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Australian PV Association

The Highs & Lows of the PV Market in Australia

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University of NSW
and
Chair, Australian PV Association

Outline

- Current PV Market in Australia and Internationally
- Key Australian support Programs
- Cost and Price Trends
- A Feed-in Tariff for Australia?
- PV Opportunities for Australia

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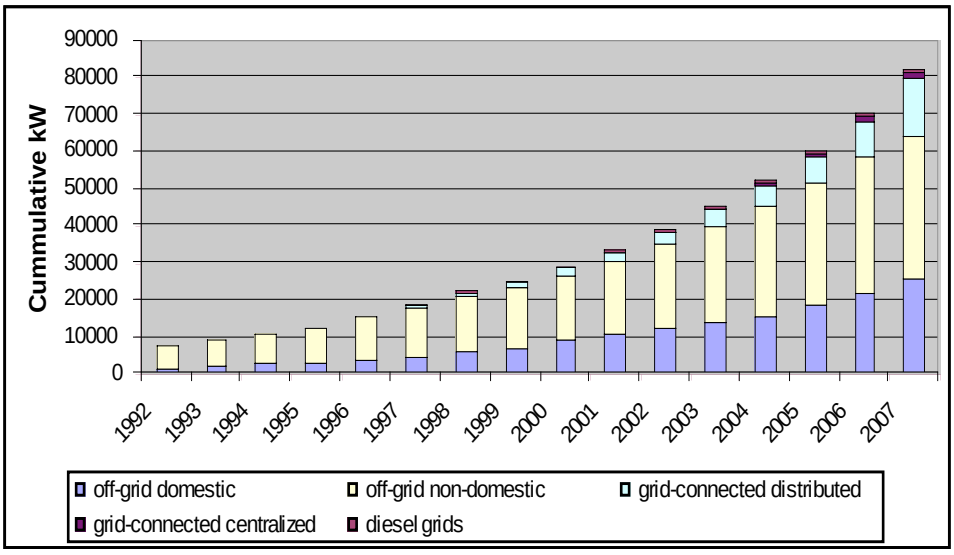
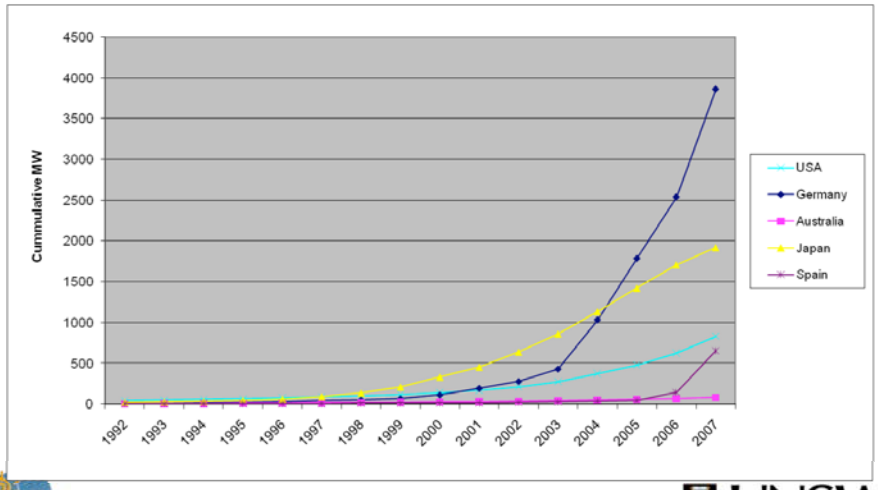
Australian and International PV Markets

Development of the Australian PV Market (APVA, 2008)



Australia Compared to Other Key PV Markets (PVPS, 2008)



