solamatrix
clean energy systems

Committee Secretary
Senate Select Committee on Electricity Prices
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

25 October 2012

By E-mail: electricityprices.sen@aph.gov.au

Submission to the Select Committee on Electricity Prices

Dear Madam/Sir,

We appreciate the opportunity to contribute this submission. Please refer to our two attached submissions we made to the Climate Change Authority on the Renewable Energy Target (RET review) and to Sustainable Energy Now, Inc. that focus on the need for a 100% renewable target based on both Feed-in Tariffs and on measurable sustainability outcomes.

We are highly concerned that this inquiry focuses on costs to end-users rather than on how to achieve sustainability outcomes for society (of which energy is a subset). Our concern has been best phrased by Albert Einstein 1879-1955:

"The world will not evolve past its current state of crisis by using the same thinking that created the situation."

Energy Debate

A Western Australian electricity bill has made it into the Australian Parliament energy debate[1]. Unfortunately, the case of Ms Hetty Verolme is not treated with the intention to provide solutions electricity consumers could benefit from.[2]

The debate focuses on the total dollar value of the bill rather than on what makes up the bill, namely consumption (kWh) multiplied by the per-unit electricity costs (¢/kWh). Both factors of consumption and per-unit electricity costs can be reduced.

For instance consumption: This could have been an opportunity to educate electricity users about their options to reduce consumption (by energy efficient appliances, behaviour change) and the per-unit electricity costs (by choosing a more competitive electricity retailer who also has a lower carbon intensive electricity to offer). A commitment to implement incentives in these areas would go a long way.

Choice of electricity retailer: In the Western Australian context, ***Full Retail Contestability*** is unavailable for households and small businesses (default supplier is state-owned Electricity Retail Corporation trading as Synergy). This is a barrier to competition and consumer choice, especially for community-

[1] Abbott 'caught out' on use of pensioner's power bill:
http://www.abc.net.au/news/2012-10-10/abbott-caught-out-on-use-of-pensioner27s-power-bill/4305908

[2] The energy conservation principles are:
1. Reduce demand.
2. Increase energy efficiency.
3. Use renewable energy.

Unit 6, 4 Whyalla Street, Willetton WA 6155, Australia
T: +61 8 9457 4341 ● F: +61 8 9354 9479
ABN: 48 401 594 660 ● info@solarmatrix.com.au ● www.solarmatrix.com.au
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owned renewable energy projects that prefer to sell 100% green electricity from their own project to their shareholders.

Ms Verolme consumed[3] above the annual electricity consumption[4] of an average WA household in just two winter months. We assert that this is due to space heating of an energy-inefficient house with poor or no thermal insulation. This demonstrate the urgent need for Green Buildings (e.g. with mandated thermal insulation requirements).

Contrary to perception, electricity is *not* a significant cost in the cost of living. The largest component in the cost of living is housing and this is where the cost-cutting focus needs to be.

Here is a comparison:
Rent for a 3-bedroom house in Perth can be $750 per week or $39,000 per year. Average annual electricity consumption is 5,800 kWh which at 25 ¢/kWh equates to $1,450 per year. Electricity makes up 3.7% of the annual rental cost ($1,450/$39,000). At half the rent (unlikely given an inflated real estate market) the electricity costs make up 7.4% of the annual rent.

Have you calculated the percentage of your electricity cost to your housing cost?
My energy percentage is 3.9%.

Green Power and Smart Metering

Green Power consumers (voluntarily paying a premium) have the choice to experience a 100% renewable energy supply ahead of Government set renewable energy targets. In the WA context, consumer confidence in this choice has been greatly weakened by charging Green Power customers a carbon component.

Unfortunately, Synergy's justification[5]: *"Our GreenPower customers receive a mix of energy - it's impractical and too expensive to have separate powerlines from renewable-only sources and given the intermittency of renewable energy."* is simply nonsense. This could have been an opportunity to educate electricity users about the benefits of smart grids and smart metering to reduce consumption, carbon emissions and (energy and network) costs[6].

How is smart metering, Green Power and carbon component costs being addressed in the other Australian states?

Energy Education

Let's use Synergy as a local experience. Synergy's residential/small business electricity bill lacks basic information about what it is that one is buying, namely:

1. Stating unspecified "units" instead of electricity measured (in kWh).

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[3] Ms Verolme's "Average Daily Consumption" is 112 kWh. Multiplied by the number of days on the bill of 59 days (2 months) her consumption is **6,608 kWh**.

[4] Given on the Synergy bill: the average daily consumption across Synergy's residential customers is 15.89 kWh; multiplied by 365 days is **5,800 kWh** per year.

