

Solar Energy in Australia: Trends and Forecast

Melbourne 10th May 2010

Prepared by Mr Alex Cross



Overview

The following interim report is a summary of the Solar Energy in Australia: Trends and Forecast event which was presented by the Australian Solar Energy Society at the Langham Hotel in Melbourne on the 10th May 2010. It gave the participants an informative 'snapshot' of solar energy industry in Australia, with presentations made by industry experts and commentators highlighting emerging trends and opportunities. The same workshop format was also held in Brisbane and Sydney.

This report includes an executive summary, a time table of the day's events and key points made by each speaker in their area of expertise, the final report to be released after July 2nd 2010 will include copies of the presentation.

In reviewing the attached notes domestic Photovoltaic (PV) refers to residential markets, commercial refers to business operators with capacity for roof installation of PV for example, whilst industry are utility scale operations.

Alex Cross attended the event as a representative of the National Centre for Sustainability and the Sunraysia Institute of TAFE.

Executive Summary

The opportunities for the solar industry in Australia are positive; however the industry is heavily reliant on government funding and policy. A significant shift in policy and introduction of effective economic market mechanisms will be needed to continue the industry's expansion and development.

There are established policies and programs in the short-term until at least 2015. For the small scale market there is the current solar credits program linked to the Renewable Energy Certificates (REC) and feed in tariffs (FIT) available across the states and territories with different rates, conditions and period of enforcement. For utility scale operations there is the Solar Flagship Program.

The establishment of the commercial market would be extremely beneficial for the industry as a whole but the lack of policy and pricing mechanism is currently limiting this opportunity.

With the Carbon Pollution Reduction Scheme (CPRS) on hold until at least 2013, the Renewable Energy Target (RET) and REC are the current key market drivers for the industry. The realisation of grid parity with PV production costs and returns for example is not expected to occur until 2018.¹ This may be achieved sooner or later depending on continued improvement in system efficiencies and introduction of new technology. With the establishment of Grid Parity the context for the solar industry will be changed again.

The first industrial scale plants will be established in Australia in the near future thanks to the Solar Flagship Program. The expansion of utility scale projects faces similar hurdles as detailed above with reference to the CPRS, grid parity, policy and incentives. In the short to medium term the utility scale solar industry faces strong competition from existing technology – e.g. coal fired power stations and early 'renewable energy' movers such as wind which has been able to secure a strong foothold because of lower capital costs and its impact of project cost than solar along with global adoption of the technology.

Broadly speaking the establishment of long-term policies along with effective pricing mechanisms will enable the industry to continue to grow across all sectors.

¹ PV Uptake in Australia, Trends and Analysis, Muriel Watts, Australian Photovoltaic Association. Viewed 10th May 2010

Summary of Event Timetable for Monday 10th May 2010

9:00 [Opening Remarks from the Chair](#) – Ken Guthrie, Sustainability Victoria

9:10 [Australian Solar Policy Overview](#)

Federal government solar policy review. State government solar incentive programs
Key issues currently facing the industry. The need for strong, united industry action in the solar sector.

- **Wayne Smith**, Renewable Energy Consultant

10:00 [PV Uptake in Australia: Trends and Analysis](#)

State of the Australian PV Market. Market segmentation by size and application, Market growth projections. The role of Policy in Shaping the PV market.

– **Joe Wyder**, IT Power on behalf of **Dr Muriel Watt**, Chair, Australian Photovoltaic Association

11:10 [Solar Thermal – The Waking Giant](#)

The global state of CSP, Different technology approaches. Review of major global projects
What Solar Flagships means for Australia's CSP industry.

– **Dr Keith Lovegrove**, IT Power

11:50 [Victorian Solar Policy](#)

State of the Australian PV Market. Market segmentation by size and application. Market growth projections. The role of Policy in Shaping the PV market.

