed information about their rooftop PV installation was available.

None of these houses have electrical energy storage systems. Our aim was to analyse the potential impact of electrical energy storage on energy use and electricity costs, and to calculate the potential Return on Investment (RoI) for storage system.

Power demand

Figure 2–Figure 7 show the demand profiles of selected households during 2013. The horizontal axis is (local) time of the week, from Sunday to Saturday. The year is divided into two seasons: summer (daylight savings period) and winter (standard time). The orange lines show 1-minute demand during summer; the light blue lines show 1-minute demand during during winter. There is one trace for each of the 52 weeks of the year on each graph. The bold red line is the median demand for a given time of week during summer; the bold blue line is the median demand during winter. Demand is negative when the household is exporting energy.

Figure 2 Weekly demand profiles for Household 1.

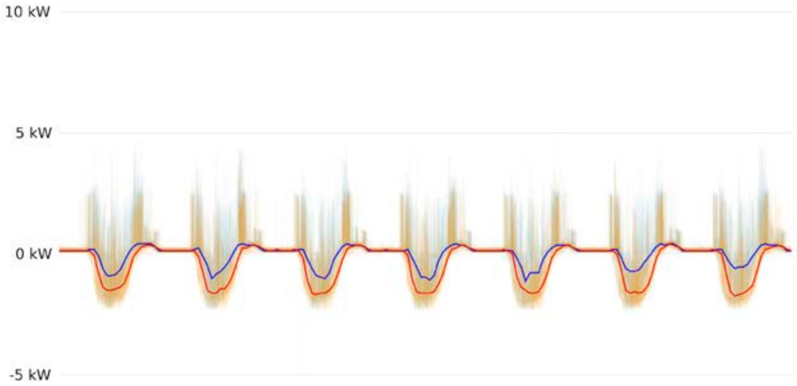


Figure 3 Weekly demand proflles for Household 3.

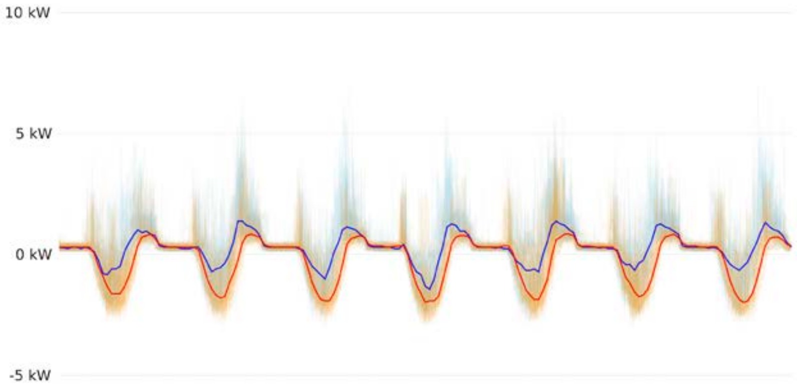


Figure 4 Weekly demand profiles for Household 7.

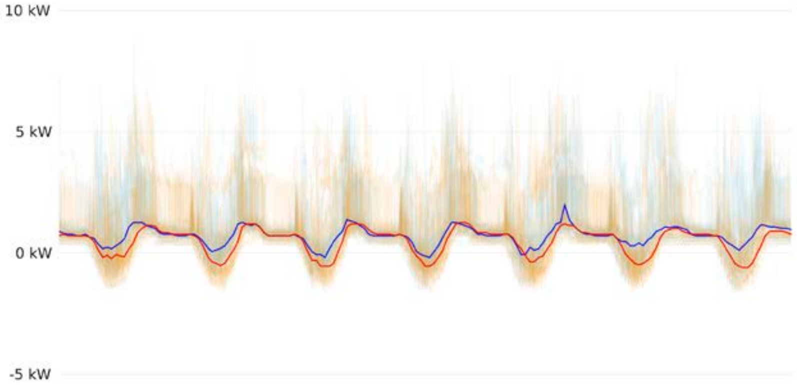


Figure 5 Weekly demand profiles for Household 8.

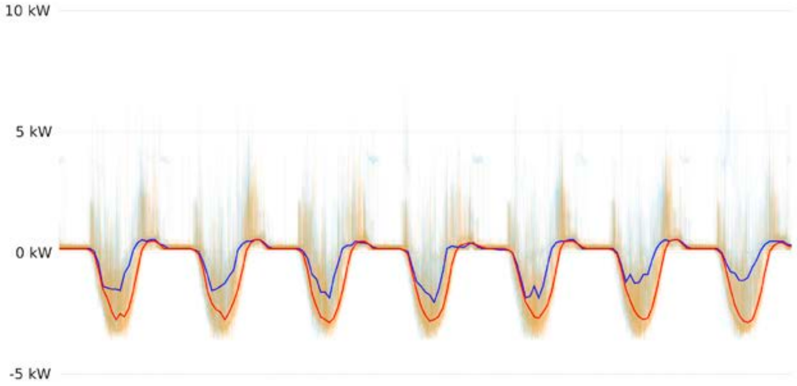


Figure 6 Weekly demand profiles for Household 10.

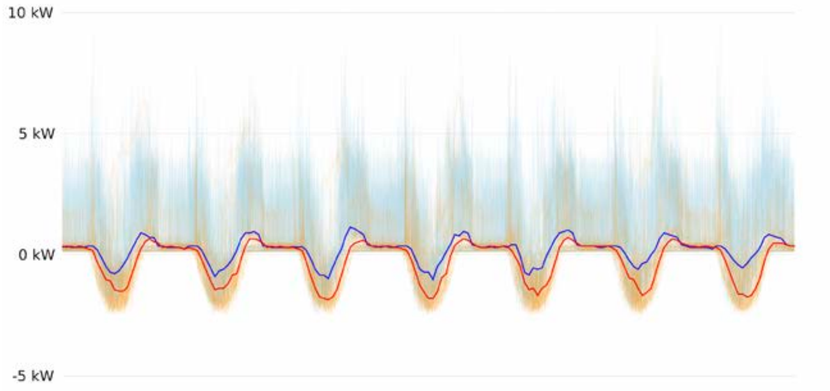


Figure 7 Weekly demand profiles for Household 13.

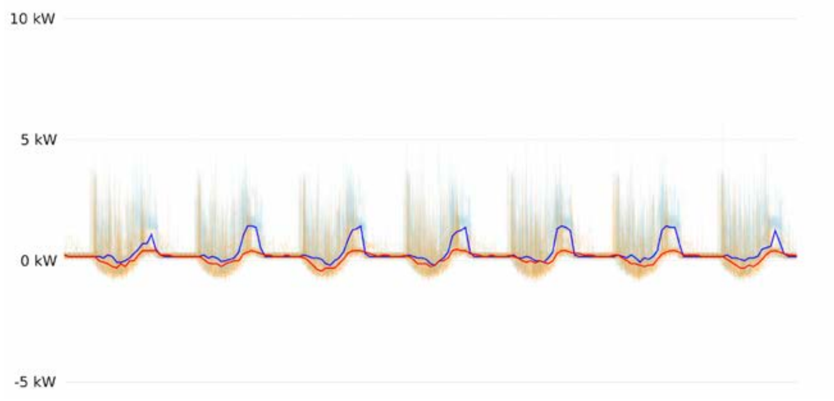


Figure 8 shows the proportion of household load that occurs while the PV system is not operating, for each of the households. The households are ordered by the proportion of load that occurs while the PV system is not operating. This proportion varies from 35 per cent up to 75 per cent. Households for which a significant proportion of load occurs while the PV system is not operating may be good candidates for energy storage.

Figure 8 Proportion of household load that occurs while the PV system is not operating, for each household.

Simulating storage

We used the one-minute load and generation data to simulate the operation of an electrical energy storage system and calculate the effect on demand. The policy for operating the electrical energy storage system was straightforward:

Generation	Battery state	Action
Generation exceeds load	Battery not full	Store excess
Generation exceeds load	Battery full	Export excess
Load exceeds generation	Battery not empty	Retrieve shortfall from storage
Load exceeds generation	Battery empty	Import shortfall

We assume that the energy storage system has a constant energy efficiency $\eta_s = 0.85$; only 85 per cent of the electrical energy applied to the storage system can be retrieved. This efficiency factor is typical for a lithium ion battery storage system, and takes into account losses in the charger and inverter electronics, and in the electrochemical cells.

Figure 9 illustrates the operation of the storage system for Household 1 with 5 kWh of useable energy storage. (The useable capacity of a lithium ion battery, for example, is typically less than 80% of the maximum capacity, to extend the life of the battery.) The capacity of the storage system is low relative to the daily energy use. During the summer (top graph, prior to the highlighted two-week period) the storage system fills on most days. The highlighted two-week period is the transition from summer to winter. The charge in the battery decreases each night, increases during the day (often filling the battery, in which case excess energy is exported), and then decreases again after sunset. The eleventh day has very little charging, and the twelfth to fourteenth days also have low charging. During winter (the middle part of the top graph) the storage system is often empty.

Figure 9 Stored energy profile for a year, for Household 1 with 5 kWh of usable energy storage.The top portion of the graph shows the stored energy profile for the entire 2013 year; the lower portion, with the blue background, shows detail from a two-week period. The vertical axis on each subgraph is stored energy, from 0 to 5 kWh.

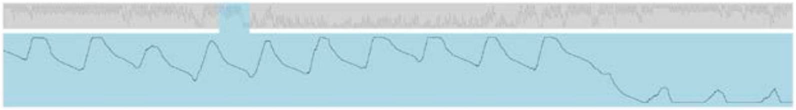


Figure 10 shows the predicted annual energy use and electricity cost for Household 15, for various levels of storage capacity ranging from no storage (top row) to 10 kWh of usable storage (bottom row), in steps of 1 kWh. As storage is increased, the energy exported and the energy imported both decrease. The annual cost of electricity (black dots) also decreases.

Figure 10 Predicted annual energy use and energy cost for Household 15. Each horizontal bar shows the predicted energy exported (red), energy imported (orange), energy retrieved from storage (green), and PV energy used as it was generated (blue), with useable energy storage capacities of 0 kWh (top) to 10 kWh (bottom). The black dots indicate the predicted annual cost of electricity.

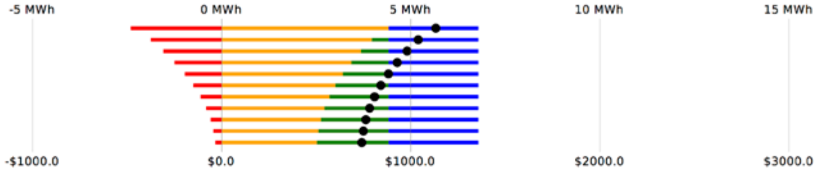
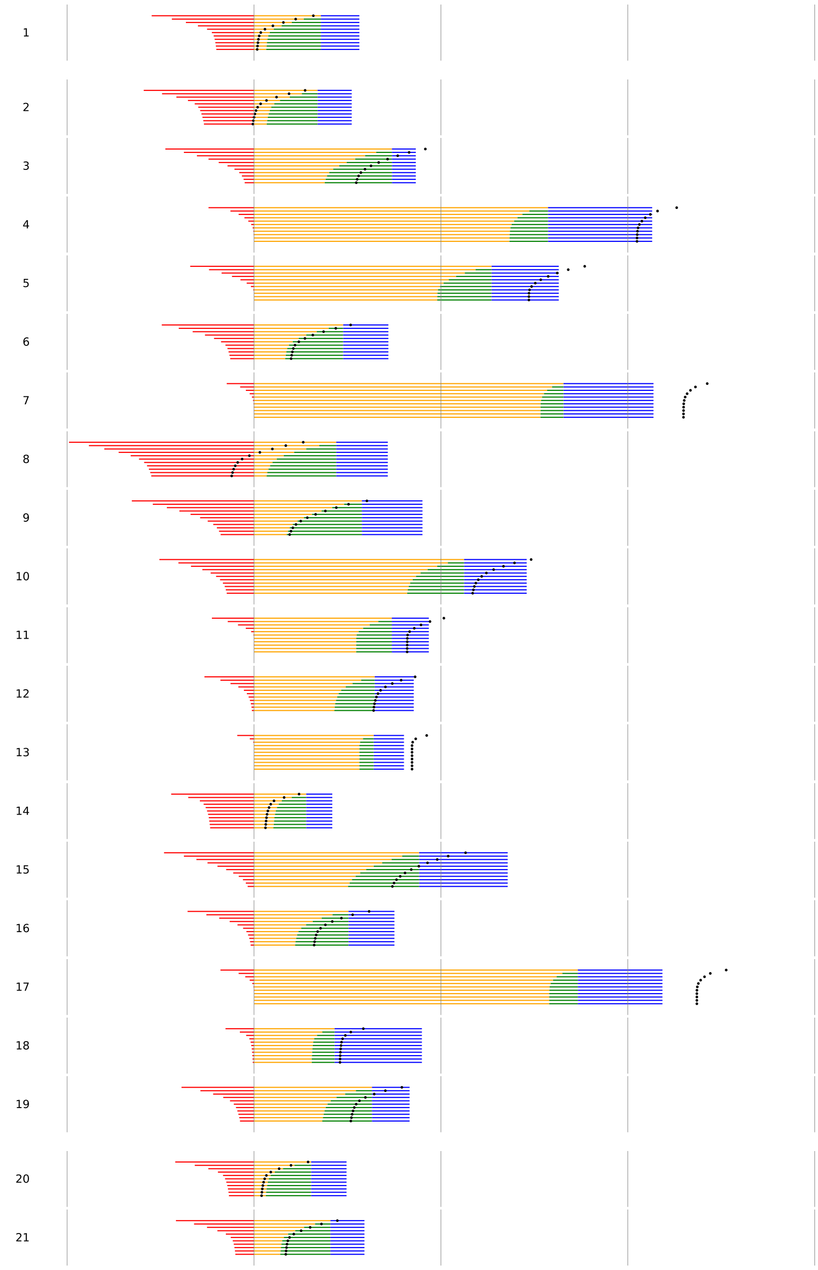
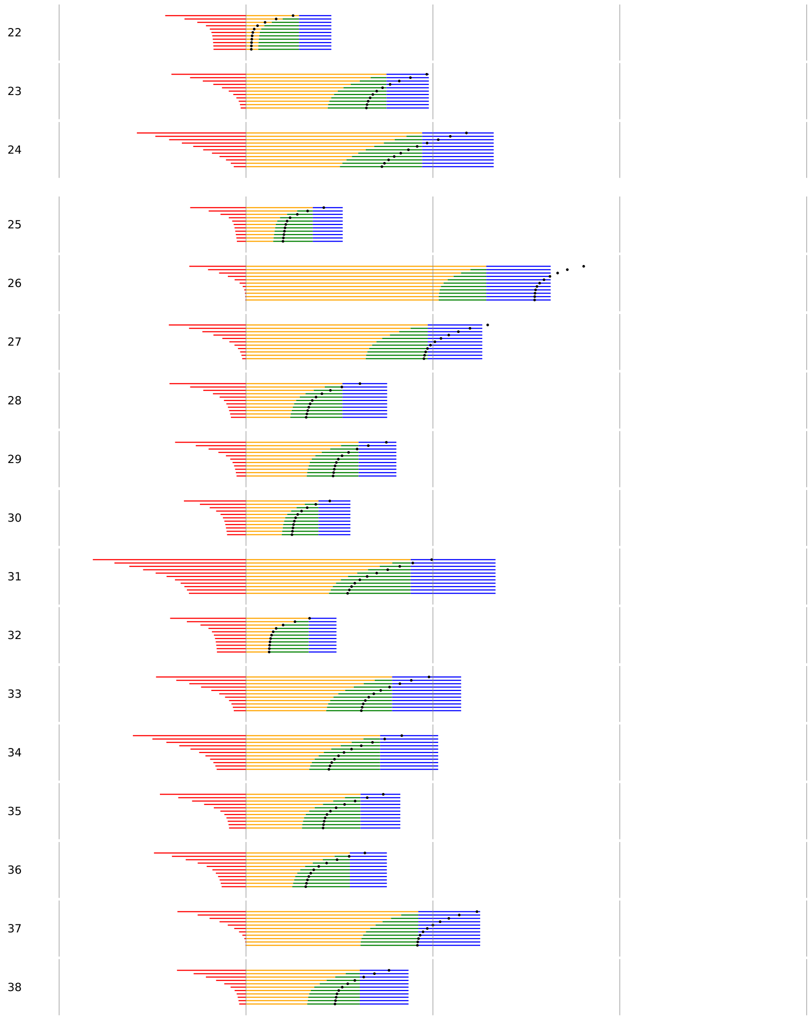


Figure 11 shows the predicted annual energy use and predicted electricity costs for each household, with various levels of storage.

Figure 11 Predicted annual energy use and energy cost of each household.

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Annual cost of electricity

The cost of electricity in Australia varies with the location of the household, the retailer, the type of tariff, time of day and time of year. We consider a simple, yet realistic, tariff:

- cost of imported electricity is 30 cents per kilowatt-hour
- the price paid for exported electricity is 8 cents per kilowatt-hour.

