



New South Wales Government

NSW Solar Feed-in Tariff Report to Ministers

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Taskforce Members

Department of Water and Energy

Department of Environment and Climate Change

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NSW Treasury

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Executive Summary

On 23 November 2008, the Deputy Premier and Minister for the Environment and Climate Change, the Hon. Carmel Tebbutt MP and the Minister for Energy, the Hon. Ian Macdonald MLC, announced NSW Government plans to establish a Solar Photovoltaic (PV) Feed-in Tariff (FiT) Scheme (the “Scheme”) from mid 2009. The Scheme will pay consumers who supply electricity to the national electricity grid from their own rooftop solar PV panels.

A NSW Government Taskforce (the “Taskforce”) was created to consider options for the Scheme for commencement in mid 2009.

The Taskforce called for public submissions on the design of the Scheme and held a workshop for key stakeholders from industry, the environment and social advocacy organisations.

The Taskforce has also considered submissions made to the Commonwealth Senate Inquiry into Feed-in Tariffs, the recent work of the COAG Working Group on Climate Change and Water, Renewable Energy Sub Group and the work of the Ministerial Council on Energy.

The Taskforce makes the following recommendations for the design of the Scheme:

1. The Scheme should run for a set period.
2. Costs of the Scheme should be recovered from electricity customers via an electricity distributor levy.
3. Payments under the Scheme should be made to solar PV system owners via electricity retailers.
4. Eligibility for the Scheme be limited to those customers with an annual electricity usage of less than 160 megawatt hours (MWh), whose system size is 10 kilowatts (kW) or less.
5. Solar PV will be included in the Scheme and micro wind be considered for inclusion over the next three months.
6. The Scheme should be reviewed in 2012, or when installed Scheme capacity reaches 50 megawatts (MW). (Any changes that occur as a result of a review should only impact customers joining the Scheme after the review.)

The Taskforce also recommends that the tariff type (gross or net), the tariff rate, and the duration of the Scheme be considered in unison with these recommendations.

The Taskforce has provided ten FiT Scheme scenarios that incorporate combinations of various tariff rates, tariff types (gross or net) and scheme durations.

As tariff rate, tariff type and duration are intrinsically linked design elements it was not possible for the Taskforce to make a recommendation in relation to one of these design elements and not the other. These scenarios enable a cost comparison to be undertaken as part of the final decision on Scheme design.

Background

A NSW Government Taskforce (the “Taskforce”) was created to consider options for the Scheme for commencement in mid 2009. The Taskforce comprises representatives from the Department of Water and Energy, the Department of Environment and Climate Change, NSW Treasury and the Department of Premier and Cabinet.

Terms of Reference

The Terms of Reference for the Taskforce were based on NSW Government objectives which include providing an additional means of support to NSW Solar PV consumers who wish to generate renewable energy locally, building the State’s green collar jobs sector in service, manufacturing or research and development by helping solar technology compete with non-renewable energy sources and expanding the visibility of renewable energy technologies to motivate the whole community to respond to climate change. (See Appendix 1).

The Taskforce also considered:

- The Council of Australian Government’s (COAG) complementarity principles and agreed principles for feed-in tariff schemes;
- The interaction of the Scheme with the Commonwealth Government’s Carbon Pollution Reduction Scheme (CPRS);
- The inclusion of other micro generation technologies;
- The regulatory environment and any constraints that would hinder a NSW Scheme;
- Harmonisation with the Feed-in Tariff Schemes of other states and territories;
- The abatement of greenhouse gas emissions; and
- The cost impact on NSW electricity consumers.

What is a Feed-in Tariff?

A Feed-in Tariff (FiT) is a payment for electricity that is generated through renewable micro-generation sources connected to the national electricity grid.

There are two main types of FiTs:

- Gross tariffs, where the consumer is paid for all the electricity their system generates; and
- Net tariffs, where the consumer is only paid for the generated electricity they export to the grid, not for the proportion of generated electricity they use themselves.

COAG Principles for Feed-in Tariff Schemes

In November 2008, the Council of Australian Governments (COAG) agreed to a set of national principles for Feed-in Tariff Schemes. It was agreed that these principles be applied to all new schemes and inform the review of existing schemes.

The agreed principles state that any jurisdictional or co-operative decisions to provide a premium on energy generated must:

- be a transitional measure with clearly defined limits and review thresholds;
- undertake analysis to establish the benefits and costs of any subsidy against the objectives of that subsidy (taking into account other complementary measures in place to support small renewable consumers);
- give explicit consideration to compensation from public funds or specific levies rather than cross-subsidisation by energy distributors or retailers; and
- not impose a disproportionate burden on other energy consumers without small renewable generation.

Under the agreement, the Ministerial Council for Energy (MCE) will continue to implement regulatory arrangements for small renewable customers to ensure the minimum terms and conditions for retail contracts for PV customers are no less favourable than those for other customers.

It was also agreed that feed-in tariff policies be consistent with previous COAG agreements (particularly the Australian Energy Market Agreement).

COAG Complementarity Principles for CPRS

In November 2008, COAG also agreed to a Document of Shared Understanding – A Guide to Jurisdictional Reviews of Climate Change Mitigation Measures. This document outlines a set of principles to ensure climate change mitigation actions are consistent with the Commonwealth's forthcoming Carbon Pollution Reduction Scheme (CPRS). It is intended that existing complementary measures be assessed against these principles.

The principles agreed include measures to target a market failure that is not expected to be adequately addressed by the CPRS, or that impinges on its effectiveness in driving emissions reductions. More broadly, complementary measures should adhere to the principles of efficiency, effectiveness, equity and administrative simplicity, and be kept under review.

Technologies

The Taskforce has focused on a solar PV FiT scheme but also investigated other types of renewable micro generation, such as small wind turbines and micro-hydro systems, that may be available and eligible to be incorporated into the Scheme.

It should not be assumed that the focus on solar PV technology in the report implies the Taskforce is dismissing the possibility of other forms of micro-generation, such as micro wind or hydro, being included the Scheme once a business case has been proven.

Regulatory Environment

The design of the Scheme must take the current regulatory context into account. There are two areas of regulation that are most relevant to the Scheme design:

1. The regulatory environment for electricity retailers and distributors, in particular their ability to recover the costs of the Scheme from all electricity consumers; and

2. Ensuring that the Scheme does not interfere with the operation of the National Electricity Market (NEM) and the associated National Electricity Law (NEL) and National Electricity Rules (NER).

Standard retail electricity tariffs for Country Energy, EnergyAustralia and Integral Energy are regulated by the Independent Pricing and Regulatory Tribunal (IPART). The regulation of NSW electricity distribution network charges is currently managed by the Australian Energy Regulator (AER).

Harmonisation with other jurisdictions' schemes

A number of FiT schemes currently operate in other states and territories around Australia. These schemes have been developed by the individual jurisdictions and reflect the policy intentions of each government. The Taskforce was asked to examine these FiT schemes to assess which design elements best suit the NSW Government's objectives and are in the best interests of NSW consumers.

Consultation

The Taskforce called for submissions on the NSW Solar PV FiT Scheme on 9 December 2008. Specifically the Taskforce wanted to ask the general public and industry groups what design features should be incorporated into a NSW Solar PV Feed-in Tariff. Comments were invited on the following issues:

- What factors should be considered in setting a tariff rate?
- Should the tariff be set for gross (all energy generated from the PV system) or net (energy generated less energy used by household)?
- Should the tariff be based on a fixed rate or a variable rate consistent with time of use pricing for consumption?
- Should the tariff be paid to solar PV owners by the electricity distributor or the electricity retailer?
- How long should the Government maintain the FiT and should the rate be fixed for the entire life of the program or varied over time?
- What eligibility criteria should exist for the FiT?

The Taskforce received 206 submissions, this included 73 form submissions. Submissions were received from a wide cross-section of the community with the majority of submissions from the general public followed by the energy industry, non-government organisations and other groups. Copies of non-confidential submissions are available at www.dwe.nsw.gov.au.

For further detail on the NSW Solar PV FiT public submissions and those submissions received as part of the Senate Inquiry see Appendix 4.

A stakeholder forum was held on Thursday 15 January 2009 to allow the Taskforce to consider the views of key stakeholders. There were approximately 50 attendees at the forum and 12 presentations were made to the Taskforce.

A diverse range of groups were represented at the forum including energy retailers and regulators, renewable energy manufacturers and community, social, environmental and energy organisations.

Context of FiTs within the National Electricity Market

A NSW Scheme must be discussed in the context of the National Electricity Market (NEM), as the NEM is the primary source of electricity for NSW consumers.

The NEM began operating as a wholesale market for the supply of electricity to retailers and end-users in December 1998. It originally consisted of an interconnected electricity system between New South Wales, Queensland, Victoria, South Australia and the Australian Capital Territory (ACT). In 2005 Tasmania joined the NEM following the installation of the Basslink Cable, which directly linked the electricity transmission systems of Tasmania and Victoria (*NEMMCO Introduction Booklet, June 2008*)¹.

The Ministerial Council on Energy (MCE) has been the central platform for governmental reform across Australia for issues related to electricity. These issues include the introduction of full retail competition (FRC), 'smart' or interval metering arrangements and time of use (ToU) pricing.

Full retail competition for NSW consumers was introduced in January 2002. This gave consumers the ability to 'shop around' for their electricity by comparing different rates offered by electricity retailers. The aim was to lower energy prices through increased competition. FRC is of importance to the Taskforce because the Scheme must not hinder a consumer's ability to choose their electricity provider.

Significant investment has been undertaken in electricity network augmentation projects in order to deliver electricity during peak periods of demand. One ongoing policy development initiative aimed at reducing peak demand, and therefore assisting to reduce or defer network augmentation, is the introduction of interval or 'smart' meters. These new meters allow ToU pricing arrangements to be applied to electricity consumers. This type of pricing aims to change consumer behaviour by charging higher prices for electricity consumed during periods of peak demand.

Another method aimed at helping to reduce or defer network augmentation investment is the introduction of distributed generation. Distributed generation is the installation of smaller electricity generators, such as solar PV panels, across multiple sites. Installing more distributed generation can contribute to overall system efficiency by reducing the amount of power lost through transmission.

Solar PV Generators and the National Electricity Market

All electricity generators connected to the national electricity grid must adhere to the National Electricity Rules (NER), which sets out requirements pertaining to small generators such as solar PV systems. The relevant sections of the NER are discussed in Appendix 2.

¹ An Introduction to Australia's National Electricity Market (6th ed.), National Electricity Market Management Company, June 2008. <http://www.nemmco.com.au/about/000-0286.pdf>

Design Elements

There are a number of design elements that have been considered for a NSW FiT including the Terms of Reference (ToR) provided to the Taskforce and submissions to the Taskforce and the Senate Inquiry.

The Taskforce has undertaken considerable deliberation regarding the design elements and as a result has split this section into two distinct areas. The first area is where the Taskforce recognises that the issues involved are complex and prefers to provide an analysis of the issue which will inform Ministers in determining the final Scheme design. This will include the Tariff Rate, the Tariff Type (gross or net), and the duration of the Scheme. The second area is where the Taskforce can make firm recommendations on the Scheme design and includes: the FiT payment and Scheme cost recovery; eligibility; applicable technology; and the review period.

Tariff Rate

The tariff rate is the actual rate, cents per kilowatt hour (c/kWh), paid to the owner of the solar PV (or alternative) system

There are several factors to be considered when setting tariff rates. These include:

- The NSW Government's objectives for the Scheme (as captured in the ToR);
- The impact of the tariff – e.g. to provide full payback of the customers investment, or simply a contribution toward it;
- The market value of energy generated;
- The total cost of the Scheme, including issues of access and social equity; and
- Harmonisation with other State and Territory schemes.

The rate of the tariff, along with the tariff type and duration, will be a key factor in determining participation levels in NSW. In order to achieve the Scheme's objectives, the tariff rate must be set at a level that is appropriate to encourage participation.

Payback period

One means of encouraging sufficient participation is to set the tariff at a level high enough that consumers will be "paid-back" for the cost of their initial investment within a specific time-frame. A shorter payback period would make installation of solar PV a more attractive investment, and could be expected to increase take-up.