[5] Power slug hits green users:
http://au.news.yahoo.com/thewest/a/-/breaking/14109537/power-slug-hits-green-users/

[6] Summary of Smart Grid Benefits and Issues. Illinois Smart Grid Initiative:
http://www.cnt.org/news/media/isgi-summary-of-benefits-and-issues-6-08.pdf

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2. Carbon intensity of the electricity (measured as carbon dioxide equivalent emissions kg CO_2-e/kWh).
3. Absolute amount of carbon emissions caused by the energy consumption (kg CO_2-e)[7].
4. Network charges plus other levies and subsidies.

Without prior knowledge in energy education the electricity user is left clueless on how to:

- Reduce consumption (demand), emissions and energy costs,
- Relate one's own consumption to climate change (carbon footprint),
- Translate the nameplate rating (kW) of appliance into energy consumption over time (kWh)[8], and
- Apply behaviour change.

Where does energy education start?[9]

Green Buildings

Green Buildings are the "low hanging fruit" on energy conservation and minimising harm to the biosphere.

Installing a photovoltaic (PV) system on a building does not make the building sustainable. Each building has an adverse impact on the biosphere that cannot be fully compensated by simply making (a portion of) its operational electricity use "carbon neutral". Where the house is now, there used to be native vegetation or a wetland; their destruction has caused a loss in biodiversity.

The absence (or lack of sufficient) Feed-in Tariffs "encourages" consumers to (down)size PV systems for their own consumption instead of contributing to society by selling excess renewable energy into the grid. This is contrary to the intent of renewable energy which is to substitute fossil fuel derived electricity on the grid in particular at times of peak demand as it is the case for PV. Such undesired (selfish) behaviour does not maximise the wider adoption of technology (Einstein's distinction applies).

An example from Italy: The photo below demonstrates how measurable energy criteria (annual consumption per square meter) can be applied to compare individual building's energy performance. Such best practice approach is missing in Australia. This has substance rather than marketing abstract Green Star ratings that lack rigorous energy criteria and comparability.

Wouldn't that transform competition on sustainable outcomes of new and existing building stock?

[7] National Greenhouse Accounts Factors—July 2012:
http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx

[8] Power is measured in kilo Watt (kW). Energy is measured in kilo Watt hours (kWh).
In honour of Scottish engineer James Watt (1736 – 1819).
1 kWh = 1 kW x 1 h, i.e. the energy consumed by running a 1 kW appliance for 1 hour.

[9] Science as a Human Endeavour" (new Australian Curriculum for Science Education - Foundation Year to Year 10):
http://www.australiancurriculum.edu.au/Science/Curriculum/F-10

Fig.1: The annual energy consumption of this building is 147.49 kWh/m².
Note that the 2012 European Energy Directive mandates **40 kWh/m²** and year[10], and **15 kWh/m² and year** for space heating and cooling under the Passive House Standard.

Sustainable Society

Renewable energy is a subset of sustainability. What are the measurable criteria of a sustainable society?

Image how a sustainable society looks like in the areas of:

- Biodiversity.
- Whole-of-system thinking and whole-of-Government approach to sustainability.
- Constitutional and enforceable right to a clean environment.
- Accountability for External Costs of Energy[11] to society.
- What is the value to society of clean air (breathe), clean water (drink) and clean soil (eat)?
- Priority access to power lines for renewables ahead if any fossil fuel generation.
- Remove all fossil fuel subsidies[12] (extraction, refining, distribution and use), which encourage fossil fuel use and pollution.
- Renewable energy generation (PV) on all new buildings, mandating higher targets: **"plus energy" buildings**, **"plus energy" suburbs**, and **"plus energy" Solar Cities**.
- Taxing energy, resources and infrastructure use NOT labour.
- Stable population (no growth).
- Absolute (mass flow of pollutants into the biosphere) versus relative criteria.
  The practice of using relative criteria such as Key Performance Indicators (KPIs) can easily be misleading by choosing inappropriate denominator: e.g. absolute pollution can go up while the relative criterion shows a reduction.
- Gross domestic happiness index.

There is room for leadership.

[10] Energy Efficiency Directive. European Commission:
http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

[11] ExternE - External Costs of Energy:
http://www.externe.info

[12] Institute for Sustainable Futures, Report: Energy and Transport subsidies in Australia, 2007 Update:
www.isf.uts.edu.au/publications/riedy2007subsidies.pdf
http://yes2renewables.org/renewables-faq-and-mythbusting/renewables-need-subsidie/#fossilsubsidies

About Solarmatrix
Solarmatrix is a wholesaler of solar energy components that we import directly from reputable German PV and inverter manufacturers who are leaders in sustainable production facilities. The undersigned is the initiator of the Perth Solar Cities project.

We acknowledge that this submission is a public document.

Trusting this is of assistance and we look forward to your response. The undersigned would be happy to take calls to answer questions and to clarify points made.

