ZERO-CARBON ENERGY FOR THE ASIA-PACIFIC

An ANU Grand Challenge

To support a timely, just, and sustainable transition to zero-carbon energy in the Asia-Pacific
This Grand Challenge winning project – to deliver zero-carbon energy to the Asia-Pacific – is a blueprint for the prosperity of Australia and our region. This project will deliver exactly what the world needs at this juncture in our history: big thinking, practical solutions, and collaboration across research, industry and the community.

ANU Vice-Chancellor, Professor Brian Schmidt.
Over the coming two decades the Asia-Pacific is expected to account for almost two-thirds of global energy use growth if stated policies are maintained and implemented\(^1\). Australia already plays a leading role in supplying the region with coal, liquefied natural gas, iron ore, and alumina. Large-scale fossil fuel exports from Australia, together with the carbon-intensive processing of raw materials in our export markets, account for 8% of the Asia-Pacific's total annual greenhouse gas emissions. A new Australian export model is needed: one that could make a major contribution both to meeting the region's growing energy and resource needs, and keeping the world within safe-operating climate constraints.

Fortunately, Australia has the potential to become a renewable energy export powerhouse. Australia is one of the world's most richly-endowed countries in renewable energy potential, blessed with sunshine, wind, and a large landmass. Australia's renewables industry is already booming. In recent years Australia has been installing solar and wind generation capacity at the fastest rate per capita – more than 200 watts per capita per annum – of any developed country\(^2\). There is enormous potential for these resources to be used to develop a zero-carbon export industry.

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\(^1\) World Energy Outlook (IEA, 2019).

\(^2\) Stocks, M., Blakers, A. & Baldwin, K. “Australia is the runaway global leader in building new renewable energy”. The Conversation (September 25, 2019).
A new export industry based on renewables
An interdisciplinary team of expert Australian National University researchers, led by the ANU Energy Change Institute, is pushing the frontiers that will future-proof the way Australia trades with the world – based on the nation’s abundant renewable energy. Our program will create the knowledge base to underpin the creation of zero-carbon export of electricity, fuels, products and capabilities.

The Projects

- Renewable Electricity Systems
- Hydrogen and Hydrogen-based Fuels
- Renewable Refining of Metal Ores, especially Green Steel
- Energy Policy and Governance in Asia-Pacific Countries
- Indigenous Community Engagement

ANU expertise helps create pathways to zero-carbon trade
Researchers from the Zero-Carbon Energy for the Asia-Pacific programme have outlined three paths which show the potential for Australia to become an exporter of zero-carbon energy. First, directly exporting electricity via sub-sea cables; second, exporting zero-carbon fuels such as green hydrogen, produced by electrolysis powered by renewable electricity; and third, the export of products that have been processed in Australia using renewable energy. Steel and aluminium are among the most promising of these products given Australia’s natural endowments.

There is growing interest in green hydrogen, likewise the certification of that product and others including ammonia. A subset of our programme involves certification, and our research team includes public servants from two Australian Government departments involved in certification from industry and foreign affairs perspectives.

Potentially some of the world’s cheapest electricity
Australia’s underlying renewable energy potential surpasses its fossil fuel capabilities. The north of the continent experiences some of the world’s best solar isolation, exceeding 6.5 kWh/m²/day in some locations. In the most prospective locations, given economies of scale to attract low-cost finance, multi-
Gigawatt solar and wind power plants could generate some of the cheapest electricity in the world, using already available technologies which are constantly improving. Australia’s iron ore and bauxite deposits are co-located with some of the best of these solar and wind resources, opening up attractive local processing opportunities. One priority among these opportunities is ensuring Indigenous peoples, on whose traditional lands the projects could be built, are involved in investment decisions and project operations. Indigenous communities must have sustainable equity and benefit-sharing arrangements. Our Indigenous Community Engagement team is helping that process, to ensure that Australia develops a much more inclusive model for this next boom, compared to previous mining booms.

**Policy and Investment**

The economics of developing a new export industry present challenges. Countries will want to protect their domestic industries, while Australia also faces competition from countries in the Middle East and North America, for example. Demand for Australian renewable energy will depend partly on the politics of self-sufficiency in the Asia-Pacific in a post-COVID-19 world, and the phasing out of support to fossil fuels in key markets.

Australia’s transition to a zero-carbon export model could be accelerated by government efforts to facilitate emerging markets for these commodities. The state could also help reduce the risk exposures of first-mover investors, promote research and development, and coordinate infrastructure hubs. Our research project is assessing all of these factors, and working closely with government and industry partners.

Australia could supply the Asia-Pacific with about 2% of the region’s projected 2040 electricity needs, together with large supplies of zero-carbon hydrogen, steel and aluminium. ANU researchers are eager to show the potential for the region to move more rapidly along its decarbonisation trajectory by working with our regional counterparts to pursue a range of least-cost zero-carbon opportunities.
Partner with us

The ANU is investing $10 million in the Zero-Carbon Energy for the Asia-Pacific program from 2019 - 2023. We are looking for opportunities to collaborate with industry, government, Indigenous organisations, and community groups to co-design, further develop and implement our research program. We welcome inquiries from those who have a collaborative research interest in our program, its objectives, and deliverables.

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