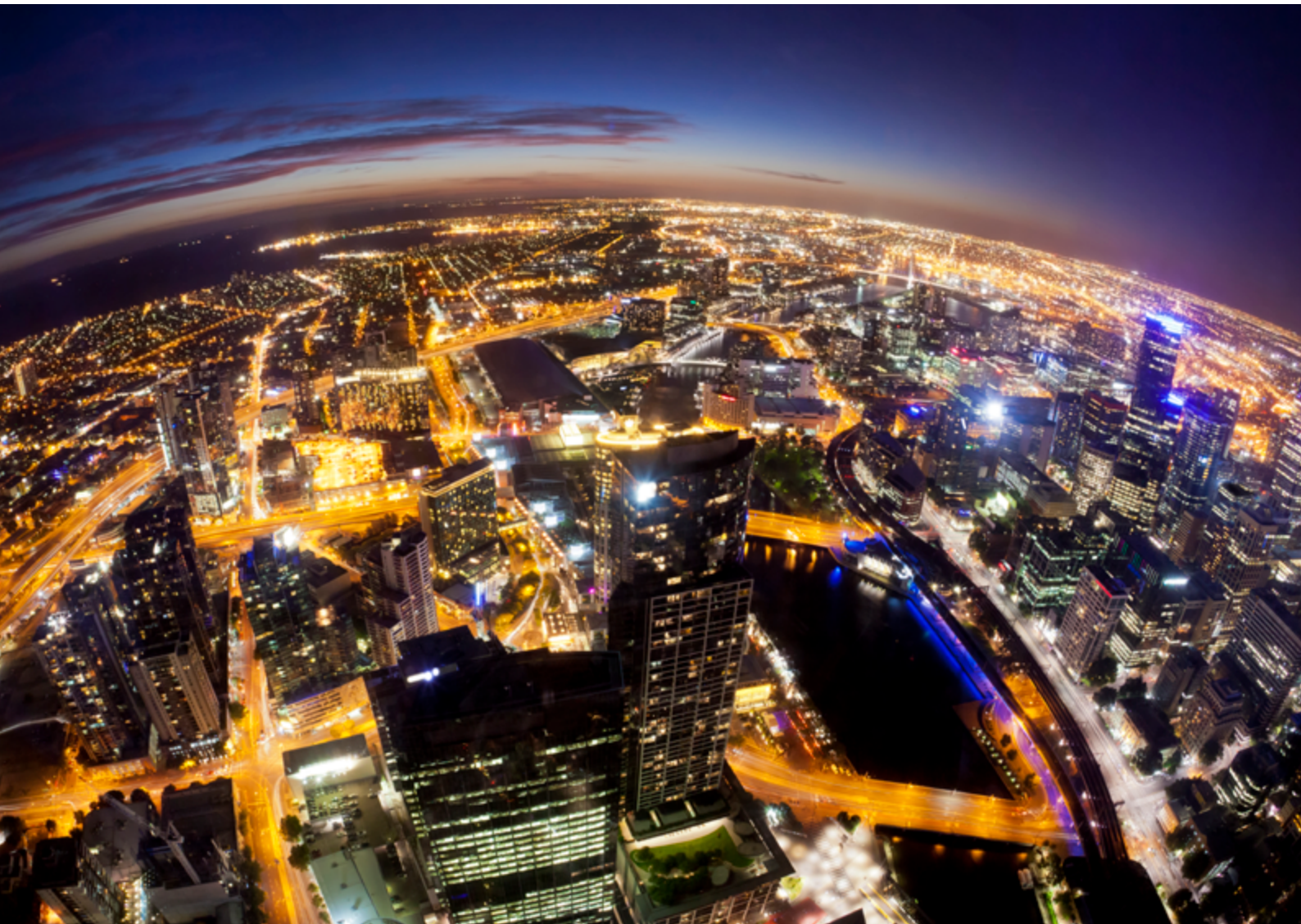
Australia's National
Science Agency

Climate ready science and energy solutions for a resilient Australia

Delivering novel energy solutions and cutting edge climate knowledge and services



The national science agency's focus on solutions

The world's climate is changing and driving changes in global markets, policies and industries – often in ways we cannot fully predict.