Setting the tariff to provide full payback well within the expected life of the installation raises questions of social equity, as customers who can afford to install solar PV will have their investment subsidised by all electricity consumers, including low income consumers. A payback period that is shorter than the life of the system will also allow owners to profit from their system at the expense of all NSW consumers. It should be noted that the expected life of a solar PV system is 20 to 25 years.

Tariff rate over time

The Taskforce recognises that there are many possibilities in relation to setting the tariff rate but has chosen two possibilities to highlight.

1. The tariff rate can be set at a constant rate across all years; and
2. The tariff rate can be set at a higher rate in earlier years and decrease over time.

A tariff rate that is set at a constant rate across all years of scheme duration provides a harmonisation benefit with some of the FiT schemes operating in other States and Territories.

A tariff rate that is constant and not indexed to CPI is expected to decline in value and consequently the value of the subsidy reduces over time.

A second possibility is that of a higher rate in earlier years, decreasing over time. This could create an incentive to invest in the early years rather than the later years as the tariff declines over the remaining life of the Scheme.

Some submissions have argued that the feed-in tariff rate should be reduced each year by approximately five per cent, in recognition that system costs are expected to decrease and to ensure that industry continues to pass through cost-reductions to solar PV customers.

Solar PV industry submissions received by the Taskforce warned that a larger incentive at the start of the Scheme may present significant challenges for 'green jobs'. This is because there may be a rush to increase installation and manufacturing capacity of solar PV in the short term to match demand. However in later years, as the subsidy and installation levels decline, so too must the capacity.

A decreasing tariff rate allows the subsidy to taper off and thus the overall total Scheme costs to reduce. It also assumes that the costs of solar PV will reduce over time and the subsidy required for systems in later years is anticipated to be lower than in earlier years.

Fixed or Time of Use

Where a consumer is on a time of use (ToU) tariff they have an incentive to change their consumption patterns, such as reducing consumption during the peak tariff periods. Consideration should be given to the compatibility of a FiT, fixed rate and variable rate, with a time of use (ToU) pricing signal. It is important to note that a household can only alter their consumption patterns as it cannot control when the solar PV is generating.

A time of generation (ToG) FiT can be compatible with time of use tariffs. To demonstrate this, we consider the possible interactions from combining a ToU tariff with either a fixed rate FiT, or a time of generation FiT:

1. Fixed rate FiT

For both a net and a gross fixed rate FiT, the payments the household receives for exports are independent of the time of generation. Any incentive the household has to shape their consumption patterns (i.e. lower peak demand, and/or shift to off-peak) depends on the ToU tariff. There is still an incentive to reduce peak demand under a gross FiT as the difference between the cost of electricity and the payback rate

widens. However, the strength of the incentive to reduce peak consumption is magnified under a net FiT.

In summary, both a net and a gross fixed rate FiT are compatible with ToU tariffs.

2. Variable rate FiT by Time of Generation (ToG)

If the household can reduce its own consumption during periods when the ToG payments are highest, then they can maximise the payments they receive for exported electricity. If the ToG Net FiT peak periods align with the ToU tariff, the incentive the household has to shape their consumption against the ToU tariff is magnified. By reducing consumption during the peak, the household gains not only the benefit of lower payments for purchases, but the bonus of higher payments for exports.

But if the ToG Net FiT pays a higher rate during non peak ToU tariff periods, the households' incentive to shape their consumption against the ToU Net tariff could be changed. In this case, the consumption pattern that aims to minimise payments for consumption could be different to that which maximises FiT payments for exports. From a total cost perspective, this is not necessarily undesirable, as the ToU tariff may not accurately reflect costs for individual consumers because it contains some averaging. However, having ToG payments on a different pattern to a ToU tariff could potentially be confusing.

Under a ToG gross FiT scheme, payments are based on gross generation, independent of consumption. In this case, the household can only shape their consumption patterns against the ToU tariff, so that even if the ToG gross FiT pays a higher rate during non-peak ToU periods, there is no extra incentive to the household to make further adjustments to their consumption patterns.

A ToG FiT increases the difficulty of estimating the returns from the FiT relative to estimating returns from a FiT with a constant rate.

In summary, a variable rate ToG FiT (either net or gross) is compatible with ToU tariffs, as long as the ToG FiT has the same time of day pattern as the ToU tariff. A gross FiT would be compatible even if the ToG pattern differs from the ToU tariff.

Tariff Type – Gross or Net

Under a gross payment scheme, all electricity produced by the solar PV system is paid for at the FiT rate, regardless of the amount used by the household or business. Therefore, the household or business's own consumption is treated as a standard retail purchase of electricity, the same as any other consumer.

Under a net payment scheme, only the electricity produced that is excess to the requirements of the household or business is paid for at the FiT rate. In other words, the household or business substitutes the “free” electricity generated by their solar PV system for the retail purchase they would otherwise have to make, and only when their generation is greater than their consumption do they export this excess and receive payment for it at the FiT rate.

For a further example of how gross and net payments are made under a FiT see Appendix 3.

Gross tariff

A key justification for a FiT is that locally produced and embedded generation can result in a broad range of avoided costs, including reduced transmission losses, deferred network augmentation, reduced demand for energy generated by alternate sources, and benefits from the diversification of energy supply.

One argument in favour of a gross FiT rests on the recognition of the economic value of the output of an embedded generator, often referred to as the "avoided cost". For every unit of energy produced by a household's solar PV, one less unit of energy needs to be produced by other generators, irrespective of the energy consumption of the household in question. Note that the focus here is on the full economic cost of generating and delivering supply to the consumer, including transmission losses, and not on the tariff that households may be paying. (Even a "time of use" (ToU) tariff is based on average costs, and may therefore understate or overstate the true avoided costs at different times of day).

Calculating the avoided cost requires consideration of what would happen in the absence of the household's solar PV output. For the household's own consumption, the avoided cost is that incurred by the retailer delivering the same amount of power to the household, including network losses. It is possible that, if there was a sufficient volume of embedded generation in one area, the cost of future network augmentation could also be avoided or deferred in addition to the generation cost. If there was a sufficient volume of embedded generation across the whole grid, the potential avoided costs would extend further afield and be even greater.

In regard to the energy that the household exports, the avoided cost would be the amount incurred by the retailer to deliver the same amount of power from another source to another local consumer. If there was a sufficient volume of embedded generation in one area, it is possible that exports could go beyond the local neighbourhood, which would create a different avoided cost.

In principle, estimating the avoided cost would require system modeling of the impact of embedded generation on network losses, future network development, and potential additions to generation capacity. This has not been modeled by the Taskforce due to time constraints. The amount of embedded generation under a high uptake scenario with 200,000 customers, an average system size of 1.5kW by 2029, would represent approximately 300MW of installed capacity.

Irrespective of the FiT rate, most consumers will be able to more accurately estimate the payments they are likely to receive under a gross scheme than under a net scheme, and correspondingly the expected payback period for an installation. This is because the expected payments under a gross scheme can be estimated without needing to know consumption patterns. The Commonwealth Government has undertaken this analysis and developed a 'postcode' average for the expected amount of solar generation in any given area, across Australia.

These estimates of expected income based on the typical expected hours of sunshine each year in a given location may make the marketing of solar PV systems easier under a gross payments scheme. This is because sales staff are able to quote the likely return on investment.

These factors may therefore lead to a greater uptake under a gross scheme than under an equivalent net scheme (one that provides the same level of payment to participants, all other things being equal).² A higher rate of uptake is consistent with the NSW Government's objectives of the Scheme, but will also result in an increased total cost for the Scheme, which must be subsidised by all NSW electricity consumers, thus creating a social equity issue.

For any given FiT rate, a gross tariff will always provide higher payments and be more expensive than a net tariff, as it is applied to all of the electricity generated. Under a gross tariff, participants will have to pay for all of their consumption of electricity, as if it is imported from the network. As such they will not have a reduction in their (gross) electricity bills.

The benefits the participant enjoys come solely from the FiT payments received, all of which have to be subsidised by other electricity consumers (not including any additional voluntary feed-in payments an electricity retailer may make to the participant). In contrast, under a net scheme, some of the participants' benefits are enjoyed as a reduction in electricity bills which do not require a subsidy from other customers.

The Taskforce considered each of these issues, and also noted the submissions received during public consultation, which overwhelmingly supported a gross payment option. The schemes in both the ACT and Western Australia will use a gross tariff.

Net tariff

A net tariff is applied only to the electricity that is surplus to a household's internal consumption, thus exported to the national electricity grid. Solar PV systems generate electricity during sunlight hours, and at any instance in time if the system is generating more than the household is consuming, a surplus will be exported to the grid.

As the use of interval meters typically measure consumption over 30 minute intervals, this is an appropriate length for a net tariff scheme. Under a dual channel metering scenario both the generation and the consumption are measured. The surplus electricity exported to the grid would be calculated as the difference between total consumption and total generation over each 30 minute time interval. The FiT would then pay the appropriate Tariff Rate for any electricity that is surplus to the needs of the household; that is when generation is greater than consumption.

² Because generation from an installation will always be uncertain, payments received will always have a degree of uncertainty whether the tariff is gross or net. Conceptually however, the probability distribution for payments will be narrower for a gross tariff than a net tariff with the same mean expected value. Given the likelihood of prospective participants being risk averse, the rate of uptake may be greater the narrower the probability distribution.

NSW consumers who already have grid connected solar PV systems will in most cases have a net metering arrangement. Introducing a net FiT will allow for easy inclusion of pre-existing solar PV owners. If a gross FiT is introduced, existing owners may need to rewire their systems and install new meters to take advantage of the scheme.

The proportion of electricity exported to the national electricity grid from the solar PV system depends on both consumption patterns and generation patterns. The available evidence from existing PV installations suggests this may be in the range 25 to 50 per cent of all generation. The South Australian Government has advised that, based on analysis of data from hundreds of installed PV systems in South Australia, the average export rate is in the order of 50 per cent.

Export rates have the potential to vary greatly between households, depending on the household's consumption patterns. Those spending more time at home during the day and who are therefore consuming more during peak periods of generation are likely to receive lower FiT income than others under a net tariff. As already noted, since it is difficult for households to predict their consumption patterns, it will be harder for them to estimate their expected payments under a net scheme than a gross scheme.

Under a net scheme, PV owners benefit in two ways³:

1. They receive payment for surplus electricity exported to the grid; and
2. They benefit from a reduction in their bill as electricity generated and consumed is free.

This means that even where export rates are low, the consumer still receives a financial benefit from their investment. Compared with a gross scheme, there is a stronger incentive under a net scheme to reduce consumption, and to shift demand away from the periods of solar generation.

The Taskforce also noted that a net scheme would provide a greater level of harmonisation with other states, with Victoria, Queensland and South Australia all using net tariffs.

Tariff Rate Relationship with Gross and Net Approaches

The total cost of the Scheme is dependent on tariff rates and tariff type (gross or net). For example (assuming a fixed tariff rate):

- If a tariff rate of 44c is chosen, a PV owner will receive a significantly higher payment from a FiT scheme under a gross scheme than under a net scheme.
- If a net tariff rate is set at a considerably higher level than a gross tariff, then a consumer may receive a higher payment under the net scheme, despite being paid only for the portion of electricity they export. For example a net tariff rate of 70c/kWh could produce a greater financial return than a gross tariff rate of 15c/kWh.
- Gross and net payment schemes that provide the same expected payments to PV owners can in principle be compared. For example, with a 25 per cent

³ Voluntary feed in payments by electricity retailers are not included.

export rate, a net scheme with a tariff rate of 88c/kWh will produce the same FiT payments to participants as a 22c/kWh gross scheme. However the same FiT payment does not take into account the savings on electricity bills under a net scheme.

Duration

The issue of scheme duration can refer to both the Scheme's total length of operation, as well as the period of time in which any individual system owner is eligible to receive payments. The duration element has a direct relationship to the overall cost of any FiT scheme.

