

## Australian Renewable Energy Agency

Professor Andrew Blakers | Australian National University |

Dr Richard Corkish | University of New South Wales |

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The Federal Government plans, through its “Omnibus” Bill, to strip the Australian Renewable Energy Agency (ARENA) of most of its funding as well as its ability to make grants. This is an existential threat to renewable energy research, innovation and education in Australia.

The solar photovoltaic (PV) industry now provides one quarter of all new generation capacity installed worldwide each year and is growing at 20-30% per year. Together, PV and wind energy constitute half of all new generation capacity installed worldwide and all new generation capacity installed in Australia. A renewable energy revolution is in progress and Australia is at the forefront. However, debilitation of ARENA directly threatens our leadership position.

For 30 years there has been an Australia renewable energy funding agency in one form or another in Australia. This has led to phenomenal success in generation of technology and provision of education. The worldwide PV industry owes its existence in large measure to Australians who were supported by grants from Government renewable energy agencies.

Billions of dollars of benefits have accrued to Australia in the form of dramatically reduced cost of PV systems, increased renewable energy business activity in Australia, reduced greenhouse gas emissions, royalties, shares and international student fees. For example, the Australian-developed PERC solar cell, has annual sales of \$10 billion, and very rapid growth, and will soon dominate the worldwide solar industry.

If ARENA is debilitated then hundreds of people would lose their jobs within a year or two. In the longer term, Australia's leadership in solar energy would vanish. After the fiasco involving CSIRO climate scientists, we now have a potential fiasco in mitigation of climate change. This would be completely at odds with the government's innovation agenda and its commitment at the Paris climate change conference to double clean energy R&D by 2020 under the international Mission Innovation program. Support for research and innovation at universities lies at the heart of accelerated growth of the renewable energy industry. It supports later stage commercialisation directly through technology development. Additionally, university research groups underpin training of engineers and scientists.

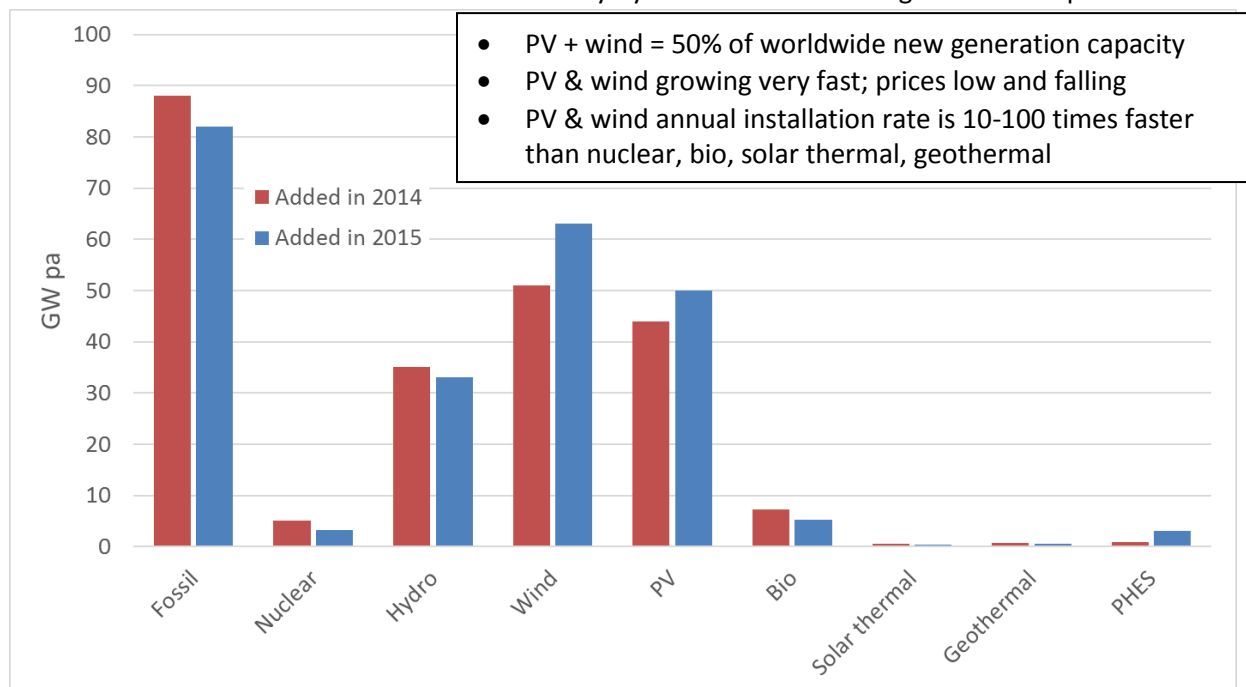
There are numerous examples of high-impact innovations that have emerged from Australian-led R&D, listed below. Photovoltaics and wind energy are fundamentally reshaping the way economies of the world are powered. It's a critical time for Australia to stay in the game and reap further benefits from its leading position in research and education by continuing grant funding.