Australia needs to navigate major societal, business and government transitions in ways that manage the risks and take advantage of opportunities. Impacts of climate change are being observed now; their magnitude and consequences into the future depend on decisions and actions we take today.

CSIRO is addressing challenges faced by individuals, communities, business, industries and governments through our multidisciplinary research that connects climate knowledge and information to climate adaptation and mitigation responses.

We are doing this through:

- Innovative new solutions for industry to manage climate risks, including transition risks, and adapting to a carbon-constrained economy.
- Helping business to reduce the impact of economic shocks and capture opportunities during change.
- Preparing society for climate risks, including natural disasters, and building resilience.
- Supporting decision makers to make informed and effective decisions.
- Providing underpinning science to meet our national goals and contribute to global research and agreements.

Information. Mitigation. Adaptation.

CSIRO has a comprehensive portfolio of research and development to address the breadth of interconnecting and complementary science areas needed to manage the risks and opportunities to Australia posed by climate change.

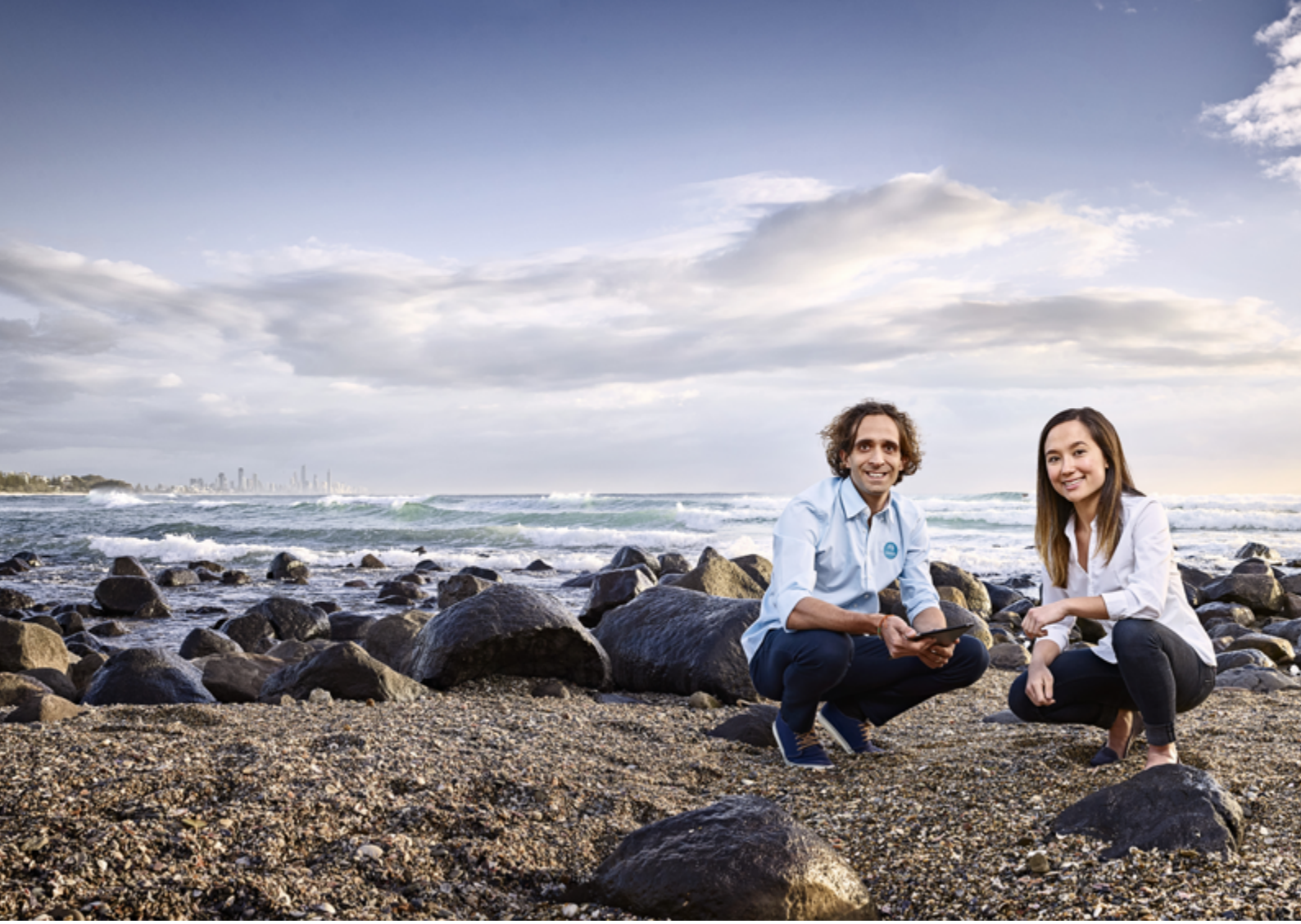
We address three integrated pillars:

Information
(data and knowledge) to support decisions

Mitigation
approaches and novel technologies to reduce emissions

Adaptation
expertise to build climate resilience across all sectors

Climate change is a major challenge for Australia, our region and the world.



National science agency delivering impact

We collaborate with our research partners and industry to build capacity and deliver integrated products and solutions across time scales from days to centuries, and from local issues through to regional and global challenges.

We're helping Australians better understand and respond to a changing climate...

Building IQ – smart energy monitoring

Building IQ intelligently alters the operation of a building's HVAC control system according to settings for cost savings, occupant comfort and energy efficiency. Building IQ is an important step in reducing greenhouse gas emissions from built infrastructure.

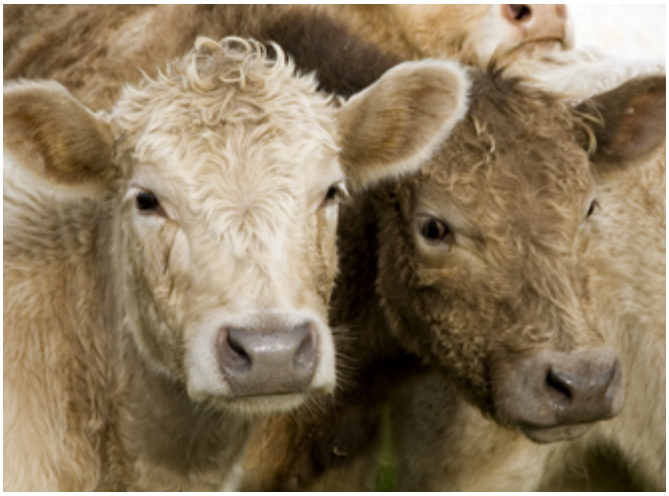
Bottling sunshine for sustainable exports

We've developed a metal membrane to extract pure hydrogen from ammonia, paving the way for a new clean export market. The thin metal membrane allows hydrogen to pass, while blocking other gases. Australia can use vast energy resources to create exportable ammonia and one day power vehicles and industry around the world.

Making carbon capture viable

We are working to reduce the cost and improve the efficiency of carbon capture, utilisation and storage so it is a viable option for Australia's energy future. We're focused on deploying large-scale demonstration projects that enable substantial reductions in emissions and provide a pathway for industry to adopt the technologies at commercial scale.

We're making solar a reliable, stable power source for Australia's energy future.



FutureFeed is a feed supplement for cattle that increases production and virtually eliminates methane emissions.

FutureFeed...a sea-based land solution

We're working on a seaweed-based feed additive called FutureFeed that significantly reduces methane emissions from livestock and has potential to increase livestock productivity.

Exporting Australian climate expertise

Can Tho, Vietnam, and Makassar, Indonesia are at risk of coastal inundation and loss of fresh water supplies. CSIRO and the Australian Government's Research for Development Alliance worked in close collaboration with stakeholder to build alternative future scenarios using integrated urban water management systems. These scenarios are used by international policy makers to assess and guide investment options.