Yours faithfully,

Raoul Abrutat
Manager – Renewable Energy Projects

Enc.:
1. RET review submission to the Climate Change Authority, 14 Sep 2012
2. Beyond FIT Policy for PV (WA). Policy draft for Sustainable Energy Now, Inc., 16 Nov 2011

Unit 6, 4 Whyalla Street, Willetton WA 6155, Australia
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www.facebook.com/pages/Solarmatrix/242200335810209

Submissions
Climate Change Authority
GPO Box 1944
Melbourne VIC 3001

14 September 2012

By E-mail: submissions@climatechangeauthority.gov.au

Submission to the Australian Government (Climate Change Authority) on the Renewable Energy Target (RET)
– Renewable Energy Target Review, Issues Paper, August 2012 –

Dear Madam/Sir,

We appreciate the opportunity to contribute to the RET review. Our submission focuses on increasing the Renewable Energy Target and on Feed-in Tariffs (incl. our observations on the operation of the certificate scheme).

Target increase

We are on the "best" way to increase the global temperature by 6°C with catastrophic climate change impacts on human life as we know it. The current impacts of climate change in Australia - evident even at a lesser temperature increase - are documented in the IPCC report:
http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter11.pdf

Within a commitment to a sustainable society the key question is:
How much more evidence would anyone need to wean the world off fossil fuel use (burning)?

In this context, the 20% Renewable Energy Target (RET) by 2020 is insufficient and urgently needs to be expanded to a 40% by 2020, 60% by 2030, 80% by 2040 and 100% target latest by 2050 to achieve a stationary energy system in Australia that is completely based on renewable energy.

This is possible, practical and doable. The environmental outcomes will be of value to society as a whole.

National Feed-in Tariff

Feed-in Tariffs (FIT) are simple, direct and most effective in delivering environmental outcomes because FITs focus on performance of electricity (kWh) generated. The outcomes are directly measurable by existing metering and billing arrangements with the electricity retailer.

In that respect it is very disappointing to see at the Federal Government failed to deliver on its promise for a national FIT.

It is also of great concern to us that "The existence and level of feed-in tariffs is beyond the scope of this review." p19.

In the absence of a legislated national FIT, in some cases state-based FIT schemes broke away "over night" causing unsustainable bust cycles with a strong decline (almost zero) in demand for residential PV systems despite the scheme.

Unit 6, 4 Whyalla Street, Willetton WA 6155, Australia
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What comes after Solar Credits for residential PV?

Key is: How is renewable energy generation being paid for its contribution to society (emission reductions, avoided social costs of fossil-fuel based electricity)?

A national FIT fixed of, say 80% of the customers' electricity retail tariff (¢/kWh) would leave equitable margins for distribution, retailing, metering and billing.

Certificate scheme

In strong contrast to FITs, the renewable energy certificate (REC) scheme is highly bureaucratic, complex, indirect and therefore it is difficult to account for its environmental outcomes as can be seen with the use of Solar Credits multipliers (phantom RECs).

Examples of the complexity and inefficiencies that characterise the current scheme are:

- Many conditions (installation date, capacity, multiplier, timing)
- The Clean Energy Council approving products regardless of quality: applying a set of stringent sustainability criteria for quality of product and sustainable production process is missing which means that practically any PV module is approved
- Introduces new money market players (agents, brokers, traders) that increase the cost of the scheme without adding value to its environmental effectiveness
- Generation deeming
- Solar Credits reward capacity (kW) installed rather than electricity (kWh) generated
- Registration
- Administration
- Compliance cost
- Two prices (Clearing House and secondary market)
- Oversupply and
- Certificates banking.

If PV systems get removed (change of home owner), left turned off or fail without being repaired, what recourse does society have to claim back the certificate valuee that was paid for the deemed renewable energy generation/emissions reduction?

Clearing House

The Clearing House doesn't clear. It is a failure in supporting the intent of the *Renewable Energy (Electricity) Act* to provide a fixed price of $40 (excl.-GST) per certificate because it doesn't provide any time certainty when the funds flow that were intended to reduce the upfront investment costs of the renewable energy system (current waiting time 18 months).

The Clearing House causes financially engineered PV systems in the secondary market (rather than PV systems that are designed for electricity output performance under a FIT).

Displacement technologies

The distinction is simply. Technologies that generate electricity on the grid from 100% renewable energy sources need to be included such as fuel cells and electric vehicles (Vehicle-to-grid). Technologies that do not generate electricity (i.e. substitute fossil fuel use) need to be excluded from the RET. Otherwise the target will be watered down.