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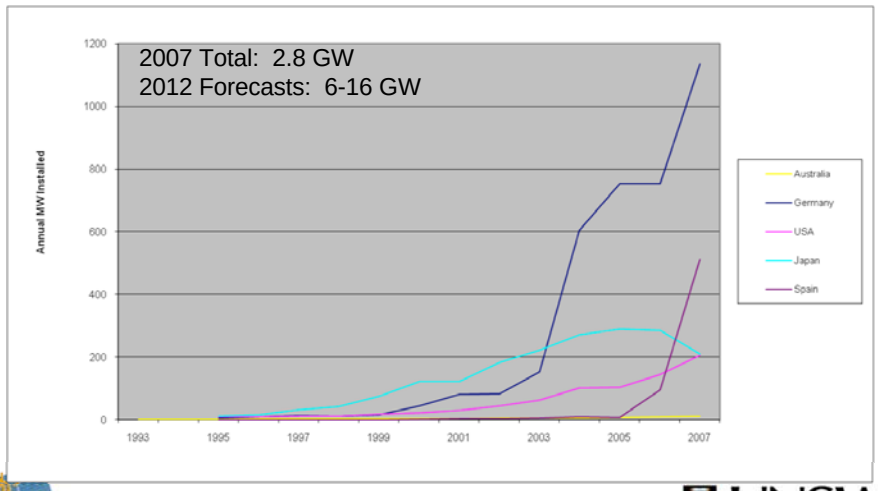
Annual Installations in Key PV Countries (PVPS, 2008)



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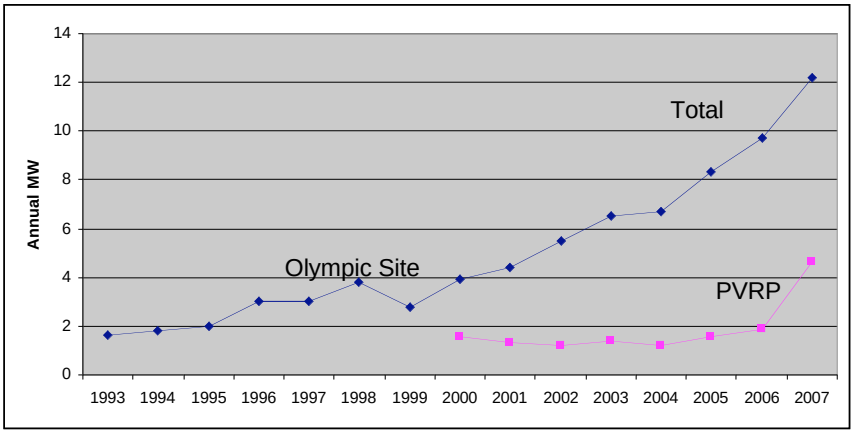
Annual Australian PV Installations
(APVA, 2008)



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Key Australian Support Programs

Photo: Ergon, Lingara

PV Installations and Contributions 2007/08

- Installations
  - PVRP ~18MW
  - RRPGP ~ 8MW
- GreenPower (NGAP, 2008)
  - 49 systems
  - 3070 MWh
- MRET (ORER, 2008)
  - 32 accredited stations
  - 8402 RECs

Photo: Simon Troman

Evolution of the PV Rebate (Solar Homes & Communities)

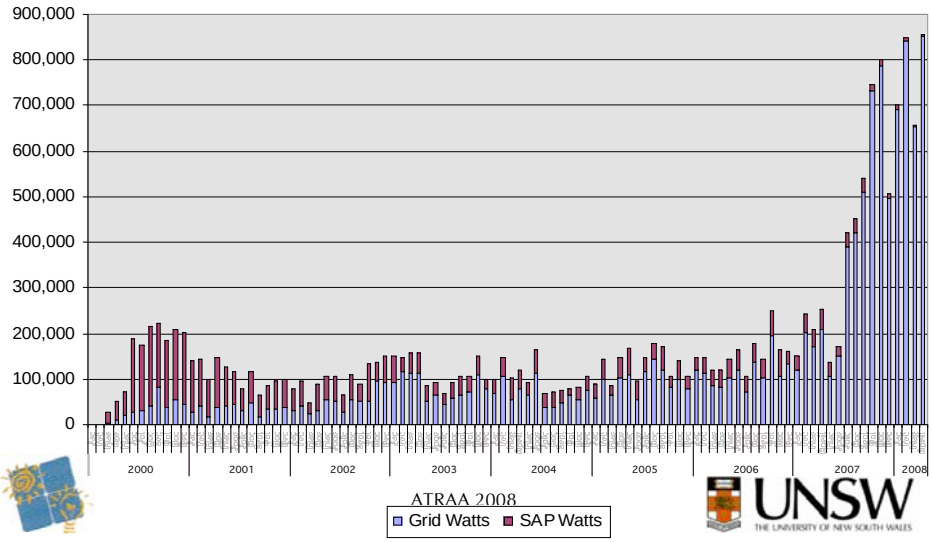
- Commenced in 2000 and currently funding likely to be used by 2009
- Rebates on PV capital costs for householders or community building owners
- Householder rebate $5.50 then $4 now $8/Wp.
- Community buildings 50% rebate capped at 2 kWp
- Schools now separtely funded
- > 13,000 systems and > 18 MWp of PV (73% grid connected) have been installed and rebates of over $100M provided

