Latest solar research and development

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ATRAA, Clean Energy Week

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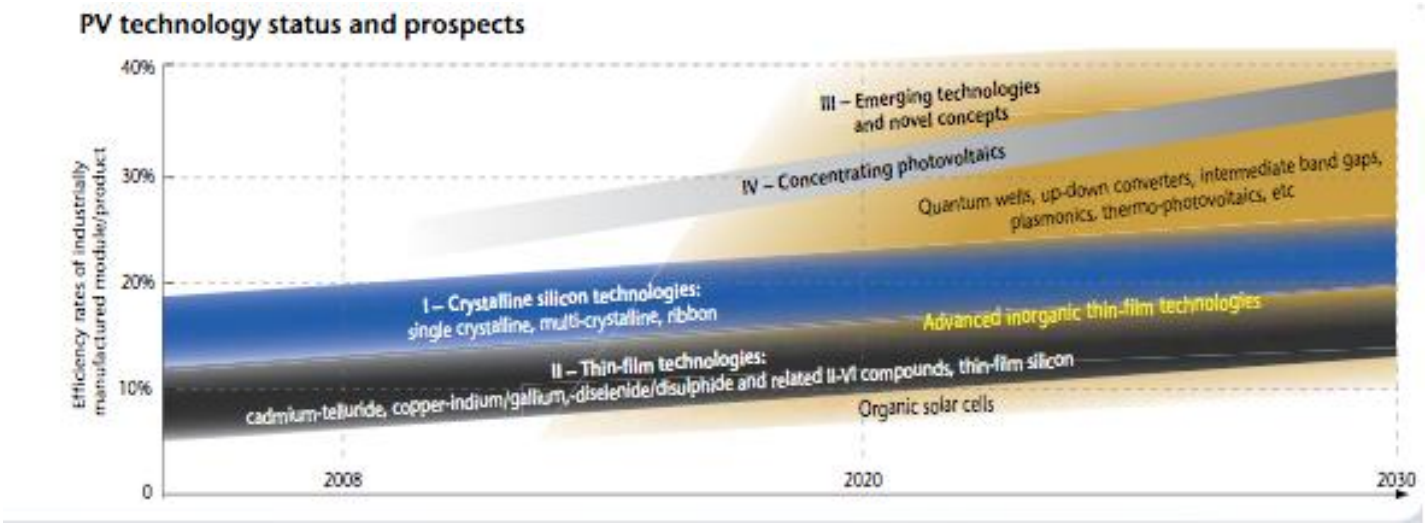
Current high level strategic technology roadmaps

- Today's technology will continue to evolve, lowering costs and increasing efficiency
- New technology emerging that will accelerate trends