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Yours faithfully,

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General Manager

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www.facebook.com/pages/Solarmatrix/242200335810209

Beyond FIT Policy for PV (WA)

To: Policy Group, Sustainable Energy Now, Inc. (www.sen.asn.au)

By: Raoul Abrutat, raoul.abrutat@solarmatrix.com.au, Solarmatrix Pty Ltd (www.solarmatrix.com.au)
16 November 2011

Guiding Design Principles

"Solar architecture is not about fashion – it is about survival."
Sir Norman Foster

"The world will not evolve past its current state of crisis by using the same thinking that created the situation."
Albert Einstein 1879-1955

Design and Outcomes

The intention of this document is to provide design approaches beyond premium Feed-in Tariff (FIT) policies (politics), given that the current *REFiT WA Bill*[1] by the WA Greens was vote down in Parliament, WA's FIT stopped and the Australian government has revoked its commitment to a nationwide FIT.

Therefore it is likely that any policy proposal insisting on premium FITs will be unsuccessful. With grid parity a premium FIT is already unnecessary today. Options to create a sustainable market for PV beyond FITs are presented.

Net Metering

It is shown that simple and effective *Net Metering* based on payments for electricity fed into the grid under existing retail tariffs (export = selling exclusive of GST, import = buying inclusive of GST) is sufficient to create a sustainable market for residential and commercial photovoltaic (PV) today.

Legislation will need to be future-proof preparing for the high PV system demand under grid parity. In the long run PV will assist in easing electricity price increases.

Big Picture

The big picture is pollution causing climate change and the imperative task is to substitute fossil fuel use with renewable energy. At the same time it is necessary to increase energy efficiency and to reduce energy demand. 100% renewable energy supply is possible and inevitable. Plonking PV on a roof doesn't make the building sustainable – PV is a subset of sustainability on the way to a sustainable society.

Photovoltaic is the most suitable form of renewable energy generation for the built environment (distributed generation). PV is modular can be applied in any size[2] anywhere in the world from Iceland to the deserts.

Building-integrated Photovoltaics (BIPV[3]) is an important contribution to distributed (CBD[4]) generation and might be an exemption where a multiplier on the Net Metering export tariff remains necessary to create a market (i.e. vertical façades are not ideally tilted to the sun and produce less energy for the same PV system size: less specific kWh output per kW installed).

Whole-of-system thinking and acting is required in terms of energy flows (stationary and transport) and energy efficiency. For example, hydrogen generating or battery charging with off-peak electricity (night) and feeding electricity back into the grid at times of peak demand (day), deemed Vehicle-to-Grid.

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[1] Renewable Energy Feed-in Tariff (REFiT WA) Bill 2010
www.parliament.wa.gov.au/parliament/bills.nsf/BillProgressPopup?openForm&ParentUNID=5D5A7BA097982DC748257753000ED863

[2] PV is modular from milli Watt to Giga Watt.
1 milli Watt (mW) = 1/1000 Watt: such as the PV capacity of a pocket calculator or watch.
1 Giga Watt (GW) = 1 billion Watt or 1 million kilo Watt (kW): such as the PV capacity of a power plant in the desert.

[3] www.pvresources.com/BIPV.aspx

[4] Central Business District high-rise buildings.

Contents

What to achieve	What to avoid
Legislation vs. Schemes	
Ideally, Commonwealth legislation is required to provide long-term investment certainty and planning security for PV throughout Australia.	State-based schemes can change and have changed without prior notice (in some cases effective the next day) causing boom and bust cycles.
kWh vs. kW (kilo Watt[5] hour vs. kilo Watt) The distinction between energy and power[6] is most important for the design. Energy measured in kilo Watt hour (kWh) is the billing unit for energy delivered to consumers or for energy generated on-site and fed into the grid. Power is measured in kilo Watt (kW) (power measures the rate of energy conversion) and is the size of the PV system. That means the PV owner buys (invests in) kW and sells kWh. Between kW and kWh is the factor of time. Here time is the working hours or the performance of the PV system (typically expressed as specific output: indicative value for Perth is 1,700 kWh/kW_{peak}).	
Energy The incentive mechanism (energy payments) needs to award performance based on the electricity (kWh) output of the PV system over time (long-term). Only actually clean electricity (energy) produced is substituting fossil fuel use. This must be the outcome of a meaningful, measurable and accountable renewable energy policy and legislation. In-built accountability is objective given through the existing kWh-metering for billing purposes (at no additional billing administration costs).	**Power** Short-term focus on kW installed (PV system size) with little or no intention to perform needs to be avoided. This has been the nature of incentive schemes across Australia to date. Combining premium FIT (state) with phantom RECs (federal) creates a situation where practically money is been "handed out" without linkage to PV system performance (kWh). By human behaviour, such approach attracts a high number of opportunistic and unethical new businesses and business practices (i.e. "financially engineered" sales rather than PV systems

[5] In honour of Scottish engineer James Watt (1736 – 1819)