In considering the length of the proposed NSW Scheme, the duration of FiT schemes in other states and territories and the life of the eligible solar PV systems should be taken into account. Typically the life of a solar PV system is around 20 to 25 years. If payback of the original cost is a desired outcome of the Scheme, then duration must be considered in tandem with the tariff rate and tariff type (gross or net). The Scheme duration will need to be at least as long as any desired payback period.

At present other states have varying durations for their FiT schemes, with most choosing a 20 year scheme with periodic reviews that occur at predefined yearly intervals or thresholds of installed solar PV capacity. Victoria is understood to be introducing a 15 year scheme.

Designing the Scheme to provide full payback of the capital cost has not been a stated objective of the Scheme, however providing an additional means of support for eligible participants is. Providing certainty to investors was a theme of many submissions received by the Taskforce. A Scheme with a clear timeframe will provide investors with a defined period over which they can calculate their returns.

The Taskforce considered 20 years (the length of South Australia, Queensland, and the ACT's schemes) as well as options for a shorter scheme, lasting 7 years (the length of support for solar PV offered through the Commonwealth's Renewable Energy Target Scheme).

A shorter scheme without a higher tariff has the potential to reduce overall Scheme costs. However, it may result in less uptake as a result of the lower returns to system owners.

A shorter Scheme would be likely to need a higher tariff rate to achieve a similar overall level of installation as a longer Scheme. Because of the higher tariff rate, a shorter Scheme allows a stronger upfront incentive to encourage uptake. A shorter Scheme with a higher tariff rate is likely to be more attractive to system owners, if it allows them to pay back the upfront capital cost of the PV system more quickly.

However, a higher tariff rate will increase impost on all customers' electricity bills and intensify the impact of the cost increases, as these are spread over a shorter time period, compared to a longer scheme.

At the same time, a 20 year scheme risks being too long, given the rapidly changing climate change and greenhouse emissions reduction policy environment.

The Taskforce examined the impacts of 7 and 20 year options. It may be that a midpoint, perhaps 12 or 15 years, would be a more appropriate duration for a NSW Solar PV FiT Scheme. Whilst the Taskforce has not directly costed 12 or 15 year

Scheme scenarios, it could be reasonably assumed that the costs would fall between those calculated for 7 and 20 years.

The Taskforce has not recommended a tariff type or tariff rate for the Scheme. Given the interrelationship between scheme duration, tariff type, tariff rate and overall scheme costs, the Taskforce has also decided not to recommend a specific duration for the NSW FiT Scheme.

The Taskforce also considered whether a scheme with a defined end date (e.g. 20 years to 2029, and then ceasing) or a scheme with a defined period of eligibility (e.g. 15 years of payments from year of installation, open until 2029 and therefore providing payments until 2044) was preferable.

The Taskforce concluded that for reasons of administrative simplicity a scheme with a defined end date was preferable. This means that the later a person enters the scheme the shorter the period for which they receive FiT payments. In other words, a clearly defined end date would provide an incentive for early uptake of solar PV, since the earlier a customer enters the Scheme the longer they will receive the tariff. The solar PV industry advises that the capital costs of solar PV are likely to decline over the life of the Scheme, and therefore customers purchasing systems in later years would require less additional support from the Scheme.

Recommendation: The Taskforce recommends a Scheme with a defined end date. The Taskforce recommends that scheme duration, tariff type and tariff rate be set in conjunction with each other.

Payment and Scheme Cost Recovery

The following section examines options regarding the mechanism for recovering the costs from consumers to fund the FiT payments. The way in which FiT payments could be made to solar PV customers is also considered.

In NSW, the Independent Pricing and Regulatory Tribunal (IPART) sets the retail tariffs charged by the Standard Retailers (EnergyAustralia, Country Energy and Integral Energy) to small customers on standard contracts. This affects the retailers' ability to recoup costs associated with a NSW Solar FiT from customers on regulated retail tariffs.

Electricity distribution network charges are regulated by the Australian Energy Regulator (AER). Similar to IPART, the AER has strict rules governing the pass through of costs onto consumers through regulated network charges and any FiT must take these constraints into account when designing the mechanism for cost recovery.

There are three options for covering the costs of the Scheme:

- 1) A levy on all NSW electricity consumers;
- 2) A subsidy paid by NSW electricity retailers or distributors; or
- 3) A NSW Government budget allocation.

In considering these three options, the Taskforce reached the following conclusions:

- 1) Option 1 is consistent with schemes in operation in other states;
- 2) Option 2 would impose unfair costs on the shareholders of electricity retail and distribution businesses; and
- 3) Option 3 was considered unachievable due to the State's narrow revenue base and both cyclical and structural budgetary imperatives.

In considering imposing a liability on retailers to collect the levy, a number of issues were identified. In particular, contestability amongst retailers would mean that passing on the full cost through an increase in the retail charges regulated by IPART may be difficult. This is because a cost pass through mandated by IPART would only apply to those customers on regulated tariffs. The extent to which costs are able to be passed through to customers on negotiated contracts would depend upon the ability of second tier retailers to pass on these costs. It may also place disproportionate cost recovery on smaller retailers (i.e. as administrative costs would be spread across a smaller customer base) or those with a higher proportion of FiT clients.

On the other hand, given that there are monopoly distributors in each area, a distributor liability to collect the levy through a regulated pass through is considered more appropriate. A sufficient increase to network charges can be levied on all consumers. For all retail customers, the levy would still have to be collected by the retailers on behalf of the distributors. The distributors would then refund individual retailers in line with the FiT payments each had made.

The Taskforce has recognised another issue concerning cost recovery and that is how the costs are spread across NSW consumers. The "Scenario's" section has highlighted two possible ways a NSW Solar FiT levy could be recovered from consumers:

- 1) The costs would be recovered evenly from all NSW electricity connections; or
- 2) A greater portion of funds would be recovered from larger electricity users than from households in line with their consumption.

The Taskforce recommends that costs be recovered from electricity customers via a distributor levy and that any further breakdown of the way costs are recovered are done in consultation with electricity distributors and the AER.

Recommendation: Scheme costs should be recovered from electricity customers via a distributor levy.

In terms of payment of the FiT to eligible participants, the Taskforce concluded this is most easily done through the electricity retailers, who already have a direct relationship with their customers. Retailers can pay their customer the appropriate tariff through an additional line in their quarterly bill, and then recoup their costs by billing the distributor. This model is consistent with that operating in a number of other jurisdictions.

Retailers who contributed to the public consultation stressed the need for adequate preparation time before the Scheme commences to ready their systems. They also requested that the Scheme be kept as simple as possible, to ensure that administrative complexity did not result in retailers attempting to avoid FiT customers.

Recommendation: Payments under the Scheme should be made to Solar PV system owners via retailers.

Eligibility

The provisions for eligibility under the Scheme are an important design feature that must balance the expansion of solar PV across NSW with the total cost of the Scheme.

Eligibility could be affected by several factors including:

- The size of the solar PV system installed;
- Other potential technologies (addressed in “Technology” section);
- Means testing of scheme participants;
- Customer type and/or size (e.g. Domestic, Community Centres, Educational, Small Business, Large Businesses); and
- Existing systems: whether those with systems already installed will be eligible to receive payments under the Scheme.

Existing State and Territory FiTs have a number of eligibility restrictions which are summarised in Table 1. These restrictions predominantly relate to the size of the installed solar PV system and business or residential developments.

Table 1 - Comparison of Eligibility Criteria across other FiT Schemes

	SA	Qld	Victoria	ACT	WA	NT - Alice Springs
Technology Eligible	Solar PV	Solar PV	Solar PV	Solar (all types) and micro-wind (although none have been installed in ACT to date). Minister has power to include further technologies in future.	Solar PV	Solar PV
Customers Eligible	Domestic and small business with systems up to 10 kVA (approx. 10 kW) for a single phase connection or up to 30 kVA (approx. 30 kW) for a three phase connection on grid. Applies to small energy customers (<160MWh consumption p.a.).	Domestic and small energy up to 10 kVA (approx. 10 kW) for a single phase connection or up to 30 kVA (approx. 30 kW) for a three phase connection on grid. Only applies to domestic and small energy (< 100 MWh consumption p.a.).	Households with systems up to 2kW.	All electricity customers (except non-educational government agencies) with generation facilities of no greater capacity than 30kW. A higher FiT applies to those systems below 10kW than those systems between 10kW and 30kW.	Not yet determined.	Households with systems up to 2kW.

System Size and Eligible Customers

In considering the issue of system size eligibility, the Taskforce assessed questions of cost against the likely effectiveness of the Scheme in meeting its objectives. The Taskforce acknowledged that the larger the eligible system, the greater the likely penetration of the Scheme and therefore the increased support that it would provide for the solar PV industry. However, this was considered against the increasing total cost of the Scheme that larger systems would impose and the associated social equity issues.

The Taskforce considered the Government's preference for a scheme that stimulates a large number of customers participating rather than a small number of large facilities. An average solar PV system is approximately 1.5kW and the information from micro-wind generators indicates that their systems are usually around 4.5kW.

Whereas a 5kW system limit would likely be sufficient for the residential sector, a 10kW system limit would allow the community and small business sectors to make use of larger roof space for solar PV systems.

Restricting eligibility to small energy customers is consistent with the objective of stimulating broader participation rather than large-scale installations. NSW provides a definition of a small customer within the *Electricity Supply (General) Regulation 2001*, clause 7, part 1. The definition states that electricity consumption must be under 160 megawatt hours (MWh) per year to qualify as a small customer. An average household would consume approximately 8MWh of electricity per year. South Australia and Queensland have similar eligibility requirements.

Recommendation: The Taskforce recommends eligibility for the Scheme be limited to those customers with an annual electricity usage of less than 160MWh, whose system size is 10kW or less.

Means Testing

The Taskforce considered the issue of means testing eligible participants. Without means testing, even the wealthiest households in the State could access the Scheme. The Commonwealth's solar grants program has an income threshold of \$100,000.

While limiting eligibility to households under a certain income level would reduce the total cost of the Scheme, it will by definition reduce the pool of eligible participants, and therefore may reduce uptake levels. Means testing also adds an extra layer of administration to the Scheme which would increase overall costs.

Existing Systems

The Taskforce took into account that the Scheme will include existing grid connected solar PV owners (approximately 2,900 in NSW⁴) and investigated the costs of including existing customers in the Scheme, see Table 2 and Table 3.

⁴ <http://www.environment.gov.au/settlements/renewable/pv/pubs/installedbystate-dec08.xls>

The Taskforce acknowledged that including existing solar PV owners would increase the cost of the Scheme, whilst not increasing the benefits of the Scheme, such as green collar jobs or industry development.

However harmonisation and administration considerations both favour allowing existing solar PV owners to be eligible. The FiT schemes being implemented in other jurisdictions include existing solar PV owners.

Existing solar PV owners should participate on the same basis as new participants, in particular it would create inequities if an existing solar PV owner were to continue receiving a retailer's feed-in tariff that was not also available to new participants.

Table 2 – Cost of existing NSW systems for Scenarios 1 to 6 (20 year Scheme)

Tariff Rate and Tariff Type Scenarios		Existing NSW system numbers	Total Cost of Existing Systems over 20 years (2009 \$)	Average Annual Cost (2009 \$)
Scenario 1	Net 22c/kWh	2,900	\$15,907,350	\$795,367
Scenario 2	Net 44c/kWh	2,900	\$31,814,699	\$1,590,735
Scenario 3	Net 60c/kWh	2,900	\$43,383,681	\$2,169,184
Scenario 4	Gross 22c/kWh	2,900	\$31,814,699	\$1,590,735
Scenario 5	Gross 35c/kWh	2,900	\$50,614,295	\$2,530,715
Scenario 6	Gross 44c/kWh	2,900	\$63,629,399	\$3,181,470

Table 3 - Costs of existing NSW systems for Scenarios 7 to 10 (7 year Scheme)

Tariff Rate and Tariff Type Scenarios		Existing NSW system numbers	Total Cost of Existing Systems over 7 years (2009 \$)	Average Annual Existing System Cost (2009 \$)
Scenario 7	Net 60c/kWh	2,900	\$15,184,288	\$2,169,184
Scenario 8	Net 88c/kWh	2,900	\$22,270,290	\$3,181,470
Scenario 9	Gross 44c/kWh	2,900	\$22,270,290	\$3,181,470
Scenario 10	Gross 60c/kWh	2,900	\$30,368,577	\$4,338,368

As most existing solar PV customers are likely to have net metering arrangements, the introduction of a gross scheme would mean these customers will need to pay to re-wire and change the meter in their existing installations. The cost of this would greatly depend on individual circumstances.

