

**Energy White Paper 2014 –
Issues Paper submission via email: ewp@industry.gov.au**

Details of person making the submission

First Name	
Surname	
Country (if not Australia)	
State	
Company or Organisation (if relevant)	
Position in Organisation (if relevant)	
Type of Organisation. Please choose from the dropdown list right	Company – Other, Not-for-Profit
Sector. Please choose from the dropdown list right	Professional, Scientific and Technical Services
Email. Please provide an email address if you would like to receive updates from the Energy White Paper Taskforce	

Confidentiality

	APVI agrees that this Submission may be published on the Department of Industry website.
--	---

Issues for comment are listed against each of the Chapter Headings. In making your submission, you are welcome to make comment against some or all of issues in the fields provided. A field for general comments is provided at the end of the template.

APVI Response to the Draft Energy White Paper, Feb 2014

What is the Australian PV Institute (APVI)?

The Institute comprises companies, agencies, individuals and academics with an interest in solar energy research, technology, manufacturing, systems, policies, programs and projects. Our objective is to:

Support the increased development and use of PV via research, analysis and information

In addition to Australian activities, we provide the structure through which Australia participates in two International Energy Agency (IEA) programs – PVPS (Photovoltaic Power Systems), made up of a number of activities concerning various aspects of PV, and SHC (Solar Heating and Cooling), concerned with new solar thermal products and services.

Our work is intended to be apolitical and of use not only to our members but also to the general community. We focus on data analysis, independent and balanced information, and collaborative research, both nationally and internationally.

APVI Services

The APVI provides a number of services to our members, Government Agencies and the community:

- Up to date information on PV developments around the world (research, product development, policy, marketing strategies) as well as issues arising.
- Expertise in data analysis and collaborative research.
- A network of PV industry, government and researchers which undertake local and international PV projects, with associated shared knowledge and understanding.
- Australian input to national and international solar guidelines and standards development.
- Management of Australian participation in the IEA-PVPS and IEA-SHC.
- Membership is open to individuals; companies; commercial, government and research/academic organisations; students and NGOs. APVI members are involved in a wide range of solar technologies, as well as complementary activities and programs, including those focused on other forms of renewable energy, climate change, sustainability, socially responsible development and policy formulation.

General Comments on the Energy White Paper

The Government's Draft Energy White Paper (EWP) is a timely update of Australia's energy resources, usage, markets and policy.

The APVI notes that, according to the EWP:

The White Paper is being undertaken within a broader package of Government reforms, such as lowering pressure on energy prices by abolishing the carbon tax and streamlining business regulation. The policy framework adopted will set the nation on a pathway to achieving longer term goals such as improved energy efficiency and lower emissions energy production.

With the levelised cost of PV electricity now at or below retail electricity costs in many areas, and continuing to decrease, an increasing number of households and businesses will install PV, with or without government subsidies. This increase in distributed PV will decrease electricity demand, adding to the decreases already evident according to the latest AEMO Electricity Statement of Opportunities, which showed that electricity use in Australia has decreased in absolute terms every year since 2008/09, with a total decrease of about 8,300GWh (5.5%) from 2008/08 to 2012/13, with another 1,500 GWh decrease recently estimated for 2013/14.

This submission focuses on the issues most relevant to PV and the APVI appreciates the opportunity to update the Government’s data on PV pricing, installed capacity and potential in Australia.

<i>PV capacity added in 2013</i>	830 MW grid-connected; 18 MW off-grid
<i>Cumulative installed capacity of PV at the end of 2013</i>	3,120 MW grid-connected; 135 MW off-grid
<i>Typical residential PV system price in 2013</i>	\$1.90/Wp
Average size of residential PV systems	1 kW in 2009; 4kW in 2013
Number of Australian homes with a PV system	Over 1 million
Residential penetration levels	Average 15%; Over 30% in some areas

Above all, the APVI would like to emphasise the need for stable policy environments.

The RET is due to be reviewed again in 2014, this is after it was reviewed only 18 months ago. The 2012 recommendations were to keep the policy in place due to the significant public benefits which included promoting Australia’s energy security and reducing wholesale generation costs.

Solar PV is a significant Industry

A recent report commissioned by the REC Traders Association¹ confirmed that the solar industry employs more Australians than the majority of other energy and resource-related industries. The solar sector is a significant employer in Australia and is a larger employer than the oil and gas industry.