– **John Edgoose**, Sustainability Victoria

1:10 [Australia's Solar Research & Development Capability](#)

State of PV R&D in Australia. Solar PV Manufacture overview. State of Australia's Solar Thermal R&D. Government solar programs.

- **Anwen Lovett**, Australian Solar Institute

1:50 [Next Generation Photovoltaic](#)

- Associate Professor **Yasuhiro Tachibana**, RMIT

2:30 [Renewable Energy Certificate Price Analysis](#)

State and forecast of REC pricing, Trends and analysis of the current REC market. Likely changes to the RET and their impact on REC pricing.

– **Ric Brazzale**, Director, Green Energy Trading

3:40 [Domestic and Industrial Trends](#)

Market segments, and analysis of demand in each segment. Current pricing, and the outlook for PV pricing. The economics of PV. Emerging ownership and other financial models in mid and large scale PV applications.

- **Grant Egerdie**, General Manager Commercial, Solar Shop Australia

4:30 [Panel Discussion](#)

Topic – 'What role will solar play in Australia in 2020?'

All presenters will participate in this important debate

5:30 Close

Opening Remarks from the Chair

– Ken Guthrie, Sustainability Victoria

Ken began by welcoming all delegates, explaining the house rules and intended program for the day.

His comments were brief and to the point: The solar industry faces challenges in Australia, focusing particularly on Victoria existing coal fired generators providing over 90% of the electricity supply and a cooler climate in comparison with other mainland states and territories. However Victoria has access to large gas field and a strong industry base suitable for renewable energy industry and production.

He concluded 'Victoria needs to move to 100% renewable energy'.

Australian Solar Policy Overview

Federal government solar policy review. State government solar incentive programs. Key issues currently facing the industry. The need for strong, united industry action in the solar sector.

- **Wayne Smith**, Renewable Energy Consultant working as a private consultant and advisor having formerly worked with Ausra and the Federal government.

The current environment of policy is constantly changing and can be described as a game of snakes and ladders, whilst the Solar Flagship Program is a 'ladder' climb for the industry the delay of an Emissions Trading Scheme until at least 2013 is a descending 'snake'.

The solar industry is important to Australia; it currently employs 6000 in the residential market with this figure set to double by 2020. The use of 'Solar' is valued by the population with over 50% wanting for example, to install solar hot water systems. This support establishes a strong building block for renewable energy policy going forward.

However the solar industry is currently very dependent on Government policy, for example the solar credit program will change in the future and in referring particularly to the photovoltaics residential market the only certainty is market uncertainty.

Renewable energy target & Policy Today

The Federal government has set a target of 20% electricity supply from renewable sources by 2020 made up of:

- Small Scale Renewable Energy Scheme (SRES) – Domestic and commercial
- Large –Scale Renewable Energy Target (LRET)

LRET will cover 41000 GW hours or 90% of the Renewable Energy Target (RET). The contribution of SRES to RET will be uncapped, but there will be a fixed price of \$40 per Renewable Energy Certificate (REC) for both Solar PV and Solar Hot Water. The incentive for uptake of SRES PV will be delivered by the Solar Credits Program commencing with 5 times multiplier in the years 2009 – 12 reduces to multiplier of 4 in June 2013, 3 in 2014, and 2 in 2015 when it ends. There is demand for further amendments to the RET for SRES as there is no cap on Residential PV. Modelling expects that demand will be exceeded.

In addition, with no price on carbon established until at least 2013 through the CPRS , the RET will be the key driver for the industry in the short-term.

Solar Flagship Program - SFP

\$1.5 Billion to be spent on 4 large scale projects with two Concentrated Thermal plants and two Photovoltaic systems developed. Made up of two rounds with each round announcing – one PV and one thermal project. At the closing date for the program there were 52 applications, of those 6 – 8 will be shortlisted².

‘This is a lottery’ Mr Smith considers the SFP a lottery because of the finite number of projects and the number of applicants.