PV R&D Portfolio Mapping
ASI cA$47m leveraging cA$138m

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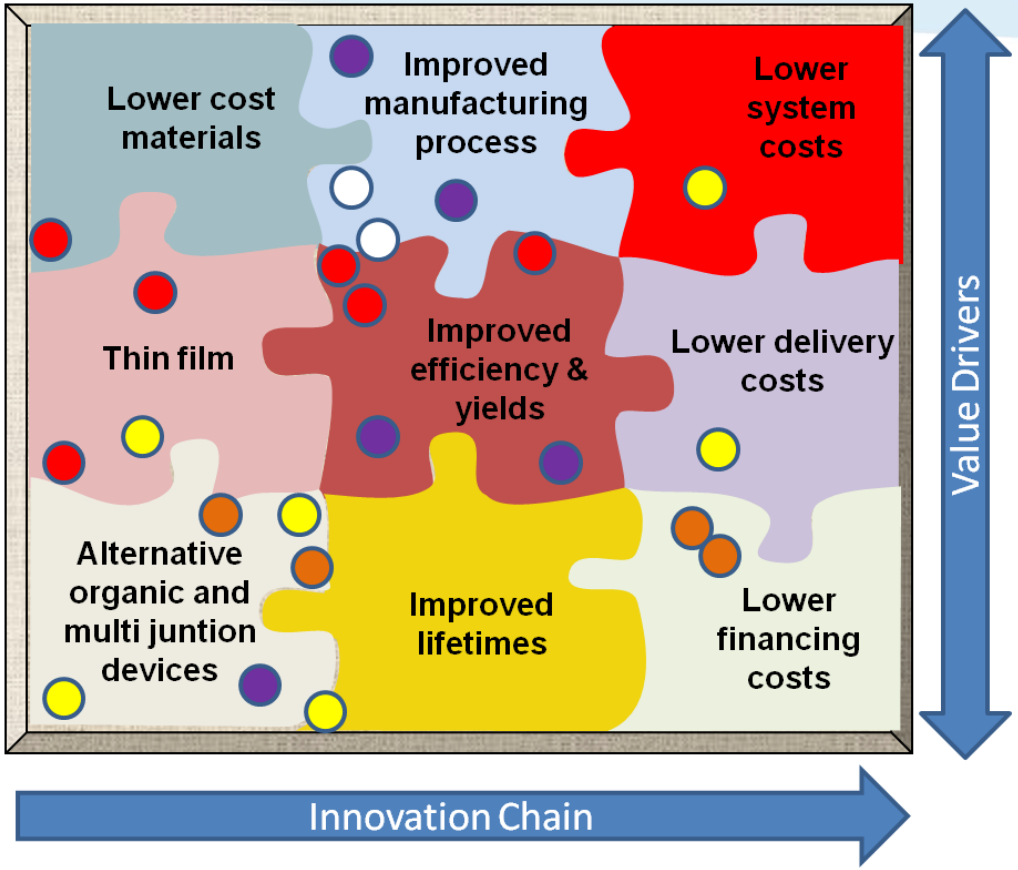
- Foundation Projects
- Round 1
- Round 2
- Round 3
- USASEC
- Aust.-Germany



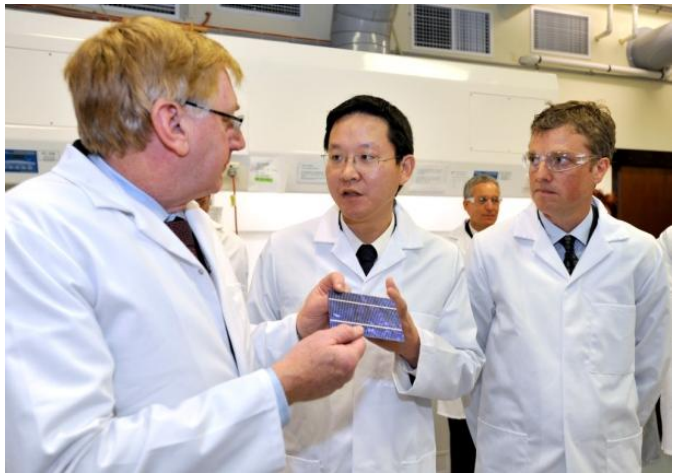
Full details on ASI website – R&D Projects

Case study: Overcoming the fundamental performance limitations of commercial solar cells

- The University of NSW and Suntech
- A$4.4m for A$14.7 million project
- Investigating improvements to device performance and reduced manufacturing costs while delivering high production yields for solar cells, potentially opening up new avenues for cost effective industrial manufacturing.
- 2012 Collaborative Innovation Award for collaboration on Pluto technology

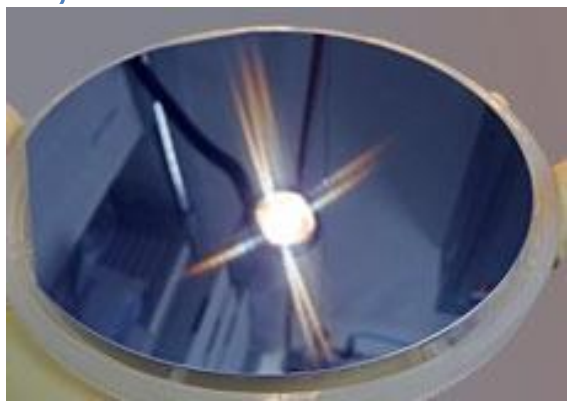
Case study: Industry ready n-type silicon solar cells led by ANU