The solar industry has become a major employer across a vast array of direct and indirect industries. In 2012, it is estimated that the industry employed more than 23,500 Australians and grew its employment rate by 51% compared to the previous year. In 2014, the solar PV industry is expected to employ some 12,300 Australians, across some 4,300 businesses.

¹ <http://www.recagents.asn.au/wp-content/uploads/2014/01/140129-solar-jobs-report.pdf>

According to an analysis of recent Australian Bureau of Statistics employment data, this growth made the PV industry the fastest employment growth segment of the twenty industry segments described.

The Report outlined that, in relative terms, PV delivers almost double the GDP per employee compared with the average industry return (\$235,991 per employee) due to the relatively high value of the goods and services it provides, according to ABS and solar industry data.

Additional Information and Attachments

Further to the comments provided below and against the Energy White Paper submission template, the APVI has submitted the following documents as additional information.

- A. *A Distributed Energy Market: Consumer & Utility Interest, and the Regulatory Requirements*, Australian PV Association, August 2013.
- B. APVI Response to the Australian Energy regulator's Issues Paper on 'Regulation of alternative energy sellers under the National Energy retail Law', October 2013.
- C. *Impacts of PV, AC, Other Technologies & Tariffs on Consumer Costs*, by the Australian PV Institute for the Centre for Policy Development, November 2013.

1. The Security of Energy Supplies

The Government seeks comment on:

- *ways community expectations can be better understood and reflected in reliability standards;*
- *the value of developing fuel reserves to meet Australia's international oil security obligations, and augment domestic security;*
- *ways to increase new gas sources to meet demand and measures to enhance transparency in market conditions; and*
- *issues relating to the regulation of energy infrastructure.*

The Australian electricity sector, with its high reliance on fossil fuels, centralised generation and distribution, has been made highly vulnerable to energy commodity price fluctuations, network costs and network reliability issues.

Critical to a resilient energy system and increased energy security is both the diversification of energy fuel sources and also distribution of energy generation.

Network costs are now driving electricity price rises, whilst increased extreme weather events, such as bushfires, cyclones and floods, have made electricity distribution infrastructure vulnerable. A transition to decentralised, renewable energy-based, local electricity nodes, or mini-grid systems for some sections of the network, would improve electricity system resilience and would certainly be cheaper than undergrounding distribution networks across Australia.

The international demand for gas is resulting in the upward pressure on the gas price and the diversion of gas into the LNG export market. As a result, the use of gas as a low carbon transition fuel will become a less viable option.

Australia has a high reliance on diesel for off-grid power supplies, including for many mining sector installations. With rising oil prices and reduced local production levels, emphasis needs to be placed on substitution of diesel fuel by cost-effective renewable energy options. PV is cost-effective for most off-grid diesel power supplies on a life-cycle cost basis (~20 years). However, many companies use very short investment horizons, so that it becomes more difficult to justify PV installation. In addition, the capital cost of PV must be depreciated over its lifetime, but diesel fuel use can be written off in the current tax year. An accelerated depreciation rate for diesel replacement by renewables would be an effective means of speeding up the transition. We note also the fuel excise benefits available for diesel used in electricity generation, which has slowed the transition to alternatives. These issues are relevant also to the discussions in Section 6.

In addition, power supplies in many regional areas are heavily subsidised (the Northern Territory Government alone currently spends over \$60 million on Community Service Obligation power supply cross-subsidies² and estimates \$100 million per year will be needed by 2014). Most of these supplies are diesel-based. PV is already a cost-effective option which will significantly reduce future fuel imports and cross subsidies, as well as reduce the environmental impacts of fuel distribution and use.

APVI notes the current electricity market is focussed on central power generation and supply and is therefore restricted in its ability to take advantage of the lower cost distributed energy options now available, which also have significant social and environmental benefits.

Australian consumers are being asked to pay increasing electricity prices to reinforce an outdated and high-cost central generation model of delivery. Distributed options are given lip service only, with large opportunities for cost-effective energy efficiency and demand management being ignored across the country and with competition apparently non-existent, as evidenced by the zero buy-back rates on offer from several retailers for solar generated power, which is on-sold at peak rates.

The APVI calls for the opportunities presented by low-cost PV in these and other aspects of energy security to be considered in the development of a comprehensive Energy Policy for Australia.

