



INNOVATION, SECURITY,
CULTURE: THE NEXT
75 YEARS OF
AUSTRALIA INDIA
RELATIONS



Australia and India: pioneers in the shipping and sharing of sunshine

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I have been Sir Louis Matheson Distinguished Visiting Professor at Monash University for the last 15 years. I have admired Australia's amazing journey to world leadership in renewable energy – achieved with great speed and scale.

Australia adopted low emissions technology eight times faster in renewable energy installations than the world average in 2020. Today, 90 per cent of solar cells produced globally use Australian technology.

Australia has a huge comparative advantage. It is endowed with high quality renewable energy resources in solar and wind, it has an abundance of land and water, a progressive government, which is fully committed to green energy transition, and a world class research and innovation ecosystem.

India has an aspiration to become a leader.

India has by 2030 committed to expand renewable energy generating capacity to around 500 gigawatts (GW) and be sourcing 50 per cent of its electricity requirements from renewable energy.¹ India's non-fossil fuel electricity generation has rapidly reached 40 percent of its energy mix. The National Hydrogen Mission² is a bold policy and funding initiative aimed at making India a global hub for the production and export of affordable green hydrogen.

In 2022 India and Australia have come together like never before. At the fourth India-Australia Energy Dialogue in February, the two countries signed an agreement on New and Renewable Energy Technology as a part of the Australian Government's A\$565.8 million commitment to support new international partnerships that make low emissions technologies cheaper.³ This was followed in April by the signing of the Australia-India Comprehensive Economic Cooperation Agreement.⁴

India and Australia are natural partners given their shared vision as well as mutually reinforcing complementary strengths. India has a reputation for creating ultra-low-cost high quality products and services. It now has the aspiration to become the world's best ultra-low-cost producer of renewable energy systems. Australia on the other hand brings technology excellence, massive energy generation opportunities and augmented manufacturing.

From my personal window, I want to suggest the way forward is bilateral research and technology where both countries can jointly focus on the grand challenges and the new partnership and funding models needed to meet these challenges.

We already have fruitful ongoing India-Australia academic partnerships. I have personally witnessed the power of an excellent partnership as the Chairman of Advisory Council of the India Institute of Technology (IIT) Bombay-Monash Research Academy that produces around 25-to-30 joint PhDs a year using a unique partnership model with Indian and Australian industry. Similar joint PhD programs have since been developed between the University of Queensland and IIT Delhi, while Swinburne University and Deakin University have teamed with IIT Hyderabad. Each of these partners bring core competencies in green energy.

However, to attain leadership, we need to raise the bar by focusing on grand challenges, where the risks are large, but the potential gains are transformational. A few examples of such grand challenges are seawater electrolysis with innovative chemistries to suppress chlorine evolution; electrochemical green ammonia synthesis from water and air; photocatalytic water splitting with order of magnitude higher efficiency; and bio-hydrogen with innovative microbial conversion processes. Acting in these areas will require bold ideas that are backed with bold funding.

Another hope for leadership comes from the powerful chains of each country's national research laboratories – India's Council of Scientific and Industrial Research (CSIR) and Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). I was the President of Global Research Alliance formed by the world's nine leading national research labs – CSIR and CSIRO were the star partners. Both have shown leadership in renewable energy research and technology. Both need to join hands creating new types of partnership models, not only between themselves but also with Indian and Australian industry.



For example, CSIR recently showcased the first ever 'invented and made in India' hydrogen fuel cell powered bus, using cutting edge technology. This was achieved thanks to a unique Public Private Partnership (PPP) initiative – the New Millennium Indian Technology Leadership Initiative (NMITLI) that was launched in 2000 when I was the Director General of CSIR.⁵ NMITLI became India's largest public private partnership with over 120 industry partners and more than 200 public institutional partners. Models like this – national PPPs focused on grand challenges – now need to be jointly reimagined by India and Australia to deliver the next generation of PPPs.

And some existing partnerships need greater investment. The Australia-India Strategic Research Fund (AISRF) is a pillar of collaboration on science, technology, and research, but its budget needs to increase several-fold for it to be able to take up the grand challenges, including support being provided at critical stages from concept to commercialisation.

Encouragingly, Australia is strengthening its technology partnership with India through the establishment of a Centre of Excellence for Critical and Emerging Technology Policy in Bengaluru, India.⁶ Australia has committed A\$35.7 million to support cooperation on the research, production and commercialisation of clean technologies, critical minerals, and energy.

Finally, we must keep our aspirations high, since they frame our possibilities. In that spirit, here is an inspiring story of Reliance Industries – India's largest private sector firm – which has made a grand entry into the green energy business. Reliance, known for its amazing exponential growth, is making multi-billion-dollar investments and building gigafactories across the whole value chain of green hydrogen.

I chair Reliance's advisory New Energy Council. Two eminent Australian thought leaders are members, Professor Martin Green and Dr Alan Finkel. Professor Green invented the PERC solar cell (passivated emitter and rear cell), which now has over 85 per cent market share worldwide. Dr Finkel, a former Chief Scientist of Australia, has given amazing policy leadership to not only Australia, but to the global hydrogen economy.

Reliance has set itself an audacious target of 1-1-1, meaning one kilogram of green hydrogen for one US dollar in one decade.⁷ Two iconic Australians are now helping an Indian corporate achieve its ambitions in green energy. We will need many more such inspiring examples of India-Australia partnership to achieve global leadership.

There is one sun. It shines brightly on all of us. The shipping and sharing of sunshine globally will lead to a sustainable world. If there was a time for this idea, it is now! And there are no better placed nations for pioneering this than India and Australia. Together we can create a much cleaner and safer planet for our future generations.

Dr. Raghunath Anant Mashelkar is known for his world class scientific research, transformative science and innovation leadership, and being an influential thought leader in shaping Science, Technology & Innovation policies in India. He was previously the Director General of CSIR, India, President of Indian National Science Academy, Chairman of National Innovation Foundation and President of Global Research Alliance. He has been honoured as a Fellow of The Royal Society as well as with several Foreign Fellowships, which include the US National Science Academy, the National Academy of Engineering, the US Academy of Arts and Science, the Australian Academy of Science and the Australian Academy of Technology and Engineering. He was a member of the Science Advisory Committee to the Prime Minister for over three decades and received India's highest civilian honours: the Padmashri, Padmabhushan and Padmavibhushan.