For example in a rural context, where the solar installation may be a longer distance from a meter point, higher costs may be incurred for the consumer to join the Scheme.

Any decision to opt-in to the Scheme should be made by the consumer after they have examined the costs and benefits in relation to their situation.

Technology

One of the NSW Government's objectives in introducing a FiT Scheme is to 'provide an additional means of support to NSW solar PV consumers who wish to generate renewable energy locally'. The Taskforce also notes the Government's objective to 'expand the visibility of renewable energy technologies'. As such, the Taskforce has examined technologies other than solar PV, such as small scale wind turbines and micro hydro systems, which could be included in the Scheme at a later date.

The wind turbine industry is usually associated with large scale wind farms that generate a considerable amount of electricity for the NEM. However small scale wind turbine technology has benefited from recent increases in research and development.

Some wind turbine manufacturers have developed the ability to mount small-scale silent wind turbines on the top of houses and small businesses. Thus wind turbine technology is a potential future competitor in the micro-renewable energy industry for NSW consumers. The benefits of wind turbines are that they have the ability to produce electricity across an entire day as opposed to only during sunlight hours with solar PV systems.

The wind industry has argued that it is placed at a distinct financial disadvantage to the solar PV industry because of the subsidies that currently exist. Another barrier the wind industry may have to overcome is the local council laws for the approval of installation towers required for wind turbines. These turbines may have a visual impact on the surrounding area which may hinder approval processes.

Small scale solar PV installations have demonstrated commercially successful applications and widespread availability in NSW. They have also overcome some of the hurdles of commercialisation. However, commercial viability of other renewable micro-generators still remains uncertain.

The Taskforce recognises that there are a number of issues that need to be addressed by emerging renewable energy industries in order to encourage consumers to purchase their products. There is a considerable amount of information available for solar PV systems and the Taskforce feels that it has insufficient information with which to make a judgement to include technologies other than solar PV.

However, the Taskforce will seek further information from the micro wind industry in the next three months and make a final recommendation to Government on its inclusion before the commencement of the Scheme in mid 2009.

For these reasons, it is recommended that the Scheme coverage initially be limited to solar PV systems. Future technologies should be included once approved by the relevant Minister.

Recommendation: The Taskforce recommends that solar PV be included in the Scheme and that micro wind be considered for inclusion over the next three months.

Review Period

The establishment of a regular review period of the Scheme is important for a number of reasons.

First, the incentive provided by a FiT may change due to a number of factors, including reductions in the price of solar PV systems, changes in the level of Commonwealth Government subsidy, any other government support for solar PV, inflation and electricity price increases.

Another key reason for regular reviews is that the cost of a FiT will depend largely on the rate of uptake of solar PV and any other eligible technologies, which is very difficult to predict during the Scheme design phase. Any review should take into account the costs of the Scheme on all consumers.

For these reasons, other jurisdictions in Australia are planning regular reviews of their FiT schemes and several have review triggers where a given amount of solar PV has been installed (e.g. South Australia's scheme will be reviewed at 10 MW installed solar PV capacity).

Reviews of the Scheme will need to consider the need to maintain the promised tariff rate for existing customers and the administrative complexity of setting a different rate for new entrants.

The Taskforce recommends that regular reviews should be undertaken to examine whether the Scheme is meeting its objectives. This is consistent with the COAG national principles on Feed-in Tariffs that states that any new FiT scheme should have "clearly defined time limits and review thresholds".

The Taskforce recommends that a review should take place to coincide with the proposed change in the Commonwealth Government's Renewable Energy Certificate multiplier in July 2012. The proposed change is specified in the current draft legislation and requires a reduction in the allocation of Renewable Energy Certificates (RECs) for solar PV systems from the initial "5 Times" RECs to "4 Times" RECs⁵, until eventual removal of the subsidy in 2016.

The Taskforce recognises that the reduction in the level of capital support provided by the proposed Commonwealth legislation will have an impact on uptake rates of solar PV systems.

The Taskforce recommends that a review mechanism should also be enacted if the Scheme reaches a predetermined amount of installed capacity before the 2012 review. The Taskforce determined that an appropriate rate would be the installation of 50MW, which represent approximately 33,000 systems with a capacity of 1.5kW.

This figure represents 11,000 systems per year over three years, a number that is slightly in excess of the high uptake rate of 10,000 systems per year used in the 'Scenario's' section in this report.

⁵ http://www.climatechange.gov.au/renewabletarget/consultation/pubs/Exposure_Bill.pdf

Recommendation: The Scheme should be reviewed in 2012 or when installed solar PV capacity reaches 50MW, whichever occurs first.

Harmonisation with other States and Territories

There are currently two states in Australia with ‘premium’ feed-in tariffs (FiTs) – South Australia (SA) and Queensland (QLD). The Australian Capital Territory (ACT) has announced that its scheme will commence on 1 March 2009. Victoria (VIC) is close to finalising the details of its FiT scheme and Western Australia (WA) is in the early stages of developing a scheme. The Tasmanian Government has not committed to a scheme but has released a discussion paper on feed-in tariffs.

While the SA, Qld and VIC schemes share many key design elements, the ACT and WA schemes are quite different. It should be noted that WA is not part of the National Electricity Market (NEM). The key design features of the existing and proposed schemes in other Australian jurisdictions can be found in Appendix 5. Table 4, gives an overview of the extent to which the schemes in other states and territories align on key design features.

Table 4 - Harmonisation

Design Feature	States / Territories
Net FiT	3 (SA, QLD, VIC)
Gross FiT	2 (ACT, WA)
Residential sector coverage only	1 (VIC)
Residential, small business and community sector coverage	3 (SA, QLD, ACT)
30kW system size limit	3 (SA, QLD, ACT)
2kW system size limit	1 (VIC)
20 year duration	3 (SA, QLD, ACT)
15 year duration	1 (VIC)
Distributor liability	4 (SA, QLD, VIC, ACT)
Budget funded	1 (WA)
Solar PV coverage only	4 (SA, QLD, VIC, WA)
Solar PV and wind coverage	1 (ACT)

A national FiT has been the preferred approach of the NSW Government given the move towards consistent electricity market regulation in the NEM. A 2008 COAG process examined options for a harmonised national approach to FiTs but ultimately recommended against a national scheme. In light of this decision the NSW Government has decided to proceed with its own Scheme.

In the absence of a national scheme, the potential advantage of harmonising State and Territory FiT schemes is that the regulatory burden on retailers is reduced. It should be noted that retailers administer the payments to FiT customers in all States and Territories with distributor models. Inconsistent schemes increase costs by requiring different systems and procedures for retailers operating across borders.

Harmonisation was noted as a priority in some retailer submissions to the Taskforce. From discussions at the Taskforce stakeholder's forum it became clear that certain aspects of the Scheme's design were considered particularly important for minimising retailers' administrative costs. For example, a single tariff rate for all eligible system owners (as in the SA, QLD and VIC schemes) is much easier to administer than different rates for different systems, technologies or dates of entry to the Scheme.

However, it must be recognised that harmonisation will be impossible if other jurisdictions are not willing to modify their schemes. Thus, the NSW Scheme should harmonise with other schemes where possible, but only if harmonisation takes into account NSW electricity market conditions and is in the best interests of NSW.

Financial analysis of different Scheme scenarios

The Taskforce has considered the different impacts that various design elements have on the overall cost of the Scheme and the associated financial implications for NSW electricity consumers.

Complex modelling of the effect of different Scheme design elements on uptake rates would have taken a significant amount of time and was not undertaken. Instead working within the prescribed timeframe, the Taskforce undertook an analysis of simple financial calculations based on assumed uptake rates.

In order to thoroughly investigate this issue the Taskforce considered a number of inputs and Scheme design options, including:

- Typical sizes of solar PV systems (1kW and 1.5kW);
- Larger sizes of solar PV systems (4.5kW and 30kW);
- Commonwealth Government rebates (From July 2009, Renewable Energy Certificates only);
- Net and gross tariff rates (22, 35, 44, 60, 70, 88 and 90c/kWh)
- Assumed net export rates (4%, 10%, 25% and 50%);
- Various payback periods of typical systems by adjusting the tariff rate;
- Total cost per year given anticipated number of participants and varying time frame (5, 7, 10, 12, 15 and 20 years);
- Total cost across all NSW electricity consumers including average increase in electricity bills per consumer and per household;
- Time of use pricing (Across EnergyAustralia, Country Energy, Integral Energy); and
- Additional premium tariff rates on top of ToU Prices (10, 20 and 30c/kWh).

These inputs and their various combinations represent a significant number of potential Scheme design scenarios. The Taskforce agreed that the examination of all these options within this report would not be possible and as such has developed the following ten scenarios for financial analysis:

SCENARIO 1 – 20 year scheme, net tariff, with an export rate of 50% and a tariff rate of 22c/kWh;

SCENARIO 2 – 20 year scheme, net tariff, with an export rate of 50% and a tariff rate of 44c/kWh;

SCENARIO 3 - 20 year scheme, net tariff, with an export rate of 50% and a tariff rate of 60c/kWh;

SCENARIO 4 - 20 year scheme, gross tariff, with a tariff rate of 22c/kWh;

SCENARIO 5 - 20 year scheme, gross tariff, with a tariff rate of 35c/kWh;

SCENARIO 6 - 20 year scheme, gross tariff, with a tariff rate of 44c/kWh;

SCENARIO 7 – 7 year scheme, net tariff, with an export rate of 50% and a tariff rate

of 60c/kWh;

SCENARIO 8 – 7 year scheme, net tariff, with an export rate of 50% and a tariff rate of 88c/kWh;

SCENARIO 9 – 7 year scheme, gross tariff, with a tariff rate of 44c/kWh; and

SCENARIO 10 – 7 year scheme, gross tariff, with a tariff rate of 60c/kWh.

The Taskforce has worked with a number of assumptions across all scenarios (see Appendix 6 for an outline of all the assumptions used), including:

- Average system size of 1.5kW solar PV;
- Annual production of 2,493 kilowatt hours; and
- A discount rate of 5% for net present value and discounted payback period analysis.

A significant area of uncertainty in projecting financial impacts is the likely take-up rates. In order to provide some indication of likely Scheme costs, the Taskforce has used both a low uptake scenario (2,000 per year + the 2,900 existing grid-connected solar PV systems in NSW) and a high uptake scenario (10,000 per year + the 2,900 existing systems). Thus at the end of a 20 year Scheme the total uptake under these scenarios would be 42,900 and 202,900 systems respectively. The Taskforce has assumed a linear uptake in both scenarios.

By way of comparison, SA has indicated that the trend over the past 1.5 years has equated to approximately 6 megawatts of solar power per year being installed. If one assumes that an average system size is 1.5kW, SA's growth would be approximately 4,000 solar PV installations.

Tariff rates were selected to represent low, medium and high values, based partly on tariffs used in other state schemes.

The financial implications of each scenario are shown in Table 5 and Table 6. For each scenario, the Taskforce has calculated the following:

- the total cost over the life of the Scheme;
- the net present value of the Scheme cost;
- the average annual Scheme cost;
- the average annual increase in electricity bills for all consumers; and
- the average annual increase in electricity bills for households.

The cost per household in the third year of the Scheme provides one way of comparing scenarios of different duration. All of these measures were calculated at both high and low uptake rates.

The Taskforce also calculated the likely annual benefit that an eligible participant would receive if they were to install a 1.5kW solar PV system under various tariff rates and types, with an assumed net export rate of 50%.

The payback period that these payments represent are also shown in Table 5 and Table 6, under both simple and discount payback methods. Simple payback refers to

payback of the original sum of money only. A discounted payback method assumes a rate of return on the sum invested in the solar PV system. Annual payments and payback periods are unaffected by uptake.