2. Regulatory Reform and Role of Government

The Government seeks comment on:

- *priority issues, barriers or gaps within the COAG energy market reform agenda;*
- *possible approaches and impacts of review of tariff structures including fixed network costs, further time-of-use based electricity tariffs and the use of smart meters;*
- *possible measures to promote greater price transparency in gas markets; and*

² NT Government Budget Papers, Community Service Obligations, Budget Paper 3 (http://www.budget.nt.gov.au/papers/bp3/community_service_obligations.pdf).

- *areas where further privatisation of government-owned assets would contribute to more effective regulatory frameworks and better outcomes for consumers.*

The APVI is of the view that a new regulatory framework for distributed energy is urgently needed.

Residential electricity use in Australia has been declining each year since 2008/09, driven by a combination of factors including the strong uptake in photovoltaics (PV), energy efficiency (EE) and responses to increasing prices (AEMO, 2013). Similar trends are being experienced in the US and elsewhere and resulting an irreversible disruption to the energy market.

The uptake of PV and EE will continue to reduce utilities' income streams and impact on their business models. Rather than respond positively to these global trends and the energy productivity benefits that they represent, utilities and governments have created additional barriers and obstacles to the new technologies. This response is rational, but only in the context of the traditional business and regulatory model remaining in place.

Last year, 2013, was a year of consolidation for the PV sector, with continuing heavy pressure from the coal, gas and utility sectors, as they realise that PV is making a dramatic difference to their revenue streams. With governments also relying on this revenue stream for their own budgets, it will continue to be a difficult market environment until real structural changes are made to our electricity regulatory structure.

With PV now a good value proposition for many customers, as well as an accepted consumer and housing industry appliance, the PV market in Australia will hopefully remain steady after the decline in 2013. Large opportunities remain, including the market for commercial and utility-scale systems. As a result, technologies such as PV and EE will likely drive the need for more fundamental regulatory changes.

The government and regulators must lead and review current business models in order to allow for a smooth transition to a more distributed energy market and technologies.

3. Growth and Investment

The Government seeks comment on:

- *commercial or market initiatives that could enhance growth and investment in the energy and resources sectors;*
- *areas where approvals processes could be further streamlined while maintaining proper environmental and social safeguards;*
- *further ways that regulatory burdens could be reduced while maintaining appropriate levels of disclosure and transparency in energy markets; and*
- *the impacts of variable land access policy and ways the community could be better informed and engaged on development in the energy sector.*

Australia is leading the world in this new phase of PV deployment and has the opportunity to implement innovative policy frameworks, not only for PV but for distributed energy solutions more generally – with energy storage rapidly emerging as the next major change to the established infrastructure and institutional arrangements.

The PV market has contracted from the 2012 high, as Solar Credits wound down and feed-in tariffs were removed, and the 2014 market could be almost half that of 2012. This places many businesses and jobs at risk.

The impacts of the carbon price being removed and the Renewable Energy Target being modified remain to be seen.

The RET has provided an important level of market certainty, and the APVI urges the Government to provide a strong statement of commitment to its 2030 goals prior to and during the 2014 review process, in order to prevent the PV market from stalling.

The energy playing field is far from level and markets alone will not be sufficient to elicit the major infrastructure and institutional changes necessary for a transition to a clean energy future.

Support for new technologies, from R&D through early stage deployment will remain important.

All Governments and at every level must be free to encourage the development of new industries and jobs in their jurisdictions.

Above all, the Solar PV sector calls for stable policy settings. Policies impacting Solar PV have changed on a regular, and often unscheduled, basis over the past decade, making it very difficult for robust long-term industry development. Hence, although PV installations have increased, the industry has not established the strong underlying infrastructure across the value chain that is necessary for long-term industry growth and maturity.

4. Trade and International Relations

The Government seeks comment on:

- *how to grow the export of value-added energy products and services;*
- *ways to remove unnecessary barriers to continued foreign investment in Australia's energy sector;*
- *ways to strengthen support for access to export markets; and*
- *ways to support business to maximise export opportunities for Australia's energy commodities, products, technologies and services, including the value of Australia's participation in the variety of international forums.*

The APVI calls on the Government to commit to supporting, maintaining and growing international linkages and export market opportunities.