Solar Homes & Communities Statistics

(AGO, 2008)

Australian Government
Department of the Environment, Water, Heritage and the Arts

Watts Installed by Month to April 2008



ATRAA 2008

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Renewable Remote Power Generation Programme (RRPGP)

- Commenced in 2000 with $205M over 10 years for RE replacing diesel in RAPS, public generators & mini-grids
- Extended by $123M in 2006, reduced by $42M in 2008
- Currently funded to 2011 (~$120M remaining)
- To end 2007: 8.37MW PV
- Grants up to 50% of the capital value of RE components
- Some administered & topped up by States and Territories
- Sub-programmes:
  - Bushlight - for small remote aboriginal community RE systems in, plus training and awareness
  - RESLab - RE systems test centre, Murdoch Uni, Perth.
  - PV Water Pumping
  - Major projects (>$200,000)

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Remote Power Stations

Solar System's 220 kWp concentrator system (Pitjantjatjara, SA)

Bushlight Energy Management Unit

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Bushlight Home Systems

Grant Wallace cleans the solar panels at House 5 at Corkwood Bore

Solar Cities

- $93.8M over 5 years to demonstrate high penetration uptake of solar technologies, energy efficiency, smart metering
- aimed at improving the market for distributed generation and demand side energy solutions
- **Adelaide**, **Townsville**, **Blacktown**, **Alice Springs, Central Victoria, Perth** and **Coburg**
  - *Solar Cities consortia are working with industry, businesses and their local communities to rethink the way they produce and use energy*
  - *valuable information and lessons to inform future energy and greenhouse policies*
  - *Household and some larger commercial and public PV systems, with grants, special loans and feed-in tariff in Alice Springs*

The Low Emissions Technology and Abatement (LETA) Fund

- $26.9M to reduce greenhouse gas emissions over the longer term
- For identification and implementation of cost effective abatement opportunities and the uptake of small scale low emission technologies in business, industry and local communities.
- Support for renewables via an industry development sub-programme available to State and Territory Government agencies and renewable energy industry associations

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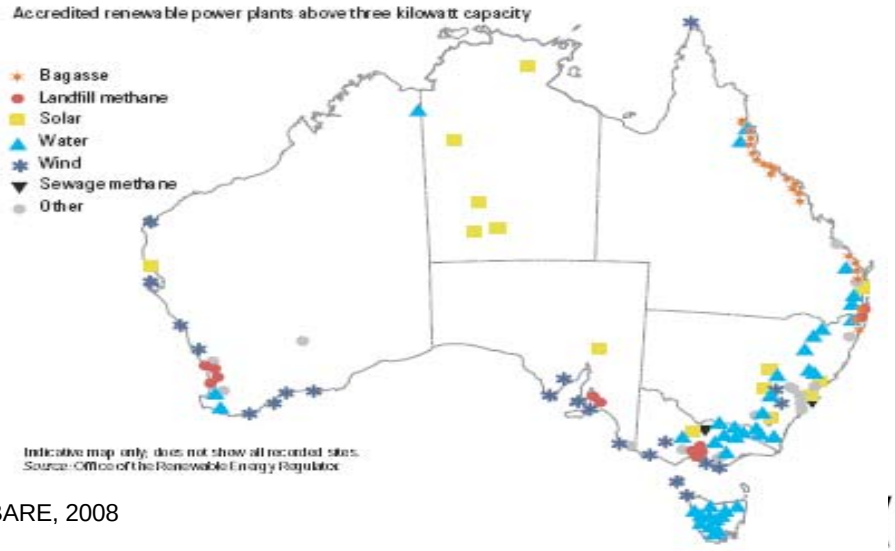
National Solar Schools Program

(Ref: Aust Gov Dept of Climate Change, 2008)

- Schools programs originally at State level and with PVRP funding
- New Program: $489 million - all schools eligible
- grants up to $50,000 to install min 2 kW PV
  - 20MW (2.5MW per year for 8 years?) and:
  - lighting upgrades
  - sky lights
  - shade awnings
  - solar hot water systems
  - rainwater tanks