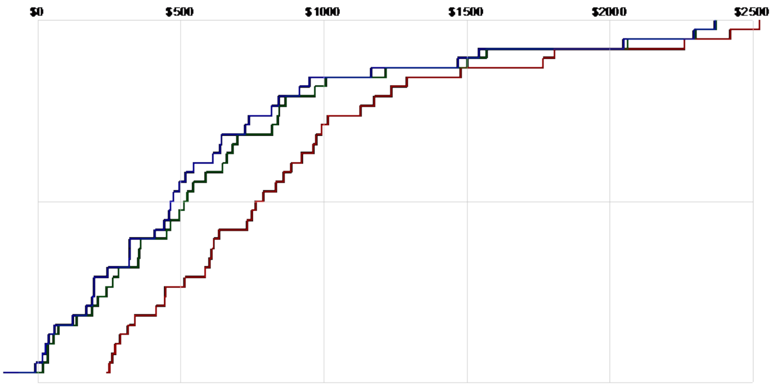
Many Australians have existing feed-in tariffs that pay more for exported electricity than the import cost of electricity. If the feed-in tariff exceeds the import cost it does not make sense to store excess generation. In fact, it would be beneficial to store imported energy then re-export it; however, households that install storage lose their feed-in tariff, or have it reduced to a level less than the cost of imported electricity.

Extravagant feed-in tariffs are no longer available, and so storage is becoming more viable as feed-in tariffs drop and the price of energy storage also drops.

Figure 11 also shows the predicted annual cost of electricity for each of the households with different sizes of energy storage. The cost of electricity cost is the difference between the cost of imported electricity and the price paid for exported electricity. The cost savings that can be achieved with energy storage depend on the size of the PV installation and on the demand profile. In general there are diminishing benefits as storage capacity increases, though having more than 5 kWh of usable storage may be viable for some households. Household 8 has a negative predicted annual cost when storage capacity is 4 kWh or more.

Figure 12 is another way to visualise the impact of energy storage on the cost of imported electricity. It shows the empirical cumulative distribution of predicted import costs for three different storage systems. For each storage system, the vertical axis indicates the number of households with predicted annual electricity less than the cost indicated on the horizontal axis. For example, with no storage (red curve), about 75% of households have a predicted annual electricity cost less than $1000, and the median annual cost of electricity is about $800. Increasing the storage capacity increases the number of households with less than a given annual electricity cost. The median annual cost of electricity drops from about $800 with no storage to less than $500 with 10 kWh of usable storage.

Figure 12 Empirical cumulative distributions of predicted annual cost of imported electricity for three different levels of useable storage: no storage (red), 5 kWh (green) and 10 kWh (blue).



Return on investment

Using the data from Lochiel Park, we have calculated the return on investment (RoI) that storage can provide for two different scenarios:

- adding storage to a household that already has a rooftop PV system
- adding storage and a PV system for a household that has neither.

In the first scenario, where the household buys a storage system to complement their existing rooftop PV, theRoI is calculated as

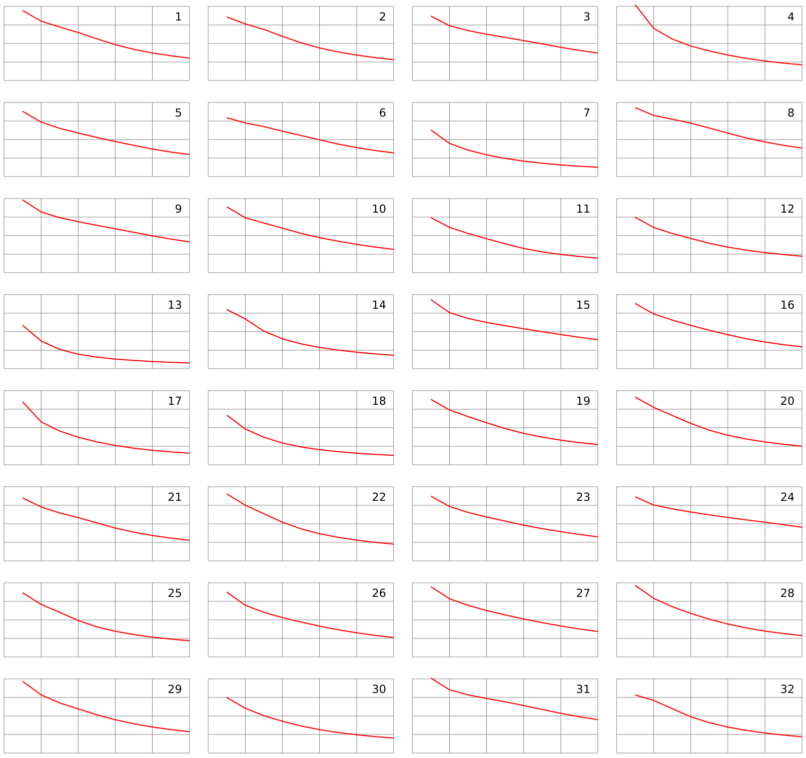
(reduction in annual cost of imported electricity) / (cost of storage)

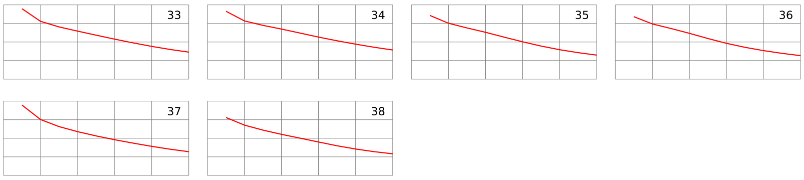
We assumed the cost of storage to be $500 per (useable) kilowatt-hour. This is perhaps low at the moment, but the cost of storage is falling. We have also assumed that cost is directly proportional to the usable capacity of the system.

Figure 13 shows the RoI for different capacity storage systems for each of the households, using existing rooftop PV. RoI decreases as the capacity of the storage system increases, and for some households can exceed 20%.

The results seem to favour small energy storage systems, as the RoI decreases as the size of the storage system increases. However, any RoI greater than could be obtained from other investments (e.g. 5-10%) is viable. Experience with PV systems suggests that many people will install storage even when the RoI is relatively low.

Figure 13 RoI for households with existing rooftop PV. The horizontal axis on each subgraph represents storage capacity from 0 to 10 kWh; the vertical axis represents RoI from 0 to 20%. The label in the top right corner of each subgraph indicates the number of the household.





In our second scenario, we calculate the RoI for households equivalent to those at Lochiel Park but without rooftop PV, and consider both the size of the PV system and the size of the storage system as parameters. In this case the RoI is

(reduction in annual cost of imported electricity) / (cost of PV + storage)

The costs of PV systems in Australia ($/watt), with and without Renewable Energy Certificates (RECs), are:

Capacity (kW)	With RECs	Without RECs
1.5	2.59	3.28
2.0	2.40	3.08
3.0	1.98	2.65
4.0	1.85	2.51
5.0	1.73	2.40
10.0	1.64	2.32

Source: http://www.solarchoice.net.au/blog/news/cost-of-solar-system-without-renewable-energy-target-050414

Figure 14–Figure 51 show heat maps of RoI. Each figure has two heat maps; the left map shows RoI when the cost of rooftop PV systems are subsidised by Renewable Energy Certificates, and the right heat map shows the lower RoI when the cost of rooftop PV is not subsidised. In each heat map, the horizontal axis indicates the useable capacity of the storage system and the vertical axis is the peak capacity of the rooftop PV system. The number in each cell, and the shading of each cell, indicates the percentage RoI for the given configuration. The orange cell in each heat map indicates the configuration with the greatest RoI.

For most households, the maximum RoI occurs when the PV system and the storage system are both small. As with the previous scenario, adding more PV or more storage has diminishing benefit, but is still worthwhile if the RoI is sufficiently high.

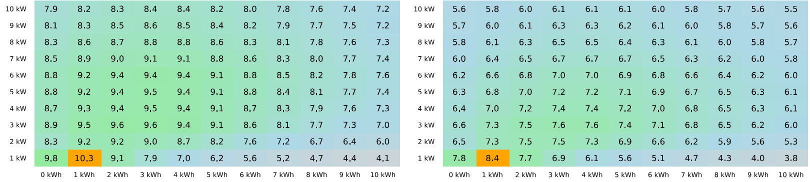
The heat maps also indicate which combinations of PV size and storage capacity will give a given RoI. For some RoI values, there are different combinations of the PV size and storage capacity that will give that RoI, but in general the different combinations will have different costs.

For some households, the maximum RoI requires significant PV and significant storage. For example, for Household 3 the maximum RoI (with RECs) requires a 6 kW PV system and a 5 kWh storage system. There are a few factors that contribute to this result:

- Household 3 has a consistent daily load, with 75% of its load occurring while the PV system is not generating (this is the highest of all households, see Figure 8), and so the utilisation of storage is high

- the RoI ‘surface’ for Household 3 is quite flat
- the use of PV energy is high enough that the household can take advantage of the lower cost per kilowatt of a 6 kW PV system.

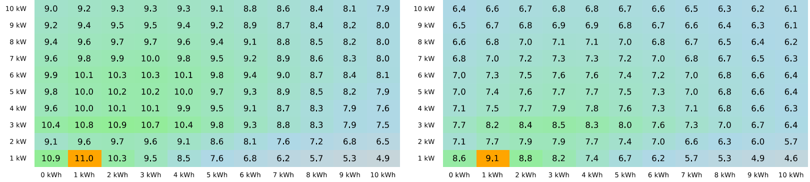
Figure 14 Return on investment for Household 1.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.9	8.2	8.3	8.4	8.4	8.2	8.0	7.8	7.6	7.4	7.2
9 kW	8.1	8.3	8.5	8.6	8.5	8.4	8.2	7.9	7.7	7.5	7.2
8 kW	8.3	8.6	8.7	8.8	8.8	8.6	8.3	8.1	7.8	7.6	7.3
7 kW	8.5	8.9	9.0	9.1	9.1	8.8	8.6	8.3	8.0	7.7	7.4
6 kW	8.8	9.2	9.4	9.4	9.4	9.1	8.8	8.5	8.2	7.8	7.6
5 kW	8.8	9.2	9.4	9.5	9.4	9.1	8.8	8.4	8.1	7.7	7.4
4 kW	8.7	9.3	9.4	9.5	9.4	9.1	8.7	8.3	7.9	7.6	7.3
3 kW	8.9	9.5	9.6	9.6	9.4	9.1	8.6	8.1	7.7	7.3	7.0
2 kW	8.3	9.2	9.2	9.0	8.7	8.2	7.6	7.2	6.7	6.4	6.0
1 kW	9.8	10.3	9.1	7.9	7.0	6.2	5.6	5.2	4.7	4.4	4.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.6	5.8	6.0	6.1	6.1	6.1	6.0	5.8	5.7	5.6	5.5
9 kW	5.7	6.0	6.1	6.3	6.3	6.2	6.1	6.0	5.8	5.7	5.6
8 kW	5.8	6.1	6.3	6.5	6.5	6.4	6.3	6.1	6.0	5.8	5.7
7 kW	6.0	6.4	6.5	6.7	6.7	6.7	6.5	6.3	6.2	6.0	5.8
6 kW	6.2	6.6	6.8	7.0	7.0	6.9	6.8	6.6	6.4	6.2	6.0
5 kW	6.3	6.8	7.0	7.2	7.2	7.1	6.9	6.7	6.5	6.3	6.1
4 kW	6.4	7.0	7.2	7.4	7.4	7.2	7.0	6.8	6.5	6.3	6.1
3 kW	6.6	7.3	7.5	7.6	7.6	7.4	7.1	6.8	6.5	6.2	6.0
2 kW	6.5	7.3	7.5	7.5	7.3	6.9	6.6	6.2	5.9	5.6	5.3
1 kW	7.8	8.4	7.7	6.9	6.1	5.6	5.1	4.7	4.3	4.0	3.8

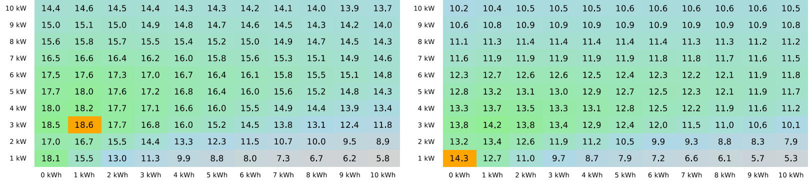
Figure 15 Return on investment for Household 2.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.0	9.2	9.3	9.3	9.3	9.1	8.8	8.6	8.4	8.1	7.9
9 kW	9.2	9.4	9.5	9.5	9.4	9.2	8.9	8.7	8.4	8.2	8.0
8 kW	9.4	9.6	9.7	9.7	9.6	9.4	9.1	8.8	8.5	8.2	8.0
7 kW	9.6	9.8	9.9	10.0	9.8	9.5	9.2	8.9	8.6	8.3	8.0
6 kW	9.9	10.1	10.3	10.3	10.1	9.8	9.4	9.0	8.7	8.4	8.1
5 kW	9.8	10.0	10.2	10.2	10.0	9.7	9.3	8.9	8.5	8.2	7.9
4 kW	9.6	10.0	10.1	10.1	9.9	9.5	9.1	8.7	8.3	7.9	7.6
3 kW	10.4	10.8	10.9	10.7	10.4	9.8	9.3	8.8	8.3	7.9	7.5
2 kW	9.1	9.6	9.7	9.6	9.1	8.6	8.1	7.6	7.2	6.8	6.5
1 kW	10.9	11.0	10.3	9.5	8.5	7.6	6.8	6.2	5.7	5.3	4.9

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.4	6.6	6.7	6.8	6.8	6.7	6.6	6.5	6.3	6.2	6.1
9 kW	6.5	6.7	6.8	6.9	6.9	6.8	6.7	6.6	6.4	6.3	6.1
8 kW	6.6	6.8	7.0	7.1	7.1	7.0	6.8	6.7	6.5	6.4	6.2
7 kW	6.8	7.0	7.2	7.3	7.3	7.2	7.0	6.8	6.7	6.5	6.3
6 kW	7.0	7.3	7.5	7.6	7.6	7.4	7.2	7.0	6.8	6.6	6.4
5 kW	7.0	7.4	7.6	7.7	7.7	7.5	7.3	7.0	6.8	6.6	6.4
4 kW	7.1	7.5	7.7	7.9	7.8	7.6	7.3	7.1	6.8	6.6	6.3
3 kW	7.7	8.2	8.4	8.5	8.3	8.0	7.6	7.3	7.0	6.7	6.4
2 kW	7.1	7.7	7.9	7.9	7.7	7.4	7.0	6.6	6.3	6.0	5.7
1 kW	8.6	9.1	8.8	8.2	7.4	6.7	6.2	5.7	5.3	4.9	4.6

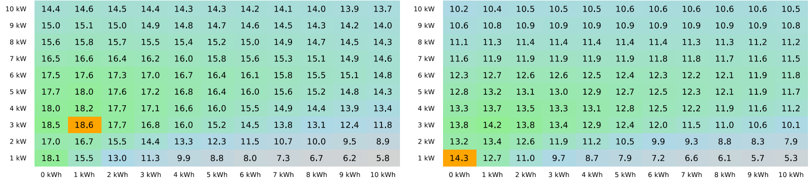
Figure 16 Return on investment for Household 3.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	14.4	14.6	14.5	14.4	14.3	14.3	14.2	14.1	14.0	13.9	13.7
9 kW	15.0	15.1	15.0	14.9	14.8	14.7	14.6	14.5	14.3	14.2	14.0
8 kW	15.6	15.8	15.7	15.5	15.4	15.2	15.0	14.9	14.7	14.5	14.3
7 kW	16.5	16.6	16.4	16.2	16.0	15.8	15.6	15.3	15.1	14.9	14.6
6 kW	17.5	17.6	17.3	17.0	16.7	16.4	16.1	15.8	15.5	15.1	14.8
5 kW	17.7	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.3
4 kW	18.0	18.2	17.7	17.1	16.6	16.0	15.5	14.9	14.4	13.9	13.4
3 kW	18.5	18.6	17.7	16.8	16.0	15.2	14.5	13.8	13.1	12.4	11.8
2 kW	17.0	16.7	15.5	14.4	13.3	12.3	11.5	10.7	10.0	9.5	8.9
1 kW	18.1	15.5	13.0	11.3	9.9	8.8	8.0	7.3	6.7	6.2	5.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	10.2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.5
9 kW	10.6	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.8
8 kW	11.1	11.3	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.2	11.2
7 kW	11.6	11.9	11.9	11.9	11.9	11.9	11.8	11.8	11.7	11.6	11.5
6 kW	12.3	12.7	12.6	12.6	12.5	12.4	12.3	12.2	12.1	11.9	11.8
5 kW	12.8	13.2	13.1	13.0	12.9	12.7	12.5	12.3	12.1	11.9	11.7
4 kW	13.3	13.7	13.5	13.3	13.1	12.8	12.5	12.2	11.9	11.6	11.2
3 kW	13.8	14.2	13.8	13.4	12.9	12.4	12.0	11.5	11.0	10.6	10.1
2 kW	13.2	13.4	12.6	11.9	11.2	10.5	9.9	9.3	8.8	8.3	7.9
1 kW	14.3	12.7	11.0	9.7	8.7	7.9	7.2	6.6	6.1	5.7	5.3

