Centre for Energy and Environmental Markets

Australian PV Association

Submission to the Senate Standing Committee on Environment, Communications and the Arts

Inquiry into the Renewable Energy (Electricity) Amendment (Feed-in-Tariff) Bill 2008

August 2008

Australian PV Association
and
CEEM UNSW

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The Australian PV Association

The objective of the Association is to encourage participation of Australian organizations in PV industry development, policy analysis, standards and accreditation, advocacy and collaborative research and development projects concerning photovoltaic solar electricity.

A principal activity is to manage Australian participation in the IEA PVPS Programme. The work of the IEA PVPS is arranged by Tasks, each with its own commitments of time and resources. At present Australia participates in:

- Task I – PV Information Exchange and Dissemination
- Task 9 – PV Services for Developing Countries;
- Task 10 – Urban Scale PV Applications
- Task 11 – PV Hybrid Systems within Minigrids.

Current Association members: ANU, BP Solar, Bushlight, CEC, Clear Security, Conergy, CSIRO, Dyesol, GE Trading, Green Solar Group, Greenbank, Greg Watt, GSES, Honda, IT Power, Novolta, RISE, Solar Cell Technologies, Solarfarm, SA Government, Sustainability Victoria, Solco, Sowilo Engineering, Spark Solar, UNSW.

The Association receives $40,000 per year from the Australian Government to assist with the costs of IEA PVPS membership and Task activities.

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The Centre for Energy and Environmental Markets

CEEM is an internal UNSW research centre which undertakes interdisciplinary research in the design, analysis and performance monitoring of energy and environmental markets and their associated policy frameworks. It brings together UNSW researchers from the Faculties of Engineering, Business, Science and Arts and Social Sciences, as well as the Institute for Environmental Studies and the Australian Graduate School of Management.

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Introduction

Before examining the Feed in Tariff (FiT) Bill, we briefly explore the nature of the FiT and market support in some of the IEA PVPS countries in which it has been applied.[1]

What is a FiT?

In the world of grid-connected renewables, the term FiT simply refers to an explicit monetary reward for producing electricity from a renewable energy source, at a rate per kWh somewhat higher than the retail electricity rates being paid by the customer – which is why the measure is often more correctly termed an "enhanced FiT". In principle, the measure encourages efficient production of renewable electricity with the output from the renewable energy system being monitored and recorded, and has consequently been promoted as a performance-based market support measure. As discussions about renewable energy policy support mature, other performance-based measures are now also attracting some interest, such as expected performance-based buydowns and incentive hold-backs.

The FiT does not directly help with the problem of the larger up-front costs associated with installing a renewable energy system, unless the future cash flow projections help the customer to more easily secure some sort of financing. For some classes of potential renewable energy system users this remains a significant barrier.

Variations in implementation

There are two main variations of the FiT approach: in the first case, all the electricity produced by the renewable energy system, irrespective of how much is used by the customer or fed into the grid, qualifies for the feed-in tariff (a Gross FiT). In the other situation, only the electricity generated that is surplus to the customer's requirements is paid under the feed-in tariff (a Net Export FiT). The remainder has the same value to the customer as their retail electricity rate. The attractiveness to the customer of the FiT is further downplayed if net-billing is used and the grid import / renewable electricity export balance is calculated over an extended period of time, rather than on a half hourly or even instantaneous basis.

The FiT becomes most attractive for all parties when time-of-use metering and pricing are employed, reflecting the real benefits to the electricity network of reducing customer demand or adding power to the system when it is most needed. From the electricity utility's perspective this may be either when bulk power is most expensive to purchase or in locations where supply is constrained, or both.

Typically, funds for the FiT are raised through a levy on electricity bills across the board, which has two main attractions: the scheme is not subjected to the usual budgetary whims associated with government funds, and, potentially, all electricity customers are contributing to improvements in their electricity supply system.

Setting an appropriate FiT level

There are a number of ways that the level of the FiT can be set. Simple financial calculations can indicate the cash flow required to provide a certain return on investment for a given renewable energy system in a particular location – for example, to pay off the system within its warranty period. Estimates of the value of externalities, such as the unfunded costs of pollution associated with traditional energy supply, can form the basis of the tariff. The specific electricity network benefits that may be relevant, such as peak demand reduction or line support, can be monetized.