MRET

32 accredited solar stations
8402 RECs to date



ABARE, 2008

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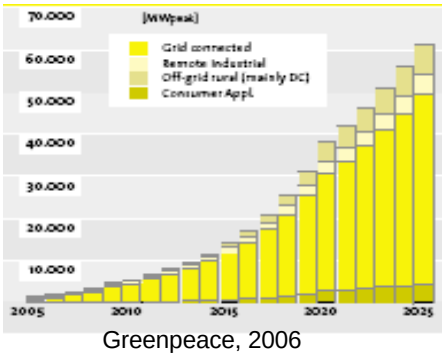
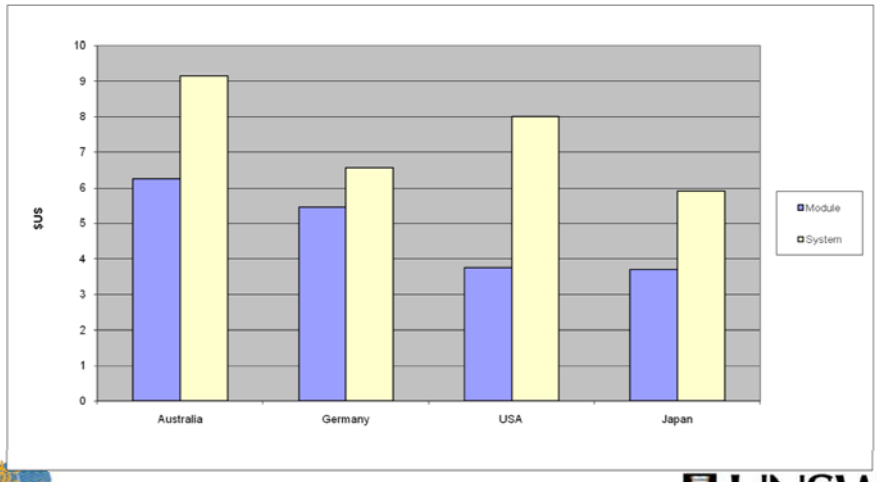
Cost and Price Trends



Greenpeace, 2006

2007 Module and Grid System Prices
(PVPS, 2008)



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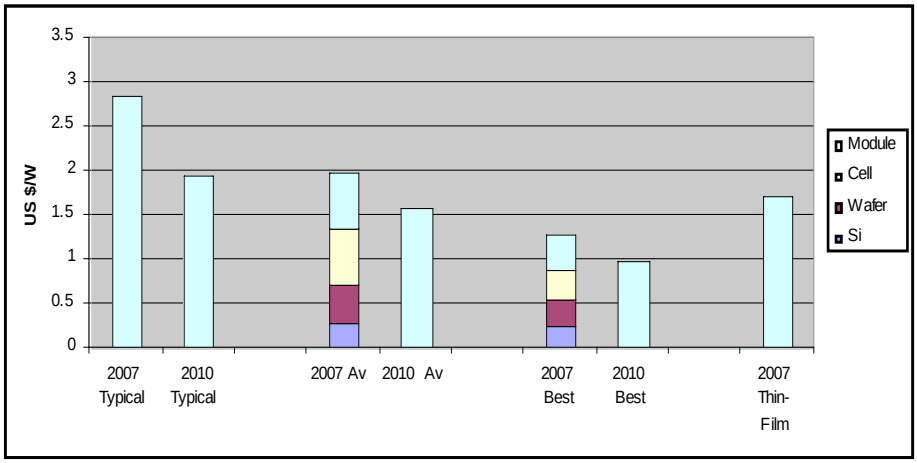
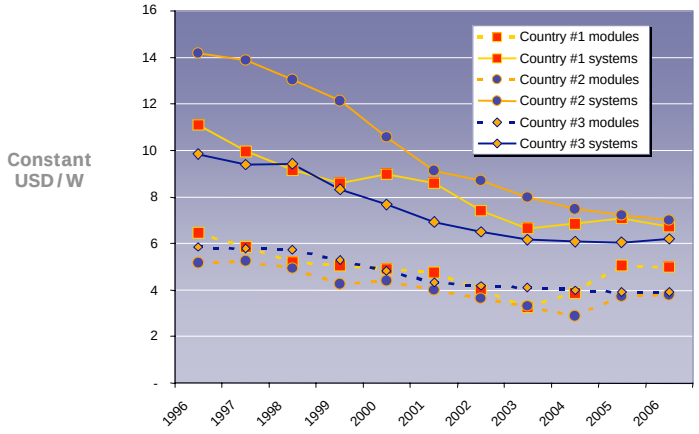
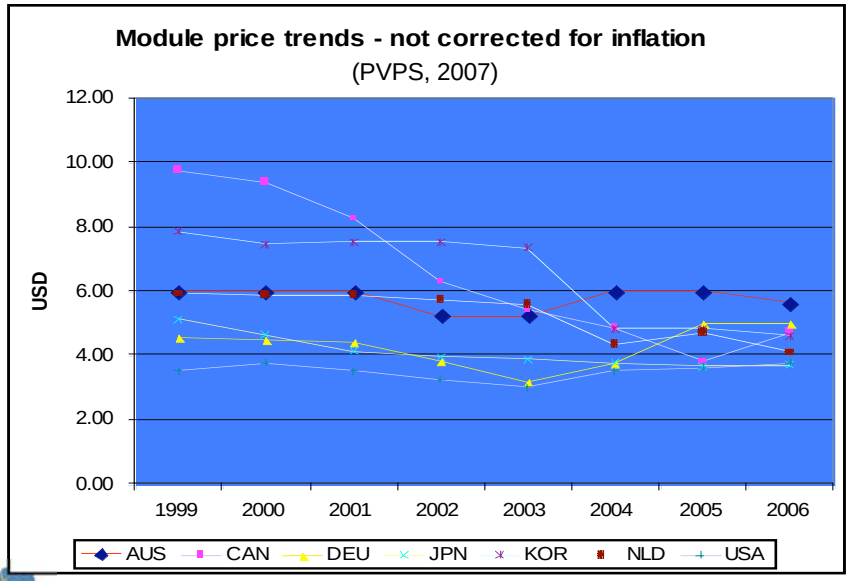
2007 and Projected 2010 Module Costs
(Photon, 2008)