Spark...predicting bushfire spread

Bushfires are complex processes, making it difficult to accurately predict their progress across the landscape, so we have developed Spark, which can model bushfire spread to help plan for and manage bushfires.

Regional Weather and Climate Guides to help build farm business resilience

The Bureau of Meteorology, FarmLink and CSIRO have partnered to provide farmers with practical guides that will include information such as the reliability of rainfall, likelihood, severity and duration of climate extremes like droughts, floods, and heatwaves, as well as the timing of key weather events like the autumn break, wet season onset and retreat, and the average date of first and last frost. The guides will help farmers make decisions on crop planting, stocking levels and managing water storages. The guides are being developed for National Resource Management regions across Australia by the end of 2019.

Weather Together – providing farmers with personalised local weather forecasts

In an Australian breakthrough, we are working with the Bureau of Meteorology to transform weather forecast data and tailor it for farmers and agribusiness in a way they've never had before. CSIRO has developed a complex algorithm to transform the Bureau's weather forecasts so they are more accurate for specific locations. This is done by ingesting data from individual on-farm weather stations and using this to continually 'learn' how the forecast differs to what farmers experience on their farms.

Helping the Great Barrier Reef resist, repair and recover

The Reef Restoration and Adaptation Program brings together Australia's leading experts to help preserve and restore the Great Barrier Reef. Despite being one of the best-managed reef ecosystems in the world, the Reef is under extreme pressure with increasing sea temperatures leading to coral bleaching, ocean acidification and increasingly frequent and severe weather events. The frequency and severity of these impacts is being exacerbated by climate change. In partnership with others we are looking at how we can help the Reef adapt and build resilience.

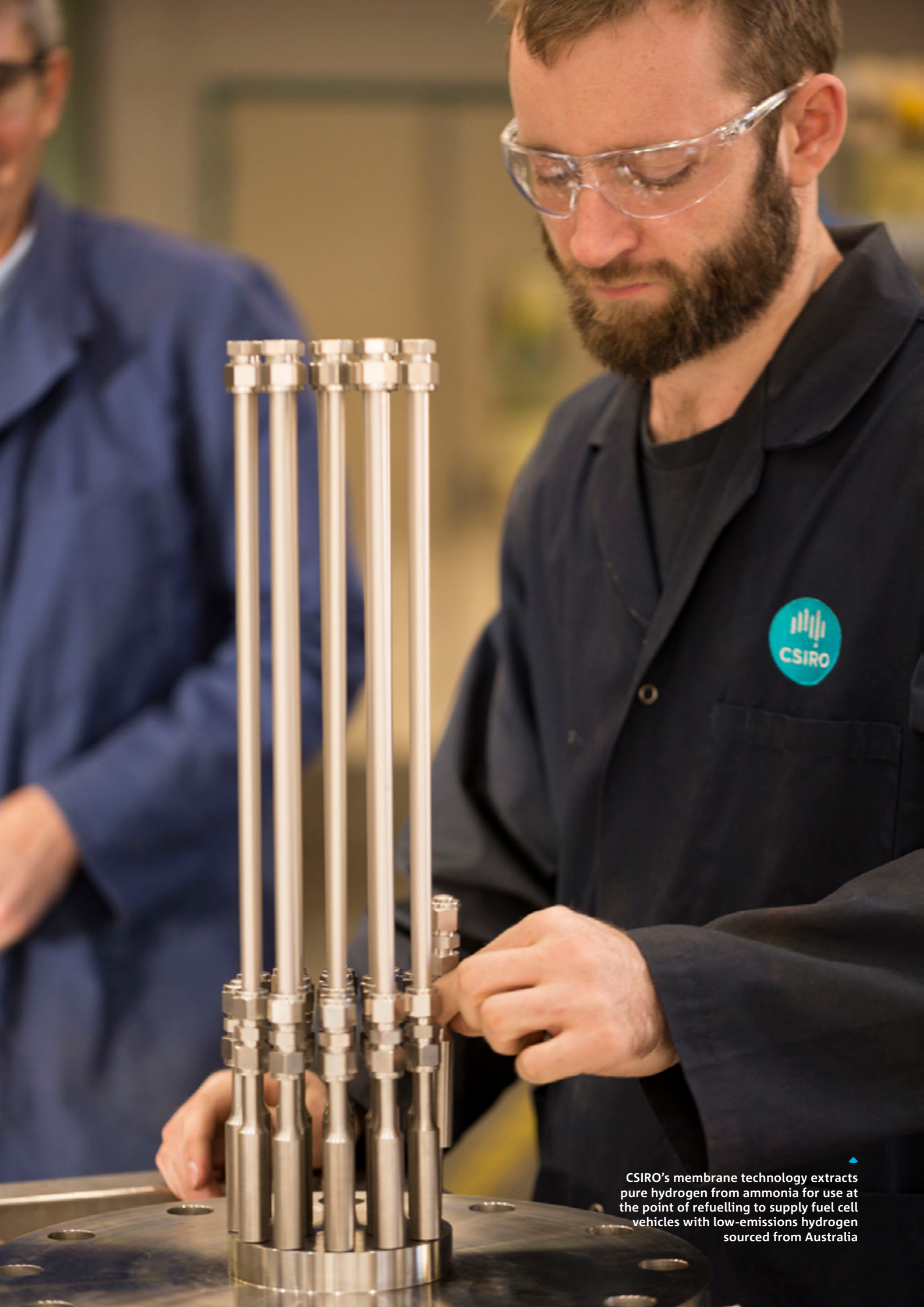
We work with farmers to develop new tools and management practices to increase profitability and productivity, reduce resource use and maintain ecosystem health.