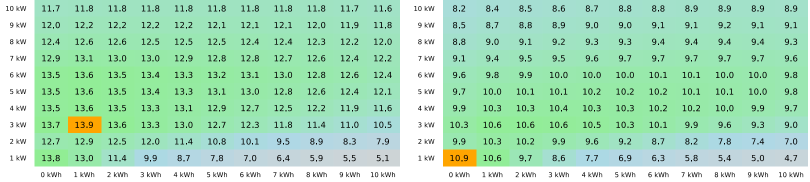
Figure 17 Return on investment for Household 4.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	14.4	14.6	14.5	14.4	14.3	14.3	14.2	14.1	14.0	13.9	13.7
9 kW	15.0	15.1	15.0	14.9	14.8	14.7	14.6	14.5	14.3	14.2	14.0
8 kW	15.6	15.8	15.7	15.5	15.4	15.2	15.0	14.9	14.7	14.5	14.3
7 kW	16.5	16.6	16.4	16.2	16.0	15.8	15.6	15.3	15.1	14.9	14.6
6 kW	17.5	17.6	17.3	17.0	16.7	16.4	16.1	15.8	15.5	15.1	14.8
5 kW	17.7	18.0	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.8	14.3
4 kW	18.0	18.2	17.7	17.1	16.6	16.0	15.5	14.9	14.4	13.9	13.4
3 kW	18.5	18.6	17.7	16.8	16.0	15.2	14.5	13.8	13.1	12.4	11.8
2 kW	17.0	16.7	15.5	14.4	13.3	12.3	11.5	10.7	10.0	9.5	8.9
1 kW	18.1	15.5	13.0	11.3	9.9	8.8	8.0	7.3	6.7	6.2	5.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	10.2	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.6	10.5
9 kW	10.6	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.8
8 kW	11.1	11.3	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.2	11.2
7 kW	11.6	11.9	11.9	11.9	11.9	11.9	11.8	11.8	11.7	11.6	11.5
6 kW	12.3	12.7	12.6	12.6	12.5	12.4	12.3	12.2	12.1	11.9	11.8
5 kW	12.8	13.2	13.1	13.0	12.9	12.7	12.5	12.3	12.1	11.9	11.7
4 kW	13.3	13.7	13.5	13.3	13.1	12.8	12.5	12.2	11.9	11.6	11.2
3 kW	13.8	14.2	13.8	13.4	12.9	12.4	12.0	11.5	11.0	10.6	10.1
2 kW	13.2	13.4	12.6	11.9	11.2	10.5	9.9	9.3	8.8	8.3	7.9
1 kW	14.3	12.7	11.0	9.7	8.7	7.9	7.2	6.6	6.1	5.7	5.3

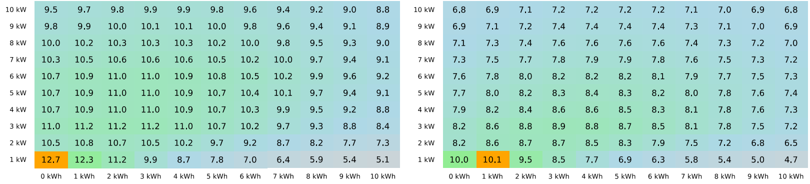
Figure 18 Return on investment for Household 5.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.6
9 kW	12.0	12.2	12.2	12.2	12.2	12.1	12.1	12.1	12.0	11.9	11.8
8 kW	12.4	12.6	12.6	12.5	12.5	12.5	12.4	12.4	12.3	12.2	12.0
7 kW	12.9	13.1	13.0	13.0	12.9	12.8	12.8	12.7	12.6	12.4	12.2
6 kW	13.5	13.6	13.5	13.4	13.3	13.2	13.1	13.0	12.8	12.6	12.4
5 kW	13.5	13.6	13.5	13.4	13.3	13.1	13.0	12.8	12.6	12.4	12.1
4 kW	13.5	13.6	13.5	13.3	13.1	12.9	12.7	12.5	12.2	11.9	11.6
3 kW	13.7	13.9	13.6	13.3	13.0	12.7	12.3	11.8	11.4	11.0	10.5
2 kW	12.7	12.9	12.5	12.0	11.4	10.8	10.1	9.5	8.9	8.3	7.9
1 kW	13.8	13.0	11.4	9.9	8.7	7.8	7.0	6.4	5.9	5.5	5.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.2	8.4	8.5	8.6	8.7	8.8	8.8	8.9	8.9	8.9	8.9
9 kW	8.5	8.7	8.8	8.9	9.0	9.0	9.1	9.1	9.2	9.1	9.1
8 kW	8.8	9.0	9.1	9.2	9.3	9.3	9.4	9.4	9.4	9.4	9.3
7 kW	9.1	9.4	9.5	9.5	9.6	9.7	9.7	9.7	9.7	9.7	9.6
6 kW	9.6	9.8	9.9	10.0	10.0	10.0	10.1	10.1	10.0	10.0	9.8
5 kW	9.7	10.0	10.1	10.1	10.2	10.2	10.2	10.1	10.1	10.0	9.8
4 kW	9.9	10.3	10.3	10.4	10.3	10.3	10.2	10.2	10.0	9.9	9.7
3 kW	10.3	10.6	10.6	10.6	10.5	10.3	10.1	9.9	9.6	9.3	9.0
2 kW	9.9	10.3	10.2	9.9	9.6	9.2	8.7	8.2	7.8	7.4	7.0
1 kW	10.9	10.6	9.7	8.6	7.7	6.9	6.3	5.8	5.4	5.0	4.7

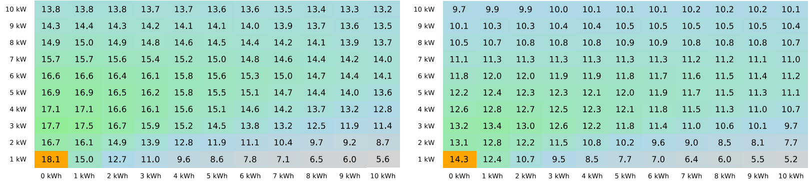
Figure 19 Return on investment for Household 6.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.5	9.7	9.8	9.9	9.9	9.8	9.6	9.4	9.2	9.0	8.8
9 kW	9.8	9.9	10.0	10.1	10.1	10.0	9.8	9.6	9.4	9.1	8.9
8 kW	10.0	10.2	10.3	10.3	10.3	10.2	10.0	9.8	9.5	9.3	9.0
7 kW	10.3	10.5	10.6	10.6	10.6	10.5	10.2	10.0	9.7	9.4	9.1
6 kW	10.7	10.9	11.0	11.0	10.9	10.8	10.5	10.2	9.9	9.6	9.2
5 kW	10.7	10.9	11.0	11.0	10.9	10.7	10.4	10.1	9.7	9.4	9.1
4 kW	10.7	10.9	11.0	11.0	10.9	10.7	10.3	9.9	9.5	9.2	8.8
3 kW	11.0	11.2	11.2	11.2	11.0	10.7	10.2	9.7	9.3	8.8	8.4
2 kW	10.5	10.8	10.7	10.5	10.2	9.7	9.2	8.7	8.2	7.7	7.3
1 kW	12.7	12.3	11.2	9.9	8.7	7.8	7.0	6.4	5.9	5.4	5.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.8	6.9	7.1	7.2	7.2	7.2	7.2	7.1	7.0	6.9	6.8
9 kW	6.9	7.1	7.2	7.4	7.4	7.4	7.4	7.3	7.1	7.0	6.9
8 kW	7.1	7.3	7.4	7.6	7.6	7.6	7.6	7.4	7.3	7.2	7.0
7 kW	7.3	7.5	7.7	7.8	7.9	7.9	7.8	7.6	7.5	7.3	7.2
6 kW	7.6	7.8	8.0	8.2	8.2	8.2	8.1	7.9	7.7	7.5	7.3
5 kW	7.7	8.0	8.2	8.3	8.4	8.3	8.2	8.0	7.8	7.6	7.4
4 kW	7.9	8.2	8.4	8.6	8.6	8.5	8.3	8.1	7.8	7.6	7.3
3 kW	8.2	8.6	8.8	8.9	8.8	8.7	8.5	8.1	7.8	7.5	7.2
2 kW	8.2	8.6	8.7	8.7	8.5	8.3	7.9	7.5	7.2	6.8	6.5
1 kW	10.0	10.1	9.5	8.5	7.7	6.9	6.3	5.8	5.4	5.0	4.7

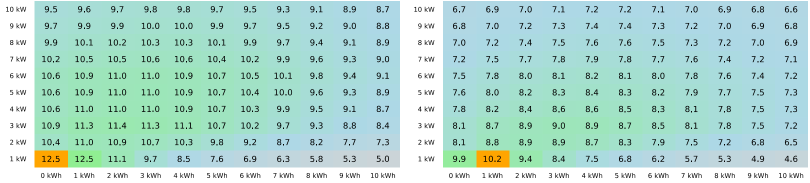
Figure 20 Return on investment for Household 7.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	13.8	13.8	13.8	13.7	13.7	13.6	13.6	13.5	13.4	13.3	13.2
9 kW	14.3	14.4	14.3	14.2	14.1	14.1	14.0	13.9	13.7	13.6	13.5
8 kW	14.9	15.0	14.9	14.8	14.6	14.5	14.4	14.2	14.1	13.9	13.7
7 kW	15.7	15.7	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.0
6 kW	16.6	16.6	16.4	16.1	15.8	15.6	15.3	15.0	14.7	14.4	14.1
5 kW	16.9	16.9	16.5	16.2	15.8	15.5	15.1	14.7	14.4	14.0	13.6
4 kW	17.1	17.1	16.6	16.1	15.6	15.1	14.6	14.2	13.7	13.2	12.8
3 kW	17.7	17.5	16.7	15.9	15.2	14.5	13.8	13.2	12.5	11.9	11.4
2 kW	16.7	16.1	14.9	13.9	12.8	11.9	11.1	10.4	9.7	9.2	8.7
1 kW	18.1	15.0	12.7	11.0	9.6	8.6	7.8	7.1	6.5	6.0	5.6

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.7	9.9	9.9	10.0	10.1	10.1	10.1	10.2	10.2	10.2	10.1
9 kW	10.1	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.4
8 kW	10.5	10.7	10.8	10.8	10.8	10.9	10.9	10.8	10.8	10.8	10.7
7 kW	11.1	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.2	11.1	11.0
6 kW	11.8	12.0	12.0	11.9	11.9	11.8	11.7	11.6	11.5	11.4	11.2
5 kW	12.2	12.4	12.3	12.3	12.1	12.0	11.9	11.7	11.5	11.3	11.1
4 kW	12.6	12.8	12.7	12.5	12.3	12.1	11.8	11.5	11.3	11.0	10.7
3 kW	13.2	13.4	13.0	12.6	12.2	11.8	11.4	11.0	10.6	10.1	9.7
2 kW	13.1	12.8	12.2	11.5	10.8	10.2	9.6	9.0	8.5	8.1	7.7
1 kW	14.3	12.4	10.7	9.5	8.5	7.7	7.0	6.4	6.0	5.5	5.2

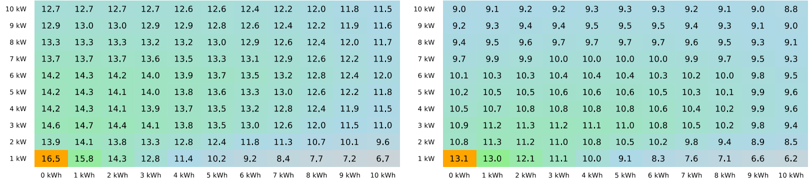
Figure 21 Return on investment for Household 8.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.5	9.6	9.7	9.8	9.8	9.7	9.5	9.3	9.1	8.9	8.7
9 kW	9.7	9.9	9.9	10.0	10.0	9.9	9.7	9.5	9.2	9.0	8.8
8 kW	9.9	10.1	10.2	10.3	10.3	10.1	9.9	9.7	9.4	9.1	8.9
7 kW	10.2	10.5	10.5	10.6	10.6	10.4	10.2	9.9	9.6	9.3	9.0
6 kW	10.6	10.9	11.0	11.0	10.9	10.7	10.5	10.1	9.8	9.4	9.1
5 kW	10.6	10.9	11.0	11.0	10.9	10.7	10.4	10.0	9.6	9.3	8.9
4 kW	10.6	11.0	11.0	11.0	10.9	10.7	10.3	9.9	9.5	9.1	8.7
3 kW	10.9	11.3	11.4	11.3	11.1	10.7	10.2	9.7	9.3	8.8	8.4
2 kW	10.4	11.0	10.9	10.7	10.3	9.8	9.2	8.7	8.2	7.7	7.3
1 kW	12.5	12.5	11.1	9.7	8.5	7.6	6.9	6.3	5.8	5.3	5.0

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.7	6.9	7.0	7.1	7.2	7.2	7.1	7.0	6.9	6.8	6.6
9 kW	6.8	7.0	7.2	7.3	7.4	7.4	7.3	7.2	7.0	6.9	6.8
8 kW	7.0	7.2	7.4	7.5	7.6	7.6	7.5	7.3	7.2	7.0	6.9
7 kW	7.2	7.5	7.7	7.8	7.9	7.8	7.7	7.6	7.4	7.2	7.1
6 kW	7.5	7.8	8.0	8.1	8.2	8.1	8.0	7.8	7.6	7.4	7.2
5 kW	7.6	8.0	8.2	8.3	8.4	8.3	8.2	7.9	7.7	7.5	7.3
4 kW	7.8	8.2	8.4	8.6	8.6	8.5	8.3	8.1	7.8	7.5	7.3
3 kW	8.1	8.7	8.9	9.0	8.9	8.7	8.5	8.1	7.8	7.5	7.2
2 kW	8.1	8.8	8.9	8.9	8.7	8.3	7.9	7.5	7.2	6.8	6.5
1 kW	9.9	10.2	9.4	8.4	7.5	6.8	6.2	5.7	5.3	4.9	4.6

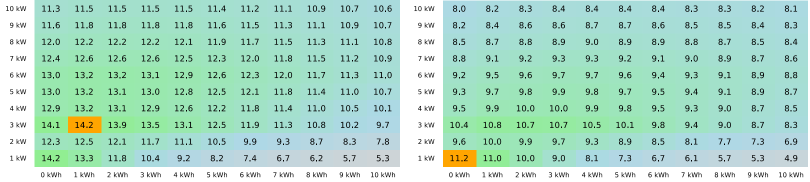
Figure 22 Return on investment for Household 9.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	12.7	12.7	12.7	12.7	12.6	12.6	12.4	12.2	12.0	11.8	11.5
9 kW	12.9	13.0	13.0	12.9	12.9	12.8	12.6	12.4	12.2	11.9	11.6
8 kW	13.3	13.3	13.3	13.2	13.2	13.0	12.9	12.6	12.4	12.0	11.7
7 kW	13.7	13.7	13.7	13.6	13.5	13.3	13.1	12.9	12.6	12.2	11.9
6 kW	14.2	14.3	14.2	14.0	13.9	13.7	13.5	13.2	12.8	12.4	12.0
5 kW	14.2	14.3	14.1	14.0	13.8	13.6	13.3	13.0	12.6	12.2	11.8
4 kW	14.2	14.3	14.1	13.9	13.7	13.5	13.2	12.8	12.4	11.9	11.5
3 kW	14.6	14.7	14.4	14.1	13.8	13.5	13.0	12.6	12.0	11.5	11.0
2 kW	13.9	14.1	13.8	13.3	12.8	12.4	11.8	11.3	10.7	10.1	9.6
1 kW	16.5	15.8	14.3	12.8	11.4	10.2	9.2	8.4	7.7	7.2	6.7

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.0	9.1	9.2	9.2	9.3	9.3	9.3	9.2	9.1	9.0	8.8
9 kW	9.2	9.3	9.4	9.4	9.5	9.5	9.5	9.4	9.3	9.1	9.0
8 kW	9.4	9.5	9.6	9.7	9.7	9.7	9.7	9.6	9.5	9.3	9.1
7 kW	9.7	9.9	9.9	10.0	10.0	10.0	10.0	9.9	9.7	9.5	9.3
6 kW	10.1	10.3	10.3	10.4	10.4	10.4	10.3	10.2	10.0	9.8	9.5
5 kW	10.2	10.5	10.5	10.6	10.6	10.6	10.5	10.3	10.1	9.9	9.6
4 kW	10.5	10.7	10.8	10.8	10.8	10.8	10.6	10.4	10.2	9.9	9.6
3 kW	10.9	11.2	11.3	11.2	11.1	11.0	10.8	10.5	10.2	9.8	9.4
2 kW	10.8	11.3	11.2	11.0	10.8	10.5	10.2	9.8	9.4	8.9	8.5
1 kW	13.1	13.0	12.1	11.1	10.0	9.1	8.3	7.6	7.1	6.6	6.2