The Solar PV sector is a large exporter of consulting services, systems and education into the Asia-Pacific region and has significant market potential where rural electrification initiatives are being undertaken such as the regions of Asia, India and Africa.

With respect to marketing Australian products, expertise and education, there are opportunities for Australian industry, in coordination with Government, to contribute and influence:

- PV guidelines and standards development. This ensures that Australian products are:
 - not excluded from international markets; and

- Australian product developers are aware of international guidelines and standards.
- Using the information and networks detailed above to promote Australian products, expertise and training.
- Working with international network partners to further develop products, services and education.
- Using the network to enter into new markets and open new business opportunities in Australia.

The APVI manages Australia's commitments to the IEA PV Power Systems (IEA-PVPS) and Solar Heating and Cooling (IEA-SHC) Programmes (see page 14) and considers that the international research collaborations that have been made possible through these programs have contributed significantly to the development of the solar sector in Australia. At the same time, the programs have allowed Australian technology and expertise to be internationally recognised.

Over the 20 years the IEA-PVPS and IEA-SHC have operated, the focus has moved from technical, through cost and now to implementation and regulatory issues. Collaborative work on many of these areas has ensured consistent global standards, rapid transfer of technical knowledge and experience and now the ability to share policy outcomes and experiences with different market structures, and business and financing models. This work, and the international networks it establishes, facilitates understanding of international energy policies, programs and directions and allows Australian access to international technology innovation, as well as international access to Australian innovation.

5. Workforce Productivity

The Government seeks comment on:

- *the nature of any current skills shortages being experienced and how these could be addressed by and with industry;*
- *the capacity of industry and education sector-led programs to meet long-term training and skills development needs of the energy and resources sectors; and*
- *specific long-term training and skills development needs for alternative transport fuel, renewable energy, energy management and other clean energy industries.*

Australia must continue its focus on Solar R&D, as well as on knowledge and capacity building. This is crucial to the improvement of PV technologies and applications as they move into the mainstream energy sector. The APVI welcomes ongoing and enhanced support of both device and systems R&D and on solar education and training at school, TAFE, university and professional levels. This is increasingly necessary to assist with safe and reliable PV and solar system design and installation. Australia has a world-leading reputation in solar R&D and education and Australian solar expertise is one of our key export services.

Included in the IEA-PVPS and IEA-SHC work is regular updating of PV and solar statistics. There is a need for improved energy metrics via energy research, analysis and forecasting. This is a key element of the APVI's work.

6. Driving Energy Productivity

The Government seeks comment on:

- *the current suite of energy efficiency measures, ways these could be enhanced to provide greater energy efficiency or possible new measures that would enhance energy productivity;*
- *the use of demand-side participation measures to encourage energy productivity and reduce peak energy use; and*
- *measures to increase energy use efficiency in the transport sector.*

The increasing uptake of PV, solar water heating, other distributed generation and energy efficiency, has the potential to significantly reduce per customer electricity sales, with significant impact on the electricity sector business model at all levels - the retailer, network operator and upstream at the wholesale energy generation market level.

The increased uptake of distributed energy services is likely to continue over time, driven by a variety of technologies in addition to PV, such as cogeneration, electric vehicles, fuel cells and various storage technologies.

In aggregate, these distributed energy options have the potential to significantly reduce electricity consumption, especially per customer, putting increasing pressure on utilities' traditional revenue and business models. Thus, it is likely that new business models will need to be developed to cater for a new market in distributed energy services, rather than just electricity sales.

New regulatory frameworks will need to be developed to cater for the new markets in distributed energy services. There is a need for more effective demand side responses, market access and a removal of regulatory barriers.

There is a tendency to reduce demand side response to dry economics. That is: there are no regulatory barriers, only a need for improved productivity, information and ability for end-use customers to choose. Rather, there is a very real need for a new market which would allow distributed energy benefits to be traded, either within the current market structure, or perhaps separately.

The latter would facilitate the establishment of new energy service companies, would empower customers to trade on their own energy investments and would break the trend to increasing consolidation of the electricity retail sector.

New market structures should encompass incentives for the grid services PV inverters can provide, including reactive power and voltage support, whilst also creating opportunities for associated storage and load control.

Above all, the APVI calls for stable and long-term policy settings. Development of new industries and the infrastructure required to service them require significant investment. Long-term policy certainty is key to attracting private sector interest in Australia's renewable energy sector and to ensure the significant support provided by taxpayers to develop the PV market to date is not wasted.