All calculations are in today's dollars and do not take into account growth in the number of electricity consumers.

As well as calculating the total costs for each scenario, the Taskforce considered the cost implications for household and business consumers. Liability for paying the tariff will be placed on electricity distributors, who will pass this on through increased distribution charges, resulting in increases to consumers' electricity bills. Distribution charges are primarily consumption based, with rates varying between domestic users, small and large businesses and other users such as schools and hospitals.

Assuming that the costs of the Scheme would be spread evenly across all consumers based on their consumption, the Taskforce calculated the average annual increase in household electricity bills. Households account for approximately 30% of electricity consumption in NSW, and would therefore pay approximately 30% of the total cost of the Scheme.

The remaining 70% of the Scheme costs would be paid for by non-domestic users. An average cost per business has not been calculated, given the amount of electricity used by different businesses varies enormously with their size and function. Increased costs on most small businesses are likely to be within a similar order of magnitude to the increases on households. Businesses with high electricity consumption would see relatively higher increases in their bills.

Table 5 - Financial analysis of scenarios – 20 year Scheme duration

Tariff rate and tariff type		Low and high scenarios (participants)	Total Scheme cost (2009 \$m)	Total Scheme cost (NPV \$m) ¹	Average annual Scheme cost (2009 \$m)	Average annual increase in electricity bills per <u>electricity consumer</u> (2009 \$) ²	Average annual increase in electricity bills per <u>household</u> (2009 \$) ³	Scheme cost per household in year 3 (2009 \$)	Annual customer benefit (2009 \$) ⁴	Payback period	
										Simple payback (years)	Discounted payback (years)
Scenario 1	Net 22c/kWh	42,900	\$131.1	\$70.8	\$6.6	\$2.06	\$0.76	\$0.28	\$449	24.7	Never
		202,900	\$591.9	\$314.2	\$29.6	\$9.32	\$3.44	\$1.05			
Scenario 2	Net 44c/kWh	42,900	\$262.2	\$141.5	\$13.1	\$4.13	\$1.53	\$0.57	\$723	15.3	Never
		202,900	\$1,183.7	\$628.4	\$59.2	\$18.64	\$6.89	\$2.10			
Scenario 3	Net 60c/kWh	42,900	\$357.5	\$193.0	\$17.9	\$5.63	\$2.08	\$0.77	\$923	12	18.8
		202,900	\$1,614.2	\$856.9	\$80.7	\$25.42	\$9.40	\$2.86			
Scenario 4	Gross 22c/kWh	42,900	\$262.2	\$141.5	\$13.1	\$4.13	\$1.53	\$0.57	\$549	20.2	Never
		202,900	\$1,183.7	\$628.4	\$59.2	\$18.64	\$6.89	\$2.10			
Scenario 5	Gross 35c/kWh	42,900	\$417.1	\$225.2	\$20.9	\$6.57	\$2.43	\$0.90	\$873	12.7	20.6
		202,900	\$1,883.2	\$999.8	\$94.2	\$29.65	\$10.96	\$3.34			
Scenario 6	Gross 44c/kWh	42,900	\$524.4	\$283.1	\$26.2	\$8.26	\$3.05	\$1.14	\$1,097	10.1	14.4
		202,900	\$2,367.5	\$1,256.8	\$118.4	\$37.28	\$13.78	\$4.20			

¹ NPV = Net present value, calculated with a discount rate of 5%.

² This is an average across all electricity consumers, including households, businesses, schools and hospitals. Care should be taken in applying it to individual cases.

³ Households represented 31% of all electricity consumption in NSW in 2007.

⁴ Under a gross scheme, the total benefit equals the tariff payment. Under a net scheme, PV-generated electricity consumed by the owner displaces some electricity that would otherwise be purchased off the grid. Hence the owner receives the benefit of the tariff payment plus the value of the avoided electricity from the grid.

Table 6 - Financial analysis of scenarios – 7 year Scheme duration

Tariff rate and tariff type		Low and high scenarios (participants)	Total Scheme cost (2009 \$m)	Total Scheme cost (NPV \$m) ¹	Average annual Scheme cost (2009 \$m)	Average annual increase in electricity bills per electricity consumer (2009 \$) ²	Average annual increase in electricity bills per household (2009\$) ³	Scheme cost per household in year 3 (2009 \$)	Annual customer benefit (2009 \$) ⁴	Payback period ⁵	
										Simple payback (years)	Discounted payback (years)
Scenario 7	Net 60c/kWh	16,900	\$57.1	\$45.5	\$8.2	\$2.57	\$0.95	\$0.77	\$923	20.8	Never
		72,900	\$224.6	\$177.2	\$32.1	\$10.11	\$3.74	\$2.86			
Scenario 8	Net 88c/kWh	16,900	\$83.7	\$66.7	\$12.0	\$3.77	\$1.39	\$1.14	\$1,272	13.8	Never
		72,900	\$329.4	\$260.0	\$47.1	\$14.82	\$5.48	\$4.20			
Scenario 9	Gross 44c/kWh	16,900	\$83.7	\$66.7	\$12.0	\$3.77	\$1.39	\$1.14	\$1,097	16.3	Never
		72,900	\$329.4	\$260.0	\$47.1	\$14.82	\$5.48	\$4.20			
Scenario 10	Gross 60c/kWh	16,900	\$114.1	\$91.0	\$16.3	\$5.14	\$1.90	\$1.55	\$1,496	8.3	20.1
		72,900	\$449.2	\$354.5	\$64.2	\$20.21	\$7.47	\$5.73			

¹ NPV = Net present value, calculated with a discount rate of 5%.

² This is an average across all electricity consumers, including households, businesses, schools and hospitals. Care should be taken in applying it to individual cases.

³ Households represented 31% of all electricity consumption in NSW in 2007.

⁴ Under a gross scheme, the total benefit equals the tariff payment. Under a net scheme, PV-generated electricity consumed by the owner displaces some electricity that would otherwise be purchased off the grid. Hence the owner receives the benefit of the tariff payment plus the value of the avoided electricity from the grid.

⁵ Assumes participant enters at the commencement of the Scheme, is paid for 7 years, and after the Scheme finishes the participant is paid 14c/kWh for the remaining life of the solar PV system.

Green Collar Jobs

Estimates of the number of people currently employed in the solar PV industry in Australia vary. According to the International Energy Agency (IEA), the Australian solar industry employed 1,660 workers in 2007. The Clean Energy Council estimates at least 3,000 are employed in the industry nationally⁶. The solar PV industry includes installation, manufacturing, wholesaling and research and development. The highest number of solar PV jobs is in the area of installation, which means that the majority of employment is at the local level.

A FiT which stimulates increased uptake of solar PV would lead to increases in the number of jobs in the solar PV industry in NSW. The Taskforce anticipates that these increases would mainly be in installation jobs and that an increase of solar PV uptake in NSW is unlikely to be sufficient to stimulate a solar PV manufacturing sector.

The Taskforce has estimated the number of jobs in the solar PV industry which may be supported by various annual rates of grid connected solar PV installations. In 2008, approximately 1,600 grid-connected solar PV systems were installed in NSW.⁷ This was an increase on installations in previous years. As noted earlier the rate of increase in Solar PV installations following the implementation of a FiT will be influenced by the tariff rate, as well as other factors including changes in the level of Commonwealth support for solar PV installations, changes in the price of solar PV and changes in electricity prices.

A study by Greenpeace and the European Photovoltaic Industry Association (EPVA), estimates that 49 jobs are created per MW of solar PV installed. These jobs are in the areas of: production (10 jobs per MW); installation (33 jobs per MW); wholesaling and indirect supply (3-4 jobs per MW) and research (1-2 jobs per MW).⁸ This is consistent with work by Access Economics for the Clean Energy Council on the costs structure of Solar PV system implementation⁹. This showed that of the final cost of a PV system, 43% was accounted for by product costs. The remaining 47% (GST accounts for 10%) comprised manufacturing, delivery and installation costs. Manufacturing accounted for around 20% of these, consistent with the findings in the Greenpeace and EPVA report.

The Taskforce has considered the number of solar PV industry jobs which would be supported annually with different rates of solar PV installations, based on the estimates in the Greenpeace and EPVA study. Due to uncertain manufacturing conditions for solar PV in NSW, the Taskforce has focused on the creation of non-manufacturing solar PV jobs.

⁶ Clean Energy Council Submission to the Senate Standing Committee on Environment, Communications and the Arts Inquiry into Renewable Energy (Electricity) Amendment (Feed In Tariff) 2008

⁷ Department of Environment, Water, Heritage and the Arts, *Solar Homes and Communities Plan - Systems installed by state*
<http://www.environment.gov.au/settlements/renewable/pv/pubs/wattsbymonth-dec08.xls>.

⁸ Greenpeace and the European Photovoltaic Industry Association, 'Solar Generation V – 2008: Solar electricity for over one billion people and two million jobs by 2020', p 48.

⁹ Access Economics Pty Ltd for the Clean Energy Council, *The Economics of Feed-in Tariffs for solar PV in Australia*, November 2008, p24

The number of new jobs created by the Scheme will be dependent upon the rate of uptake. For example, if 10,000 Solar PV systems are installed in each year of the Scheme, this can be expected to support around 500 additional ongoing jobs.

However, the Commonwealth's Carbon Pollution Reduction Scheme (CPRS) and the expanded Renewable Energy Target (RET) will also be providing incentives and support for the expanded uptake of solar PV, so any new jobs created will result from a combination of these three separate incentives. Identifying the relative contribution of each of these policies to the number of jobs created is not possible.

It is also important to note that any new jobs are created only once, and not in each year of the Scheme's operation. In order for the number of jobs to increase beyond this figure, the annual rate of system installations would also need to increase. Equally, if the rate of installations declines for any reason, for example after the Scheme finishes, the number of jobs may also decline proportionally.

As the total number of jobs created is relatively small, the level of subsidy per job is high. This is primarily because the Scheme is designed to support the purchase of a long term, durable asset that is unlikely to be replaced during the life of the Scheme. Table 7 illustrates the level of subsidy per job created over a 20 year Scheme for different tariff rates and types. As noted above, not all of these new jobs are attributable to the NSW Solar PV FiT, so these numbers actually understate the true cost per job in terms of the subsidies provided by the Scheme, which may be significantly higher.

Table 7 - Subsidy per Job – 20 year Scheme

Scheme design	Annual PV installations	Jobs created	Subsidy per job over life of the Scheme	Subsidy per job per year
Net tariff 60c/kWh (50% export)	2,000	23	\$15.5 million	\$777,000
Gross tariff 44c/kWh	2,000	23	\$22.8 million	\$1.1 million
Net tariff 60c/kWh (50% export)	10,000	491	\$3.3 million	\$164,000
Gross tariff 44c/kWh	10,000	491	\$4.8 million	\$241,000

If the length of the Scheme is shortened, then the subsidies per job will decline accordingly, although again, these numbers understate the true subsidy as they do not account for the relative contribution of other policies.

Table 8 shows that even under the least expensive outcome, each created job is still subsidised by consumers at nearly \$100,000 per year. As noted earlier, the rate of new installations each year would need to remain at least as high after the Scheme finishes for these jobs to continue to be supported. For this to occur, industry costs will need to have been driven down significantly enough over the Scheme's lifetime, so that by the time it finishes, solar PV is an attractive investment even without the subsidy provided by the Scheme.

Table 8 - Subsidy per Job – 7 year scheme

Scheme design	Annual PV installations	Jobs created	Subsidy per job over life of the Scheme	Subsidy per job per year
Net tariff 88c/kWh (50% export)	2,000	23	\$3.6 million	\$520,000
Gross tariff 60c/kWh	2,000	23	\$5.0 million	\$709,000
Net tariff 88c/kWh (50% export)	10,000	491	\$671,000	\$96,000
Gross tariff 60c/kWh	10,000	491	\$915,000	\$131,000

Any reduction in costs would be driven by a combination of the Scheme itself, related Commonwealth policies including the CPRS and RET and any technical developments. Whether this level of cost reduction will be achieved over this period is unknown.