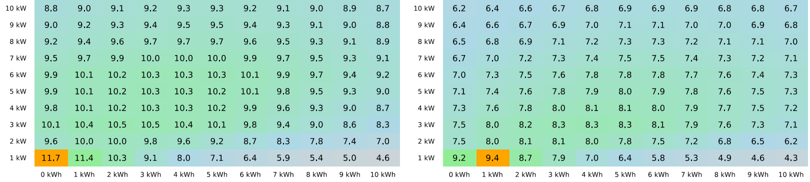
Figure 23 Return on investment for Household 10.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.3	11.5	11.5	11.5	11.5	11.4	11.2	11.1	10.9	10.7	10.6
9 kW	11.6	11.8	11.8	11.8	11.8	11.6	11.5	11.3	11.1	10.9	10.7
8 kW	12.0	12.2	12.2	12.2	12.1	11.9	11.7	11.5	11.3	11.1	10.8
7 kW	12.4	12.6	12.6	12.6	12.5	12.3	12.0	11.8	11.5	11.2	10.9
6 kW	13.0	13.2	13.2	13.1	12.9	12.6	12.3	12.0	11.7	11.3	11.0
5 kW	13.0	13.2	13.1	13.0	12.8	12.5	12.1	11.8	11.4	11.0	10.7
4 kW	12.9	13.2	13.1	12.9	12.6	12.2	11.8	11.4	11.0	10.5	10.1
3 kW	14.1	14.2	13.9	13.5	13.1	12.5	11.9	11.3	10.8	10.2	9.7
2 kW	12.3	12.5	12.1	11.7	11.1	10.5	9.9	9.3	8.7	8.3	7.8
1 kW	14.2	13.3	11.8	10.4	9.2	8.2	7.4	6.7	6.2	5.7	5.3

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.0	8.2	8.3	8.4	8.4	8.4	8.4	8.3	8.3	8.2	8.1
9 kW	8.2	8.4	8.6	8.6	8.7	8.7	8.6	8.5	8.5	8.4	8.3
8 kW	8.5	8.7	8.8	8.9	9.0	8.9	8.9	8.8	8.7	8.5	8.4
7 kW	8.8	9.1	9.2	9.3	9.3	9.2	9.1	9.0	8.9	8.7	8.6
6 kW	9.2	9.5	9.6	9.7	9.7	9.6	9.4	9.3	9.1	8.9	8.8
5 kW	9.3	9.7	9.8	9.9	9.8	9.7	9.5	9.4	9.1	8.9	8.7
4 kW	9.5	9.9	10.0	10.0	9.9	9.8	9.5	9.3	9.0	8.7	8.5
3 kW	10.4	10.8	10.7	10.7	10.5	10.1	9.8	9.4	9.0	8.7	8.3
2 kW	9.6	10.0	9.9	9.7	9.3	8.9	8.5	8.1	7.7	7.3	6.9
1 kW	11.2	11.0	10.0	9.0	8.1	7.3	6.7	6.1	5.7	5.3	4.9

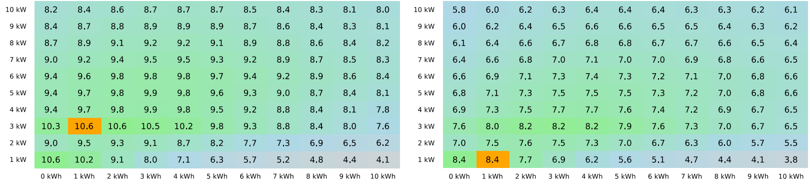
Figure 24 Return on investment for Household 11.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.8	9.0	9.1	9.2	9.3	9.3	9.2	9.1	9.0	8.9	8.7
9 kW	9.0	9.2	9.3	9.4	9.5	9.5	9.4	9.3	9.1	9.0	8.8
8 kW	9.2	9.4	9.6	9.7	9.7	9.7	9.6	9.5	9.3	9.1	8.9
7 kW	9.5	9.7	9.9	10.0	10.0	10.0	9.9	9.7	9.5	9.3	9.1
6 kW	9.9	10.1	10.2	10.3	10.3	10.3	10.1	9.9	9.7	9.4	9.2
5 kW	9.9	10.1	10.2	10.3	10.3	10.2	10.1	9.8	9.5	9.3	9.0
4 kW	9.8	10.1	10.2	10.3	10.3	10.2	9.9	9.6	9.3	9.0	8.7
3 kW	10.1	10.4	10.5	10.5	10.4	10.1	9.8	9.4	9.0	8.6	8.3
2 kW	9.6	10.0	10.0	9.8	9.6	9.2	8.7	8.3	7.8	7.4	7.0
1 kW	11.7	11.4	10.3	9.1	8.0	7.1	6.4	5.9	5.4	5.0	4.6

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.2	6.4	6.6	6.7	6.8	6.9	6.9	6.9	6.8	6.8	6.7
9 kW	6.4	6.6	6.7	6.9	7.0	7.1	7.1	7.0	7.0	6.9	6.8
8 kW	6.5	6.8	6.9	7.1	7.2	7.3	7.3	7.2	7.1	7.1	7.0
7 kW	6.7	7.0	7.2	7.3	7.4	7.5	7.5	7.4	7.3	7.2	7.1
6 kW	7.0	7.3	7.5	7.6	7.8	7.8	7.8	7.7	7.6	7.4	7.3
5 kW	7.1	7.4	7.6	7.8	7.9	8.0	7.9	7.8	7.6	7.5	7.3
4 kW	7.3	7.6	7.8	8.0	8.1	8.1	8.0	7.9	7.7	7.5	7.2
3 kW	7.5	8.0	8.2	8.3	8.3	8.3	8.1	7.9	7.6	7.3	7.1
2 kW	7.5	8.0	8.1	8.1	8.0	7.8	7.5	7.2	6.8	6.5	6.2
1 kW	9.2	9.4	8.7	7.9	7.0	6.4	5.8	5.3	4.9	4.6	4.3

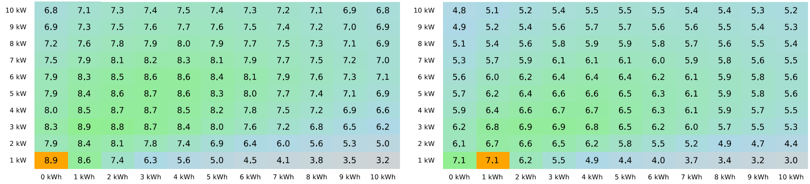
Figure 25 Return on investment for Household 12.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.2	8.4	8.6	8.7	8.7	8.7	8.5	8.4	8.3	8.1	8.0
9 kW	8.4	8.7	8.8	8.9	8.9	8.9	8.7	8.6	8.4	8.3	8.1
8 kW	8.7	8.9	9.1	9.2	9.2	9.1	8.9	8.8	8.6	8.4	8.2
7 kW	9.0	9.2	9.4	9.5	9.5	9.3	9.2	8.9	8.7	8.5	8.3
6 kW	9.4	9.6	9.8	9.8	9.8	9.7	9.4	9.2	8.9	8.6	8.4
5 kW	9.4	9.7	9.8	9.9	9.8	9.6	9.3	9.0	8.7	8.4	8.1
4 kW	9.4	9.7	9.8	9.9	9.8	9.5	9.2	8.8	8.4	8.1	7.8
3 kW	10.3	10.6	10.6	10.5	10.2	9.8	9.3	8.8	8.4	8.0	7.6
2 kW	9.0	9.5	9.3	9.1	8.7	8.2	7.7	7.3	6.9	6.5	6.2
1 kW	10.6	10.2	9.1	8.0	7.1	6.3	5.7	5.2	4.8	4.4	4.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.8	6.0	6.2	6.3	6.4	6.4	6.4	6.3	6.3	6.2	6.1
9 kW	6.0	6.2	6.4	6.5	6.6	6.6	6.5	6.5	6.4	6.3	6.2
8 kW	6.1	6.4	6.6	6.7	6.8	6.8	6.7	6.7	6.6	6.5	6.4
7 kW	6.4	6.6	6.8	7.0	7.1	7.0	7.0	6.9	6.8	6.6	6.5
6 kW	6.6	6.9	7.1	7.3	7.4	7.3	7.2	7.1	7.0	6.8	6.6
5 kW	6.8	7.1	7.3	7.5	7.5	7.5	7.3	7.2	7.0	6.8	6.6
4 kW	6.9	7.3	7.5	7.7	7.7	7.6	7.4	7.2	6.9	6.7	6.5
3 kW	7.6	8.0	8.2	8.2	8.2	7.9	7.6	7.3	7.0	6.7	6.5
2 kW	7.0	7.5	7.6	7.5	7.3	7.0	6.7	6.3	6.0	5.7	5.5
1 kW	8.4	8.4	7.7	6.9	6.2	5.6	5.1	4.7	4.4	4.1	3.8

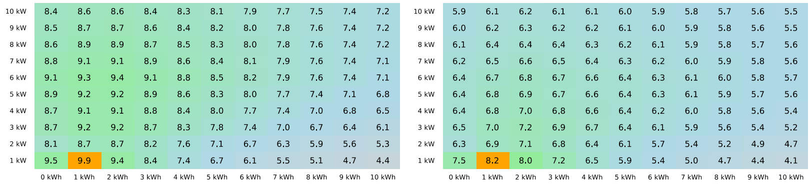
Figure 26 Return on investment for Household 13.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.8	7.1	7.3	7.4	7.5	7.4	7.3	7.2	7.1	6.9	6.8
9 kW	6.9	7.3	7.5	7.6	7.7	7.6	7.5	7.4	7.2	7.0	6.9
8 kW	7.2	7.6	7.8	7.9	8.0	7.9	7.7	7.5	7.3	7.1	6.9
7 kW	7.5	7.9	8.1	8.2	8.3	8.1	7.9	7.7	7.5	7.2	7.0
6 kW	7.9	8.3	8.5	8.6	8.6	8.4	8.1	7.9	7.6	7.3	7.1
5 kW	7.9	8.4	8.6	8.7	8.6	8.3	8.0	7.7	7.4	7.1	6.9
4 kW	8.0	8.5	8.7	8.7	8.5	8.2	7.8	7.5	7.2	6.9	6.6
3 kW	8.3	8.9	8.8	8.7	8.4	8.0	7.6	7.2	6.8	6.5	6.2
2 kW	7.9	8.4	8.1	7.8	7.4	6.9	6.4	6.0	5.6	5.3	5.0
1 kW	8.9	8.6	7.4	6.3	5.6	5.0	4.5	4.1	3.8	3.5	3.2

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	4.8	5.1	5.2	5.4	5.5	5.5	5.5	5.4	5.4	5.3	5.2
9 kW	4.9	5.2	5.4	5.6	5.7	5.7	5.6	5.6	5.5	5.4	5.3
8 kW	5.1	5.4	5.6	5.8	5.9	5.9	5.8	5.7	5.6	5.5	5.4
7 kW	5.3	5.7	5.9	6.1	6.1	6.1	6.0	5.9	5.8	5.6	5.5
6 kW	5.6	6.0	6.2	6.4	6.4	6.4	6.2	6.1	5.9	5.8	5.6
5 kW	5.7	6.2	6.4	6.6	6.6	6.5	6.3	6.1	5.9	5.8	5.6
4 kW	5.9	6.4	6.6	6.7	6.7	6.5	6.3	6.1	5.9	5.7	5.5
3 kW	6.2	6.8	6.9	6.9	6.8	6.5	6.2	6.0	5.7	5.5	5.3
2 kW	6.1	6.7	6.6	6.5	6.2	5.8	5.5	5.2	4.9	4.7	4.4
1 kW	7.1	7.1	6.2	5.5	4.9	4.4	4.0	3.7	3.4	3.2	3.0

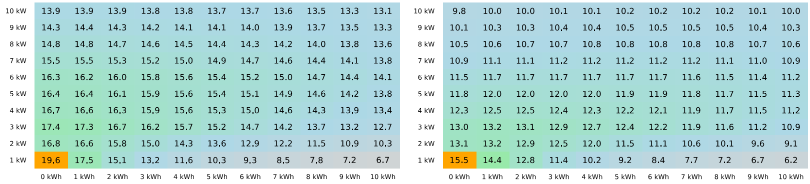
Figure 27 Return on investment for Household 14.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.4	8.6	8.6	8.4	8.3	8.1	7.9	7.7	7.5	7.4	7.2
9 kW	8.5	8.7	8.7	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.2
8 kW	8.6	8.9	8.9	8.7	8.5	8.3	8.0	7.8	7.6	7.4	7.2
7 kW	8.8	9.1	9.1	8.9	8.6	8.4	8.1	7.9	7.6	7.4	7.1
6 kW	9.1	9.3	9.4	9.1	8.8	8.5	8.2	7.9	7.6	7.4	7.1
5 kW	8.9	9.2	9.2	8.9	8.6	8.3	8.0	7.7	7.4	7.1	6.8
4 kW	8.7	9.1	9.1	8.8	8.4	8.0	7.7	7.4	7.0	6.8	6.5
3 kW	8.7	9.2	9.2	8.7	8.3	7.8	7.4	7.0	6.7	6.4	6.1
2 kW	8.1	8.7	8.7	8.2	7.6	7.1	6.7	6.3	5.9	5.6	5.3
1 kW	9.5	9.9	9.4	8.4	7.4	6.7	6.1	5.5	5.1	4.7	4.4

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.9	6.1	6.2	6.1	6.1	6.0	5.9	5.8	5.7	5.6	5.5
9 kW	6.0	6.2	6.3	6.2	6.2	6.1	6.0	5.9	5.8	5.6	5.5
8 kW	6.1	6.4	6.4	6.4	6.3	6.2	6.1	5.9	5.8	5.7	5.6
7 kW	6.2	6.5	6.6	6.5	6.4	6.3	6.2	6.0	5.9	5.8	5.6
6 kW	6.4	6.7	6.8	6.7	6.6	6.4	6.3	6.1	6.0	5.8	5.7
5 kW	6.4	6.8	6.9	6.7	6.6	6.4	6.3	6.1	5.9	5.7	5.6
4 kW	6.4	6.8	7.0	6.8	6.6	6.4	6.2	6.0	5.8	5.6	5.4
3 kW	6.5	7.0	7.2	6.9	6.7	6.4	6.1	5.9	5.6	5.4	5.2
2 kW	6.3	6.9	7.1	6.8	6.4	6.1	5.7	5.4	5.2	4.9	4.7
1 kW	7.5	8.2	8.0	7.2	6.5	5.9	5.4	5.0	4.7	4.4	4.1

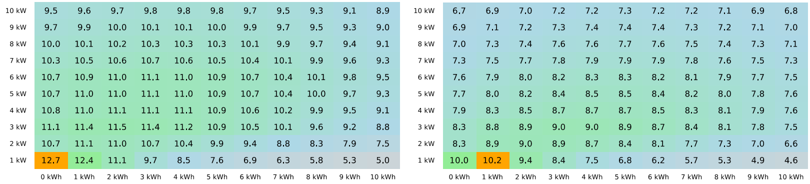
Figure 28 Return on investment for Household 15.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	13.9	13.9	13.9	13.8	13.8	13.7	13.7	13.6	13.5	13.3	13.1
9 kW	14.3	14.4	14.3	14.2	14.1	14.1	14.0	13.9	13.7	13.5	13.3
8 kW	14.8	14.8	14.7	14.6	14.5	14.4	14.3	14.2	14.0	13.8	13.6
7 kW	15.5	15.5	15.3	15.2	15.0	14.9	14.7	14.6	14.4	14.1	13.8
6 kW	16.3	16.2	16.0	15.8	15.6	15.4	15.2	15.0	14.7	14.4	14.1
5 kW	16.4	16.4	16.1	15.9	15.6	15.4	15.1	14.9	14.6	14.2	13.8
4 kW	16.7	16.6	16.3	15.9	15.6	15.3	15.0	14.6	14.3	13.9	13.4
3 kW	17.4	17.3	16.7	16.2	15.7	15.2	14.7	14.2	13.7	13.2	12.7
2 kW	16.8	16.6	15.8	15.0	14.3	13.6	12.9	12.2	11.5	10.9	10.3
1 kW	19.6	17.5	15.1	13.2	11.6	10.3	9.3	8.5	7.8	7.2	6.7

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.8	10.0	10.0	10.1	10.1	10.2	10.2	10.2	10.2	10.1	10.0
9 kW	10.1	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.4	10.3
8 kW	10.5	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.7	10.6
7 kW	10.9	11.1	11.1	11.2	11.2	11.2	11.2	11.2	11.1	11.0	10.9
6 kW	11.5	11.7	11.7	11.7	11.7	11.7	11.7	11.6	11.5	11.4	11.2
5 kW	11.8	12.0	12.0	12.0	12.0	11.9	11.9	11.8	11.7	11.5	11.3
4 kW	12.3	12.5	12.5	12.4	12.3	12.2	12.1	11.9	11.7	11.5	11.2
3 kW	13.0	13.2	13.1	12.9	12.7	12.4	12.2	11.9	11.6	11.2	10.9
2 kW	13.1	13.2	12.9	12.5	12.0	11.5	11.1	10.6	10.1	9.6	9.1
1 kW	15.5	14.4	12.8	11.4	10.2	9.2	8.4	7.7	7.2	6.7	6.2