Effective development of the renewables market and demand side responses generally goes beyond information and choice for end-use customers, and requires innovation and augmentation of the current market. The APVI supports the continuation of the Government's Clean Energy Finance Corporation (CEFC) and also Australian Renewable Energy Agency

(ARENA) in their roles of providing support to level the playing field for renewables until such time as the market has been restructured.

The APVI also supports the continuation and further development of standardised grid connection protocols, minimum energy performance standards and building disclosure requirements.

7. Alternative and Emerging Energy Sources and Technology

The Government seeks comment on:

- *ways to encourage a lower emissions energy supply that avoids market distortion or causes increased energy prices;*
- *the need to review existing network tariff structures in the face of rapidly growing deployment of grid-backed-up distributed energy systems, to ensure proper distribution of costs;*
- *additional cost-effective means, beyond current mandatory targets and grants, to encourage further development of renewable and other alternative energy sources and their effective integration within the wider energy market;*
- *how the uptake of high efficiency low emissions intensity electricity generation can be progressed;*
- *any barriers to increased uptake of LPG in private and commercial vehicles and CNG and LNG in the heavy vehicle fleet; and*
- *any barriers to the increased uptake of electric vehicles and advanced biofuels.*

The impact of different technologies, such as PV, energy efficiency or air conditioners, installed by customers on the costs faced by other customers is very dependent on whether the Distributed Network Service Provider (DNSP) is regulated under a Weighted Average Price Cap (WAPC) or a revenue cap. Under a WAPC, where a technology reduces electricity use, the cost is incurred by the DNSP. Under a revenue cap, this cost is passed through to all customers in the form of higher tariffs.

The APVI supports the transition of DNSPs to revenue cap regulation. However, this is only one of the steps needed to enable distributed energy to fully contribute to least-cost energy services. For a fully functional distributed energy market to be established, regulatory changes are required that will result in equal competition between supply and demand side options at all levels: generation, networks and retail. This is likely to require Integrated Resource Planning for network augmentation and replacement, as well as a range of other changes to enable equal competition on a day-to-day basis.

Under the current WAPC regulation, APVI research indicates it is likely that PV has been reducing the cost increases for other customers, which have largely been driven by high AC uptake. However, this means that PV has been reducing revenue for DNSPs where they have been regulated under a WAPC. Under revenue cap regulation, PV only minimally increases costs for other customers where the 'responsible customer' is on a Standard tariff. Where they are on a Time of use (TOU) tariff, the increase is likely to be insignificant and when on a demand charge tariff, PV actually reduces costs for other customers, without reducing revenue to DNSPs.

A Demand charge tariff is the most effective way of reducing the cost impacts of AC and PV because it is capacity based (it provides a price signal to smooth or reduce annual demand peaks), whereas TOU tariffs are volume based (they increase DNSP revenue if demand increases during peak periods, but don't have a particular emphasis on the annual peak).

Thus, APVI research recommends a demand charge component be used in electricity bills for all customers, rather than the blunt instruments of fixed levies which have been proposed for PV customers. Such fixed charges provide no price signal for people to reduce demand peaks and are discriminatory. Demand charges will provide a more equitable outcome and will also cater for the full range of distributed energy options likely to be available in future, including demand management, energy efficiency, storage and electric vehicles.

Summary of Recommendations

- When 'disruptive technologies' such as PV and energy efficiency are introduced into a well-established industry, they don't simply integrate seamlessly, but exert change in doing so. Whereas the current electricity system is based on a 'top down' structure for consumers who simply buy electricity, PV and other distributed energy (DE) options are providing customers with a significant number of alternatives that allows them to actively participate in a system growing from the bottom up.
- To allow these two approaches to integrate requires a regulatory framework based on equal competition between supply-side and demand-side options at all levels (generation, networks and retail), for both network planning and during the day-to-day operations of the electricity market.
- Best practice Integrated Resource Planning (IRP) should become an integral component of network planning so that DE options can be used to decrease network expenditure. The proposed Regulatory Investment Test Distribution (RIT-D) is an embryonic form of IRP, but has significant scope for improvement.
- The market arrangements required to drive uptake of DE on a day-to-day basis can be divided into the following three types:
 - Those related to the operation of the incumbents: where the two most critical are decoupling network operators' revenue from their sales through the use of a revenue cap; and mechanisms that allow network operators to participate in the DE market, for example 'one-way' ring fencing.
 - Those related to the design and operation of the distributed energy market itself: for example, consumers should be able to source their electricity from, and sell their PV electricity to, entities other than their retailer; and solar access rights should be formalised.
 - Those that then stimulate the broader distributed energy market and enhance the interaction and operation of all participants: for example information and training, minimum energy performance standards, house energy rating schemes, and feed-in tariffs and white certificate schemes.
- To date, most effort has been on the third type of market arrangement, and as a result has been insufficient to effectively integrate DE.
- Once DE has been used to reduce network expenditure as much as possible, a proportion of network costs could be paid through a fixed charge based on a customer's annual