[6] Analogy: kW is the horse power of your car (1 HP = 0.746 kW) – kWh is the fuel (energy) the engine burns. 1 litre petrol = 10 kWh

	engineered for performance, misleading claims like RECs being a Government subsidy[7], false warranty promises, and aggressive marketing spiel shamelessly taking advantage of uninformed consumer mentality). As the example shows this is unsustainable both in economic and environmental outcomes: **Example "Phantom RECs[8]":** Under the *Renewable Energy (Electricity) Act 2000* to 30 June 2011, the Solar Credits multiplier was 5 (now 3) for a max. PV system size of 1.5 kW. The act allows for a max. 15-year deeming period. Per year a PV system in Perth (Zone 3) will generate 1.5 kW x 1382 h = 2073 kWh (or 2 MWh[9] rounded down). For 15 years and with a 5 multiplier this results in 155 MWh or 155 Certificates. Valued at $40/MWh the point of sale discount for a 1.5 kW PV system equates to up to $6,200. This is less than the PV system cost and created a "free systems" (negative payback times) consumer mindset. The act has no in-built accountability for actual kWh-performance and emissions saved[10]. Short-term economic gain replaces long-term outcomes for society and the environment (emission reductions paid for are an unmeasurable outcome). These are unsustainable practices in what could be a sustainable industry. Questions remaining are: ***Who is accountable?*** ***How is this going to be reconciled?***
Net Metering vs. premium FIT	
The definition of (1:1) **Net Metering** is: (i) When PV electricity is fed into the grid ("exported") it is paid the retail electricity tariff <u>less the GST</u> component, and (ii) When PV electricity is self-consumed on-site electricity costs are saved at the retail electricity tariff <u>inclusive of GST</u> ("Avoided Energy Costs").	In WA, the premium net FIT (47 ¢/kWh) has been reduced to 7 ¢/kWh. This is not a "fair and reasonable" payment for clean energy and is too low to be an incentive. As a consequence demand for residential PV in WA and other states dropped to unsustainable levels. The PV system owner made the investment in generation infrastructure and <u>not</u> the utility (retail

[7] Media release "Response to 'Well Being Green' claims"
www.climatechange.gov.au/minister/greg-combet/2011/media-releases/September/mr20110907.aspx
[8] 1 REC = 1 MWh of electricity generated (Renewable Energy Certificate, now called Small-scale Technology Certificate (STC)).
[9] 1 MWh = 1000 kWh
[10] Emissions are measured in carbon dioxide equivalents (CO_2-e). The carbon intensity of WA grid electricity is 0.93 kg CO_2-e/kWh. This means that 1 kWh generated by PV saves 0.93 kg of emissions (1:1 rule of thumb: **1 kWh = 1 kg CO_2-e**).
www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx

Exemptions to the 1:1 Net Metering default are BIPV where the multiplier needs to be 130%-150% of the retail electricity tariffs, and greater than 100% to achieve geographic distribution of PV systems. ***Cost per energy*** Two energy costs need to be compared, the cost/kWh from PV with the cost/kWh from the electricity tariff (grid). ***Key question is how much does a kWh cost from PV in Perth?*** The Levelized Cost of Electricity (LCOE)[11] method is used to calculate the cost/kWh from PV. All inputs into the calculation (available online) and results are given in Appendix 3. At current PV system costs of **$4/W** – less certificates – the LCOE is around **20 ¢/kWh** and PV electricity is thereby cost-competitive and costs less today than the WA residential retail tariff. ***Net Metering under SmartPower*** When applying the 2011 SmartPower tariff for Net Metering the resulting average payment for PV electricity fed into the grid is greater **>26 ¢/kWh** (excl.-GST). With Net Metering under SmartPower for every kWh from PV used on-site the electricity cost savings (avoided import) are >26 ¢/kWh+GST. Reasonable payback times for investments in PV systems of 5-8 years are desirable.	and network). This needs to be considered in a "fair and reasonable" recognition of the true value to society paid for PV electricity exported. No retrospective payments for existing PV systems are necessary and are counter-productive (because the investment decision had been made on the then "schemes" and was deemed sufficient).
Grid parity is inevitable	
The definition of **Grid Parity** is: The cost of on-site PV electricity ($/kWh) generation is equal or less than the retail electricity tariff (grid). Australia-wide with both (i) PV system costs reducing and (ii) electricity costs increasing grid parity is inevitable. In WA, we have now reached grid parity for the residential A1[12] and SmartPower[13] tariffs (Peak is **42.15 ¢/kWh** incl.-GST) and for certain business tariffs[14]. Synergy's residential A1 tariff is projected to increase substantially (see Appendix 2).	Network owners and electricity retailers are likely to work against this development and will push back hard, because today's networks are designed for few large centralised power stations rather than for a high number of small distributed generators such as PV systems. Given that PV has all potential to be a major energy source the current business model of electricity revenue and retailing might have to face a paradigm shift.

