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Phoenix Solar Pty Ltd

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

To: Committee Secretary
Senate Standing Committee on Environment, Communications and the Arts
Department of the Senate
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Introduction

Dear Sir / Madam,

Firstly we would like to thank you for giving us the opportunity to provide feedback on the Renewable Energy (Electricity) Amendment (Feed-in-Tariff) Bill 2008. We hope we will be able to provide useful information for the tariff discussions.

About Phoenix Solar

To put our feedback into perspective we would like to use this opportunity to quickly introduce our company. Phoenix Solar, with headquarters in Sulzemoos near Munich, Germany, is a leading photovoltaic systems supplier. In the financial year 2007, the Phoenix Solar Group generated sales of EUR 416 million in Germany and abroad. Phoenix Solar designs, builds and operates large-scale photovoltaic plants and is a wholesaler of complete solar electricity plants, solar modules and components. The Group is a market leader in photovoltaic systems technology. The focus of activities is on consistent reduction of system costs. With a sales network covering the whole of Germany, and subsidiaries in Australia, Greece, Spain, Italy and Singapore, the Group currently has over 200 employees. The shares of Phoenix Solar AG are listed on the regulated market (Prime Standard) on the Frankfurt stock exchange.

Phoenix Solar believes in Australia as a future photovoltaic market with significant growth potential. With our strong skills in large-scale plant construction and small-scale system wholesaling, we see a great potential for combining our experience with the existing, excellent industry expertise in Australia to bring photovoltaics rapidly into the mainstream.

Recommended Principles when Considering Renewable Energy Incentives

1. Uptake of photovoltaics is the paramount consideration

   Whilst avoiding unnecessarily high administrative costs is a worthy goal, programs producing a higher uptake rate should be favoured over less costly programs with a lower uptake for several reasons.

   - Programs that are sufficiently attractive tend to produce a dramatic uptake of PV technology, so that any extra administrative efforts or costs are spread over a much wider basis. The effort/cost per installed megawatt is significantly lower than that of less ambitious programs.
   - A dramatic uptake of PV has been shown to attract new businesses (manufacturers, system integrators, and others throughout the PV value chain) resulting in many new jobs[1] and increased tax revenues. In Germany, the renewable energy industry now accounts for over 214,000 jobs. Of these, 35,000 are in the area of solar energy – more than the number of people employed in brown coal, black coal, or nuclear power. This job creation effect further decreases the net effort/costs of the PV incentive program. In 2006 (the sixth year of its own feed-in tariff program) Germany recorded over 5 billion euros (8.2 billion AUD) of industry revenue from photovoltaics. Of this amount, over 79% was earned in the construction of PV plants.[2] Moderate programs do increase uptake but do

[1] An in-depth 2006 study of the 2005 data can be found (in English) at: http://www.erneuerbare-energien.de/inhalt/38515

[2] 2007 statistics from the 2006 were published by the German Ministry for the Environment, Feb 2007. See: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/hintergrund_zahlen2006_eng.pdf

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not produce the same job creation effects; rather, they tend to create new markets for overseas established players.

- By increasing the amount of installed PV, we will be able to lower the price of electricity supplied via PV due to the efficiencies that come with experience and also economies of scale. A significant uptake in installed capacity is required as a driving factor and is only encouraged by attractive support programs. By including a decrease of the feed-in tariff we can be confident that industry will respond with decreased system prices in order to generate ongoing investment and retain viability.