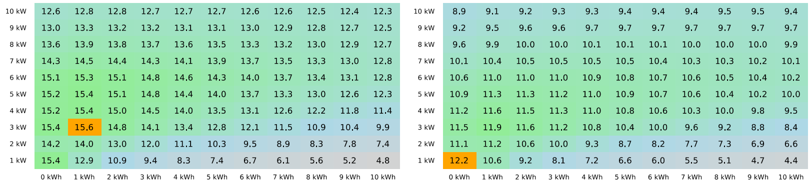
Figure 29 Return on investment for Household 16.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.5	9.6	9.7	9.8	9.8	9.8	9.7	9.5	9.3	9.1	8.9
9 kW	9.7	9.9	10.0	10.1	10.1	10.0	9.9	9.7	9.5	9.3	9.0
8 kW	10.0	10.1	10.2	10.3	10.3	10.3	10.1	9.9	9.7	9.4	9.1
7 kW	10.3	10.5	10.6	10.7	10.6	10.5	10.4	10.1	9.9	9.6	9.3
6 kW	10.7	10.9	11.0	11.1	11.0	10.9	10.7	10.4	10.1	9.8	9.5
5 kW	10.7	11.0	11.0	11.1	11.0	10.9	10.7	10.4	10.0	9.7	9.3
4 kW	10.8	11.0	11.1	11.1	11.1	10.9	10.6	10.2	9.9	9.5	9.1
3 kW	11.1	11.4	11.5	11.4	11.2	10.9	10.5	10.1	9.6	9.2	8.8
2 kW	10.7	11.1	11.0	10.7	10.4	9.9	9.4	8.8	8.3	7.9	7.5
1 kW	12.7	12.4	11.1	9.7	8.5	7.6	6.9	6.3	5.8	5.3	5.0

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.7	6.9	7.0	7.2	7.2	7.3	7.2	7.2	7.1	6.9	6.8
9 kW	6.9	7.1	7.2	7.3	7.4	7.4	7.4	7.3	7.2	7.1	7.0
8 kW	7.0	7.3	7.4	7.6	7.6	7.7	7.6	7.5	7.4	7.3	7.1
7 kW	7.3	7.5	7.7	7.8	7.9	7.9	7.9	7.8	7.6	7.5	7.3
6 kW	7.6	7.9	8.0	8.2	8.3	8.3	8.2	8.1	7.9	7.7	7.5
5 kW	7.7	8.0	8.2	8.4	8.5	8.5	8.4	8.2	8.0	7.8	7.6
4 kW	7.9	8.3	8.5	8.7	8.7	8.7	8.5	8.3	8.1	7.9	7.6
3 kW	8.3	8.8	8.9	9.0	9.0	8.9	8.7	8.4	8.1	7.8	7.5
2 kW	8.3	8.9	9.0	8.9	8.7	8.4	8.1	7.7	7.3	7.0	6.6
1 kW	10.0	10.2	9.4	8.4	7.5	6.8	6.2	5.7	5.3	4.9	4.6

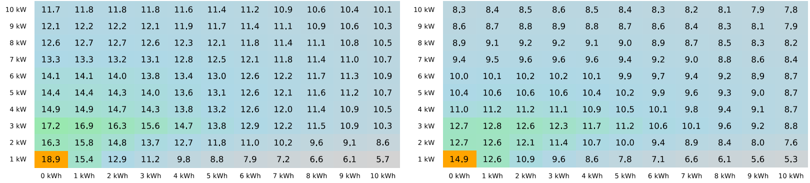
Figure 30 Return on investment for Household 17.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	12.6	12.8	12.8	12.7	12.7	12.7	12.6	12.6	12.5	12.4	12.3
9 kW	13.0	13.3	13.2	13.2	13.1	13.1	13.0	12.9	12.8	12.7	12.5
8 kW	13.6	13.9	13.8	13.7	13.6	13.5	13.3	13.2	13.0	12.9	12.7
7 kW	14.3	14.5	14.4	14.3	14.1	13.9	13.7	13.5	13.3	13.0	12.8
6 kW	15.1	15.3	15.1	14.8	14.6	14.3	14.0	13.7	13.4	13.1	12.8
5 kW	15.2	15.4	15.1	14.8	14.4	14.0	13.7	13.3	13.0	12.6	12.3
4 kW	15.2	15.4	15.0	14.5	14.0	13.5	13.1	12.6	12.2	11.8	11.4
3 kW	15.4	15.6	14.8	14.1	13.4	12.8	12.1	11.5	10.9	10.4	9.9
2 kW	14.2	14.0	13.0	12.0	11.1	10.3	9.5	8.9	8.3	7.8	7.4
1 kW	15.4	12.9	10.9	9.4	8.3	7.4	6.7	6.1	5.6	5.2	4.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.9	9.1	9.2	9.3	9.3	9.4	9.4	9.4	9.5	9.5	9.4
9 kW	9.2	9.5	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7
8 kW	9.6	9.9	10.0	10.0	10.1	10.1	10.1	10.0	10.0	10.0	9.9
7 kW	10.1	10.4	10.5	10.5	10.5	10.5	10.4	10.3	10.3	10.2	10.1
6 kW	10.6	11.0	11.0	11.0	10.9	10.8	10.7	10.6	10.5	10.4	10.2
5 kW	10.9	11.3	11.3	11.2	11.0	10.9	10.7	10.6	10.4	10.2	10.0
4 kW	11.2	11.6	11.5	11.3	11.0	10.8	10.6	10.3	10.0	9.8	9.5
3 kW	11.5	11.9	11.6	11.2	10.8	10.4	10.0	9.6	9.2	8.8	8.4
2 kW	11.1	11.2	10.6	10.0	9.3	8.7	8.2	7.7	7.3	6.9	6.6
1 kW	12.2	10.6	9.2	8.1	7.2	6.6	6.0	5.5	5.1	4.7	4.4

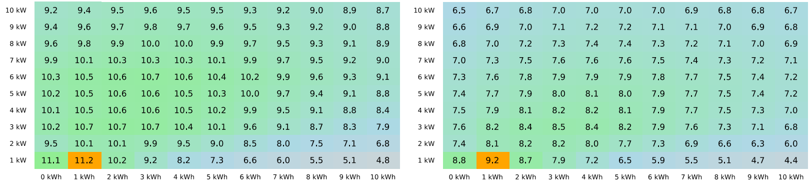
Figure 31 Return on investment for Household 18.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.7	11.8	11.8	11.8	11.6	11.4	11.2	10.9	10.6	10.4	10.1
9 kW	12.1	12.2	12.2	12.1	11.9	11.7	11.4	11.1	10.9	10.6	10.3
8 kW	12.6	12.7	12.7	12.6	12.3	12.1	11.8	11.4	11.1	10.8	10.5
7 kW	13.3	13.3	13.2	13.1	12.8	12.5	12.1	11.8	11.4	11.0	10.7
6 kW	14.1	14.1	14.0	13.8	13.4	13.0	12.6	12.2	11.7	11.3	10.9
5 kW	14.4	14.4	14.3	14.0	13.6	13.1	12.6	12.1	11.6	11.2	10.7
4 kW	14.9	14.9	14.7	14.3	13.8	13.2	12.6	12.0	11.4	10.9	10.5
3 kW	17.2	16.9	16.3	15.6	14.7	13.8	12.9	12.2	11.5	10.9	10.3
2 kW	16.3	15.8	14.8	13.7	12.7	11.8	11.0	10.2	9.6	9.1	8.6
1 kW	18.9	15.4	12.9	11.2	9.8	8.8	7.9	7.2	6.6	6.1	5.7

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.3	8.4	8.5	8.6	8.5	8.4	8.3	8.2	8.1	7.9	7.8
9 kW	8.6	8.7	8.8	8.9	8.8	8.7	8.6	8.4	8.3	8.1	7.9
8 kW	8.9	9.1	9.2	9.2	9.1	9.0	8.9	8.7	8.5	8.3	8.2
7 kW	9.4	9.5	9.6	9.6	9.6	9.4	9.2	9.0	8.8	8.6	8.4
6 kW	10.0	10.1	10.2	10.2	10.1	9.9	9.7	9.4	9.2	8.9	8.7
5 kW	10.4	10.6	10.6	10.6	10.4	10.2	9.9	9.6	9.3	9.0	8.7
4 kW	11.0	11.2	11.2	11.1	10.9	10.5	10.1	9.8	9.4	9.1	8.7
3 kW	12.7	12.8	12.6	12.3	11.7	11.2	10.6	10.1	9.6	9.2	8.8
2 kW	12.7	12.6	12.1	11.4	10.7	10.0	9.4	8.9	8.4	8.0	7.6
1 kW	14.9	12.6	10.9	9.6	8.6	7.8	7.1	6.6	6.1	5.6	5.3

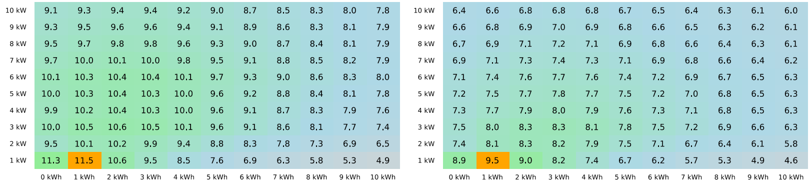
Figure 32 Return on investment for Household 19.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.2	9.4	9.5	9.6	9.5	9.5	9.3	9.2	9.0	8.9	8.7
9 kW	9.4	9.6	9.7	9.8	9.7	9.6	9.5	9.3	9.2	9.0	8.8
8 kW	9.6	9.8	9.9	10.0	10.0	9.9	9.7	9.5	9.3	9.1	8.9
7 kW	9.9	10.1	10.3	10.3	10.3	10.1	9.9	9.7	9.5	9.2	9.0
6 kW	10.3	10.5	10.6	10.7	10.6	10.4	10.2	9.9	9.6	9.3	9.1
5 kW	10.2	10.5	10.6	10.6	10.5	10.3	10.0	9.7	9.4	9.1	8.8
4 kW	10.1	10.5	10.6	10.6	10.5	10.2	9.9	9.5	9.1	8.8	8.4
3 kW	10.2	10.7	10.7	10.7	10.4	10.1	9.6	9.1	8.7	8.3	7.9
2 kW	9.5	10.1	10.1	9.9	9.5	9.0	8.5	8.0	7.5	7.1	6.8
1 kW	11.1	11.2	10.2	9.2	8.2	7.3	6.6	6.0	5.5	5.1	4.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.5	6.7	6.8	7.0	7.0	7.0	7.0	6.9	6.8	6.8	6.7
9 kW	6.6	6.9	7.0	7.1	7.2	7.2	7.1	7.1	7.0	6.9	6.8
8 kW	6.8	7.0	7.2	7.3	7.4	7.4	7.3	7.2	7.1	7.0	6.9
7 kW	7.0	7.3	7.5	7.6	7.6	7.6	7.5	7.4	7.3	7.2	7.1
6 kW	7.3	7.6	7.8	7.9	7.9	7.9	7.8	7.7	7.5	7.4	7.2
5 kW	7.4	7.7	7.9	8.0	8.1	8.0	7.9	7.7	7.5	7.4	7.2
4 kW	7.5	7.9	8.1	8.2	8.2	8.1	7.9	7.7	7.5	7.3	7.0
3 kW	7.6	8.2	8.4	8.5	8.4	8.2	7.9	7.6	7.3	7.1	6.8
2 kW	7.4	8.1	8.2	8.2	8.0	7.7	7.3	6.9	6.6	6.3	6.0
1 kW	8.8	9.2	8.7	7.9	7.2	6.5	5.9	5.5	5.1	4.7	4.4

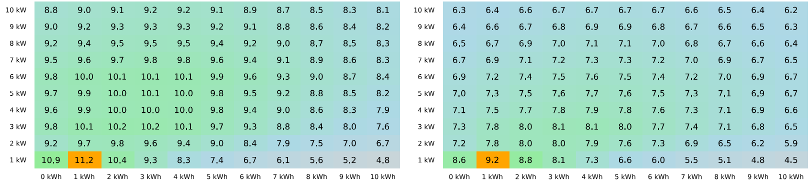
Figure 33 Return on investment for Household 20.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.1	9.3	9.4	9.4	9.2	9.0	8.7	8.5	8.3	8.0	7.8
9 kW	9.3	9.5	9.6	9.6	9.4	9.1	8.9	8.6	8.3	8.1	7.9
8 kW	9.5	9.7	9.8	9.8	9.6	9.3	9.0	8.7	8.4	8.1	7.9
7 kW	9.7	10.0	10.1	10.0	9.8	9.5	9.1	8.8	8.5	8.2	7.9
6 kW	10.1	10.3	10.4	10.4	10.1	9.7	9.3	9.0	8.6	8.3	8.0
5 kW	10.0	10.3	10.4	10.3	10.0	9.6	9.2	8.8	8.4	8.1	7.8
4 kW	9.9	10.2	10.4	10.3	10.0	9.6	9.1	8.7	8.3	7.9	7.6
3 kW	10.0	10.5	10.6	10.5	10.1	9.6	9.1	8.6	8.1	7.7	7.4
2 kW	9.5	10.1	10.2	9.9	9.4	8.8	8.3	7.8	7.3	6.9	6.5
1 kW	11.3	11.5	10.6	9.5	8.5	7.6	6.9	6.3	5.8	5.3	4.9

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.4	6.6	6.8	6.8	6.8	6.7	6.5	6.4	6.3	6.1	6.0
9 kW	6.6	6.8	6.9	7.0	6.9	6.8	6.6	6.5	6.3	6.2	6.1
8 kW	6.7	6.9	7.1	7.2	7.1	6.9	6.8	6.6	6.4	6.3	6.1
7 kW	6.9	7.1	7.3	7.4	7.3	7.1	6.9	6.8	6.6	6.4	6.2
6 kW	7.1	7.4	7.6	7.7	7.6	7.4	7.2	6.9	6.7	6.5	6.3
5 kW	7.2	7.5	7.7	7.8	7.7	7.5	7.2	7.0	6.8	6.5	6.3
4 kW	7.3	7.7	7.9	8.0	7.9	7.6	7.3	7.1	6.8	6.5	6.3
3 kW	7.5	8.0	8.3	8.3	8.1	7.8	7.5	7.2	6.9	6.6	6.3
2 kW	7.4	8.1	8.3	8.2	7.9	7.5	7.1	6.7	6.4	6.1	5.8
1 kW	8.9	9.5	9.0	8.2	7.4	6.7	6.2	5.7	5.3	4.9	4.6

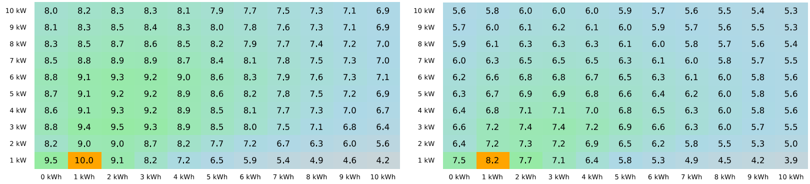
Figure 34 Return on investment for Household 21.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.8	9.0	9.1	9.2	9.2	9.1	8.9	8.7	8.5	8.3	8.1
9 kW	9.0	9.2	9.3	9.3	9.3	9.2	9.1	8.8	8.6	8.4	8.2
8 kW	9.2	9.4	9.5	9.5	9.5	9.4	9.2	9.0	8.7	8.5	8.3
7 kW	9.5	9.6	9.7	9.8	9.8	9.6	9.4	9.1	8.9	8.6	8.3
6 kW	9.8	10.0	10.1	10.1	10.1	9.9	9.6	9.3	9.0	8.7	8.4
5 kW	9.7	9.9	10.0	10.1	10.0	9.8	9.5	9.2	8.8	8.5	8.2
4 kW	9.6	9.9	10.0	10.0	10.0	9.8	9.4	9.0	8.6	8.3	7.9
3 kW	9.8	10.1	10.2	10.2	10.1	9.7	9.3	8.8	8.4	8.0	7.6
2 kW	9.2	9.7	9.8	9.6	9.4	9.0	8.4	7.9	7.5	7.0	6.7
1 kW	10.9	11.2	10.4	9.3	8.3	7.4	6.7	6.1	5.6	5.2	4.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.3	6.4	6.6	6.7	6.7	6.7	6.7	6.6	6.5	6.4	6.2
9 kW	6.4	6.6	6.7	6.8	6.9	6.9	6.8	6.7	6.6	6.5	6.3
8 kW	6.5	6.7	6.9	7.0	7.1	7.1	7.0	6.8	6.7	6.6	6.4
7 kW	6.7	6.9	7.1	7.2	7.3	7.3	7.2	7.0	6.9	6.7	6.5
6 kW	6.9	7.2	7.4	7.5	7.6	7.5	7.4	7.2	7.0	6.9	6.7
5 kW	7.0	7.3	7.5	7.6	7.7	7.6	7.5	7.3	7.1	6.9	6.7
4 kW	7.1	7.5	7.7	7.8	7.9	7.8	7.6	7.3	7.1	6.9	6.6
3 kW	7.3	7.8	8.0	8.1	8.1	8.0	7.7	7.4	7.1	6.8	6.5
2 kW	7.2	7.8	8.0	8.0	7.9	7.6	7.3	6.9	6.5	6.2	5.9
1 kW	8.6	9.2	8.8	8.1	7.3	6.6	6.0	5.5	5.1	4.8	4.5