Emissions Reductions

The recent Senate Inquiry on feed-in tariffs found:

“There are two main reasons why a FiT may be set. It may be intended to correct a market failure, such as a lack of a price signal reflecting the environmental harm caused by greenhouse gas emissions. It may also be used to stimulate the development of particular electricity generating technologies, such as photovoltaic cells. Often these two reasons are closely related.”

(Senate Inquiry, Renewable Energy (Electricity) Amendment (Feed-in-Tariff) Bill 2008, page 1, November 2008)

The Commonwealth Government has committed to reducing Australia’s greenhouse gas emissions in 2050 by 60% relative to 2000 levels. Over the medium term it has committed to reductions of 5-15% below 2000 level by 2020. The Carbon Pollution Reduction Scheme (CPRS), scheduled to commence on 1 July 2010, is expected to play the primary role in delivering these commitments.

Developing cost-effective emissions reduction technologies is important to ensure that Australia’s 2050 emissions reduction target can be met without significant economic and social costs. Existing government policies are aimed at developing a portfolio of cost-effective technologies which will facilitate greenhouse gas emissions cuts over the medium-long term. A feed-in tariff for solar PV would complement these policies.

Under the CPRS, emissions reduction targets will apply across all covered sectors including electricity generation. The effect of the emissions reduction target under the CPRS will be to cap emissions across covered sectors, without prescribing where or how emissions reductions will occur.

Therefore, while a NSW Solar PV FiT Scheme will not alter the total level of emissions reduction from the electricity generation sector that will occur nationally under the CPRS, it will lead to a change in their composition.

Metering

The metering requirements differ for the two tariff types.

The question of tariff type (net or gross) is distinct from the physical metering arrangements required to operate a NSW Solar PV FiT Scheme.

A gross metering arrangement (see Diagram 1) allows both the measurement of generation from a solar PV system and the measurement of household consumption.

A net metering arrangement (see Diagram 2) does not measure individual generation from a solar PV system and the consumption of the household separately. Instead it sums generation and consumption together and calculates the net outcome. In other words the meter would provide a single figure for the difference between consumption and generation units.

It is important to note that a gross metering system can support both a net tariff type and a gross tariff type. A net metering arrangement can only support a net tariff type as you cannot measure the generation of the solar PV system. This distinction is explained further below.

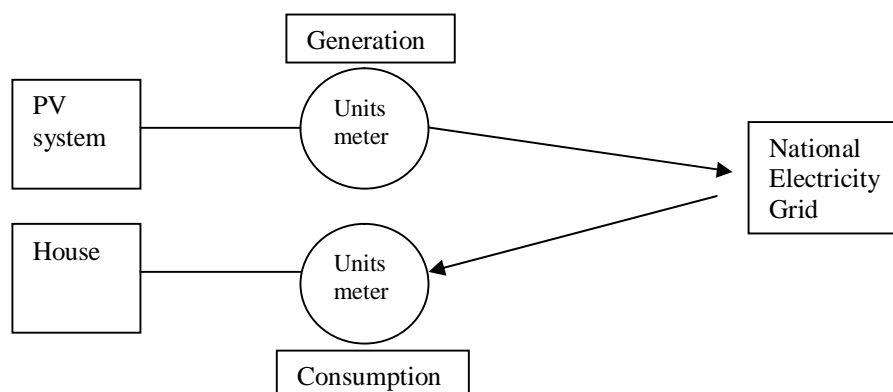
Another important consideration is the type of meter used, whether accumulation or interval. An interval meter can specify a period of time, e.g. 30 minutes, at which to calculate the electricity usage. An accumulation meter on the other hand, will continually accumulate information and not record information in 30 minute intervals. Normally an accumulation meter will be read over a larger period of time and thus it would be more advantageous for the consumer to use an interval meter, as it is able to capture 30 minute blocks of export to the national electricity grid.

Gross FiT Metering

Gross metering arrangements measure both the total electricity consumed by a customer and the total electricity generated by the solar PV system. This requires the provision of a separate meter to solely measure the output of the micro-generator.

Conceptually, the required metering arrangement is as shown in Diagram 1.

Diagram 1 - Gross FiT metering arrangement



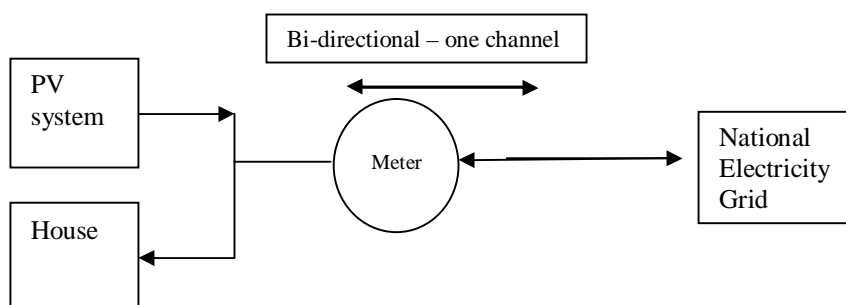
The cost of installation (re-wiring) for a gross metering arrangement will be higher the greater the distance of the micro-generator is to the metering point. The physical constraints of the existing metering point may also present problems for installing an additional meter.

Net FIT Metering

Net metering arrangements measure the difference between the electricity consumed by a household and the generation by the solar PV system. Excess electricity is then exported or required electricity imported through the meter.

Conceptually, the metering arrangement is as shown in the following diagram:

Diagram 2 - Net FiT metering arrangement



Metering – Participant Cost Implications

EnergyAustralia supply electronic 30 minute interval meters as part of their standard distributor service.

Beyond the cost of the generator itself, there are three primary cost components associated with metering a micro-generator: the hardware itself (i.e. the meter), the cost of installing the meter and the cost of any additional meter wiring.

The cost of most meters is currently covered by electricity distributor charges applied to all electricity consumers. However, the installation of these meters is not covered by the distributor and has to be paid by consumers.

Additional meter wiring would only apply if the customers metering arrangements are not suitable for the tariff type specified by the Scheme. It would be at the customers' discretion whether to opt-in to the Scheme and incur the costs associated with changing their metering wiring, or to continue on with their current arrangement.

Interval or Accumulation Meters

The National Electricity Market Management Company (NEMMCO) in its submission to the Taskforce notes that it would be consistent with NEM arrangements if 30 minute interval meters were required as part of the NSW Scheme.

With an accumulation meter, the payment is determined by the frequency with which the meter is read, typically quarterly. Net exports over a three month interval depend on average quarterly consumption. If consumption exceeds the generation of a solar PV installation, which will likely be the case for most households with 1 to 1.5kW installations, no net exports will be recorded over the quarter.

However, there may have been many periods of up to several consecutive hours when the PV's generation exceeded a participant's consumption. Therefore, it is desirable under a net FiT scheme to have an interval meter that records net exports and net imports for short blocks of time, e.g. 30 minutes.

Any change in electricity metering must take into account the metering reforms by the Ministerial Council on Energy. For further information on these see Appendix 8.

Low Income Households

The Taskforce considered the potential impacts that the Scheme would have on low income households and how they could be shielded from the financial impacts of the Scheme. Equity of access to the FiT was also considered, as in most cases only those who own their own home can afford the initial investment, and whose roofs are of appropriate size and angle can access the Scheme, yet all consumers will contribute to the costs of the Scheme. For these reasons it was important for the Taskforce to balance issues of encouraging investment with concerns for the total cost.

The NSW Government provides direct financial assistance with energy bills to customers through three existing programs. These are the Pensioner Energy Rebate, the Life Support Electricity Rebate and the Energy Accounts Payment Assistance (EAPA) scheme. In total these three programs are budgeted to provide over \$94 million in assistance during 2008-2009. These three NSW programs operate in addition to other forms of assistance such as the Commonwealth Government's Pensioner Utility Allowance of \$500 per year, and non-financial measures including the requirement for retailers to offer customers payment plans and strong regulations in regards to disconnection policies.

The Pensioner Energy Rebate is means-tested, based on eligibility criteria which require a customer to hold one of several Centrelink concession cards. The Life Support Electricity Rebate is limited to users of approved equipment determined in consultation with NSW Health.

EAPA is available to any customer who is having trouble paying an energy bill because of financial difficulties, based on assessments by community welfare organisations.

A number of public submissions have noted that the Scheme would have a disproportionate impact on low income consumers, because they spend more on their electricity as a proportion of their total income. Most notably the Public Interest Advocacy Centre noted the impact on low income consumers in its submission and suggested an increase in the current pensioner rebate from \$112 to \$130 per annum (indexed to CPI) and that the concessions should be extended to holders of Health Care Cards. Other submissions have suggested that low income households should simply be excluded from having to pay the costs of the Scheme.

The Taskforce considers that the introduction of measures to help low income consumers, as suggested by the public submissions, would create a greater cost impost than the benefit they achieve. Instead, the tariff rate should be set at an appropriate level which balances the achievement of policy goals with the cost impact on low income consumers. It should also be noted that FiT Schemes operating in other States and Territories have not taken steps to remove the associated costs from low income households.

The Taskforce notes that the costs of the Scheme and its associated impact will be reviewed as per the recommended review period. The existing schemes that help low income consumers, may take into account the financial pressures that the Scheme may place on low income consumers.

Appendix 1 – NSW Solar FiT Taskforce Terms of Reference

Terms of Reference

Introduction of Solar PV Feed-in Tariffs in NSW

On 23 November 2008, the Deputy Premier and Minister for Climate Change and the Environment, The Hon. Carmel Tebbutt MP and the Minister for Energy, The Hon. Ian Macdonald MLC, jointly announced the intention of the NSW Government to introduce a NSW Solar Photovoltaic (PV) feed-in tariff (FiT) scheme that will pay customers for electricity they put into the grid from roof top solar panels.

A joint task force, chaired by the Department of Water and Energy, also includes representatives from:

- The Department of Environment and Climate Change;
- NSW Treasury; and
- The Department of Premier and Cabinet.

The Taskforce is required to produce a report in January 2009 which will provide recommendations on how best to implement a NSW feed-in tariff scheme. This report will form the basis for a decision by Ministers. It is anticipated that the new feed-in tariff scheme will be introduced in mid 2009.

Government Objectives in Introducing a Feed-in Tariff

- Provide an additional means of support to NSW Solar PV consumers who wish to generate renewable energy locally;
- Build the state's green collar jobs sector (e.g. service, manufacturing or research and development), by helping solar technology compete with non-renewable energy sources; and
- Expand the visibility of renewable energy technologies to help motivate the whole community in responding to climate change.

Role of the Taskforce

- Guided by the Government's objectives, investigate and cost options for the establishment of a feed-in-tariff in NSW; (See Tab A)
- Prepare a proposal for consideration by the Ministers that takes into account the Council of Australian Governments agreed principles for feed-in tariffs and Complementarity Principles;
- Identify the potential additional greenhouse emissions reduction and/or possible industry development benefits of a feed-in-tariff; and
- Identify the potential cost impact on NSW electricity consumers of a feed-in tariff.

Scope of Work

The taskforce will focus on a Solar PV FiT scheme but will also investigate other types of renewable micro generation that may be available and eligible to be incorporated into the Scheme at a later date. These further investigations will ensure

that new technologies that could develop over the life of the Scheme, may be included subject to Ministers' approval.

Harmonisation

Where possible the task force should seek to examine the options of harmonisation with other FiT schemes that currently operate in States and Territories.

Harmonisation can include areas such as:

- Limits on maximum eligible generating capacity;
- Duration commitments for the FiT scheme, and trigger points for review or change;
- Tariff rates;
- Technologies;
- Eligibility; and
- Implementation of a FiT scheme.

The Taskforce should consider:

- A limit on the maximum eligible generating capacity per electricity customer, to enable the tariff to stimulate large numbers of customers to participate rather than a smaller number of large facilities.
- An annual electricity usage threshold to define customer eligibility, to focus the benefits on small scale users

IPART

The taskforce should examine any implications that the Independent Pricing and Regulatory Tribunal retail price determination will have on NSW electricity consumers as a result of the NSW FiT scheme.