Notes regarding Federal Opposition and State Government Policy

With the Federal election looming – the opposition has its own policy including Solar Sunrise. State governments are impacting the market with net and gross feed in tariffs based on their own pricing and policy.

The Future Policy: To stimulate the market

Looking forward to the future the following could be considered:

- National Feed in tariffs for residential, commercial (business e.g. – installation on roofs) and industry scale solar. The ACT / NSW residential feed in tariffs may provide the ideal model, whilst for commercial operators the ACT is currently examining the feed in tariff.
- Feed in tariff for large, scale solar would be set at a much lower level and differ across the states.
- Introduction of Loan Guarantees – these are promised by government to pay if the project fails e.g. USA announced \$1.37 billion loan guarantee to BrightSource Energy.
- Increase and expand RET to 30% @ 2030 to provide incentives beyond 2015, with wind set to take 80 % of RET; incentives for the solar industry are needed to take a larger share.
- Time of day incentives in RET.
- Income Tax credit and capital allowances, with cleantech R & D tax credit.

² Note: at the time of this seminar no announcements had been made see <http://www.government-grant.com.au/2010/05/solar-flagship-program-round-1-short-list/>
For the latest update and shortlisted projects.

PV Uptake in Australia: Trends and Analysis

State of the Australian PV Market. Market segmentation by size and application. Market growth projections. The role of Policy in Shaping the PV market.

– **Joe Wyder**, IT Power on behalf of

Dr Muriel Watt, Chair, Australian Photovoltaic Association

The development of the PV market has been impacted by policy agreements of various federal and state political parties and currently the PV market continues to exist because of the Solar Credits and RET programs.

For the year 2009, the annual installed PV capacity by Australia put it in the top 10 countries worldwide. This is important for Australia to be seen to be acting on the world stage.

The continued expansion of the PV uptake will be impacted by price. Whilst the Solar Credits currently provides incentives, it also artificially keeps the system price high. Prices have come down, but this has occurred because of expanding production capacity. A doubling of production has reduced costs by 20% along with the reduction in silicon costs. Over the next 5 years the Balance of System Costs (BOS), i.e. inverters, mounting systems and installation will become important factors.

In the long-term, the continued upward trend of expanded PV capacity in Australia will be reliant on grid parity e.g. cost of electricity equals cost of PV production. In Sydney, this will be tentatively achieved by 2018. The increase in electricity will be driven by introduction of carbon pricing, but more importantly the cost of and maintaining distribution networks.

Overseas, the PV market is being driven by commercial interests. In Australia the commercial market produces 10% of the Green House Gases (GHG) and consumes 22% of electricity increasing to 32% by 2029 – ABARE. However, currently there are no incentives focusing on this potential and significant market. There is great opportunity for the development of the commercial market because generally speaking commercial hours of operation run parallel with PV production.

The Main Issues going forward:

- Mainstreaming the small “PV” market and moving away from subsidies. Introduction of stricter building codes and zero energy home targets.
- Developing the commercial scale market between 10kw to 30Mw.

Solar Thermal – The Waking Giant

The global state of CSP. Different technology approaches. Review of major global projects
What Solar Flagships means for Australia's CSP industry

– **Dr Keith Lovegrove**, IT Power

Concentrated Solar Power refers to several types of technologies that includes Parabolic Troughs, Towers or Central Receivers with Heliostat Mirrors or Linear Fresnel and Parabolic Dish.

All concentrated forms of power need direct sunlight – DNI – Direct Normal Irradiation to operate efficiently that needs to be produced in the 10's of MW's to achieve economies of scale.

Since 2006 a new wave of CSP systems have come on line with over 700 MW now in operation. The International Energy Agency (IEA) is looking to bring 20GW annual on line, but to do so \$15 Trillion dollars of R & D is needed for new energy technology.