Continuity in funding is essential in solar cell research. If the policy to curtail ARENA grants is implemented the progress to a clean energy future will be slowed and hundreds of research and PhD positions will expire, along with Australia's leading position in photovoltaics. Like the CSIRO climate scientists, these people will either leave the field or leave Australia. Australia will be the poorer for curtailing its leadership in climate change science and climate change mitigation and opportunities for participating in, indeed, leading in, the global transition to a clean energy future and the associated jobs and economic growth will be needlessly and pointlessly curtailed.

***ARENA is working well. Its funding should stay intact.***

## The renewable energy industry

- PV + wind dominate annual new-build generation capacity: 50% worldwide, 100% in Australia
- Small improvements in PV & wind = very large gains in commercial & greenhouse terms
- Pumped hydro energy storage is 99% of all storage – unlimited opportunity in Australia
- PV + wind + PHES each >150 Gigawatt installed capacity
  - Allows 100% renewable electricity by 2030 without heroic growth assumptions



## Australian Technology impact

There are numerous examples of high-impact innovations that have emerged from Australian-led R&D:

1. PERC solar cells were developed at the University of NSW (UNSW) by people now at the Australian National University (ANU) and UNSW, with current module sales of about \$9 billion per year and growing fast. They are set to dominate the worldwide solar industry, and so far is the most successful energy technology to emerge from Australia. Gains in efficiency, made possible by PERC cells, are forecast to save \$750 million in Australia's electricity generation costs over the next 10 years.
2. PHOTO-LUMINESCENCE: BT Imaging's advanced characterisation systems enables researchers and industrial engineers to visually assess silicon quality in great detail.
3. HYDROGEN-PASSIVATION OF DEFECTS: flowing from work currently underway at UNSW, this may become widely adopted by the world's PV industry to increase cell efficiency.
4. SLIVER SOLAR CELLS: were invented at ANU and became the subject of a major commercialisation by Origin Energy and Transform Solar.
5. RAYGEN'S HELIOSTATS: PV concentrator system development follows on from earlier PV dish concentrator systems developed by the same team.
6. BURIED CONTACT SOLAR CELL: developed at UNSW and commercialised by BP Solar, these cells had a substantial impact upon the PV industry in the 1990s and \$500m worth of product was sold.

7. CRYSTALLINE SILICON ON GLASS SOLAR CELL: developed at UNSW and by Pacific Solar and commercialised by CSG Solar.
8. THERMOSIPHON SOLAR HOT WATER: CSIRO played a major role in the development of the modern thermosiphon solar hot water system.
9. SUNGEVITY'S SOLAR LEASING: based on UNSW-developed software and Australian ideas and has created value in Australia and reputation around the world.
10. SOLAR ANALYTICS: based on UNSW-developed software and Australian ideas and currently monitoring and optimizing the photovoltaic systems of Australian users.
11. SOLCAST: spun out of ANU, supported by ARENA, to improve forecasting of the output of roof-mounted PV systems.

Australian universities have played a major role in developing and driving the growth of PV globally via education, training and governance. A large proportion of Asian technology and business leaders in the PV industry have received their education and technology training in Australia and many are Australian citizens.

The large impact of Australia's grant-supported researchers in accelerating the worldwide solar industry has major benefits for Australia in terms of reduced greenhouse gas emissions and reduced prices for Australian solar energy systems. Since PV now constitutes one quarter of new electricity generation capacity installed worldwide, substantial greenhouse benefits are flowing from acceleration of industry growth and hence reduced emissions. The monetary value to the country of the previous photovoltaics research has been estimated at \$8B ([www.engineering.unsw.edu.au/energy-engineering/news/pv-research-brings-8-billion-into-australia](http://www.engineering.unsw.edu.au/energy-engineering/news/pv-research-brings-8-billion-into-australia)) and it is leading to strong and important international engagements ([www.torch.unsw.edu.au/](http://www.torch.unsw.edu.au/); [www.ausiapv.net.au](http://www.ausiapv.net.au)).

Before the election, 62 senior energy researchers wrote to Prime Minister Malcolm Turnbull calling on his government to reverse its decision to end ARENA grant funding: "Grant-supported renewable energy R&D and education is a crucial part of climate change mitigation, and will be seriously downgraded by this new policy," it stated. Subsequently, 130 more researchers wrote to then Environment Minister Greg Hunt, making the same call. More recently, 190 people associated with some of the leading Australian photovoltaics R&D institutions published an open letter in support of ARENA's continuation (<https://theconversation.com/dear-politicians-please-dont-endanger-world-leading-solar-research-by-cutting-arena-64611>).

#### Note

Parts of this submission were published recently as an oped in the Fairfax Press