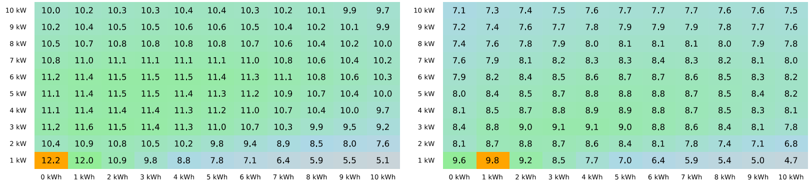
Figure 35 Return on investment for Household 22.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.0	8.2	8.3	8.3	8.1	7.9	7.7	7.5	7.3	7.1	6.9
9 kW	8.1	8.3	8.5	8.4	8.3	8.0	7.8	7.6	7.3	7.1	6.9
8 kW	8.3	8.5	8.7	8.6	8.5	8.2	7.9	7.7	7.4	7.2	7.0
7 kW	8.5	8.8	8.9	8.9	8.7	8.4	8.1	7.8	7.5	7.3	7.0
6 kW	8.8	9.1	9.3	9.2	9.0	8.6	8.3	7.9	7.6	7.3	7.1
5 kW	8.7	9.1	9.2	9.2	8.9	8.6	8.2	7.8	7.5	7.2	6.9
4 kW	8.6	9.1	9.3	9.2	8.9	8.5	8.1	7.7	7.3	7.0	6.7
3 kW	8.8	9.4	9.5	9.3	8.9	8.5	8.0	7.5	7.1	6.8	6.4
2 kW	8.2	9.0	9.0	8.7	8.2	7.7	7.2	6.7	6.3	6.0	5.6
1 kW	9.5	10.0	9.1	8.2	7.2	6.5	5.9	5.4	4.9	4.6	4.2

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.6	5.8	6.0	6.0	6.0	5.9	5.7	5.6	5.5	5.4	5.3
9 kW	5.7	6.0	6.1	6.2	6.1	6.0	5.9	5.7	5.6	5.5	5.3
8 kW	5.9	6.1	6.3	6.3	6.3	6.1	6.0	5.8	5.7	5.6	5.4
7 kW	6.0	6.3	6.5	6.5	6.5	6.3	6.1	6.0	5.8	5.7	5.5
6 kW	6.2	6.6	6.8	6.8	6.7	6.5	6.3	6.1	6.0	5.8	5.6
5 kW	6.3	6.7	6.9	6.9	6.8	6.6	6.4	6.2	6.0	5.8	5.6
4 kW	6.4	6.8	7.1	7.1	7.0	6.8	6.5	6.3	6.0	5.8	5.6
3 kW	6.6	7.2	7.4	7.4	7.2	6.9	6.6	6.3	6.0	5.7	5.5
2 kW	6.4	7.2	7.3	7.2	6.9	6.5	6.2	5.8	5.5	5.3	5.0
1 kW	7.5	8.2	7.7	7.1	6.4	5.8	5.3	4.9	4.5	4.2	3.9

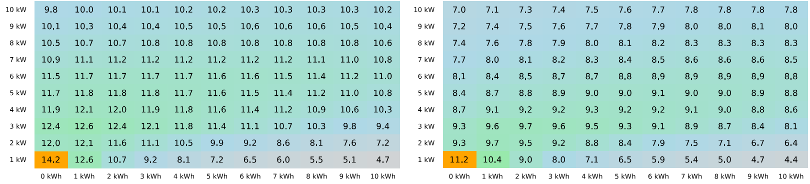
Figure 36 Return on investment for Household 23.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	10.0	10.2	10.3	10.3	10.4	10.4	10.3	10.2	10.1	9.9	9.7
9 kW	10.2	10.4	10.5	10.5	10.6	10.6	10.5	10.4	10.2	10.1	9.9
8 kW	10.5	10.7	10.8	10.8	10.8	10.8	10.7	10.6	10.4	10.2	10.0
7 kW	10.8	11.0	11.1	11.1	11.1	11.1	11.0	10.8	10.6	10.4	10.2
6 kW	11.2	11.4	11.5	11.5	11.5	11.4	11.3	11.1	10.8	10.6	10.3
5 kW	11.1	11.4	11.5	11.5	11.4	11.3	11.2	10.9	10.7	10.4	10.0
4 kW	11.1	11.4	11.4	11.4	11.3	11.2	11.0	10.7	10.4	10.0	9.7
3 kW	11.2	11.6	11.5	11.4	11.3	11.0	10.7	10.3	9.9	9.5	9.2
2 kW	10.4	10.9	10.8	10.5	10.2	9.8	9.4	8.9	8.5	8.0	7.6
1 kW	12.2	12.0	10.9	9.8	8.8	7.8	7.1	6.4	5.9	5.5	5.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.1	7.3	7.4	7.5	7.6	7.7	7.7	7.7	7.6	7.6	7.5
9 kW	7.2	7.4	7.6	7.7	7.8	7.9	7.9	7.9	7.8	7.7	7.6
8 kW	7.4	7.6	7.8	7.9	8.0	8.1	8.1	8.1	8.0	7.9	7.8
7 kW	7.6	7.9	8.1	8.2	8.3	8.3	8.4	8.3	8.2	8.1	8.0
6 kW	7.9	8.2	8.4	8.5	8.6	8.7	8.7	8.6	8.5	8.3	8.2
5 kW	8.0	8.4	8.5	8.7	8.8	8.8	8.8	8.7	8.5	8.4	8.2
4 kW	8.1	8.5	8.7	8.8	8.9	8.9	8.8	8.7	8.5	8.3	8.1
3 kW	8.4	8.8	9.0	9.1	9.1	9.0	8.8	8.6	8.4	8.1	7.8
2 kW	8.1	8.7	8.8	8.7	8.6	8.4	8.1	7.8	7.4	7.1	6.8
1 kW	9.6	9.8	9.2	8.5	7.7	7.0	6.4	5.9	5.4	5.0	4.7

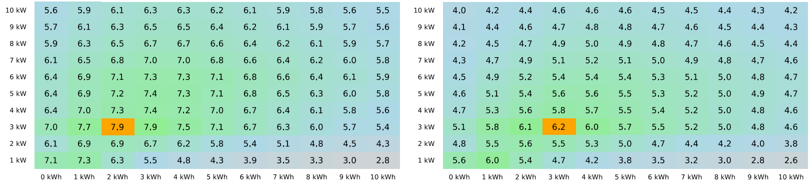
Figure 37 Return on investment for Household 24.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.8	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.3	10.2
9 kW	10.1	10.3	10.4	10.4	10.5	10.5	10.6	10.6	10.6	10.5	10.4
8 kW	10.5	10.7	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.6
7 kW	10.9	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.1	11.0	10.8
6 kW	11.5	11.7	11.7	11.7	11.7	11.6	11.6	11.5	11.4	11.2	11.0
5 kW	11.7	11.8	11.8	11.8	11.7	11.6	11.5	11.4	11.2	11.0	10.8
4 kW	11.9	12.1	12.0	11.9	11.8	11.6	11.4	11.2	10.9	10.6	10.3
3 kW	12.4	12.6	12.4	12.1	11.8	11.4	11.1	10.7	10.3	9.8	9.4
2 kW	12.0	12.1	11.6	11.1	10.5	9.9	9.2	8.6	8.1	7.6	7.2
1 kW	14.2	12.6	10.7	9.2	8.1	7.2	6.5	6.0	5.5	5.1	4.7

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.0	7.1	7.3	7.4	7.5	7.6	7.7	7.8	7.8	7.8	7.8
9 kW	7.2	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.0	8.1	8.0
8 kW	7.4	7.6	7.8	7.9	8.0	8.1	8.2	8.3	8.3	8.3	8.3
7 kW	7.7	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.6	8.6	8.5
6 kW	8.1	8.4	8.5	8.7	8.7	8.8	8.9	8.9	8.9	8.9	8.8
5 kW	8.4	8.7	8.8	8.9	9.0	9.0	9.1	9.0	9.0	8.9	8.8
4 kW	8.7	9.1	9.2	9.2	9.3	9.2	9.2	9.1	9.0	8.8	8.6
3 kW	9.3	9.6	9.7	9.6	9.5	9.3	9.1	8.9	8.7	8.4	8.1
2 kW	9.3	9.7	9.5	9.2	8.8	8.4	7.9	7.5	7.1	6.7	6.4
1 kW	11.2	10.4	9.0	8.0	7.1	6.5	5.9	5.4	5.0	4.7	4.4

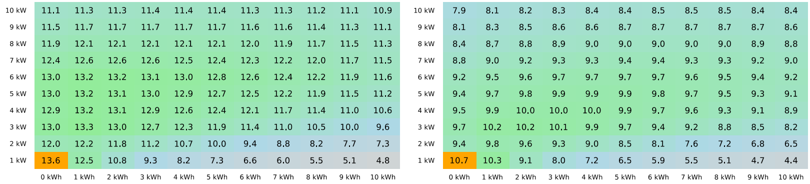
Figure 38 Return on investment for Household 25.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.6	5.9	6.1	6.3	6.3	6.2	6.1	5.9	5.8	5.6	5.5
9 kW	5.7	6.1	6.3	6.5	6.5	6.4	6.2	6.1	5.9	5.7	5.6
8 kW	5.9	6.3	6.5	6.7	6.7	6.6	6.4	6.2	6.1	5.9	5.7
7 kW	6.1	6.5	6.8	7.0	7.0	6.8	6.6	6.4	6.2	6.0	5.8
6 kW	6.4	6.9	7.1	7.3	7.3	7.1	6.8	6.6	6.4	6.1	5.9
5 kW	6.4	6.9	7.2	7.4	7.3	7.1	6.8	6.5	6.3	6.0	5.8
4 kW	6.4	7.0	7.3	7.4	7.2	7.0	6.7	6.4	6.1	5.8	5.6
3 kW	7.0	7.7	7.9	7.9	7.5	7.1	6.7	6.3	6.0	5.7	5.4
2 kW	6.1	6.9	6.9	6.7	6.2	5.8	5.4	5.1	4.8	4.5	4.3
1 kW	7.1	7.3	6.3	5.5	4.8	4.3	3.9	3.5	3.3	3.0	2.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	4.0	4.2	4.4	4.6	4.6	4.6	4.5	4.5	4.4	4.3	4.2
9 kW	4.1	4.4	4.6	4.7	4.8	4.8	4.7	4.6	4.5	4.4	4.3
8 kW	4.2	4.5	4.7	4.9	5.0	4.9	4.8	4.7	4.6	4.5	4.4
7 kW	4.3	4.7	4.9	5.1	5.2	5.1	5.0	4.9	4.8	4.7	4.6
6 kW	4.5	4.9	5.2	5.4	5.4	5.4	5.3	5.1	5.0	4.8	4.7
5 kW	4.6	5.1	5.4	5.6	5.6	5.5	5.3	5.2	5.0	4.9	4.7
4 kW	4.7	5.3	5.6	5.8	5.7	5.5	5.4	5.2	5.0	4.8	4.6
3 kW	5.1	5.8	6.1	6.2	6.0	5.7	5.5	5.2	5.0	4.8	4.6
2 kW	4.8	5.5	5.6	5.5	5.3	5.0	4.7	4.4	4.2	4.0	3.8
1 kW	5.6	6.0	5.4	4.7	4.2	3.8	3.5	3.2	3.0	2.8	2.6

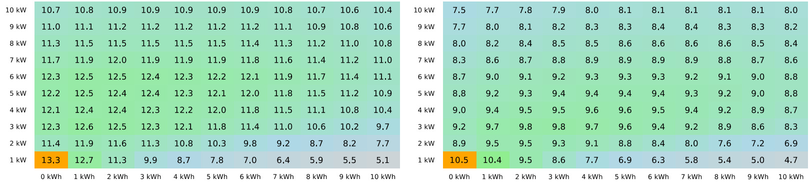
Figure 39 Return on investment for Household 26.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.1	11.3	11.3	11.4	11.4	11.4	11.3	11.3	11.2	11.1	10.9
9 kW	11.5	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.4	11.3	11.1
8 kW	11.9	12.1	12.1	12.1	12.1	12.1	12.0	11.9	11.7	11.5	11.3
7 kW	12.4	12.6	12.6	12.6	12.5	12.4	12.3	12.2	12.0	11.7	11.5
6 kW	13.0	13.2	13.2	13.1	13.0	12.8	12.6	12.4	12.2	11.9	11.6
5 kW	13.0	13.2	13.1	13.0	12.9	12.7	12.5	12.2	11.9	11.5	11.2
4 kW	12.9	13.2	13.1	12.9	12.6	12.4	12.1	11.7	11.4	11.0	10.6
3 kW	13.0	13.3	13.0	12.7	12.3	11.9	11.4	11.0	10.5	10.0	9.6
2 kW	12.0	12.2	11.8	11.2	10.7	10.0	9.4	8.8	8.2	7.7	7.3
1 kW	13.6	12.5	10.8	9.3	8.2	7.3	6.6	6.0	5.5	5.1	4.8

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.9	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.5	8.4	8.4
9 kW	8.1	8.3	8.5	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.6
8 kW	8.4	8.7	8.8	8.9	9.0	9.0	9.0	9.0	9.0	8.9	8.8
7 kW	8.8	9.0	9.2	9.3	9.3	9.4	9.4	9.3	9.3	9.2	9.0
6 kW	9.2	9.5	9.6	9.7	9.7	9.7	9.7	9.6	9.5	9.4	9.2
5 kW	9.4	9.7	9.8	9.9	9.9	9.9	9.8	9.7	9.5	9.3	9.1
4 kW	9.5	9.9	10.0	10.0	10.0	9.9	9.7	9.6	9.3	9.1	8.9
3 kW	9.7	10.2	10.2	10.1	9.9	9.7	9.4	9.2	8.8	8.5	8.2
2 kW	9.4	9.8	9.6	9.3	9.0	8.5	8.1	7.6	7.2	6.8	6.5
1 kW	10.7	10.3	9.1	8.0	7.2	6.5	5.9	5.5	5.1	4.7	4.4

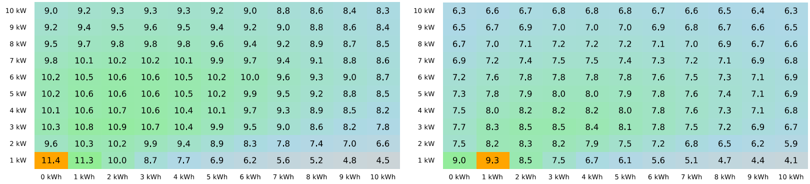
Figure 40 Return on investment for Household 27.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	10.7	10.8	10.9	10.9	10.9	10.9	10.9	10.8	10.7	10.6	10.4
9 kW	11.0	11.1	11.2	11.2	11.2	11.2	11.2	11.1	10.9	10.8	10.6
8 kW	11.3	11.5	11.5	11.5	11.5	11.5	11.4	11.3	11.2	11.0	10.8
7 kW	11.7	11.9	12.0	11.9	11.9	11.9	11.8	11.6	11.4	11.2	11.0
6 kW	12.3	12.5	12.5	12.4	12.3	12.2	12.1	11.9	11.7	11.4	11.1
5 kW	12.2	12.5	12.4	12.4	12.3	12.1	12.0	11.8	11.5	11.2	10.9
4 kW	12.1	12.4	12.4	12.3	12.2	12.0	11.8	11.5	11.1	10.8	10.4
3 kW	12.3	12.6	12.5	12.3	12.1	11.8	11.4	11.0	10.6	10.2	9.7
2 kW	11.4	11.9	11.6	11.3	10.8	10.3	9.8	9.2	8.7	8.2	7.7
1 kW	13.3	12.7	11.3	9.9	8.7	7.8	7.0	6.4	5.9	5.5	5.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.5	7.7	7.8	7.9	8.0	8.1	8.1	8.1	8.1	8.1	8.0
9 kW	7.7	8.0	8.1	8.2	8.3	8.3	8.4	8.4	8.3	8.3	8.2
8 kW	8.0	8.2	8.4	8.5	8.5	8.6	8.6	8.6	8.6	8.5	8.4
7 kW	8.3	8.6	8.7	8.8	8.9	8.9	8.9	8.9	8.8	8.7	8.6
6 kW	8.7	9.0	9.1	9.2	9.3	9.3	9.3	9.2	9.1	9.0	8.8
5 kW	8.8	9.2	9.3	9.4	9.4	9.4	9.4	9.3	9.2	9.0	8.8
4 kW	9.0	9.4	9.5	9.5	9.6	9.6	9.5	9.4	9.2	8.9	8.7
3 kW	9.2	9.7	9.8	9.8	9.7	9.6	9.4	9.2	8.9	8.6	8.3
2 kW	8.9	9.5	9.5	9.3	9.1	8.8	8.4	8.0	7.6	7.2	6.9
1 kW	10.5	10.4	9.5	8.6	7.7	6.9	6.3	5.8	5.4	5.0	4.7

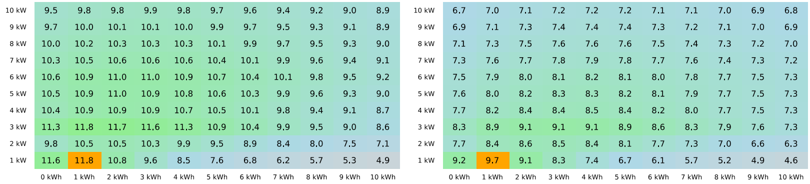
Figure 41 Return on investment for Household 28.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.0	9.2	9.3	9.3	9.3	9.2	9.0	8.8	8.6	8.4	8.3
9 kW	9.2	9.4	9.5	9.6	9.5	9.4	9.2	9.0	8.8	8.6	8.4
8 kW	9.5	9.7	9.8	9.8	9.8	9.6	9.4	9.2	8.9	8.7	8.5
7 kW	9.8	10.1	10.2	10.2	10.1	9.9	9.7	9.4	9.1	8.8	8.6
6 kW	10.2	10.5	10.6	10.6	10.5	10.2	10.0	9.6	9.3	9.0	8.7
5 kW	10.2	10.6	10.6	10.6	10.5	10.2	9.9	9.5	9.2	8.8	8.5
4 kW	10.1	10.6	10.7	10.6	10.4	10.1	9.7	9.3	8.9	8.5	8.2
3 kW	10.3	10.8	10.9	10.7	10.4	9.9	9.5	9.0	8.6	8.2	7.8
2 kW	9.6	10.3	10.2	9.9	9.4	8.9	8.3	7.8	7.4	7.0	6.6
1 kW	11.4	11.3	10.0	8.7	7.7	6.9	6.2	5.6	5.2	4.8	4.5