[11] Demystifying Levelized Cost of Electricity (LCOE):
www.renewableenergyworld.com/rea/blog/post/2010/08/demystifying-lcoe
www.renewableenergyworld.com/assets/documents/2010/simple_lcoe_model.xls
[12] www.synergy.net.au/at_home/prices.xhtml#A1_Home_tariff
[13] www.synergy.net.au/at_home/smartpower.xhtml#tabs-2
[14] www.synergy.net.au/for_business/small_medium_business/prices_and_rebates.xhtml

The legislation has to be future-proof preparing/planning for grid parity. With grid parity the demand for PV will become unstoppable. As electricity prices increase more households and businesses will wish to substitute purchased electricity with their own PV electricity (desired behaviour change).	
Rather than PV matching the peak, make the peak come to the PV	
Price signals based on time-of-use pricing for electricity work best to bring about behaviour change. The desired behaviour change for true sustainability outcomes is: • Reduce demand • Increase energy efficiency, and • Use renewable energy. The legislation needs to be based on price signals (incentive) at the right time-of-use: Peak price to be the "stick" and Off-peak price to be the "carrot". ***Equity principle*** The existing Synergy time-of-use SmartPower pricing could be applied (see Appendix 1). This could be based on the equity principle that the one who benefits from the system (from avoided energy costs and a payment for exported PV electricity) needs to contribute to the system by being (mandated) on SmartPower embracing the desired behaviour change. The SmartPower tariff might need to be slightly adjusted to encourage PV electricity export beyond 17:00 in summer to a Peak time of 19:00. ***Geographic distribution*** With the intent to achieve a geographical distribution of PV across Australia a factor on the Net Metering export price in line with the existing Zone Rating (that reflects the specific PV output based on the amount of sunlight the zone receives) could be applied: Zone / Rating (MWh/kW_p) / Factor 1 / 1.622 / 1.00 2 / 1.536 / 1.06 3 / 1.382 / 1.17 4 / 1.185 / 1.37	In WA, a 7 ¢/kWh tariff for exported PV electricity is by far too low (one-third of Net Metering). A too low export tariff will encourage an undesired behaviour change of load shifting to time of generation. In WA, where the network demand peak coincides with PV output, such load shifting could make the demand peaks worse[15].

[15] Australian PV Association (APVA) Submission to the IPART Energy Issues Paper on Solar Feed-in Tariffs, September 2011, p10

<table>
<tr><td colspan="2">Mandatory PV on all new buildings (Government and private)</td></tr>
<tr><td>Legislation is needed to mandate PV for all new buildings to at least “pay pack in full” both the (i) embodied energy[16] and the (ii) operational energy throughout the buildings’ life cycle (40-50 years).

Outcome: buildings are truly energy neutral (not to be misguided by “carbon neutral” claims which typically refer only to offsetting the electricity used to operate the building).

Plus Energy
Legislate higher targets: “plus energy” buildings, “plus energy” suburbs, and “plus energy” Solar Cities.

Outcome: buildings are energy neutral plus contributing electricity to the grid.

Without such mandate new buildings will use fossil fuels adding to the public liability of carbon pollution.</td><td>Forms of current building design and suburbs “development” are unsustainable and a public liability: energy and resources intensive to build and run, lack or ineffective public transport, high levels of motorised individual traffic, high infrastructure costs for energy and water, highest land use and loss of biodiversity (habitat).</td></tr>
<tr><td colspan="2">Residential and commercial solar</td></tr>
<tr><td>PV on commercial roofs needs to be encouraged and included in the legislation (incentive mechanism).

Commercial roofs are the biggest potential market for PV and the largest opportunity for PV to effectively substitute fossil fuel use in meaningful quantities (roof-top PV systems on industrial areas and warehouses).

Also PV has a better correlation to commercial load profiles than to residential load profiles and hence is more effective in reducing peak demand.</td><td>Abandon small-scale PV systems thinking and schemes of the utilities (1.5, 5, 10 or 30 kW limits).

Commercial roofs lie dormant and in the absence of a policy for commercial rooftop PV (preference over green field) this is currently the most underutilised asset available to PV.</td></tr>
<tr><td>No cap on PV (100% renewable)</td><td>Cap on fossil fuel use</td></tr>
<tr><td>Big picture
We are in the middle of climate change.

Any cap, typically arbitrary, on PV is unacceptable from the commitment to transform our society into a sustainable society (WA: state-based FIT capped at 150 MW[17] capacity).