PV module and system prices in selected PVPS countries (PVPS, 2007)





PV Electricity Costs (Photon, 2008)

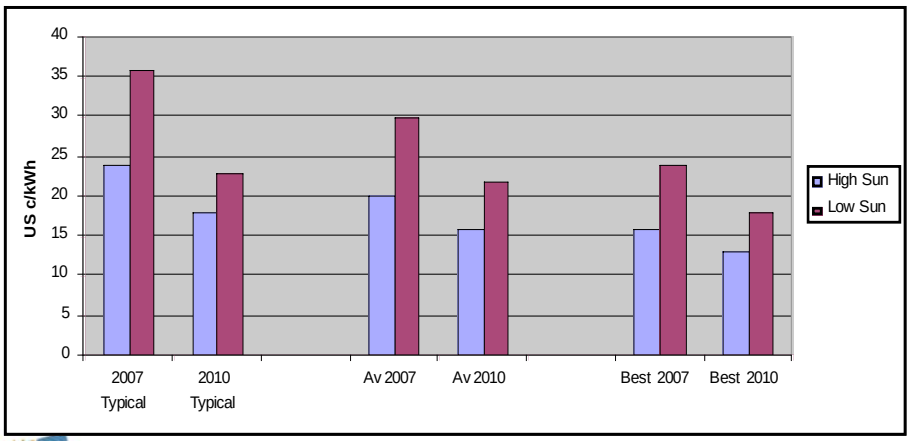


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Photo: STI, Melb Uni

An Australian Feed-in Tariff?

Photo: Energy Australia, Kogarah

Feed-in Tariff (FiT) Principles

- Electricity buy-back rate which provides payback within the life of the system / scheme
- First used in California in the 1970s (PURPA) and then Austrian local government in 1980s (rate based incentives)
- Enhanced tariff is mandated and paid for via a levy on electricity sales (sometimes from Government budgets)
- Can be paid on total generation, generation net of customer usage, up to a set limit, time of generation etc
- Tariff for the year of installation is guaranteed for a set period, typically 15 to 20 years, but can be as low as 5 years
- Can attract huge investment in renewables if appropriately structured
- Now available in 37 countries and various States