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.3	6.6	6.7	6.8	6.8	6.8	6.7	6.6	6.5	6.4	6.3
9 kW	6.5	6.7	6.9	7.0	7.0	7.0	6.9	6.8	6.7	6.6	6.5
8 kW	6.7	7.0	7.1	7.2	7.2	7.2	7.1	7.0	6.9	6.7	6.6
7 kW	6.9	7.2	7.4	7.5	7.5	7.4	7.3	7.2	7.1	6.9	6.8
6 kW	7.2	7.6	7.8	7.8	7.8	7.8	7.6	7.5	7.3	7.1	6.9
5 kW	7.3	7.8	7.9	8.0	8.0	7.9	7.8	7.6	7.4	7.1	6.9
4 kW	7.5	8.0	8.2	8.2	8.2	8.0	7.8	7.6	7.3	7.1	6.8
3 kW	7.7	8.3	8.5	8.5	8.4	8.1	7.8	7.5	7.2	6.9	6.7
2 kW	7.5	8.2	8.3	8.2	7.9	7.5	7.2	6.8	6.5	6.2	5.9
1 kW	9.0	9.3	8.5	7.5	6.7	6.1	5.6	5.1	4.7	4.4	4.1

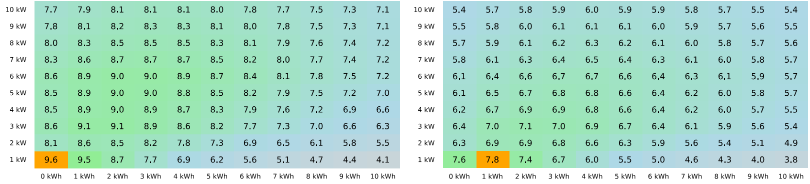
Figure 42 Return on investment for Household 29.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	9.5	9.8	9.8	9.9	9.8	9.7	9.6	9.4	9.2	9.0	8.9
9 kW	9.7	10.0	10.1	10.1	10.0	9.9	9.7	9.5	9.3	9.1	8.9
8 kW	10.0	10.2	10.3	10.3	10.3	10.1	9.9	9.7	9.5	9.3	9.0
7 kW	10.3	10.5	10.6	10.6	10.6	10.4	10.1	9.9	9.6	9.4	9.1
6 kW	10.6	10.9	11.0	11.0	10.9	10.7	10.4	10.1	9.8	9.5	9.2
5 kW	10.5	10.9	11.0	10.9	10.8	10.6	10.3	9.9	9.6	9.3	9.0
4 kW	10.4	10.9	10.9	10.9	10.7	10.5	10.1	9.8	9.4	9.1	8.7
3 kW	11.3	11.8	11.7	11.6	11.3	10.9	10.4	9.9	9.5	9.0	8.6
2 kW	9.8	10.5	10.5	10.3	9.9	9.5	8.9	8.4	8.0	7.5	7.1
1 kW	11.6	11.8	10.8	9.6	8.5	7.6	6.8	6.2	5.7	5.3	4.9

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.7	7.0	7.1	7.2	7.2	7.2	7.1	7.1	7.0	6.9	6.8
9 kW	6.9	7.1	7.3	7.4	7.4	7.4	7.3	7.2	7.1	7.0	6.9
8 kW	7.1	7.3	7.5	7.6	7.6	7.6	7.5	7.4	7.3	7.2	7.0
7 kW	7.3	7.6	7.7	7.8	7.9	7.8	7.7	7.6	7.4	7.3	7.2
6 kW	7.5	7.9	8.0	8.1	8.2	8.1	8.0	7.8	7.7	7.5	7.3
5 kW	7.6	8.0	8.2	8.3	8.3	8.2	8.1	7.9	7.7	7.5	7.3
4 kW	7.7	8.2	8.4	8.4	8.5	8.4	8.2	8.0	7.7	7.5	7.3
3 kW	8.3	8.9	9.1	9.1	9.1	8.9	8.6	8.3	7.9	7.6	7.3
2 kW	7.7	8.4	8.6	8.5	8.4	8.1	7.7	7.3	7.0	6.6	6.3
1 kW	9.2	9.7	9.1	8.3	7.4	6.7	6.1	5.7	5.2	4.9	4.6

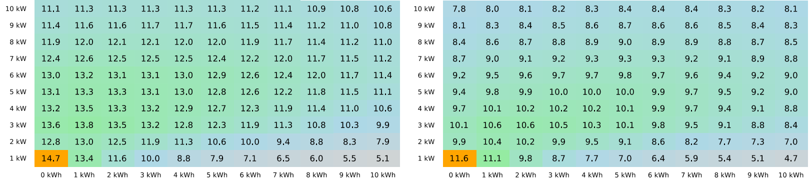
Figure 43 Return on investment for Household 30.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.7	7.9	8.1	8.1	8.1	8.0	7.8	7.7	7.5	7.3	7.1
9 kW	7.8	8.1	8.2	8.3	8.3	8.1	8.0	7.8	7.5	7.3	7.1
8 kW	8.0	8.3	8.5	8.5	8.5	8.3	8.1	7.9	7.6	7.4	7.2
7 kW	8.3	8.6	8.7	8.7	8.7	8.5	8.2	8.0	7.7	7.4	7.2
6 kW	8.6	8.9	9.0	9.0	8.9	8.7	8.4	8.1	7.8	7.5	7.2
5 kW	8.5	8.9	9.0	9.0	8.8	8.5	8.2	7.9	7.5	7.2	7.0
4 kW	8.5	8.9	9.0	8.9	8.7	8.3	7.9	7.6	7.2	6.9	6.6
3 kW	8.6	9.1	9.1	8.9	8.6	8.2	7.7	7.3	7.0	6.6	6.3
2 kW	8.1	8.6	8.5	8.2	7.8	7.3	6.9	6.5	6.1	5.8	5.5
1 kW	9.6	9.5	8.7	7.7	6.9	6.2	5.6	5.1	4.7	4.4	4.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	5.4	5.7	5.8	5.9	6.0	5.9	5.9	5.8	5.7	5.5	5.4
9 kW	5.5	5.8	6.0	6.1	6.1	6.1	6.0	5.9	5.7	5.6	5.5
8 kW	5.7	5.9	6.1	6.2	6.3	6.2	6.1	6.0	5.8	5.7	5.6
7 kW	5.8	6.1	6.3	6.4	6.5	6.4	6.3	6.1	6.0	5.8	5.7
6 kW	6.1	6.4	6.6	6.7	6.7	6.6	6.4	6.3	6.1	5.9	5.7
5 kW	6.1	6.5	6.7	6.8	6.8	6.6	6.4	6.2	6.0	5.8	5.7
4 kW	6.2	6.7	6.9	6.9	6.8	6.6	6.4	6.2	6.0	5.7	5.5
3 kW	6.4	7.0	7.1	7.0	6.9	6.7	6.4	6.1	5.9	5.6	5.4
2 kW	6.3	6.9	6.9	6.8	6.6	6.3	5.9	5.6	5.4	5.1	4.9
1 kW	7.6	7.8	7.4	6.7	6.0	5.5	5.0	4.6	4.3	4.0	3.8

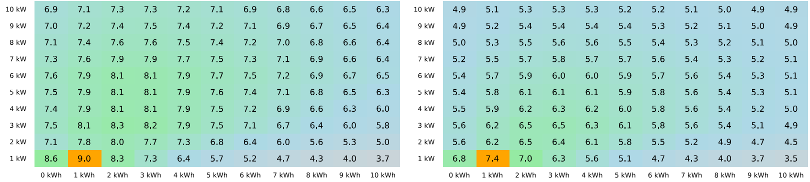
Figure 44 Return on investment for Household 31.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.1	11.3	11.3	11.3	11.3	11.3	11.2	11.1	10.9	10.8	10.6
9 kW	11.4	11.6	11.6	11.7	11.7	11.6	11.5	11.4	11.2	11.0	10.8
8 kW	11.9	12.0	12.1	12.1	12.0	12.0	11.9	11.7	11.4	11.2	11.0
7 kW	12.4	12.6	12.5	12.5	12.5	12.4	12.2	12.0	11.7	11.5	11.2
6 kW	13.0	13.2	13.1	13.1	13.0	12.9	12.6	12.4	12.0	11.7	11.4
5 kW	13.1	13.3	13.3	13.1	13.0	12.8	12.6	12.2	11.8	11.5	11.1
4 kW	13.2	13.5	13.3	13.2	12.9	12.7	12.3	11.9	11.4	11.0	10.6
3 kW	13.6	13.8	13.5	13.2	12.8	12.3	11.9	11.3	10.8	10.3	9.9
2 kW	12.8	13.0	12.5	11.9	11.3	10.6	10.0	9.4	8.8	8.3	7.9
1 kW	14.7	13.4	11.6	10.0	8.8	7.9	7.1	6.5	6.0	5.5	5.1

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.8	8.0	8.1	8.2	8.3	8.4	8.4	8.4	8.3	8.2	8.1
9 kW	8.1	8.3	8.4	8.5	8.6	8.7	8.6	8.6	8.5	8.4	8.3
8 kW	8.4	8.6	8.7	8.8	8.9	9.0	8.9	8.9	8.8	8.7	8.5
7 kW	8.7	9.0	9.1	9.2	9.3	9.3	9.3	9.2	9.1	8.9	8.8
6 kW	9.2	9.5	9.6	9.7	9.7	9.8	9.7	9.6	9.4	9.2	9.0
5 kW	9.4	9.8	9.9	10.0	10.0	10.0	9.9	9.7	9.5	9.2	9.0
4 kW	9.7	10.1	10.2	10.2	10.2	10.1	9.9	9.7	9.4	9.1	8.8
3 kW	10.1	10.6	10.6	10.5	10.3	10.1	9.8	9.5	9.1	8.8	8.4
2 kW	9.9	10.4	10.2	9.9	9.5	9.1	8.6	8.2	7.7	7.3	7.0
1 kW	11.6	11.1	9.8	8.7	7.7	7.0	6.4	5.9	5.4	5.1	4.7

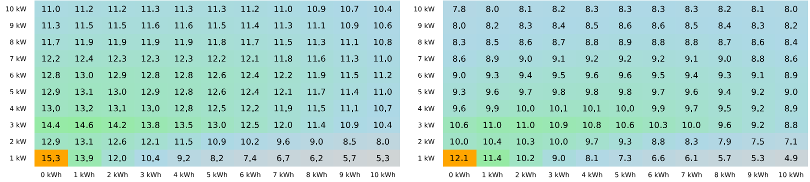
Figure 45 Return on investment for Household 32.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.9	7.1	7.3	7.3	7.2	7.1	6.9	6.8	6.6	6.5	6.3
9 kW	7.0	7.2	7.4	7.5	7.4	7.2	7.1	6.9	6.7	6.5	6.4
8 kW	7.1	7.4	7.6	7.6	7.5	7.4	7.2	7.0	6.8	6.6	6.4
7 kW	7.3	7.6	7.9	7.9	7.7	7.5	7.3	7.1	6.9	6.6	6.4
6 kW	7.6	7.9	8.1	8.1	7.9	7.7	7.5	7.2	6.9	6.7	6.5
5 kW	7.5	7.9	8.1	8.1	7.9	7.6	7.4	7.1	6.8	6.5	6.3
4 kW	7.4	7.9	8.1	8.1	7.9	7.5	7.2	6.9	6.6	6.3	6.0
3 kW	7.5	8.1	8.3	8.2	7.9	7.5	7.1	6.7	6.4	6.0	5.8
2 kW	7.1	7.8	8.0	7.7	7.3	6.8	6.4	6.0	5.6	5.3	5.0
1 kW	8.6	9.0	8.3	7.3	6.4	5.7	5.2	4.7	4.3	4.0	3.7

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	4.9	5.1	5.3	5.3	5.3	5.2	5.2	5.1	5.0	4.9	4.9
9 kW	4.9	5.2	5.4	5.4	5.4	5.4	5.3	5.2	5.1	5.0	4.9
8 kW	5.0	5.3	5.5	5.6	5.6	5.5	5.4	5.3	5.2	5.1	5.0
7 kW	5.2	5.5	5.7	5.8	5.7	5.7	5.6	5.4	5.3	5.2	5.1
6 kW	5.4	5.7	5.9	6.0	6.0	5.9	5.7	5.6	5.4	5.3	5.1
5 kW	5.4	5.8	6.1	6.1	6.1	5.9	5.8	5.6	5.4	5.3	5.1
4 kW	5.5	5.9	6.2	6.3	6.2	6.0	5.8	5.6	5.4	5.2	5.0
3 kW	5.6	6.2	6.5	6.5	6.3	6.1	5.8	5.6	5.4	5.1	4.9
2 kW	5.6	6.2	6.5	6.4	6.1	5.8	5.5	5.2	4.9	4.7	4.5
1 kW	6.8	7.4	7.0	6.3	5.6	5.1	4.7	4.3	4.0	3.7	3.5

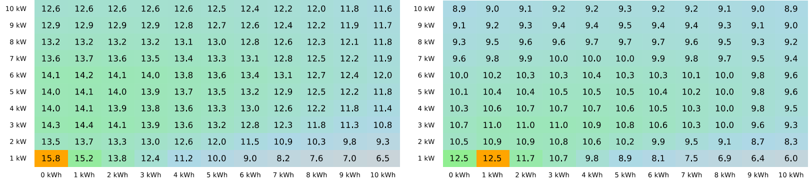
Figure 46 Return on investment for Household 33.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	11.0	11.2	11.2	11.3	11.3	11.3	11.2	11.0	10.9	10.7	10.4
9 kW	11.3	11.5	11.5	11.6	11.6	11.5	11.4	11.3	11.1	10.9	10.6
8 kW	11.7	11.9	11.9	11.9	11.9	11.8	11.7	11.5	11.3	11.1	10.8
7 kW	12.2	12.4	12.3	12.3	12.3	12.2	12.1	11.8	11.6	11.3	11.0
6 kW	12.8	13.0	12.9	12.8	12.8	12.6	12.4	12.2	11.9	11.5	11.2
5 kW	12.9	13.1	13.0	12.9	12.8	12.6	12.4	12.1	11.7	11.4	11.0
4 kW	13.0	13.2	13.1	13.0	12.8	12.5	12.2	11.9	11.5	11.1	10.7
3 kW	14.4	14.6	14.2	13.8	13.5	13.0	12.5	12.0	11.4	10.9	10.4
2 kW	12.9	13.1	12.6	12.1	11.5	10.9	10.2	9.6	9.0	8.5	8.0
1 kW	15.3	13.9	12.0	10.4	9.2	8.2	7.4	6.7	6.2	5.7	5.3

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.8	8.0	8.1	8.2	8.3	8.3	8.3	8.3	8.2	8.1	8.0
9 kW	8.0	8.2	8.3	8.4	8.5	8.6	8.6	8.5	8.4	8.3	8.2
8 kW	8.3	8.5	8.6	8.7	8.8	8.9	8.8	8.8	8.7	8.6	8.4
7 kW	8.6	8.9	9.0	9.1	9.2	9.2	9.2	9.1	9.0	8.8	8.6
6 kW	9.0	9.3	9.4	9.5	9.6	9.6	9.5	9.4	9.3	9.1	8.9
5 kW	9.3	9.6	9.7	9.8	9.8	9.8	9.7	9.6	9.4	9.2	9.0
4 kW	9.6	9.9	10.0	10.1	10.1	10.0	9.9	9.7	9.5	9.2	8.9
3 kW	10.6	11.0	11.0	10.9	10.8	10.6	10.3	10.0	9.6	9.2	8.8
2 kW	10.0	10.4	10.3	10.0	9.7	9.3	8.8	8.3	7.9	7.5	7.1
1 kW	12.1	11.4	10.2	9.0	8.1	7.3	6.6	6.1	5.7	5.3	4.9