demand peak, making each customer's contribution to network costs more related to their impact. This approach is preferable to current suggestions of higher fixed charges for all customers, or specifically for PV customers, which would disadvantage low energy users and low-income households while also making price signals less cost-reflective.

- A fully competitive distributed energy market will need to develop over time, however, the required institutional and organisational changes need to begin now and will need to accommodate both the incumbents and new entrants, on an ongoing basis. DE technology is developing very rapidly and electricity utilities are likely to be left with stranded assets if regulatory processes are too slow to adjust.

Attachment A: Background on the APVI

The APVI is an association of companies, government agencies, individuals, universities and research institutions with an interest in solar photovoltaic electricity. In addition to Australian activities, we provide the structure through which Australia participates in the International Energy Agency (IEA) PVPS (Photovoltaic Power Systems) and SHC (Solar Heating and Cooling) programmes, which in turn are made up of a number of activities concerning PV and solar system performance and implementation. Further information is available from www.apvi.org.au.

APVI Objective

The objective of the APVI is to support the increased development and use of PV via research, analysis and information.

APVI membership provides:

Information

- Australian PV data and information
- Standards impacting on PV applications
- Up to date information on new PV developments around the world (research, product development, policy, marketing strategies) as well as issues arising
- Access to PV sites and PV data from around the world
- International experiences with strategies, standards, technologies and policies

Networking

- Opportunity to participate in Australian and international projects, with associated shared knowledge and understanding
- Access to Australian and international PV networks (PV industry, government, researchers) which can be invaluable in business, research or policy development or information exchange generally
- Opportunity to meet regularly and discuss specific issues which are of local, as well as international interest. This provides opportunities for joint work, reduces duplication of effort and keeps everyone up to date on current issues.

Marketing Australian Products and Expertise

- Opportunities for Australian input (and hence influence on) PV guidelines and standards development. This ensures both that Australian products are not excluded from international markets and that Australian product developers are aware of likely international guidelines.
- Using the information and networks detailed above to promote Australian products and expertise.
- Working with international network partners to further develop products and services.
- Using the network to enter into new markets and open new business opportunities in Australia.

The International Energy Agency Programmes

PV Power Systems (IEA PVPS)

- **Mission:** *To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems*
- **Focus** (26 countries, 5 associates)
 - PV technology development
 - Competitive PV markets
 - Environmentally & economically sustainable PV industry
 - Policy recommendations and strategies
 - Neutral and unbiased information

Australia currently participates in:

PVPS Task 1: Information Dissemination

PVPS Task 13: PV System Performance

PVPS Task 14: High Penetration PV in Electricity Grids.

Solar Heating & Cooling (IEA SHC)

- **Mission:** *International collaboration to fulfil the vision of solar thermal energy meeting 50% of low temperature heating and cooling demand by 2050*
- **Focus** (21 countries, 2 associates)
 - Components
 - Systems
 - Integration into energy system
 - Design and planning tools
 - Training and capacity building

Current Australian participation:

- SHC Task 51 – PV in Urban Environments
- SHC Task 48 – Quality Assurance Support Measures for Solar Cooling Systems
- SHC Task 47 – Solar renovation of non-residential buildings
- SHC Task 46 - Solar Resource Assessment and Forecasting
- SHC Task 43 - Solar Rating & Certification Procedures
- SHC Task 42 - Compact Thermal Energy Storage
- SHC Task 40 - Net Zero Energy Solar Buildings

For further information on the Australian PV Association visit: www.apvi.org.au

For further information on the IEA PVPS Programmes visit www.iea-pvps.org and www.iea-shc.org