Trough Systems have the least technical risk, many based on the [SEGS Plants](#) - Solar Energy Generation Systems in California, with 5 Meter apertures. Currently there are 2 market providers of evacuated tube receivers and 2 providers of the glass facets. Schott being one of them with the expansion of Trough Systems watch for the Chinese to enter the production market in the future.

Tower systems – less commercially viable - [Esolar](#), [BrightSource](#), [Sener Torresol](#), [Abengoa](#) all have development in this area and are being very innovative. Tower Systems include – Steam Receivers, Molten Salt Receivers and Volumetric Air Receivers.

Compact Linear Fresnel – have been developed by [Ausra](#) who was recently bought out by the French Nuclear company Areva and [Novatec Bisol](#) which has a 1Mwe demonstration site in Spain.

Dish Systems has the least commercial development to date – well known research and development with [Eurodish](#) units has been undertaken. [Stirling Energy System](#) has developed systems. In Australia the former Solar Systems now owned by [Silex](#), was developing a parabolic dish with concentrated PV.

Projects around the world

USA

In 2007, the [Nevada Solar One](#) project was commissioned, using CST Technology a 64MW Solar Field 357300 m² in size being constructed in 15 months from Feb 06 to June 07. The ability to build future plants in such a short time span is principally limited by size and available workforce.

In the US the introduction of alternative technology is harder to finance and many 'big' announcements are made but the number of serious projects is a lot less.

Spain

Spain is leading the world due to premium feed in tariffs which benefit plants smaller than 50MW, thereby resulting in many smaller plants being constructed as opposed to larger units. In addition, because of a generous feed in tariff adaption of technology such as CST has been adopted.

[Adasol 1](#) is the new benchmark for solar plants, consisting of a 519.12 m² solar field and storage capacity with molten salt, capable of supplying up to 7.5 hours of additional electricity supply.

Closing Comments

- Concentrating Solar Thermal is versatile and dispatch able.
 - Concentrating Solar Thermal is taking off around the world.
 - India a market to watch.
 - Australia must move fast to keep up. The Solar Flagships program is a great start.
- The focus must be on a low risk technology to maximise the benefits of establishing the market in Australia.

Victorian Solar Policy

State of the Australian PV Market. Market segmentation by size and application. Market growth projections. The role of Policy in Shaping the PV market.

– **Dr John Edgoose**, Sustainability Victoria

John provided an overview of the solar resources in Victoria. In 2009, the breakdown of renewable energy production in Victoria was Wind 50%, Solar 1.3%, Hydro 25%, Biomass 24%, whilst Geothermal and Wave made negligible contributions.

Victorian's solar initiatives and policy are handled through the Department of Primary Industries and Sustainability Victoria

Programs include:

Energy Technology Innovation Strategy

Smart Energy Zones / Solar Cities

Solar in Schools

Feed in Tariff for small PV

Solar Energy Hubs

SHW rebates

In the recently released Victorian Government program [Jobs for the Future Economy](#) - a number of programs including the Solar Energy Hubs were announced.

Australia's Solar Research & Development Capability

State of PV R&D in Australia. Solar PV Manufacture overview. State of Australia's Solar Thermal R&D, Government solar programs.

- **Anwen Lovett**, Australian Solar Institute

The Australian Solar Institute is part of the Clean Energy Initiative, set up as company based in Newcastle with the current sole investor being the federal government.

It's charter is to advance Solar R & D, Skills Development and Knowledge Base in Australia and operate as a conduit to international research organisations.

Next Generation Photovoltaics

Associate Professor: Tasuhio Tachibana RMIT

Professor Tachibana provided an overview of the development of PV in the future. With a strong focus on efficiency to help reduce the costs of energy production

Providing an overview of the generation of cells as listed below.

1st Generation: Si, GaAs

2nd Generation: Thin Film Si, Dye Sensitisation, Organic Bulk Heterojunction

3rd Generation: Theoretical - Multi junction cells, Quantum Dots solar cells

For the best research cell efficiencies chart go [here](#) located at end of this report.