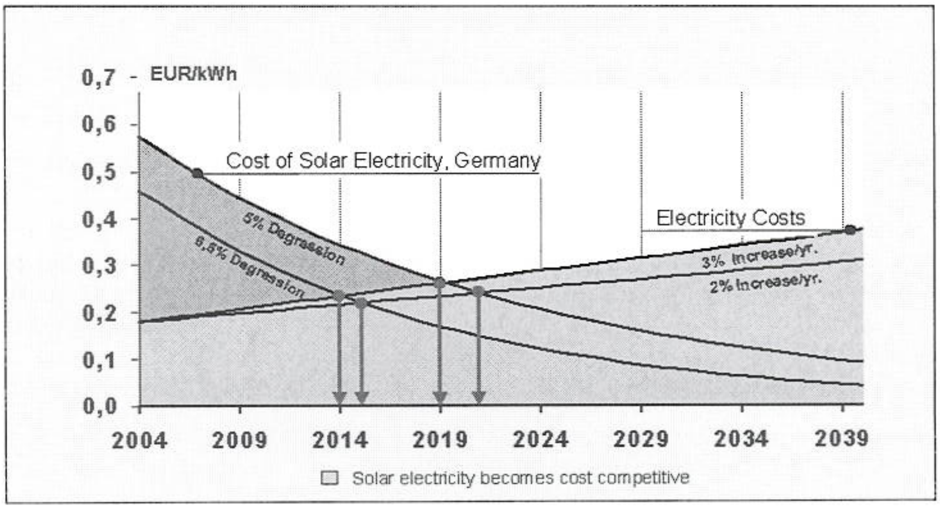


Figure 1: Historical and estimated progress of PV-generated power toward grid parity. Process improvements and economies of scale allow the cost of PV to match Germany's decreasing feed-in tariff, driving PV toward cost parity with conventional electricity generation by (at the latest) 2020.

Like an aeroplane, it takes a certain amount of forward drive to fly. Below a certain level of thrust, all effort is wasted; the aeroplane will not get off the ground.

2. Voluntary Participation is (sadly) a waste of time

Commercial companies are obliged to increase revenues and reduce costs wherever possible to produce financial returns for their owners and/or shareholders. Companies who increase costs and reduce profits 'for the common good' put themselves at a competitive disadvantage relative to more self-interested competitors and are soon pushed from the market. The only way out of this dilemma is to establish rules which ensure all competitors are obliged to participate.[3] This not only maintains a level playing field but encourages companies to achieve a competitive advantage by meeting their obligations more efficiently rather than by shirking responsibility.

Even in Germany (with arguably the most successful PV incentive program in the world) large utilities such as EON fought (and continue to fight) the market introduction of photovoltaics wherever possible. Pacific Gas & Electric (PG&E) – one of California's largest utilities with more customer-owned PV generation capacity than any other utility in the USA – is notorious for its resistance to customer-owned PV Systems. The first customers to receive a feed-in tariff under

[3] To understand the necessity of mandatory participation, one need only consider how football teams would react if asked to *voluntarily* refrain from making "offside" passes. With no penalty for offside passes, they would be immediately practiced by all teams. Considerations how to make it 'attractive' to refrain from offside passing would be pointless.

one of California's earlier feed-in mechanisms had to take PG&E to court to receive the tariffs to which they were already legally entitled. But even this situation was better than in the state of Washington. There, legislators passed an attractive feed-in tariff to be paid to PV owners as soon as utilities agreed on common interconnect standards. By sparing themselves the effort of developing such standards, the utilities also conveniently spared themselves the expense of paying the feed-in tariffs. These and many other examples have lead to the widespread opinion among industry insiders that a feed-in mechanism with 'voluntary participation' is worse than no feed-in mechanism at all.

3. There are significant 'first mover advantages' to be had

   The experience of Germany has shown that once PV companies reach a given size and expertise in their home markets, they export their products and services to other regions or countries. German renewable energy companies could be earning 24-30 billion Euros (15 – 18.75 billion AUD) outside of Germany by 2020[4]. Australia has the potential to become the region from which other countries in the Asia-Pacific region are served.

Key Success Factors for Germany's Renewable Energy Incentive Programs

While it may be true that Germany's renewable energy law (EEG) cannot be easily replicated in Australia, it does contain a number of factors that we believe must be replicated for a renewable energy incentive program to succeed anywhere:

- **Income streams guaranteed over a long term** (20 years). This is the key element in any successful incentive program, as it allows for the calculation of a financial benefit for PV system owners. While the cost of PV systems has been decreasing, it still remains a sufficiently expensive purchase that few customers will consider unless it brings a positive return on investment.
- **German utilities are required to purchase all power produced by a PV system**. This is necessary for the calculation of a financial return on investment.
- **Attractively high tariffs**. These go hand-in-hand with the long-term income streams. Higher tariffs produce a faster return on investment for PV system owners. The faster the return on investment, the larger the group of individuals who will decide to invest in such a system.
- **A simple, easy-to-understand tariff structure.** This aids not only customers considering a PV system but also the banks who finance such systems. Note that while German tariffs are guaranteed at a fixed level for 20 years, the fixed tariff offered decreases by 5% each year in line with decreasing costs of investment. This allows early investors to earn sufficiently attractive financial returns without needing to wait for further technological advances. Indeed, without a healthy market for PV systems in the present, necessary technological advances will never occur. At the same time, the yearly reduction in tariff paid forces the PV industry to use technological advances to lower costs and prices in order to maintain established levels of financial return. How well this system works was seen in late 2006. Although system costs had been consistently decreasing for over a decade (despite cost increases for raw materials such as polysilicon, copper and aluminium) system prices had been increasing since May 2004. In late 2006, industry journals, including some very influential agricultural journals, announced that PV systems could no longer produce sufficient economic returns (4-7% residential, 7-10% in commercial installations) and sales crawled to a standstill. By November, industry resistance was

[4] See "Renewable Energy: Employment Effects", German Ministry for the Environment, June 2006, page 12 at http://www.erneuerbare-energien.de/inhalt/38515

broken and prices began to fall, not only in Germany, but around the world. By February prices had largely stabilised and the industry is now recovering nicely.

- **An existing domestic solar market** (retailers, installers, etc.) that can handle demand for additional installations. Germany's '100,000 Solar Roofs' program and the first version of the Renewable Energy Law (EEG) in the year 2000 led to the creation of many small and medium-sized businesses specialising in solar photovoltaics. When the 2004 revision of the EEG improved the financial return on PV systems even further, these companies were able to respond to the demand, some of them becoming world-class multinational corporations in the process.
- **Low legal and bureaucratic hurdles.** Germany's EEG has managed to keep hurdles relatively low in several ways:
    - By requiring all utilities to pay for all power provided by PV system owners, the EEG ensures that a potential PV system owner can easily access a participating energy retailer.
    - The EEG law provides that customers can build a system without approval from the utility. If the utility wishes to refuse the connection, it must justify its decision.
    - The EEG established a grievance procedure for customers wishing to file complaints against un-cooperative utilities.

Value of PV electricity in the public grid

Quantifying the exact value of PV in a given market is a very complex matter. Some issues that are commonly overlooked when calculating the value of PV in a given market include:

- The potential of PV to delay or negate the need for costly upgrades to transmission and distribution infrastructure
- Avoidance of economic damages caused by blackouts
- The proven tendency of PV (as with other forms of renewable energy) to create jobs
- The usefulness of totally transparent power generation costs (no hidden 'external costs' to complicate decision making regarding future power generation policy)
- The potential of PV to stabilise the wholesale market for electricity by reducing reliance on 'merchant plants' ('peaking plants'), which are highly exposed to rising oil and natural gas prices.
- Disaster response: properly mounted PV systems will withstand large hailstones and hurricane-force winds. These systems are then available to disaster-response teams needing to rapidly restore power to critical systems such as communications systems and hospitals. In the aftermath of Hurricanes Rita and Katrina in the USA, lack of such systems significantly hampered disaster relief efforts, multiplying the economic damage and human costs of the storms.