Drought tolerant crops

For decades, CSIRO has been breeding drought tolerant and water efficient crop varieties. Using Delta Carbon Technology to identify plants that use water more efficiently, CSIRO has bred the wheat variety 'Drysdale' that yields at least five per cent more than other varieties under dry conditions. CSIRO is also helping farmers to manage water resources on their farms by developing user-friendly decision support tools. We are researching different crop and pasture management techniques that can best conserve water in different regions.

Climate information for the electricity sector

CSIRO is a delivery partner alongside the Bureau of Meteorology and the Australian Energy Market Operator (AEMO) on a project that will improve the reliability and resilience of the National Electricity Market (NEM) to the risks from climate change and associated extreme weather. The *Electricity Sector Climate Information* project will provide useable science-based climate change data and information tailored to the needs of AEMO risk managers to inform decision-making and support long-term climate risk planning and management for the NEM.



CSIRO's membrane technology extracts pure hydrogen from ammonia for use at the point of refuelling to supply fuel cell vehicles with low-emissions hydrogen sourced from Australia

Our research areas

Disaster preparedness and response

Changing the face of disaster risk management through innovation in sharing risk information and revealing and addressing the root causes of vulnerability.

Renewable and low emissions technologies

Reducing customer energy costs and building climate resilient communities by innovating new low carbon, renewable and clean fuel technologies, as well as whole of system integration support.

Climate smart agriculture

Sustainably improving productivity and delivering global food security while reducing agricultural emissions through innovative technologies.

Cities and coasts

Transforming urban and coastal development with new ways to assess whole-of-city carbon footprints, improving building strength and energy efficiency, addressing pressures in the coastal zone, and unlocking new types of collaborations.

Climate science

Observing and diagnosing climate change, to inform decisions and actions across all sectors, and improve our understanding of the climate system's interaction with environmental and human systems.

Climate modelling

Integrating physical, social and economic information using world-leading models to investigate future climate scenarios that underpin adaptation and mitigation plans and policies.