Renewable Energy Certificate Price Analysis

State and forecast of REC pricing. Trends and analysis of the current REC market. Likely changes to the RET and their impact on REC pricing.

– **Ric Brazzale**, Director, Green Energy Trading

The inclusion of heat pumps and solar hot water systems (SHW) have in recent times had a impact on REC pricing (Supply/ Demand factors) and resulted in lower prices. In 2009, 45% of all REC were created from SHW whilst wind and PV created 27% and 19% respectively.

The schemes that have underwritten the existence of REC's were the Mandatory Renewable Energy Target (MRET) -> Renewable Energy Target (RET) and soon to be introduced Enhanced Renewable Energy Target (ERET). From January 2010 the ERET will be divided into LRET and SRES.

Outlook for SHW and Heat Pumps (HP)

In the short-term, rebates, building regulations and SRES will support them, in the longer term phasing out of electric storage, changes to building regulation, electricity and carbon price will have impacts.

Outlook for PV

This year 80 Mwh was installed – based on REC, in the short term existing FIT, the solar credits will support going installation. Over the longer term the outlook is less clear whilst installation of PV will continue it won't be at the current rate because previously mentioned factors. Grid parity will play a role in the future.

Supply and Price of RECs

The short-term supply will come from banked and the solar credit program along with existing operating projects. Leading up to 2018 with a further 1300MW from Solar Flagship will enabled continue supply. Into the future further projects will need to come on line – beyond 2018. Will they be wind or solar? this depends on the capital cost for the solar projects and establishing a strong preferable higher REC price. If the REC price adjusts upward to the \$50 – 60 price brand new investment will occur.

Domestic and Industrial Trends

Market segments and analysis of demand in each segment. Current pricing and the outlook for PV pricing. The economics of PV. Emerging ownership and other financial models in mid and large scale PV applications.

- **Grant Egerdie**, General Manager Commercial, Solar Shop Australia

The establishment of grid parity is vital for the commercial industry to expand with a preferably Gross Feed in Tariff (FIT) paid at a premium to domestic FIT because of the scale of installation which results in superior power conditions and coupled with battery storage would offer increased benefits. The FIT should allow and promote aggregation of panel generation.

Whist a FIT is welcome; lump sum capital or tax relief incentives would be preferred.

The commercial market (204 Terra Watts: Tw) uses 12 times as much power as the residential market (16Tw). Opening this market to participate and make a contribution to the RET would be significant.

Within its commercial division, Solar Shop Australia is seeking to create a value chain but to accomplish this, the following needs to be met: improved & robust industry standards, and customer expectations.

Grant concluded by discussing climate change, efficiency, the focus on renewable energy and the need for industry to be telling its story. He also referred to skills in the industry, summarizing that skills in the domestic market are adequate but with the introduction of storage e.g. battery systems skills development will be required.

Panel Discussion

4:30 **Topic – ‘What role will solar play in Australia in 2020?’**

All presenters will participate in this important debate

5:30 Close

The closing panel discussion expanded on the presentations made during the day. Many questions were request for points of clarification.

Not addressed in any particular topic was the question of lobbying and achieving greater spheres of influence in the business and political arena. This was responded with the fact that the Australian Solar Industry is part of the Clean Energy Council and it is through this organisation it seeks to influence and bring about change.

For Further Information about this report contact:

Mr Alex Cross
Research & Implementation Officer
National Centre for Sustainability
Tel: 03 5022 3748
Email: across@sunitafe.edu.au

Appendix – Additional Presentations made in Sydney or Brisbane

Links to Websites:

[Sustainability Victoria](#)
[Clean Economy Services](#)
[IT Power](#)
[Australian National University – Solar Thermal Group](#)
[Australia Solar Institute](#)
[Green Energy Trading](#)
[Solar Shop Australia](#)
[Australian Solar Energy Society](#)