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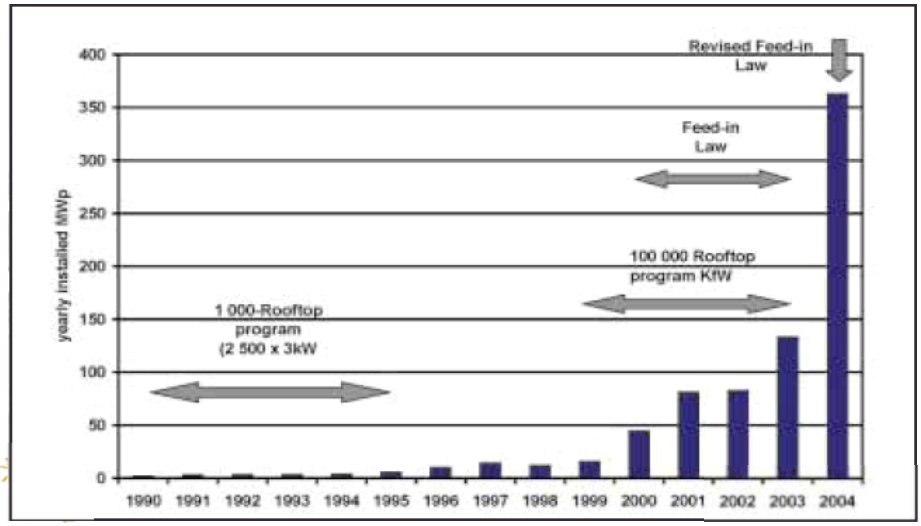
German PV market growth

(EPIA, 2005)



FiT Issues

- Too high a Tariff (as for grants!)
  - creates high demand
  - increases prices if supply constrained
  - restricts uptake in non-subsidised markets
  - pressure to use unskilled labour
  - pressure to use uncertified products
  - leaves industry vulnerable to change
- Net export
  - Need large systems / small loads / minimum day load
    - Could exacerbate evening peak
  - Difficult to calculate cost effectiveness
- MW Caps or short timeframe
  - Boom and bust cycle

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Australian FiTs

- ACT – 3.88X tariff, 10 years, 10 kW
- SA - 44 c/kWh net export , 2028
- Qld – 44 c/kWh net export (10 years, 8MW or 2028)
- Vic - 60 c/kWh net export, 2 kW, 15 years
- Energy Australia - 28 c/kWh (net export, 2-8pm)
- Alice Springs Solar City – 45 c/kWh gross generation, 10 years, limit of $5 per day

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Implementation Issues for an Australia FiT

- Likely public take-up?
  - Green interest, local self reliance, disposable income, age profile
  - Depends on FiT structure and PV rebates
  - $4 PVRP ~ 28 c/kWh FiT (above retail price) => steady uptake
  - $8 PVRP ~ 48 c/kWh => rapid uptake
- Utility response - OK with small penetrations, more issues once PV starts to be noticeable
- Gross FiT not compatible with net metering → need for electronic or 2nd meter
- Net FiT – unknown earnings projections

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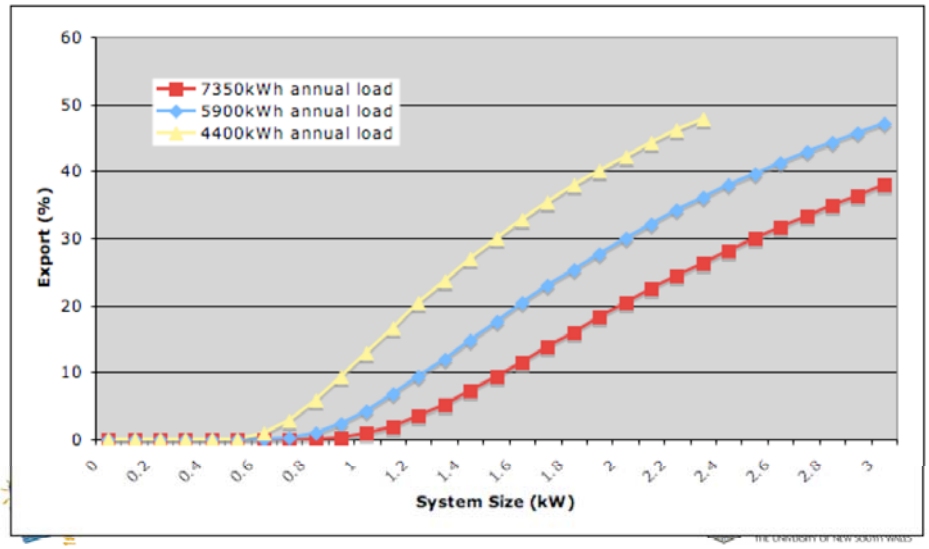
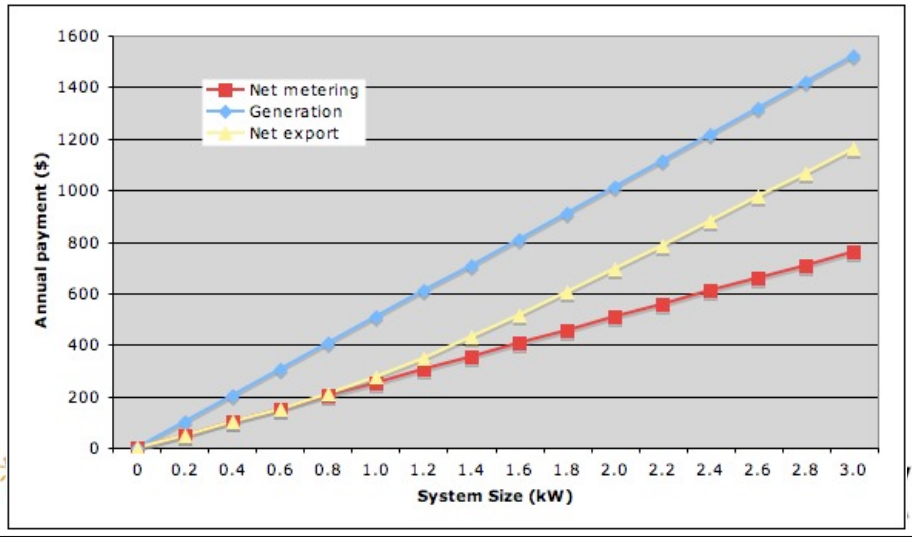
PV export vs system size and load