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[1] From the IEA-PVPS publication "PV Power", Issue 26. Available from www.iea-pvps.org.

The target market

In isolation, the FiT is best targeted at entities with a business cash flow requirement such as housing developers, investors, commercial entities. If the FiT is combined with a direct capital subsidy, it also becomes appealing for customers with more limited access to capital such as households, small businesses and public organisations. If the FiT provides a payback period within the system life, financing becomes viable.

Countries using a FiT

FiT schemes are becoming more widespread and are showing a variety of outcomes. Amongst the IEA PVPS countries notable examples can be found in Austria, France, Germany, Italy, Korea, the Netherlands, Portugal and Spain. Detailed data on growth rates in various national markets can be found in the annually published report "Trends in photovoltaic applications", available from www.iea-pvps.org. While a high tariff level has been shown to be capable of driving substantial market growth, some of the controlling conditions that have been placed on different countries' schemes have resulted in difficulties in achieving such a result or sustaining high levels of investment. These controlling conditions have included:

- caps on capacity allowed under the scheme,
- exclusion of certain types of projects such as large-scale plants (or lack of appropriate differentiation of tariffs),
- inadequate period guaranteed for the FiT and
- overly complex administrative requirements.

Even in Germany, where these problems have largely been avoided, the combination of a generous FiT and a year-by-year decrease in the tariff level has driven a huge demand very quickly, which has created its own challenges – sustaining the required level of investor interest may be difficult when system prices do not also fall steadily, and there would be some local political interest in seeing local industry meeting a greater proportion of the demand for renewable energy technologies.

Alternative market support approaches

Notable amongst countries that have not yet pursued the FiT approach but which, in many cases, have still seen significant development of their grid-connected renewable energy markets are Japan, the USA, Switzerland and Australia. In these countries the support mechanisms of choice have been direct capital subsidies, renewable portfolio standards, green electricity schemes or tax exemptions, or some combination of these. Generally, in these countries growth of the renewable energy market is typically slower but steadier than in the countries using the FiT.

Controlling the rate of deployment

A particular focus of policies that support deployment of technologies is to achieve a certain level of uptake. This is certainly not easy to predict – as demonstrated by the rush of investment in the early stages of MRET. Where a FiT is used, if the pool of potential investors is not adequately understood – their motivations, financial positions and so on – overheated markets can result initially if the tariffs are set too high. Set the tariffs too low and the investments could be negligible, consequently wasting the time and effort that has been invested in development of the scheme.

The most obvious solution is to set the initial tariff at the 'right' level – but this is easier said than done if the FiT is being used as a broad support mechanism. An advantage of a FiT over a scheme such as MRET is that it can be adjusted each year in response to changing circumstances and to help target a certain level of deployment. Within each year it is possible to use a system of price 'tiers' that reduce as certain levels of deployment are reached. This can also apply to individual systems using a tariff that decreases at higher levels of generation. This avoids the need for setting a potentially problematic cap on the size of the scheme, a source of considerable angst in some international cases.

It is also possible to clearly target the approach on specific, limited market segments, which can then be expanded over time.

Policy considerations

As with any proposed tool of public policy, a mechanism should be evaluated broadly against a number of criteria. In the case of a proposed FiT, the outcomes that have been achieved elsewhere are becoming easier to document. But are the local barriers to be addressed the same as those tackled elsewhere? Is the local electricity industry structure compatible with the approach? Will the scheme be flexible enough to survive political change? Can the scheme alone transform the market? How costly is the administrative burden compared to that of other approaches? Is the free-rider effect minimizsed? And what are the overall socio-economic-environmental impacts of the measure?

In summary, the simple answer to a complex problem can often raise many more questions – but they are always worth tackling in the long run.

The following box summarises the key design principles we consider necessary for a successful FiT for renewables in Australia. These principles are derived from the international experiences cited above, and on experiences in Australia with renewable energy support mechanisms. An illustration of the impact of different FiT types, using a PV example, is also provided.

