

AUSTRALIAN RESEARCH IS BRINGING DOWN THE COST OF SOLAR PV



Australia has provided more than \$290 million to around 300 solar research and development projects since 2009 through programs either transferred to ARENA, or run by ARENA since 2012. This funding has supported new technologies to reduce the installed cost of PV systems, improve system reliability and develop materials for new market applications.

Efficiency improvements have a cascade effect, flowing through as per kilowatt cost savings from cells to modules, to distribution and final system costs. Every one percentage point efficiency improvement in module performance (e.g. from 20 per cent to 21 per cent) reduces the cost of the module by approximately five per cent. This means that solar modules that were selling at 60 cents/watt can then sell at 57 cents/watt. For each one gigawatt of solar installed in Australia each year, this step change alone would deliver savings of \$30 million in the cost of modules. Higher solar cell efficiencies also mean that the same electricity output can be achieved from a smaller number of modules. The environmental impact is therefore reduced through less material required for 'balance of system' components, such as support frames and cables and transport costs. The rapidly falling cost and increasing efficiency of PV cells and modules contributes significantly to making renewable energy technology more competitive.

Australian technology is expected to dominate the PV market over the next decade with key contributions from ARENA-funded solar research undertaken by Australian universities:

- › University of New South Wales (UNSW) developed the passivated emitter rear cell (PERC), currently used in more than 60 per cent of commercial PV cells available in the global market, achieving world record efficiencies of up to 25 per cent compared to standard solar cells (~20 per cent). An estimate made by the Australian National University (ANU) of the potential benefits

of the PERC solar cell technology indicates that a five per cent relative efficiency improvement on 50 per cent of Australian PV systems installed over the ten-year period 2018 to 2028, with average annual installation rates of two gigawatts per year and average area-related costs of \$1500 per kilowatt, translates to savings of \$750 million. Worldwide, the savings could be 50 times larger, or more than \$37 billion.

- › New hydrogenation technology developed by UNSW and expanded by ANU has been demonstrated to increase the performance of low-quality / low-cost solar-grade silicon wafers. This technology can be incorporated into current standard cell manufacturing lines with minimal equipment change and has 22 industry partners interested in further development prior to commercial adoption. Its deployment over the coming decade could result in global savings of some US\$7.5 billion each year, with Australia to directly benefit through lower module costs and royalties feeding back into the economy.

Research into new materials and technologies, including perovskites, tandem cells and copper-zinc-tin-sulphide, will help to ensure Australian research remains at the forefront of these new technologies as they reach commercial production. This will include new, high-efficiency, low-cost, flexible and non-toxic materials which could be integrated into buildings and other new products within a decade.

This year, an evaluation of ARENA's solar research projects by ITP Renewables found ARENA's funding has significantly boosted Australia's solar research capability and played a critical role in keeping Australia in the forefront of the international solar industry.