(APVA & CEEM, 2007)

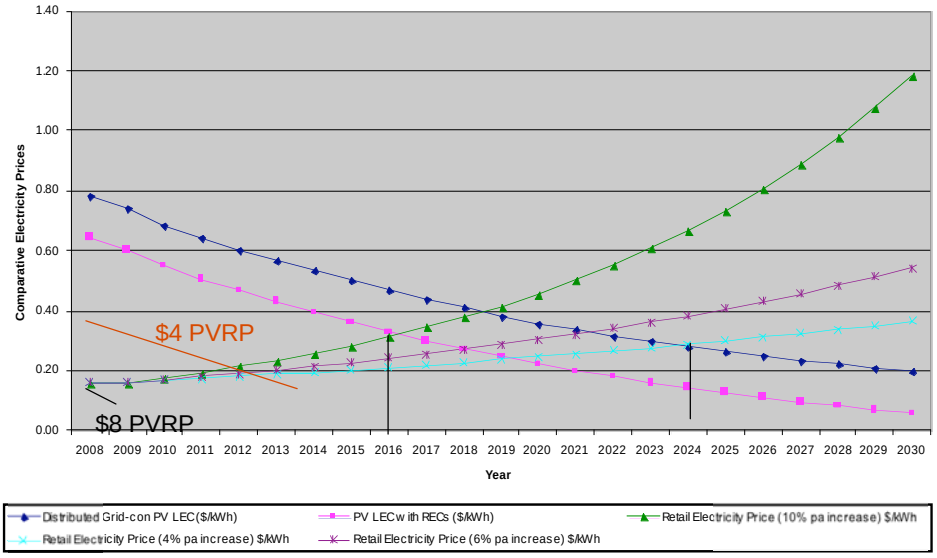


FiT income vs system size for different types of FiTs

(APVA & CEEM, 2007)



Electricity and PV Price Trends



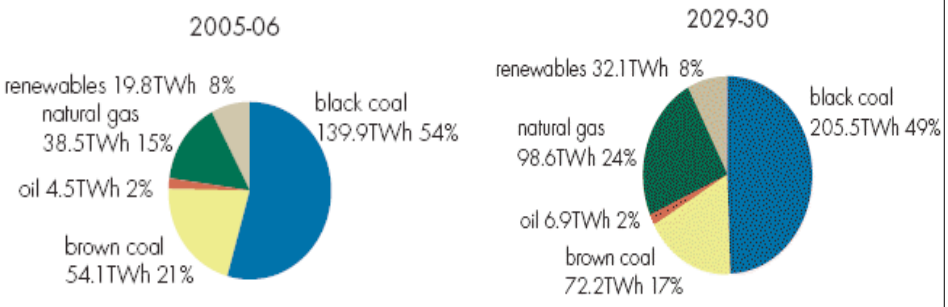
The preferred FiT Model

- Nationally consistent FiT above electricity tariff
- Initial starting tariff should aim to repay capital cost over a FiT time period of 15-20 years
- Tariff should decrease by 5-10% each year
  - Eg. start at 50 c/kWh above retail tariff (~66 c) and decreases at 10%pa => zero within 10 years and hence has a defined end date
- FiT cost should be covered by customer levy, rather than government budget
- All customer sectors should be eligible (but may exclude large industry)
- Levy should be spread across all customer types (but could avoid the more sensitive large industry sector)
- No cap
- Payment on total generation