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Key Design Principles of a Renewable Energy Feed-in-Tariff

Timeframe:
In order to create market certainty, attract investment and deliver meaningful economic and environmental dividends:

- A FiT should guarantee payment to the system owner for a minimum of 15 years.
- Each technology should have its own FiT, with further breakdown by system size or application.
- For each technology included, the programme should run for minimum of 10 years, meaning the FiT is paid out over 20 years (systems installed in year 10 will still earn a FiT for the following 10 years).

Reducing tariffs:
The FiT should be fixed only for the systems installed in any one year and can be changed for the systems installed in successive years. A predetermined system of reducing FiT price “tiers” over the scheme timeframe can provide predictability for investors and a known expense for government. The FiT for installations in successive years could decrease by say 5% to capture and encourage cost reduction potential as the industry moves down the cost learning curve.

Contestable Retail Electricity Markets
The FiT should be paid as a separate tariff on top and independent of prevailing retail electricity tariffs. This ensures all systems receive the same benefit, regardless of their local tariff, and there is no loss of competition between retailers.

Payment on total generation:
The FiT should be paid on all electricity generated by the system. This simplifies calculation of future revenue streams, as it is not dependent on time of electricity generation, or electricity usage profiles, and so provides investment certainty. The graphs on the following page illustrate this point.

Source of subsidy money:
The revenue to pay for the FiT should be raised through an across-the-board levy on network providers so as to remove any issues of competition at the retail level. Retailers would subtract all or a proportion of the cost of exported generation from the customer’s bill and the network provider would make up the difference.

New installations only:
To maximise new deployment, to prevent double dipping and to facilitate the introduction of standard metering arrangements, the FiT should be provided to customers who have not previously received government grants towards their systems, or for extensions to existing installations, where the latter receive the FiT only for the extension. An interval meter with at least 2 channels should be used so as to enable metering of total generation.

Choice between the FiT and RECs
To streamline processing and avoid double dipping, system installers should choose between support via the FiT or via MRET, but not both

Guaranteed connection and purchase:
Electricity retailers and network providers should guarantee that renewable energy systems which comply with technical connection requirements imposed by Australian Standards and State or Territory regulators will be connected and all their generation purchased.

Grid-connection agreements:
The application and approval processes for connection of PV systems to the grid should be streamlined. Ideally the FiT arrangements should be incorporated directly into this process.

Monitoring:
Some form of monitoring/assessment program should be incorporated into any FiT program to:

- assess PV’s contribution to total generation and during times of peak demand,
- collect demographic energy information, and
- assess take-up rates, drivers, significant price points, customer preferences and any issues arising.

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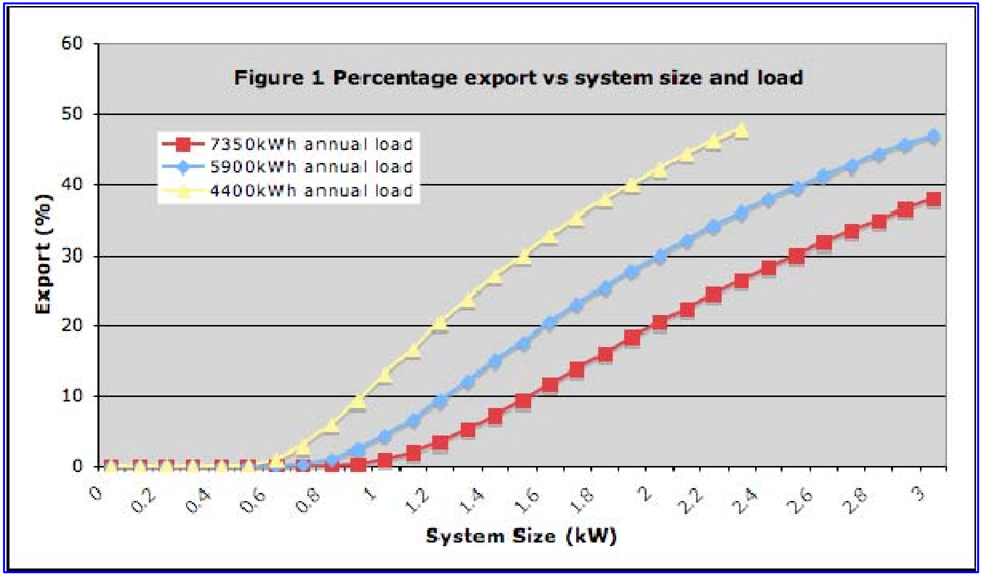
Empirical assessment of different FiTs