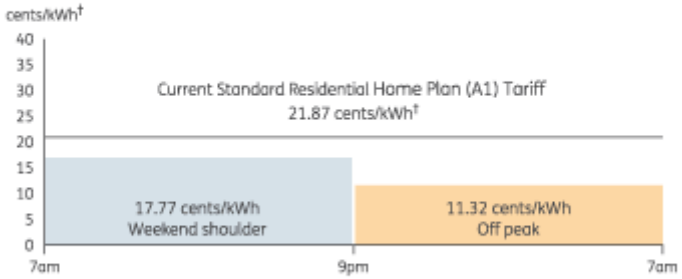
At the same time fossil fuel based generation capacity in WA is around 5000 MW[18] (SWIS), i.e.</td><td>Residential renewable energy systems are capped to 5 kW capacity (Synergy, WA: Renewable Energy Buyback Scheme) to feed/sell electricity to the grid while the fossil fuel burning car in the garage has easily several hundred kW[19].</td></tr>
</table>

[16] 1 brick = approx. 1 kWh
[17] Inverter capacity (typically the inverter capacity is greater than the PV capacity to enable upgrades of more PV modules)
[18] Maximum daily peak demand is greater 3,800 MW (26.02.2011, 16:30 - 17:00), IMO Statement of Opportunities, June 2011, p15
[19] Holden Commodore Series II www.holden.com.au/vehicles/commodore#/overview

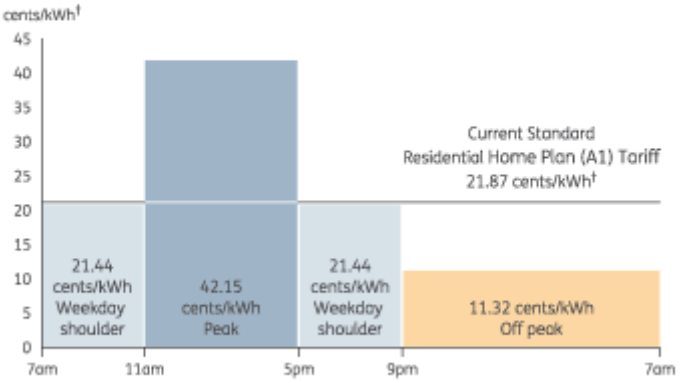
only 3% is renewables. This shows a significant disparity between clean and polluting fuel use. The federal renewable energy target is **20% by 2020**. PV can assist in closing the gap. However pro-active network planning based on authentic sustainability criteria is needed to enable this potential.	
Priority access for PV (renewables)	
Priority access for PV needs to be legislated and needs to go hand-in-hand with the PV system demand under grid parity. In particular the network owners can assist in identifying network constraints in locations where PV could be applied. Such approach would be a benefit to the network (and retailer) above the value of the kWh, thereby increasing the value of PV to society.	Current practice for network access in WA is first-come-first-served (Western Power *Applications and Queuing Policy*) without consideration of fuel source and sustainability outcomes, i.e. a proposed coal-fired power station can block the network capacity that would otherwise be available for renewables. Bold political leadership pro-sustainability is needed to overcome this barrier.
Where does the money need to come from?	
Polluter-pays-principle The money needs to come from the polluters to wean the world off fossil fuel use. The **REFiT WA Bill** offers a workable and effective mechanism on how to achieve this: network operators (SWIS and NWIS) pay the Net Metering and recover the payment annually form all electricity retailers in accordance with each retailer's market share.	**Not from consolidated revenue** • Funding FITs through consolidated revenue is the most inappropriate funding source with the highest use of taxpayers' funds and hence biased towards business. • Renewable energy uptake will be limited in accordance with state budgets and is under Government control. • Taxpayers' funds flowing to pay for the FIT premium are lost to fund other sustainable actions such as education (where WA is lagging behind other Australian states).