PV Opportunities for Australia

Photo: BP Solar Greenbridge

Current and Projected Energy Use in Australia (ABARE 2007)



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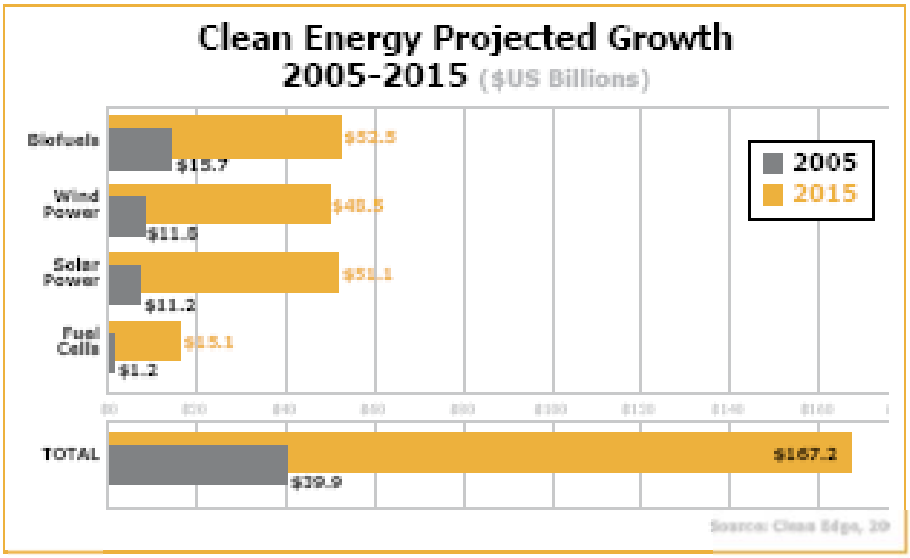
Clean Edge 2006



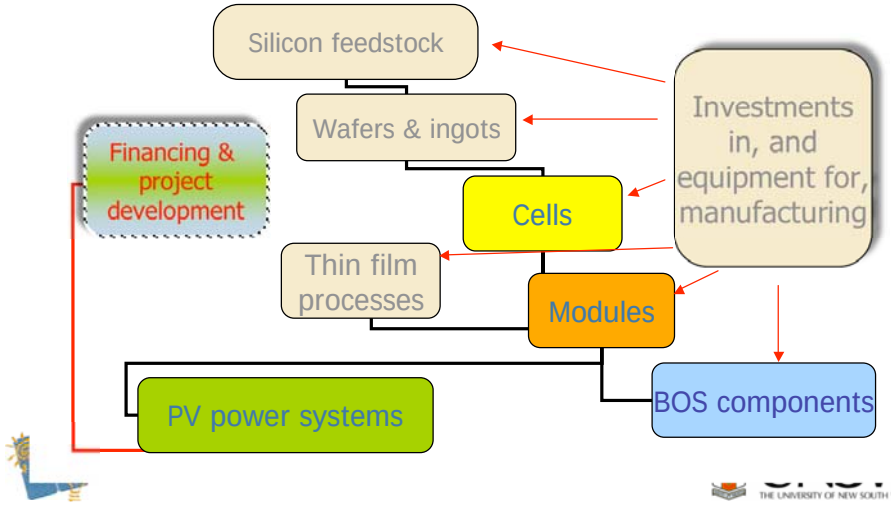
PV support frameworks

- Renewable portfolio standards
- Direct capital subsidies
- Green electricity schemes
- Enhanced feed-in tariffs
- Manufacturing incentives
- Government procurement
- Tax Credits
- Building regulations

plus emerging mechanisms…

- **Preferential home mortgage terms**
- **Green loans from commercial banks**
- **Share offerings in private PV investment funds**

PV supply chain – can Australia extend its scope?



Launch 12 August

Centre for Energy Research and Policy

University of NSW

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