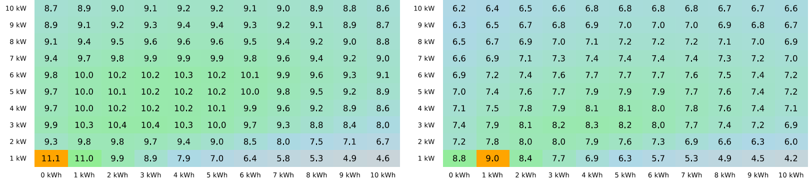
Figure 47 Return on investment for Household 34.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	12.6	12.6	12.6	12.6	12.6	12.5	12.4	12.2	12.0	11.8	11.6
9 kW	12.9	12.9	12.9	12.9	12.8	12.7	12.6	12.4	12.2	11.9	11.7
8 kW	13.2	13.2	13.2	13.2	13.1	13.0	12.8	12.6	12.3	12.1	11.8
7 kW	13.6	13.7	13.6	13.5	13.4	13.3	13.1	12.8	12.5	12.2	11.9
6 kW	14.1	14.2	14.1	14.0	13.8	13.6	13.4	13.1	12.7	12.4	12.0
5 kW	14.0	14.1	14.0	13.9	13.7	13.5	13.2	12.9	12.5	12.2	11.8
4 kW	14.0	14.1	13.9	13.8	13.6	13.3	13.0	12.6	12.2	11.8	11.4
3 kW	14.3	14.4	14.1	13.9	13.6	13.2	12.8	12.3	11.8	11.3	10.8
2 kW	13.5	13.7	13.3	13.0	12.6	12.0	11.5	10.9	10.3	9.8	9.3
1 kW	15.8	15.2	13.8	12.4	11.2	10.0	9.0	8.2	7.6	7.0	6.5

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.9	9.0	9.1	9.2	9.2	9.3	9.2	9.2	9.1	9.0	8.9
9 kW	9.1	9.2	9.3	9.4	9.4	9.5	9.4	9.4	9.3	9.1	9.0
8 kW	9.3	9.5	9.6	9.6	9.7	9.7	9.7	9.6	9.5	9.3	9.2
7 kW	9.6	9.8	9.9	10.0	10.0	10.0	9.9	9.8	9.7	9.5	9.4
6 kW	10.0	10.2	10.3	10.3	10.4	10.3	10.3	10.1	10.0	9.8	9.6
5 kW	10.1	10.4	10.4	10.5	10.5	10.5	10.4	10.2	10.0	9.8	9.6
4 kW	10.3	10.6	10.7	10.7	10.7	10.6	10.5	10.3	10.0	9.8	9.5
3 kW	10.7	11.0	11.0	11.0	10.9	10.8	10.6	10.3	10.0	9.6	9.3
2 kW	10.5	10.9	10.9	10.8	10.6	10.2	9.9	9.5	9.1	8.7	8.3
1 kW	12.5	12.5	11.7	10.7	9.8	8.9	8.1	7.5	6.9	6.4	6.0

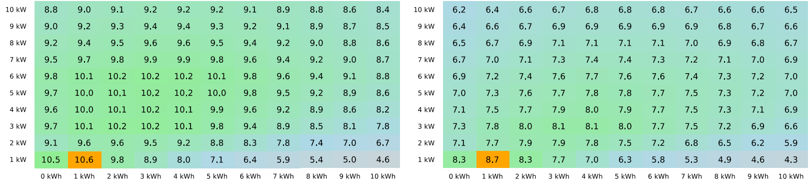
Figure 48 Return on investment for Household 35.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.7	8.9	9.0	9.1	9.2	9.2	9.1	9.0	8.9	8.8	8.6
9 kW	8.9	9.1	9.2	9.3	9.4	9.4	9.3	9.2	9.1	8.9	8.7
8 kW	9.1	9.4	9.5	9.6	9.6	9.6	9.5	9.4	9.2	9.0	8.8
7 kW	9.4	9.7	9.8	9.9	9.9	9.9	9.8	9.6	9.4	9.2	9.0
6 kW	9.8	10.0	10.2	10.2	10.3	10.2	10.1	9.9	9.6	9.3	9.1
5 kW	9.7	10.0	10.1	10.2	10.2	10.2	10.0	9.8	9.5	9.2	8.9
4 kW	9.7	10.0	10.2	10.2	10.2	10.1	9.9	9.6	9.2	8.9	8.6
3 kW	9.9	10.3	10.4	10.4	10.3	10.0	9.7	9.3	8.8	8.4	8.0
2 kW	9.3	9.8	9.8	9.7	9.4	9.0	8.5	8.0	7.5	7.1	6.7
1 kW	11.1	11.0	9.9	8.9	7.9	7.0	6.4	5.8	5.3	4.9	4.6

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.2	6.4	6.5	6.6	6.8	6.8	6.8	6.8	6.7	6.7	6.6
9 kW	6.3	6.5	6.7	6.8	6.9	7.0	7.0	7.0	6.9	6.8	6.7
8 kW	6.5	6.7	6.9	7.0	7.1	7.2	7.2	7.2	7.1	7.0	6.9
7 kW	6.6	6.9	7.1	7.3	7.4	7.4	7.4	7.4	7.3	7.2	7.0
6 kW	6.9	7.2	7.4	7.6	7.7	7.7	7.7	7.6	7.5	7.4	7.2
5 kW	7.0	7.4	7.6	7.7	7.9	7.9	7.9	7.7	7.6	7.4	7.2
4 kW	7.1	7.5	7.8	7.9	8.1	8.1	8.0	7.8	7.6	7.4	7.1
3 kW	7.4	7.9	8.1	8.2	8.3	8.2	8.0	7.7	7.4	7.2	6.9
2 kW	7.2	7.8	8.0	8.0	7.9	7.6	7.3	6.9	6.6	6.3	6.0
1 kW	8.8	9.0	8.4	7.7	6.9	6.3	5.7	5.3	4.9	4.5	4.2

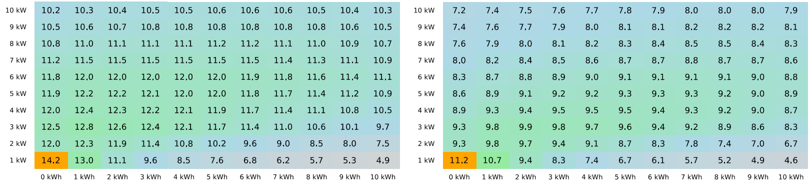
Figure 49 Return on investment for Household 36.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.8	9.0	9.1	9.2	9.2	9.2	9.1	8.9	8.8	8.6	8.4
9 kW	9.0	9.2	9.3	9.4	9.4	9.3	9.2	9.1	8.9	8.7	8.5
8 kW	9.2	9.4	9.5	9.6	9.6	9.5	9.4	9.2	9.0	8.8	8.6
7 kW	9.5	9.7	9.8	9.9	9.9	9.8	9.6	9.4	9.2	9.0	8.7
6 kW	9.8	10.1	10.2	10.2	10.2	10.1	9.8	9.6	9.4	9.1	8.8
5 kW	9.7	10.0	10.1	10.2	10.2	10.0	9.8	9.5	9.2	8.9	8.6
4 kW	9.6	10.0	10.1	10.2	10.1	9.9	9.6	9.2	8.9	8.6	8.2
3 kW	9.7	10.1	10.2	10.2	10.1	9.8	9.4	8.9	8.5	8.1	7.8
2 kW	9.1	9.6	9.6	9.5	9.2	8.8	8.3	7.8	7.4	7.0	6.7
1 kW	10.5	10.6	9.8	8.9	8.0	7.1	6.4	5.9	5.4	5.0	4.6

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.2	6.4	6.6	6.7	6.8	6.8	6.8	6.7	6.6	6.6	6.5
9 kW	6.4	6.6	6.7	6.9	6.9	6.9	6.9	6.9	6.8	6.7	6.6
8 kW	6.5	6.7	6.9	7.1	7.1	7.1	7.1	7.0	6.9	6.8	6.7
7 kW	6.7	7.0	7.1	7.3	7.4	7.4	7.3	7.2	7.1	7.0	6.9
6 kW	6.9	7.2	7.4	7.6	7.7	7.6	7.6	7.4	7.3	7.2	7.0
5 kW	7.0	7.3	7.6	7.7	7.8	7.8	7.7	7.5	7.3	7.2	7.0
4 kW	7.1	7.5	7.7	7.9	8.0	7.9	7.7	7.5	7.3	7.1	6.9
3 kW	7.3	7.8	8.0	8.1	8.1	8.0	7.7	7.5	7.2	6.9	6.6
2 kW	7.1	7.7	7.9	7.9	7.8	7.5	7.2	6.8	6.5	6.2	5.9
1 kW	8.3	8.7	8.3	7.7	7.0	6.3	5.8	5.3	4.9	4.6	4.3

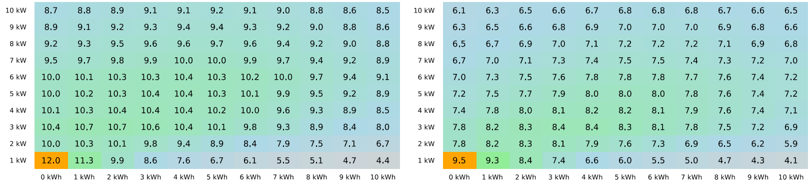
Figure 50 Return on investment for Household 37.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	10.2	10.3	10.4	10.5	10.5	10.6	10.6	10.6	10.5	10.4	10.3
9 kW	10.5	10.6	10.7	10.8	10.8	10.8	10.8	10.8	10.8	10.6	10.5
8 kW	10.8	11.0	11.1	11.1	11.1	11.2	11.2	11.1	11.0	10.9	10.7
7 kW	11.2	11.5	11.5	11.5	11.5	11.5	11.5	11.4	11.3	11.1	10.9
6 kW	11.8	12.0	12.0	12.0	12.0	12.0	11.9	11.8	11.6	11.4	11.1
5 kW	11.9	12.2	12.2	12.1	12.0	12.0	11.8	11.7	11.4	11.2	10.9
4 kW	12.0	12.4	12.3	12.2	12.1	11.9	11.7	11.4	11.1	10.8	10.5
3 kW	12.5	12.8	12.6	12.4	12.1	11.7	11.4	11.0	10.6	10.1	9.7
2 kW	12.0	12.3	11.9	11.4	10.8	10.2	9.6	9.0	8.5	8.0	7.5
1 kW	14.2	13.0	11.1	9.6	8.5	7.6	6.8	6.2	5.7	5.3	4.9

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	7.2	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.0	8.0	7.9
9 kW	7.4	7.6	7.7	7.9	8.0	8.1	8.1	8.2	8.2	8.2	8.1
8 kW	7.6	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.5	8.4	8.3
7 kW	8.0	8.2	8.4	8.5	8.6	8.7	8.7	8.8	8.7	8.7	8.6
6 kW	8.3	8.7	8.8	8.9	9.0	9.1	9.1	9.1	9.1	9.0	8.8
5 kW	8.6	8.9	9.1	9.2	9.2	9.3	9.3	9.3	9.2	9.0	8.9
4 kW	8.9	9.3	9.4	9.5	9.5	9.5	9.4	9.3	9.2	9.0	8.7
3 kW	9.3	9.8	9.9	9.8	9.7	9.6	9.4	9.2	8.9	8.6	8.3
2 kW	9.3	9.8	9.7	9.4	9.1	8.7	8.3	7.8	7.4	7.0	6.7
1 kW	11.2	10.7	9.4	8.3	7.4	6.7	6.1	5.7	5.2	4.9	4.6

Figure 51 Return on investment for Household 38.



	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	8.7	8.8	8.9	9.1	9.1	9.2	9.1	9.0	8.8	8.6	8.5
9 kW	8.9	9.1	9.2	9.3	9.4	9.4	9.3	9.2	9.0	8.8	8.6
8 kW	9.2	9.3	9.5	9.6	9.6	9.7	9.6	9.4	9.2	9.0	8.8
7 kW	9.5	9.7	9.8	9.9	10.0	10.0	9.9	9.7	9.4	9.2	8.9
6 kW	10.0	10.1	10.3	10.3	10.4	10.3	10.2	10.0	9.7	9.4	9.1
5 kW	10.0	10.2	10.3	10.4	10.4	10.3	10.1	9.9	9.5	9.2	8.9
4 kW	10.1	10.3	10.4	10.4	10.4	10.2	10.0	9.6	9.3	8.9	8.5
3 kW	10.4	10.7	10.7	10.6	10.4	10.1	9.8	9.3	8.9	8.4	8.0
2 kW	10.0	10.3	10.1	9.8	9.4	8.9	8.4	7.9	7.5	7.1	6.7
1 kW	12.0	11.3	9.9	8.6	7.6	6.7	6.1	5.5	5.1	4.7	4.4

	0 kWh	1 kWh	2 kWh	3 kWh	4 kWh	5 kWh	6 kWh	7 kWh	8 kWh	9 kWh	10 kWh
10 kW	6.1	6.3	6.5	6.6	6.7	6.8	6.8	6.8	6.7	6.6	6.5
9 kW	6.3	6.5	6.6	6.8	6.9	7.0	7.0	7.0	6.9	6.8	6.6
8 kW	6.5	6.7	6.9	7.0	7.1	7.2	7.2	7.2	7.1	6.9	6.8
7 kW	6.7	7.0	7.1	7.3	7.4	7.5	7.5	7.4	7.3	7.2	7.0
6 kW	7.0	7.3	7.5	7.6	7.8	7.8	7.8	7.7	7.6	7.4	7.2
5 kW	7.2	7.5	7.7	7.9	8.0	8.0	8.0	7.8	7.6	7.4	7.2
4 kW	7.4	7.8	8.0	8.1	8.2	8.2	8.1	7.9	7.6	7.4	7.1
3 kW	7.8	8.2	8.3	8.4	8.4	8.3	8.1	7.8	7.5	7.2	6.9
2 kW	7.8	8.2	8.3	8.1	7.9	7.6	7.3	6.9	6.5	6.2	5.9
1 kW	9.5	9.3	8.4	7.4	6.6	6.0	5.5	5.0	4.7	4.3	4.1

Predicting storage requirements

The ideal amount of storage for a household depends on how energy is used and generated by the household, how energy is imported and exported, and the desired Return on Investment (RoI). We would like to be able to determine the ideal amount of storage for a household without requiring detailed logs; it would be useful to be able to determine storage requirements based on readily-available measurements: annual import, annual export and annual PV generation. (Annual load can be determined from these three measurements.)

We first constructed a linear model with the form

$$S = c_I I + c_E E + c_G G$$

where S is the storage capacity required to give a 10% RoI, I is the annual energy import, E is the annual energy export, G is the annual PV generation, and coefficients c_I, c_E and c_G are to be determined. The value of S for each household was found by interpolating the data shown in Figure 11.

Using linear regression with the data from the thirty-eight households at Lochiel Park, we found that export was the only significant factor. When we removed import and generation, the best fit model was

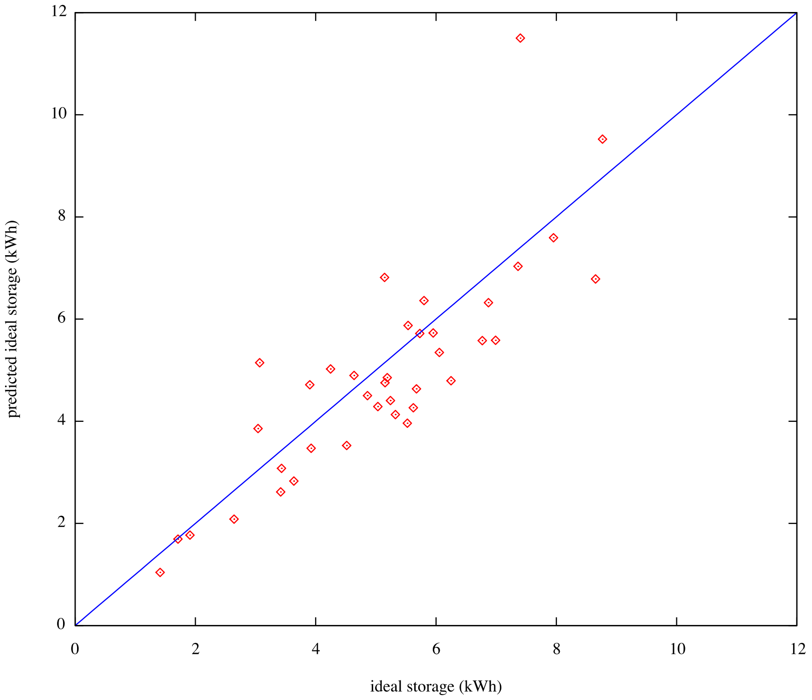
$$S = 2.324 \times 10^{-3} E$$

This model is a good fit, with adjusted $R^2 = 0.955$. The residuals—the difference between the ideal storage and the model—had the following characteristics (in kWh):

min	1Q	median	3Q	max
-4.0971	-0.1908	0.3668	0.8308	1.8679

Figure 52 shows the storage that gives 10% RoI against the prediction from the model.

Figure 52 Predicted ideal storage vs ideal storage.



Conclusion

We have used one-minute demand and PV generation data to simulate the operation of different households with various levels of PV generation and electrical energy storage. When the price paid for exported energy is less than the cost of imported energy, energy storage can be used to reduce energy exports and hence reduce the overall cost of imported energy.

The Return on Investment (RoI) for PV and energy storage systems depends on many factors, including the cost of PV, the cost of energy storage, the cost of electricity, the price paid for exported energy, the power generated by the PV system and how and when energy is used by the household. Our analysis of households at Lochiel Park in Adelaide shows that returns of up to 20% are possible. Furthermore, our analysis method can be used to reveal different configuration options that will give the same RoI.

Decreasing feed-in tariffs and decreasing cost of energy storage will lead to an uptake of energy storage system over the next few years. While storage can be used to reduce household electricity cost, it does not lead directly to reductions in CO2 emissions. However, household energy storage will enable greater use of rooftop PV, and ultimately can be used to match household demand to variable supply from renewable energy sources.