Appendix 1

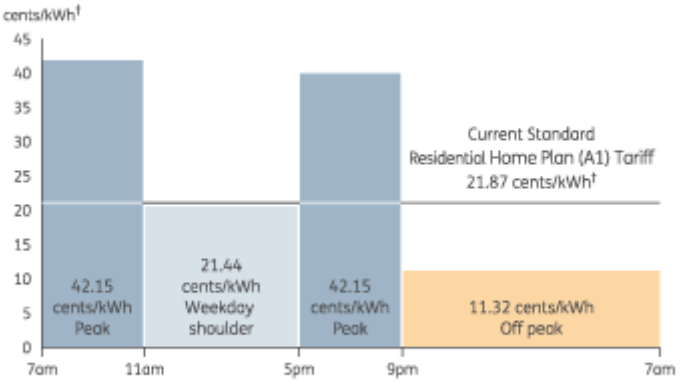
1. Weekends all year round



2. Summer (October to March) Weekdays



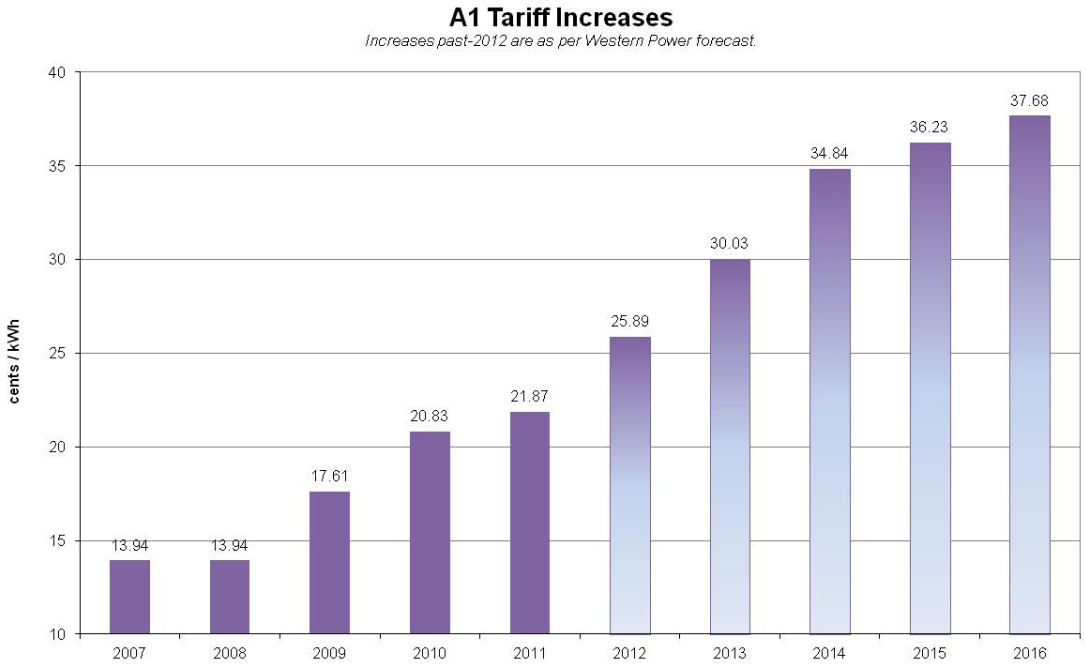
3. Winter (April to September) Weekdays



†All prices include GST and are effective at 1 July, 2011.
Prices and time periods subject to change at any time.

2011 Synergy SmartPower® time-of-use electricity tariff structure with its four (4) price signals. The most obvious price signal to bring about desired behaviour change is the Peak price of **42.15 ¢/kWh**: discouraging electricity consumption at a high price while – under Net Metering – encouraging PV electricity generation at times of high demand.

Appendix 2



Synergy Residential A1 flat rate Tariff (incl.-GST): Historic and forecast prices (5 years each). Electricity prices in WA are *not* cost-reflective and further price rises are inevitable[20]. A carbon price (increasing tariffs) will further shorten the payback time of PV systems.

Appendix 3

Solar Credits Multiplier = 3
165 STCs
(to 30 June 2012)

Project size (W)	5,000
Cost/Watt	$3.08
Investment Tax Credit	0%
Watt-hours/Watt-peak	1,700
Derating	100%
Discount rate	8.0%
Productive years	25
Degradation	0.50%
Operations cost	0.50%
Inverter replacement year	15
Inverter replacement cost ($/W)	$0.35
Levelized cost of electricity	**$0.192**

Solar Credits Multiplier = 2
134 STCs
(to 30 June 2013)

Project size (W)	5,000
Cost/Watt	$3.25
Investment Tax Credit	0%
Watt-hours/Watt-peak	1,700
Derating	100%
Discount rate	8.0%
Productive years	25
Degradation	0.50%
Operations cost	0.50%
Inverter replacement year	15
Inverter replacement cost ($/W)	$0.35
Levelized cost of electricity	**$0.203**

Solar Credits Multiplier = 1
103 STCs
(from 1 July 2013)

Project size (W)	5,000
Cost/Watt	$3.42
Investment Tax Credit	0%
Watt-hours/Watt-peak	1,700
Derating	100%
Discount rate	8.0%
Productive years	25
Degradation	0.50%
Operations cost	0.50%
Inverter replacement year	15
Inverter replacement cost ($/W)	$0.35
Levelized cost of electricity	**$0.213**

Inputs into the **LCOE calculation**. The cost/Watt figure is the current specific PV system cost of **$4/W** less the Small-scale Technology Certificates (STC) at current market value of $28/STC x 165 STC = $4,620 for a 5 kW PV system. The LCOE of around **20 ¢/kWh** compares favourably with and is less than today's Synergy A1 retail tariff.

Hypothetically, without Certificates, at **$4/W** the LCOE is **24.8 ¢/kWh** and close to the 2011 Synergy SmartPower tariff average of **26 ¢/kWh**.

The LCOE will be *lower* at locations with a higher solar radiation than Perth (Zone 2 and Zone 1). For Zone 4 the LCOE will be *higher*. A factor on export price can be applied to compensate this.

[20] 2011-10-26 More big power bill shocks in pipeline - The West
http://au.news.yahoo.com/thewest/a/-/newshome/10872356/more-big-power-bill-shocks-in-pipeline