FACT SHEET

Customers with solar PV units in NSW – producing and consuming electricity

Based on *Solar feed-in tariffs - Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW - Draft Report*
November 2011

Background

More than 150,000 household and small business customers have installed solar PV units in NSW, creating additional generation capacity of over 340 MW. These PV units generate electricity by converting sunlight into low voltage electricity. In most cases, they are also connected to an 'inverter' which allows the energy they generate to be converted into a form suitable for use on the customer's premises or transportation on the distribution network (grid) for use by a nearby customer.

Each PV customer is likely to have different characteristics in terms of their electricity consumption (how much electricity they consume and when) and PV generation (the size of their unit, its orientation and location within NSW).

The characteristics of a household's electricity consumption and PV unit's generation have important implications for electricity customers thinking of installing a PV unit in NSW, as well as for customers that have already installed units and may want maximise the financial benefits that receive from their units.

This Fact Sheet briefly sets out our draft findings in relation to the characteristics of PV units in NSW as well as some key messages. We are releasing this Fact Sheet together with a Draft Report recommending a fair and reasonable feed-in tariff for NSW that is available on the IPART website.

1.1 How will a PV unit interact with the electricity grid?

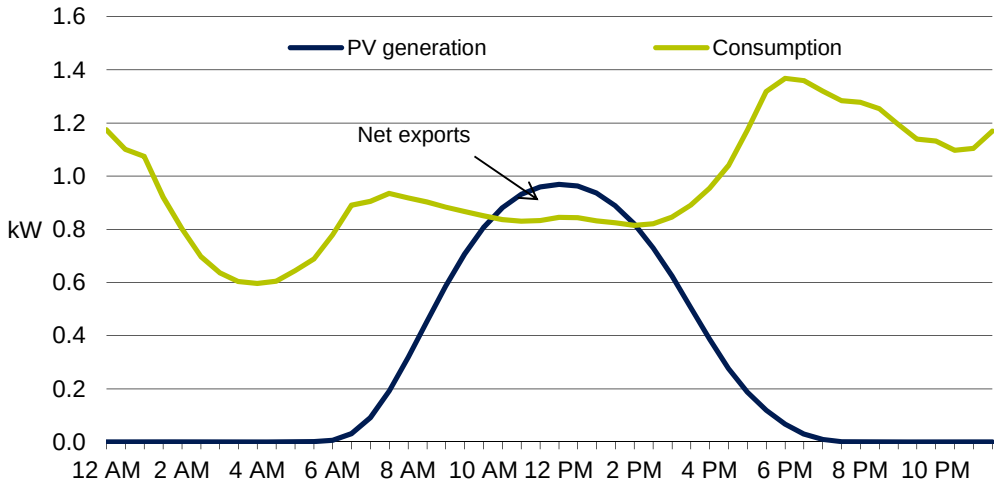
Most customers with PV units are connected to the grid, which allows them to:

- **import** electricity at times when their consumption exceeds the generation from their PV unit, such as during the evening (when the unit is not operating) or when they are using a number of appliances simultaneously during the day
- **export** electricity at times when the generation from their PV unit exceeds their consumption, such as the times when the sun is shining directly on the panels (when the unit is operating at high capacity) and nobody is at home.

Customers typically use most of the electricity they generate in their own premises to meet their demand at the time the electricity is generated. If this demand is higher than the amount they are generating, they import the additional energy they need from the grid. If their demand is lower than the amount they are generating, they export their excess energy to the grid. Importantly, this process of importing and exporting electricity occurs throughout the day, and is instantaneously and separately recorded on the customer's meter.

Figure 1 provides an illustrative example of a customer's generation and consumption profile over a single day. On this particular day, the customer's generation (the blue line) is higher than their consumption (the green line) between around 10 am to 2 pm. During this period, the generation that is not consumed in the premises – the difference between the customer's generation and consumption at the time of generation – is exported to the grid. The size of this difference in kWh represents is their net exports on this day.

Figure 1 Illustrative example of a customer's generation and consumption profiles over one day



Data source: IPART.

1.2 How will a PV unit affect my electricity bill?

The way that electricity exports and imports are measured for billing purposes varies, depending on whether a customer has gross or net metering arrangements.

Under gross metering arrangements, all the electricity generated by the customer is measured independently to all the electricity consumed in the customer's premises. The customer earns the applicable feed-in tariff for all the electricity they generate, and pays the applicable retail price for all the electricity they consume. Most customers under the subsidised Solar Bonus Scheme have gross metering.

Under net metering arrangements, the electricity generated by the customer that is exported to the grid and the electricity consumed by the customer that is imported from the grid are independently measured. The electricity generated and consumed in the customer's premises at the time of generation is not metered, and the customer pays nothing for this electricity. Whenever generation exceeds the customer's demand at a point in time, the excess amount is exported to the grid ('net exports' in Figure 1), and the customer may earn a feed-in tariff for this exported electricity (the focus of this review is to set an unsubsidised, 'fair and reasonable' feed-in tariff for customers who are not eligible for the Solar Bonus Scheme). Whenever the electricity being generated is insufficient to meet this demand, the extra electricity required is imported from the grid, and the customer pays the applicable retail price for this imported electricity. Most customers that are not eligible for the Solar Bonus Scheme have net metering.

1.3 How much electricity is a household likely to export to the grid?

The amount of electricity that is exported to the grid is influenced by the characteristics of an individual customer, namely the amount and timing of their electricity consumption and PV generation.

These characteristics have important implications for electricity customers thinking of installing a PV unit in NSW, as well as for customers that have already installed units and may want to maximise the financial benefits that receive from their units.