- $3.3m ASI funding for $10.3m project combining existing fast and inexpensive methods used to make today's standard p-type silicon solar cells, with the latest advances in higher efficiency n-type silicon cells. 3 parts:
- Developing 20% efficient n-type cells with Trina Solar
- Improving standard p-type cell to 19% with Trina Solar
- In collaboration with UNSW, developing industry-ready n-type cells with >22% efficiency



USASEC Case study: Cost effective gallium arsenide top solar cell grown on a high performance, low cost silicon solar cell

- UNSW, Arizona State University, University of Delaware, NREL, Amberwave Inc, Veeco Inc
- $2.5m ASI funding for $6.3m project that aims to cut solar energy costs by developing a high voltage cell that will be 40% more efficient than conventional solar cells
- Combining world record solar cell developed by UNSW with novel high performance, low-cost silicon germanium solar cell grown as the top cell using an innovative set of processes developed by US partners.



Case study: Expanding the value proposition for Building Integrated Photovoltaics

- Australia's Bluescope Steel Ltd, Germany's Fraunhofer Institute for Solar Energy Systems ISE, The Sustainable Buildings Research Centre at The University of Wollongong (Australia)
- $0.5m ASI funding for $1.6m project
- Develop a systematic approach and methodology to optimise the design configuration and sizing of building integrated photovoltaic thermal (BIPV-T) systems to suit installation on existing Australian buildings.
- This project will result in a decision support framework and tool specific to Australian conditions that could lead to manufacturing and widespread deployment of thin-film solar cells integrated into Australian buildings.

Case study: Roof-mounted hybrid CST system for distributed generation of heating, cooling and electricity

- $3.2m ASI funding for $9.5m project to develop and commercialise an improved roof-mounted hybrid solar concentrator PV/ thermal product for cost effective delivery of heating, cooling and electricity.
- Key innovation is use of spectral splitting of sunlight to improve effectiveness and novel cooling technology.
- Thermal and electrical energy will be delivered to the energy meters, where energy prices are triple wholesale energy prices.

Case study: CSIRO Solar Thermal Research Hub

- Largest of its kind tubular receiver solar air turbine system, which doesn't require water
- Aiming to prove that a target of 10-14 cents/kWh is achievable in commercial CST deployments- required to compete with wind generation
- Systems approach focused on increasing the efficiency of CST systems options (higher temperatures at the receiver) and proving storage while at the same time reducing capital and operating costs
- $5m from ASI

Progress across the full set of costs is required to increase commercial viability and deployment

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LCOE Drivers

- Finance Channel Margins
- Other Hardware, Civils, Install , Land, O&M
- Solar Device

Local costs
70-80% of employment in these areas

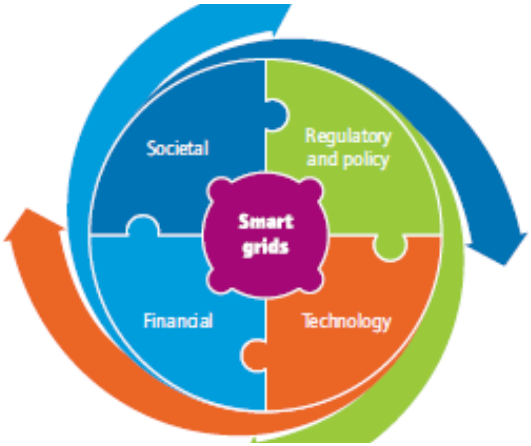
Global costs
Technology
IP key value

Area required for a 6.5MW PV Power Plant at 10% and 20% efficiency

Source : Sunpower Corporation.

In summary, major trends shaping industry

- Energy is getting smart: Baseload redefined, Energy efficiency
- Australian R&D critical part of global supply chain
- Local costs now a major driver with PV device now <$1pW
- Technology – efficiency key to lower installed costs
- Business models and distributed generation regulation and policy settings critical factors



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