Enabling Adaptation Pathways

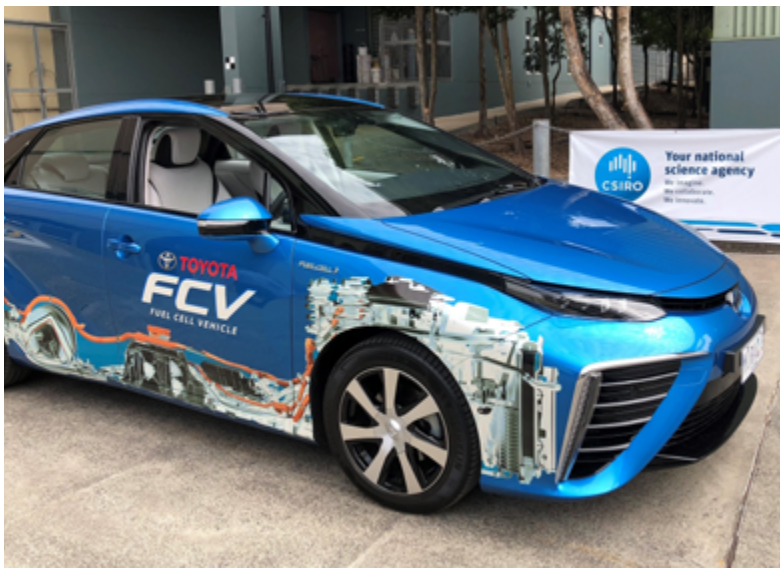
Developing, in partnership with stakeholders, tools and processes to help people plan for the future. These are designed to support decision makers and researchers to diagnose adaptation problems and explore the social, environmental and economic costs and benefits of adaptation initiatives.

Capacity building

Building the capacity of the Australian government, neighbouring nations and industry to understand and respond to climate challenges, especially transition risks.

Provision of tailored climate data

Providing authoritative data sets for ongoing research, plus tailoring climate information and data to meet the needs of Australian sectors and communities – from global and national down to regional and even local scales.



CSIRO collaborates with industry to ensure Australia is at the forefront of hydrogen technology as a low emission fuel of the future.

Shaping the future

We aim to shape a better (sustainable, productive and resilient) future by delivering high-quality, solution-focused science for the benefit of Australia and the world. We deliver positive impact through world-renowned science and world-class facilities to transform the way we think about and plan for the future. Examples include:

Climate and Earth simulation

With partners we have built ACCESS, Australia's Earth system simulator that provides weather forecasts, climate outlooks, and projections for future decades and centuries.

Projections products and tools

We have developed a comprehensive website for climate change projections data (climatechangeinaustralia.gov.au) and provided expertise for a coastal decision making tool – NCCARF's CoastAdapt (coastadapt.com.au).

Big data

In development is Conflux – a new tool to transform stored and real-time raw data into product ready information for agriculture and land management applications. We are also working on clever analytics and high-tech decision tools to support access to growing carbon markets.