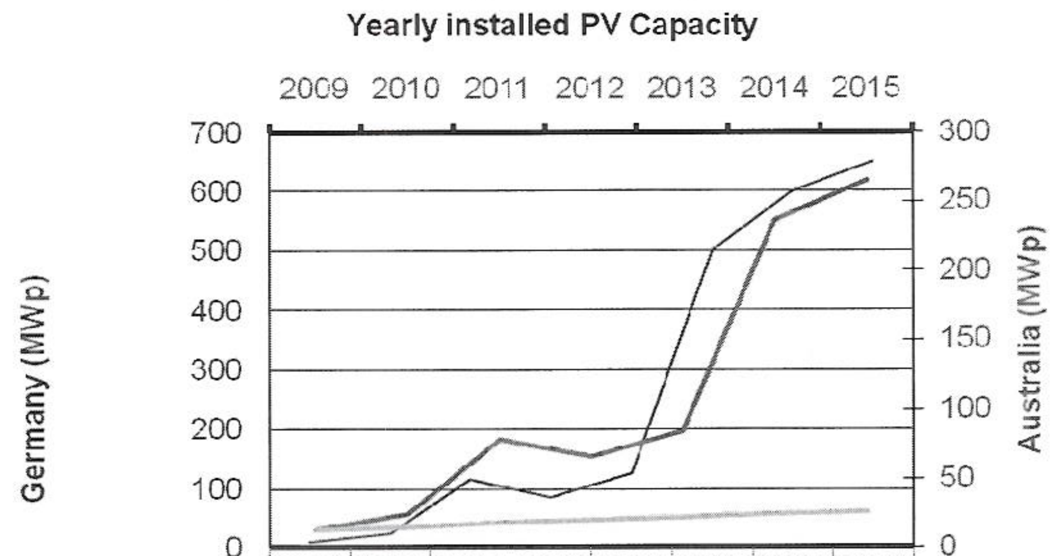
The simplest, most accessible proxy for the 'market value' of PV generated energy would be the spot market price for peak power. This is especially true in Australia, where the gap between the cost of peak and non-peak power is one of the largest in the world. Note that since residential PV systems produce electricity at or near the place of consumption transmission and distribution losses are avoided (usually 30% of traditionally generated power is lost during distribution). 1MWh of PV-power generated during peak consumption periods is worth 1.43 MWh of peak power on the spot market (1/ (1-0.3) = 1.428).

Dr Thomas Hoff has created a rigorous model for determining the value of PV in a given market. This model may be useful to you in your efforts. Several papers describing his methods for calculating the value of PV can be found at: http://www.clean-power.com/research.aspx, in particular:

- "Moving Towards a More Comprehensive Framework to Evaluate Distributed Photovoltaics" http://www.clean-power.com/research/customerPV/EvaluationFramework.pdf
- "How to Incorporate Perspective When Performing a Solar Value Analysis" http://www.clean-power.com/research/customerPV/IncorporatingPerspectiveInValueAnalysis.pdf
- "Photovoltaic Incentive Design Handbook" http://www.clean-power.com/research/customerPV/PVIncentiveDesignHandbook.pdf

What level could installed PV capacity be expected to reach in coming years in response to a feed-in tariff?

Assuming the introduction of an effective feed-in mechanism, Australia could reasonably expect growth rates similar to those experienced in Germany. Germany's growth was interrupted by a period of uncertainty due to the expected review of the feed-in tariff structure and levels (2002). Even if Australia achieves only 60% of the growth rate experienced in Germany it should experience PV uptake similar to the red line below. If the program is implemented in early 2009, Australia should reach a yearly installed capacity of more than 250 megawatts by 2015.



	1999	2000	2001	2002	2003	2004	2005	2006
Germany	10	25	115	85	125	500	600	650
Australia with FiT	13.0	24.7	78.1	65.8	84.4	236.4	264.8	
Australia without FiT	13.0	15.0	18.0	20.0	22.0	24.0	26.0	

Figure 2: Estimated uptake of PV in Australia.
With only 60% of the effectiveness of Germany's Renewable Energy Law (EEG), Australia can reach 250 megawatts yearly installed capacity by 2015

Inaccurate data resulting from net metering

Determining the contribution of PV to the power generation infrastructure depends on accurately measuring the total energy produced by grid-connected PV systems because in the end every kilowatt hour produced will be used. Where will the data for electricity produced by PV come from? Most likely it will come from the records of the utilities, which will be required to keep accurate records when compensating customers.

Under a net metering mechanism, utilities are only required to measure the amount of power (roughly estimated at half of total production) returned to the grid. This indicates a 50% downward distortion of total PV power produced. If experience in Germany and other countries is any indication, utilities will doggedly contest any upward extrapolation of PV power generation and disagreement over the numbers will be an obstacle to any constructive discussion on the topic for many years. We urge Australia to avoid this pitfall and require accurate metering and reporting of all power produced by PV systems from the inception of the first feed-in mechanism.

What is the ideal scheme design for a feed-in mechanism?