We found that on average, customers will export around 32 to 50% of the electricity that is generated by their PV units, with most customers that have 1 to 2 kW systems being at the lower end of this range. That is, on average customers will consume around two-thirds of the electricity at the times that is generated by their PV units.

A customers' imports (what they are billed for by their retailer) and exports (what they might be paid for by their retailer) is metered throughout the day and are then individually totalled over a quarterly period for billing purposes. Importantly, total generation from a customer's PV unit is not deducted from total consumption at the end of the billing period.

1.4 What are the key messages for PV customers?

The sections below discuss what we considered to be key messages for PV customers. However, it's important to note that while these messages apply to most customers, they will not necessarily be true for all customers and the customer should assess their own characteristics.

1.4.1 New PV customers in NSW should have net metering arrangements

As new PV customers **will not** be eligible for government-subsidised feed-in tariffs, net metering arrangements are likely to provide these PV customers with higher ongoing financial benefits than gross metering. Under net metering, PV customers are billed only for their **net** electricity consumption (ie, their total consumption minus the electricity they generated and consumed in their premises at the time of generation). Therefore, for each kWh they generate and consume in billing period, they save the retail price they would normally pay per kWh (currently around 25 to 30 c on average). In other words, they effectively earn the retail price for this portion of their total generation.

However, under gross metering arrangements, PV customers are billed for their entire consumption per billing period at the normal retail price. They **may** also be paid an unsubsidised feed-in tariff for their entire generation for this period, if their retailer voluntarily offers them one (currently voluntary feed-in tariffs are around 6 to 8 c/kWh). However, even if they are, it is unlikely that they will earn more from this tariff than they would save on their retail bill under net metering arrangements. This is due to the difference between retail prices and unsubsidised feed-in tariffs, and because our findings indicate they are likely to consume the bulk of the electricity they generate in their premises.

1.4.2 The most significant source of ongoing financial benefit for new PV customers is savings on retail electricity bills

PV customers are still eligible for an upfront subsidy under the Renewable Energy Target (RET). This subsidy is a significant one-off benefit, and is typically used to offset most of the costs of installation.

In addition, they can also derive 1 or potentially 2 ongoing financial benefits from installing a PV unit. They will make savings in their electricity bills, and may earn revenue from unsubsidised feed-in tariffs for electricity that is exported to the grid.

The savings in their electricity bills are more significant than the revenue they can earn from unsubsidised feed-in tariffs. These savings are more significant because, as indicated above, they are worth more per kWh than the unsubsidised feed-in tariffs retailers are likely to offer (ie, currently around 25 to 30 c compared to the 6 to 8 c feed-tariff some retailers current offer). In addition, if they consume more than half of the electricity they generate in their own premises at the time of generation (as our findings indicate most customers do), this higher savings rate will apply to a higher number of kWh than the lower feed-in tariff rate.

1.4.3 New PV customers should consider their own electricity consumption patterns as well as the potential generation from the PV unit

It is difficult to calculate an individual customer's likely financial benefits from a PV unit, as there are so many variables. However, in considering whether to install a unit and if so, the size of the unit, customers should think about:

- their profile of energy consumption during the day, not simply their total daily energy consumption
- the potential generation from their PV unit.

This information will help them work out whether they are likely to use most of the electricity they generate in their premises or export most to the grid.

Our findings suggest that households on average consume the majority of the electricity at the times it is produced by their PV units. This could be the result of generation from the PV units being less than optimal, which can be caused by many factors (orientation of panels, weather, etc). It could also be the result of consumption during the day being material given that:

- most households have some appliances that use electricity during the day, regardless of whether or not anyone is at home
- many households have at least 1 household member at home during the day (or part of the day), especially on weekends.

The ongoing financial benefits of PV units will be more if customers use most of their generation in their premises – or in other words, if they have a low export ratio. To illustrate this point, we estimated the potential ongoing financial benefits for a new PV customer with a 1.5 kW unit and net metering, including both savings in the form of lower bills and income from an unsubsidised feed-in tariff. The results of this analysis, shown in the table below, clearly show that the financial benefit to this customer increases as their export ratio decreases.

Table 1 Estimated annual financial benefit for a PV customer with a 1.5 kW unit

Export ratio	Annual bill savings ($)	Annual feed-in tariff income ($)	Total financial benefit ($)
100%	-	188	188
75%	118	141	259
50%	235	94	329
40%	282	75	358
35%	306	66	372
30%	329	56	386
25%	353	47	400
20%	376	38	414
15%	400	28	428
10%	423	19	442
5%	447	9	456
0%	471	-	471

Note 1: Assumes annual generation of 1,882kWh, retail tariff 25 c/kWh, unsubsidised feed-in tariff 10 c/kWh.
Note 2: The export ratio is the proportion of electricity produced by a PV unit that is exported to the grid.
Source: IPART.

1.4.4 New PV customers will continue to receive electricity bills

New customers who install PV units will continue to receive retail electricity bills. Only those few customers who install large PV units (for example, over 5 kW[1]) and have very low consumption (for example, less than 2,000 kWh per annum) have the potential to earn enough income from unsubsidised feed-in tariffs on their electricity exports to offset the price they pay for their electricity imports. These larger unit sizes are more expensive.

1 Larger unit sizes are more expensive and the payback period could be longer due to the structure of the subsidy under the Federal Government's Renewable Energy Target scheme is maximized at a 1.5 kW system. Further, larger systems are likely to export more energy, which attracts a feed-in tariff lower than the retail rate that it would effectively save if it was used in the house.