Novel technologies and sensors

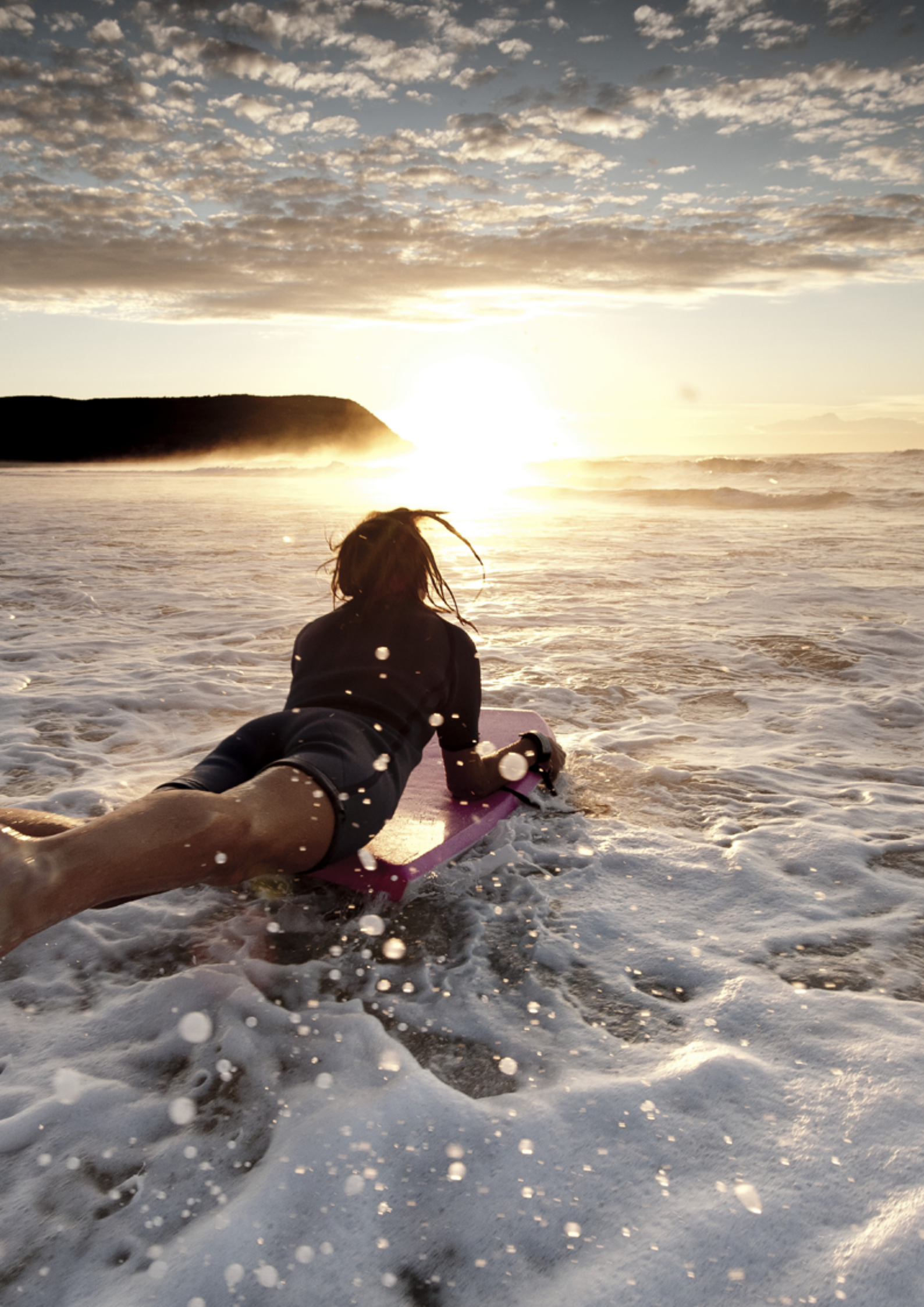
Our marine and atmospheric monitoring network is becoming more sophisticated including the introduction of autonomous marine vessels, real-time data sharing and increased atmospheric data coverage through citizen-science based networks of low-cost sensors.

Advanced materials

We are developing gene drive technology to modify the resilience of species under threat from climate change. Our contribution to the Reef Restoration and Adaptation Program will explore innovative ways to facilitate the recovery of the Great Barrier Reef.

Adaptation pathways and roadmaps

We are on the leading edge of how to develop adaptation pathways and transition roadmaps, with a particular focus on actions that break barriers to innovation – delivering improved plans for regional development in Australia and improved livelihoods in the Pacific region.



World class facilities allow us to collaborate across sectors to deepen understanding of our changing climate.

Cape Grim Baseline Air Pollution Station is a globally critical research station, operated by the Bureau of Meteorology, sampling air from the Southern Hemisphere which has been unaffected by regional pollution sources. This enables us to track changing levels of gases that affect the global climate.

Australia's Marine National Facility and Research Vessel *Investigator* conducts blue-water research into oceanographic, atmospheric, biological and geoscience research.

Centre for Hybrid Energy Systems showcases our expertise and capability in integrating energy storage, renewable energy, hydrogen and fuel cell technologies, fuel processing, systems design and construction.

Renewable and Stored Energy Integration Facilities can showcase and evaluate how renewable and stored energy solutions behave in a simulated grid environment, helping to ensure reliability and lower energy emissions and costs for electricity users across the country.

Urban Living Labs offer a new way for our researchers, industry, community and government to co-innovate, moving our cities towards a more liveable, sustainable and resilient future.

As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Unlocking a better future for everyone.

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