Consultation

Multiple states in Australia have already established feed-in tariffs for Solar Photovoltaic systems, while NSW has only had voluntary feed in tariffs provided through individual retailers. The taskforce will consider these schemes in its final report.

Consideration will also be given to the recent Senate Inquiry (*Renewable Energy (Electricity) Amendment (Feed-in Tariff) Bill 2008*) into a national FiT, which accepted submissions from 129 parties.

The Taskforce should call for stakeholder submissions on the design details of NSW feed-in tariff scheme by Friday, 5 December 2008. The Taskforce should also call for public submissions as soon as practicable. All submissions will be due by COB Thursday, 15 January 2009. The Taskforce will also hold an industry forum on or around Thursday, 15 January 2009 to solicit its views and suggestions.

Tab A

Options for the establishment of a feed-in tariff in NSW

Below are the variables that will be examined for the NSW formal feed-in tariff. These variables represent genuine policy options and differences and will be thoroughly investigated in the final report.

1) **Tariff Rate** – What factors should be considered in setting a tariff rate? Are there any GST implications with your suggested tariff rate? How much should be paid for electricity from solar PVs per kWh?

Should the tariff be based on a fixed rate or a variable rate consistent with time-of-use pricing for consumption?

2) **Energy Production** - Net Vs Gross

Should the tariff be set for Gross (all energy generated from the PV system) or net (energy generated less energy used by household)?

3) **Payment** - Who should pay for the costs incurred in this policy? Includes possible implications for IPART regulated tariff. Will the liability lie with distributors or retailers? How would the costs be passed on to electricity consumers?

4) **Duration** – How long should the Government maintain the FiT and should the rate be fixed for the entire life of the program or varied in future years? What would appropriate review triggers be?

5) **Eligibility** – Which customers will be eligible? (Noting the Government's preference for a scheme that stimulates a large number of customers participating rather than a smaller number of large facilities).

6) **Technology** – What other renewable technologies (other than solar PV) could be incorporated into a FiT scheme at a later date?

Appendix 2 – National Electricity Rules relevant to a FiT

Registration

Paragraph 2.2.1 (a) of the Rules requires that a person must not engage in the activity of owning, controlling or operating a generating system that is connected to a transmission or distribution system unless that person is registered by the National Electricity Market Management Company (NEMMCO) as a Generator. Under clause 2.2.1(c) of the Rules, NEMMCO may exempt a person from the requirement to register a generating system in accordance with guidelines issued from time to time.

These Registration Guidelines allow exemptions for any generating system which has a total nameplate rating at a connection point of less than 5 MW, or is not capable of exporting more than 5MW to a transmission or distribution system. This is on the basis that systems of this size cannot significantly affect market outcomes or impact power system security.

Domestic solar PV power systems are in the kilowatt size, community systems in the tens of kilowatts and commercial systems may be in the hundreds of kilowatts. All of them fall below the 5 MW limit for exemption and therefore do not need to be registered with NEMMCO.

Non-Scheduled Generators

Paragraph 2.2.3 (a) of the Rules requires that a generating unit with a nameplate rating of less than 30 MW (not being part of a group of generating units) must be classified as non-scheduled (unless NEMMCO approves otherwise). Non-scheduled generating units do not participate in the co-ordinated central dispatch process operated by NEMMCO. Domestic, community and commercial PV systems are far less than 30 MW in capacity and are therefore classified as non-scheduled generators.

All new intermittent generators greater than 30 MW are required to register under a new classification of “Semi-Scheduled Generator”. They must submit and receive dispatch information in a similar manner to scheduled generating units, and limit their output at times when it may exceed secure network limits.

Non-Market Generators

Solar PV systems in the context of the proposed NSW scheme also conform to the Rules as they relate to Non-Market Generators.

Paragraph 2.2.5 of the Rules states that if output from a generator is purchased in entirety by the local retailer or customer located at the same connection point, the generator must be classified as a non-market generating unit.

Electricity sent to the distribution network from domestic, community and commercial solar PV power systems is almost exclusively sold to electricity retailers. These systems are therefore classified as non-market generators and the generator does not receive payment from NEMMCO.

Appendix 3 – Gross and Net Scenario Example

Below is an example of how a Feed-in Tariff would be calculated at a certain period of time (e.g. 30 minute interval) based on a net or a gross scenario and the benefits that would be derived for the participant. Please note that this is a conceptual example only and the assumptions used do not necessarily reflect the final Scheme that will be implemented.

It should also be noted that the figures below (generation and consumption) are used to assist in the understanding of the concepts. They may not necessarily reflect personal consumption patterns.

Assumptions

- Solar PV Generation = 100 kilowatt hours (kWh)
- Consumption = 50kWh
- Net Scenario - 50% export rate (50% of generation is assumed to go to the national electricity grid)
- FiT assumed payment = 60 cents per kilowatt hour (c/kWh)
- Electricity Tariff = 10c/kWh

No Solar PV system

Consumption = 50kWh X 10c/kWh = \$5.00

If no Feed-in Tariff is present then the household will have to pay for all their consumption which in this case will be \$5.00

Gross Tariff Scenario

Generation payment = 100kWh X 60c/kWh = \$60

Consumption payment = 50kWh X 10c/kWh = \$5.00

Benefit to participant = \$60.00 – \$5.00 = \$55.00

In a Gross scenario the participant is paid for all generation and pays for all consumption. Thus they will receive the sum of \$55.00.

Net Tariff Scenario

Net export to the grid = Generation - Consumption = 100kWh – 50kWh = 50kWh

Generation Payment = 50kWh X 60c/kWh = \$30.00

Consumption Payment = 0. This is because your generation is greater than consumption and you have not required any electricity from the national electricity grid.

In the above scenario the owner of the solar PV system will receive a FiT payment of \$30.00. They also receive a benefit of lower electricity bills because if the person did not have the solar PV system they would have to pay \$5.00 for their electricity. So in effect the participant is saving \$5.00 off their electricity bill by having Solar PV on their roof.

The overall benefit to the consumer under this net scenario is \$35.00.

Appendix 4 – Public Submissions

NSW Solar FiT Public Submissions

The Taskforce notes that approximately 73 of the submissions received were form letters supporting the Nature Conservation Council of NSW's submission to the Taskforce.

The majority of submissions were in favour of a FiT scheme for NSW and favoured a gross tariff system, in operation for 20 years, with a fixed 60c/kWh rate, open to all sectors of the economy, open to all size systems and all renewable technologies.

It should be noted that the summary of submissions does not necessarily reflect the majority of the general public's views on FiTs.

The views of these submissions have been summarised according to the main design principles that are set out in the Terms of Reference (Appendix 1). These principles are:

- Tariff rate (including fixed or variable rate);
- Tariff Type - Net or Gross;
- Payment liability (Retailer or Distributor);
- Duration of FiT Scheme;
- Eligibility; and
- Technologies

Tariff Type – Net or Gross

- The overwhelming majority of submissions were in favour of a gross tariff.
- Of the submissions received, 175 were in favour of a gross tariff, five were in favour of a net tariff and six submissions suggested a combination of a net and gross FiT system.
- A gross tariff was argued to provide a simpler administrative system and provide more certainty for consumers in calculating their payback on investments.
- Popular justification for a gross tariff was that the recipient of a FiT would be able to payback in a shorter time frame. However, it should be noted that the period of payback is dependent on not only whether the tariff is paid for all generation (gross) or for that electricity that is fed back into the grid (net) but also on the rate of the tariff i.e. a net tariff with a high rate could create a similar outcome to a gross tariff with a low rate.
- A gross tariff was argued as more appropriate than net as it values all renewable energy generation (not just excess electricity above consumption) and values avoided network costs.
- A number of submissions argued in favour of a gross tariff on equity reasons as there is no differentiation of consumers based on system size on consumption patterns. It was argued that a net tariff which pays for electricity in excess to electricity consumption creates inequities. Under a net system for solar PV, those with smaller size systems and those who are likely to consume electricity during the day (such as senior citizens, the unemployed and stay-at-

home parents) rarely produce more electricity than they consume and are unlikely to export electricity and receive any payments under a net system.

- The arguments in favour of a net tariff were that this would encourage behavioural changes in consumption (energy efficiency improvements) by creating an incentive to reduce the amount of consumption relative to generation.
- The need to consider compatibility of current metering arrangements and proposals when considering a gross or net tariff system was also raised.

Factors to consider in setting a tariff rate

- A tariff rate sufficient to pay back the consumer for the capital costs of installing renewable generation was the most popular response to this question. A ten year payback was the most popular time period suggested.
- Other factors considered important included providing investment certainty for consumers, manufacturers and installers of renewable generation.
- Other factors raised included consistency with the COAG National Principles for Feed-in Tariffs and COAG's Complementary Principles, interaction with other Government policies such as the Commonwealth Government's Renewable Energy Target and the Carbon Pollution Reduction Scheme, the duration and costs of the FiT Scheme.

Tariff rate

- Suggestions for the actual tariff rate ranged from approximately 14c/kWh (parity with electricity tariffs) to \$1/kWh.
- The most popular tariff rate suggested was 60c/kWh, equal to approximately four times the electricity tariff.
- Variation of tariff rates within the Scheme was raised as a way to differentiate local manufactured products from those produced overseas. Variation of the tariff rate was also raised as an option to differentiate rates of investment, the costs of different types of renewable technologies, the size of technology installations and the types of customers.
- Some submissions argued for no variation in tariff rates to simplify the billing systems in place and avoid extra costs.
- A declining tariff rate was suggested by many to allow for advances in technologies and changes in costs over time to be reflected in the tariff rate. A rate of 5% per annum was the most popular suggestion.
- Many submissions suggested the tariff rate be indexed to inflation and/or adjusted in proportion to fluctuations in electricity tariffs over the life of the Scheme.

Fixed or variable time-of-use tariff

- There were a greater number of submissions in favour of a fixed tariff (29 submissions) over a variable time of use tariff (13 submissions).
- Arguments put forward in favour of a fixed tariff included administrative simplicity and certainty for investors in calculating the rate of return on their investment. The minimal ability of solar PV systems to generate power in peak times due to few daylight hours falling in this period was raised as a concern in a time of use scenario.

- Those in favour of a time of use tariff argued that it would motivate consumers to change their behaviour by rewarding consumption outside of peak times which would assist the electricity network to manage peak load.

Duration

- Twenty years was the most popular suggested length for the Scheme by a significant margin.
- Some submissions addressed the need to not only have a length specified for the Scheme but a guaranteed length of payment to consumers from the year of installation. This was argued as necessary for creating investor and industry certainty.
- Many submissions mentioned the need for periodic reviews to monitor the effectiveness of the Scheme and to make allowances for developments and cost structures of renewable energy technologies.

Payment liability

- There was wide range of responses regarding payment liability for the Scheme.
- A distributor liability was raised as preferable as it would be the distribution network that would benefit from reductions in peak load as a result of the Scheme.
- It was also argued that a retailer liability would impose an unfair burden on those retailers who had a higher proportion of FiT customers and prevent new entrants into the retail market.
- Electricity retailers were suggested by many as the relevant party to pay the FiT to consumers, however many submissions did not clearly outline whether this meant that retailers should simply manage the billing arrangements for customers or fund the Scheme.
- Government funding and electricity customer funding (via a levy from electricity retailers and distributors) were also suggested as options for the Scheme.

Eligibility

- The most popular response in relation to eligibility was that there should be no criteria for the Scheme and that it should be open to all sectors of the economy (residential, commercial and industrial), have no restrictions on system size or electricity generation rates.
- Access to the Scheme to community owned power generation facilities was put forward as a way to provide access to those who do not own their own home or who otherwise would not be able to install renewable generation as an individual.

Technology

- The majority of submissions supported a Scheme open to all renewable technologies.

Other issues

Some submissions raised the following issues:

- Equity concerns were highlighted in relation to FiT schemes. Concerns were raised that a FiT policy is a cross subsidy that imposes costs on all consumers

but does not provide access to all due to the high capital costs of installations. Suggestions of how to balance these concerns within a FiT Scheme included exempting low income earners and disadvantaged households from any increases in electricity costs related to the Scheme. Other proposals included increasing the NSW Pensioner Energy Rebate and funding the Scheme through the Commonwealth Government's Carbon Pollution Reduction Scheme.