A Photovoltaics Example using Newington Solar Olympic Village data

The UNSW Centre for Energy and Environmental Markets (CEEM) conducted a study of the PV systems installed in the Newington Solar Olympic Village for the NSW government in 2006.[2] Using the household load and PV output data from this study, they found that just over 4% of the output of a 1kW PV system was exported over half hourly intervals throughout the year.

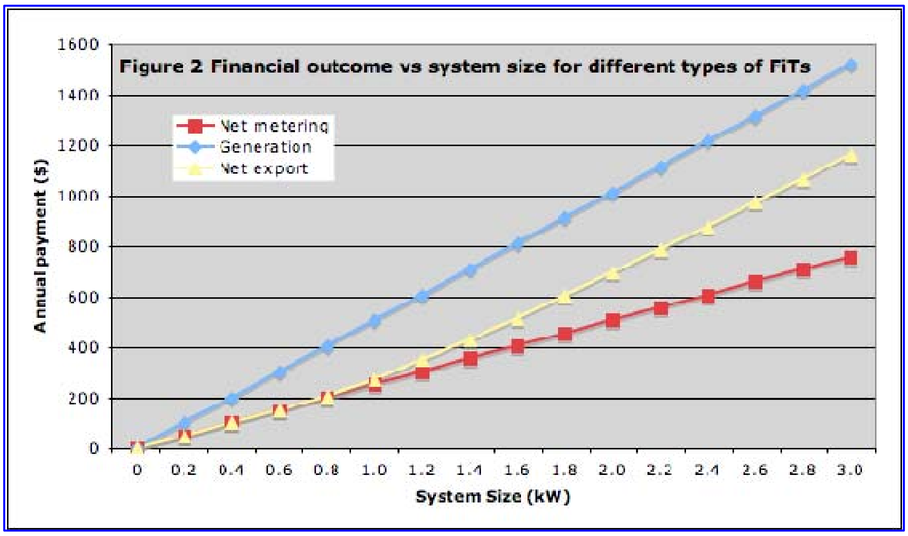
Given that the Newington houses were passive solar designed with gas hot water and cooking, they may have a lower daytime load than the average Australian house, thus increasing the net PV export. Similarly, it is possible that households that choose to install PV may use less energy than average and so have greater PV export.

Using the Newington half-hourly data, it is possible to change the effective system size and residential load and recalculate net export for each half hour period - see Figure 1. It can be seen that the net export is significantly dependent on the interaction between load and system size. This highlights a key issue for developing FiT policy if a Net Export FiT is used, ie. estimating the financial returns to householders and therefore costs of providing the FiT.



Using average solar insolation data, this can be estimated with a fair degree of accuracy for a FiT based on total generation, but is much more difficult for a FiT based on net export because this is also affected by the household load by time of use, which is more difficult to estimate. For other technologies, such as wind, it would be even more difficult to estimate.

Figure 2 shows how the financial outcome for different sized systems is affected by net metering, payment on total generation or payment on net export (assuming a 5000kWh/yr load,[3] a 22c/kWh retail price and a 44c/kWh FiT). It can be seen that for a 1kW PV system a net export FiT is little better than the current net metering arrangement; for a 1.6kW system (the average size under the PV rebate program) the extra annual earnings are around $100. As expected, payment on gross export doubles the financial return.



[2] This report, *An analysis of photovoltaic output, residential load and PV's ability to reduce peak demand*, can be provided on request. Note that some members of APVA are CEEM staff.

[3] The Newington systems were 1 kW and the average annual load was about 5,850 kWh.