As a successful benchmark in renewable energy feed-in regulations we would like to point out once more some of the key success factors of the EEG program in Germany:

How the EEG works[5]

The core elements of the EEG are:

- Priority connection of installations for the generation of electricity from renewable energies to the general electricity supply grids.
- Priority purchase and transmission of this electricity.
- A consistent fee paid by the grid operators for this electricity, generally for a 20- year period, for commissioned installations. This payment is determined by costs.
- Nationwide equalisation of electricity purchased and corresponding fees paid.

The EEG is very efficient because the costs for renewable energies hinge largely on investment security. If an investment is high risk, banks demand high interest rates for the loan and the investors demand high-risk mark-ups. Since the structure of the EEG guarantees a particularly high investment security, credit interest rates and risk mark-ups are low compared with other investments. Furthermore, the lowering of fees as laid down in the EEG for installations commissioned at a later date ensures further price reductions. This degression has already had an impact. The costs for installing photovoltaic systems dropped by 25% between 1999 and 2004; for wind turbines, costs were reduced by 30% between 1993 and 2003.

The degression also leads to installations being constructed as quickly as possible, in order to obtain a high payment level. This avoids the possibility of operators waiting until installations become cheaper. The EEG ensures very high-quality installations and, because payment is made per kilowatt-hour produced, there is great incentive for operators to run their installations efficiently and with as little interruption to operation as possible, at least during the usual 20-year payment period. Operators therefore demand high standards from the installers and manufacturers.

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[5] Text quoted from: 'The main features of the Act on granting priority to renewable energy sources', http://www.bmu.de/english/renewable_energy/doc/6465.php

Data to be collected to provide indicators of the scheme's performance

All PV systems should be added to a register and the output of these systems should be collected (from the retailers) and analysed at least twice per year. This is an area where Australia can improve on Germany's EEG feed-in mechanism, which only requires data from systems larger than 500 kilowatts peak capacity to be recorded.

What eligibility criteria (in terms of system size, generation type, customer type or any other criteria) should be placed on the feed-in incentive?

None whatsoever! The objective of the feed-in mechanism should be to increase uptake of PV, not to channel it into specific customer segments. Every country that has attempted this sort of limitation (current examples are Italy and Spain) has seen uptake of PV systems stagnate or even decrease. In addition, the market always finds alternatives that render system limitations meaningless. Spain, for example, attempted to limit PV to small-scale applications with a system size limit of 100 kilowatts peak. The market, however, wanted larger scale systems so simply created them in large PV generation parks composed of 100 kilowatt generation blocks. PV parks of 10,000 kilowatts (10 megawatts) or more are now commonplace in Spain. In the end, the 100 kW limit served only to unnecessarily increase the cost of large-scale systems.

As has now been demonstrated in countries all over the world (Germany, Spain, Portugal, Japan, the USA, and Italy to name a few) there is verifiable market demand for PV systems of all sizes even into the industrial-scale multi-megawatt range.[6] These systems help drive production volumes up, which is the most critical factor in driving costs down. This is the same 'learning curve' and 'cost curve' effect observed in nearly every industry since the beginning of the 20th century, including the automobile, steel, aluminium, and semiconductor industries.

In addition, the large amounts of power that can be generated by large-scale systems can be fed into the grid in such a way as to reduce the effect of peak usage and thereby the significantly higher costs of peak power generation purchased on the spot market.

Administrative issues for retailers or distributors

The fact that customers could go 'in credit' with their retailers under a net metering scheme becomes an additional argument in favour of compensating PV owners for 100% of the power they produce via a gross metering tariff. By separating power production from power consumption in this way, customers would continue to pay for all of the power they consume just as they always have. This offers several advantages:

- A customer can never go 'in credit' with his or her retailer, thereby avoiding any financial or accounting difficulties that would otherwise arise
- PV owners retain visibility of the amount of power they consume, so that the incentive to use power more efficiently is not blurred by the fact of owning a PV system.
- PV owners achieve visibility of the amount of power they produce. Without this visibility, PV owners would be unable to recognise a drop in production (that can't be explained by less sunny weather) and, if necessary, have their systems inspected and repaired. Thus, compensating 100% of power produced is the key to assuring quality system design and installation.

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[6] For a list of large PV systems, see http://www.pvresources.com/en/top50pv.php