- The need to link energy efficiency targets with the Scheme.
- Mandating Australian standards for components to be built into the Scheme.
- Grid connection arrangements to require distributors to guarantee connection and payment for generation where standards are met.

Senate Inquiry Public Submissions

The Senate Inquiry into the *Renewable Energy (Electricity) Amendment (Feed-in Tariff) Bill 2008* finalised its report on 10 November 2008. It received 129 public submissions from interested parties, which have been analysed to ascertain the views of the wider public on the issue of a FiT. Although these views are not necessarily NSW specific, they do examine issues of relevance to the design elements of a NSW FiT.

The Taskforce has summarised the Senate Inquiry submissions below. The numbers represent a cumulative total of the responses that were made from the submissions. The design elements have been selected based on the considerations for a NSW Solar FiT.

The majority of stakeholders who provided a submission were in favour of a gross payment system that has a fixed, high tariff rate over a 15 to 20 year period, with no limit on eligibility.

Of those submissions received, 66 favoured a gross FiT system with only 1 favouring a net system; and 39 favoured a fixed tariff rate with 11 favouring a time-of-use tariff. The most popular tariff rate suggested was 60c/kWh (21 submissions), followed by 70c/kWh (13 submissions).

In relation to the question of what eligibility criteria should exist for a FiT scheme, the most popular response was that there should be no criteria (19 submissions). A 20-year scheme duration was suggested by 16 submissions, followed by a duration of 15 years by 13 submissions.

Appendix 5 - Feed-in Tariff Schemes in Australia – Key Design Details

NB - Tasmania is considering a feed-in tariff – a discussion paper was released in late 2008.

Design Element	SA	Qld	Vic	ACT	WA	NT - Alice Springs Solar City Program – ‘elevated buy-back tariff’
Core scheme objectives	To make solar power more affordable for South Australians and encourage energy efficiency.	To make solar power more affordable for Queenslanders and encourage energy efficiency.	To support households to act on climate change.	To support increased uptake of micro renewables and the micro renewables industry		Increased solar PV uptake and data collection.
Stage of development	Scheme started 1 July 08	Scheme started 1 July 08	Scheme details still being finalised. Scheduled to commence in 2009.	Stage 1 of the Scheme will commence on 1 March 2009.		Commenced March 2008
Net / Gross	Net	Net	Net	Gross	Gross	Gross
Meter	Import/ export	Import/ export	Import/ export	Type 6 meter	Unknown	Smart meter
Tariff rate	44c/kWh – approx 2x standard retail rate.	44c/kWh – approx 3x standard retail rate.	60c/kWh – approx 4 x standard retail rate.	50.05c/kWh up to 10kW system size. 40.04c/kWh between 10kW and 30kW	60c/kWh	45.76c/kWh, adjusted for annually for CPI. Tariff is capped at \$5 per day, above which the price reverts to the peak

Design Element	SA	Qld	Vic	ACT	WA	NT - Alice Springs Solar City Program – ‘elevated buy-back tariff’
						tariff rate (approx 23 cents/kWh)
Retailer / distributor liability NB - Under all distributor liability models in Australia, retailers actually pay tariff and recoup costs from distributor.	Distributor liability Distributors pass costs through to all electricity customers.	Distributor liability. No cost pass through as costs so small -> ‘not worth the trouble’.	Distributor liability. Distributors to pass through costs to residential electricity customers in distribution charges.	Distributor liability. Distributors to pass through costs to all electricity customers in network charges.	Budget funded.	Paid for under the Commonwealth’s Solar Cities Program
System size limits	10kW for single phase power and 30kW for three-phase power	10kW for single phase power and 30kW for three-phase power	2kW	30 kW		2kW system size limit but residential customers who wish to purchase a larger system may still be able to receive an incentive capped at incentive value of a 2kW system.
Sectors covered	Small electricity customers	Small electricity customers	Residential (may further	All sectors except non-educational government		Residential

Design Element	SA	Qld	Vic	ACT	WA	NT - Alice Springs Solar City Program – ‘elevated buy-back tariff’
	(household, small business, community building, church or other facility that consumes less than 160MWh per annum).	(those consuming no more than 100 MWh of electricity a year – the average household uses 10MWh a year).	restrict to primary place of residence)	agencies.		
Eligible technologies	Solar PV	Solar PV	Solar PV	Solar (all types) and micro-wind (although none has been installed in ACT to date). Minister has power to include further technologies in future.	Solar PV	Solar PV
Further eligibility criteria	Grid connection to a distribution network which supplies electricity to 10,000 or more domestic customers. Systems comply			Existing installations are included but no back payments will be made.		Incentives available for 225 rooftop systems.

Design Element	SA	Qld	Vic	ACT	WA	NT - Alice Springs Solar City Program – ‘elevated buy-back tariff’
	with Australian Standard – AS 4777.					
Scheme duration and reviews	<p>Until 2028</p> <p>Review after 2.5 years or when 10MW installed capacity.</p> <p>Review will look at inclusion of other RE technologies in scheme.</p>	<p>Until 2028</p> <p>Review after 10 years or when 8MW installed capacity.</p>	<p>15 years from start date</p> <p>Or</p> <p>100 MW installed capacity (to cap overall cost of scheme)</p>	<p>20 years</p> <p>Review after 5 years.</p>	<p>The feed-in tariff will be paid for sufficient time to pay for the system cost after accounting for capital subsidies, grants and rebates. This is likely to vary between two and nine years.</p> <p>After system capital costs are recovered, system owners will revert to the Renewable Energy Buyback Scheme.</p>	<p>The lifetime of the Solar City (March 08 - 30 June 2013).</p> <p>Beyond the life of the Solar City, PWC have advised (no formal commitment given) customers they will continue to buy power at the peak tariff rate.</p>

Appendix 6 - Assumptions made in the Scenarios

Assumption	Value	Units	Methodology / Source
Solar radiation on north facing surface at 34° tilt in Sydney	5.06 1,847	kWh/m ² /d kWh/m ² /yr	University of NSW solar data at Kensington over period of 8 years.
Average annual household electricity use	7,500	kWh/yr	ESAA publication "Electricity Gas Australia 2008" – NSW and ACT 2007 data.
Size of PV system	1.5	kWpk	Average size of installed Solar PV system. Data supplied from Solar Homes and Communities Plan, Commonwealth Government. http://www.environment.gov.au/settlements/renewable/pv/index.html
PV system output	2,770	kWh/yr	Calculated from solar radiation data integrated to equivalent number of hours at 1kW/m ² multiplied by the PV system peak power rating (which is the output of a PV panel exposed to solar radiation of 1kW/m ²).
PV output minus 10% inverter and wiring losses	2,493	kWh/yr	Assumed 10% loss as an annual average. Does not take into account a failure rate or maintenance down time.
PV system installed cost rate	12.5	\$/Wpk	Typical installed cost of a residential PV system (also used by MMA in its modelling report to the Dept of Climate Change (page 8).
PV system installed cost	18,750	\$	= (Size of PV System) X (PV System Cost Rate)
Commonwealth rebate of zero	0	\$	Commonwealth Solar Homes and Communities Plan rebate of \$8 per watt peak up to \$8,000 will no longer be available from July 2009. Commonwealth proposes to replace this with the Solar Credits Scheme which will provide for PV systems to receive 5 x RECs.
REC spot price at 15 Dec 08	48.70	\$	Next Generation Energy Solutions Pty Ltd "The Green Room" publication 15 Dec 08
MRET zone 3 rating	1.382		Renewable Energy (Electricity) Regulations 2001 (16 December 2006 compilation), Schedule 5 zone rating for postcodes 1001 to 2356

Assumption	Value	Units	Methodology / Source
5 x Up front value of RECs for 15yrs	7,673	\$	= (Size of PV System) X (Zone 3 Rating) X (REC Spot Price) X (15 Years) X (5x RECs given by Fed Govt) Renewable Energy (Electricity) Regulations 2001 (16 December 2006 compilation), Subdivision 2.3.3 paragraph 20 (1) (b), and paragraphs 7 and 8
Remaining capital cost	11,077	\$	= (PV system installed cost) – (Upfront value of RECS)
Domestic electricity tariff	14	c/kWh	Average residential tariff offered by NSW retailers.
Annual cost of 7500kWh at domestic rate	1,050	\$p.a.	= (Domestic Electricity Tariff) X (Average Annual Household Usage)
Discount rate	5%		This figure is based on a real weighted average cost of capital set at 5% above the risk free long-term bond rate.
Net export rate to grid	50%		South Australia provided data
Lifetime of Solar System	20 to 25	years	Solar PV warranty
Increase in retail tariffs with time			Not applied in the spreadsheet calculations.
PV system capital cost decline factor			Not applied in the simple spreadsheet calculations.
Rate of uptake	Linear		Used for simplicity and in the absence of complex modelling of likely uptake. Does not take into account that some factors are likely to encourage high levels of early participation – e.g. Commonwealth policy settings (ending of rebates, introduction and phased digression of RECs multiplier), plus a general incentive for a fixed terms FiT to maximise income from early participation.
Existing grid-connected solar PV systems in NSW	2900		Systems installed by State under the Commonwealth's Solar Homes and Communities Plan, as at December 2008.

Assumption	Value	Units	Methodology / Source
			http://www.environment.gov.au/settlements/renewable/pv/pubs/installedbystate-dec08.xls
Number of electricity consumers in NSW	3 175 229		ESAA, <i>Electricity Gas Australia 2008</i> ACTEWAGL, <i>Annual and Sustainability Report 2008</i>
Number of households in NSW	2 679 407 (31% of electricity consumption)		ESAA, <i>Electricity Gas Australia 2008</i>
Voluntary Feed-in Payments made by NSW electricity retailers			These were not taken into account in the spreadsheet calculations. Only payments under a NSW Solar PV FiT Scheme were calculated.

Appendix 7 - MCE Rollout of Smart Meters Program

The Council of Australian Governments has approved a staged approach to mandating a national roll-out of smart meters, in areas where the benefits are shown to outweigh the costs.

Smart meters record not just the amount of electricity used by customers, but also the time of day when that usage occurs. This allows retailers to charge more during times of peak demand (when there is more pressure on the electricity network), and less at other times.

On 13 December 2007, the Ministerial Council on Energy agreed, based on a national cost benefit study, to establish a list of minimum functions for smart meters in the national electricity market. These functions will define the minimum capabilities for national smart meters. The initial list includes:

- Remotely read interval metering, with the meter capable of daily reads of cumulative consumption;
- Quality of supply and outage detection to improve consumer supply services;
- Import and export metering to support distributed generation such as solar PV;
- Ability to control connection and disconnection remotely and apply supply capacity limits to manage emergency situations;
- Ability to manage load through a dedicated circuit, to support existing off-peak arrangements; and
- Supporting management functions such as data security, tamper detections, remote configuration, remote upgrade and plug-and play installation.

On 13 June 2008 the Ministerial Council on Energy reviewed a detailed cost-benefit analysis of a national smart meter roll-out and noted a wide range of potential net benefits but that benefits and costs are not certain in all jurisdictions. To maximise the benefits of the roll-out, MCE will develop a consistent national framework for smart meters in the National Electricity Market with the obligation for deployment placed on distributors with an appropriate cost recovery. This framework will be developed with stakeholders through a co-regulatory process.

The development of the national framework including the finalisation of the smart meter functionality and performance standards is being undertaken by a National Stakeholder Steering Committee (NSSC), which is expected to complete the following:

- Regulatory Architecture End April 2009
- Operating Model (Level 1) End September 2009
- Functional Specification End October 2009
- Operating Model (Level 2) End March 2010
- Rule Changes and NEM procedures by December 2010

The MCE agreed to further progress the smart meter roll-out by undertaking coordinated pilots and business-specific business case studies. The NSSC is also undertaking this coordination role. The Department of Water and Energy is working with NSW distribution businesses through the next stage of pilots.