




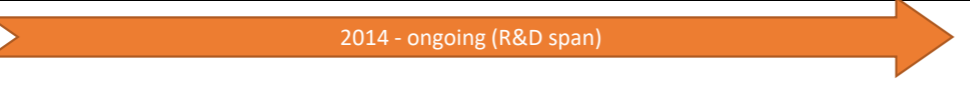


Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Australia	CSIRO	Production	Development of PEM electrolysis technology and kW class systems for distributed and off-grid applications Current 2015 - 2019	Development of low cost electrolysis cells, stacks, BOP and control & safety system for building 1-2 kW PEM electrolyzers.	Dr Sarb Giddey / CSIRO	ATCO Gas, WA	
			Development of solid oxide electrolysis for steam / CO2 electrolysis for production of hydrogen, syngas and liquid fuels Current 2016 - 2021	Development of catalysts, materials, cell designs for steam / CO2 electrolysis to build a prototype reactor that consumes less than 40 kWh/kg hydrogen for integration with liquid fuels synthesis reactor	Dr Ani Kulkarni / CSIRO	ARENA, Johnson Matthey, Ben Gurion Uni., Northwestern Uni, RayGen, ADME Fuels	
			Basic R&D for electrochemical ammonia synthesis using renewable sources of electricity. Current 2019 - 2022	Develop catalysts (graphene/CNT, biological), materials and cell design for ammonia synthesis.	Dr HyungKuk Ju / CSIRO	CSIRO Hydrogen FSP / strategic areas of research, Australian University	
		Transportation / Storage	Development of metal membrane based reactor for ammonia production at low pressures by sourcing hydrogen directly from a PEM electrolyser Current 2014 - 2021	Development of catalysts, membrane materials, interfacial designs, and a prototype system to produce ammonia at a kg scale from renewable energy electricity.	Dr Sarb Giddey / CSIRO	ARENA, Orica, GRDC	
			Development of solid state hydrogen compressor for domestic use (in-home re-fuelling of fuel cell electric vehicles) / Fundamental research into metal hydride materials capable of compressing H2 using low grade heat sources (2018 - 2021) Current 2018 - 2021	Development of a prototype solid state H2 compressor designed to deliver 350 bar H2	Dr Ashleigh Cousins / CSIRO	(Domestic) Griffith University	
			Commercialisation of CSIRO's metal membrane technology. This project aims to scale up the production of CSIRO's hydrogen separation membranes and construct two pilot plants each capable of producing 200kg/day of fuel cell quality hydrogen from decomposed ammonia. Current 2019 - 2022	Demonstrate the viability of exporting hydrogen in the form of ammonia and extracting ultra high purity hydrogen at the point of use with a production rate of 200kg/day.	Dr. David Viano / CSIRO	(Domestic) Fortescue Metals Group Limited	https://www.csiro.au/en/News/News-releases/2018/CSIRO-tech-accelerates-hydrogen-vehicle-future
		Utilisation	Basic R&D for direct ammonia utilisation in a solid oxide fuel cell for power generation Current 2019 - 2022	Develop catalysts, materials and cell design for ammonia cracking and hydrogen oxidation in the fuel cell.	Dr Ani Kulkarni / CSIRO	CSIRO Hydrogen FSP / strategic areas of research, RMIT University	

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Australia	CSIRO	Electrochemical CO2 utilisation	Development of solid oxide electrolysis for steam / CO2 electrolysis for production of hydrogen, syngas and liquid fuels Current 	Development of catalysts, materials, cell designs for steam / CO2 electrolysis to build a prototype reactor that consumes less than 40 kWh/kg hydrogen for integration with liquid fuels synthesis reactor	Dr Ani Kulkarni / CSIRO	ARENA, Johnson Matthey, Ben Gurion Uni., Northwestern Uni, RayGen, ADME Fuels	
		CO2 storage In Situ Laboratory		Using an existing well (Harvey-2), CSIRO researchers will strategically place monitoring instruments in order to conduct a shallow CO2 release test in the subsurface area.	DR Karsten Michael / CSIRO		https://www.csiro.au/en/Research/EF/Areas/Low-emissions-technologies/CCS/In-situ-lab
		Post-combustion CO2 capture	PICA Project: 5000 hour evaluation of an advanced Post-Combustion CO2-capture process (PCC) with two advanced liquid absorbents for application in Victorian brown coal fired power 	Evaluation of robustness and energy performance of two advanced amine-based processes for CO2 capture in preparation of larger scale demonstration in the Latrobe Valley	Dr Paul Feron, Mr Aaron Cottrell (CSIRO), Mr Takumi Endo (IHI)	CSIRO, IHI, AGL Loy Yang, ACI	https://www.csiro.au
		Methane production from atmospheric CO2	The technology development in this project aims to convert hydrogen produced from renewable electricity together with CO2 from the atmosphere into a methane product that seamlessly fits in with existing energy export chains and available infrastructure 	Development of efficient liquid absorbent technologies for CO2-capture from air Aim for methane production costs of \$10/GJ excl. hydrogen production costs	Dr Paul Feron, Dr Ali Kiani	CSIRO, ARENA	https://www.csiro.au

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Australia	CSIRO	Solar Electric vehicle charging	<p style="text-align: center;">2014 - ongoing (R&D span) </p> <p>CSIRO began investigating barriers for EV adoption in Australia. Charging infrastructure was identified as being a key area where there could be improvements. Areas identified as problematic are charging in homes with multiple cars, large groups of vehicles and remote fast charges.</p>	CSIRO has worked with industry to develop new charging stations to allow for greater adoption of EV's in Australia. Initial work has developed a home charging station that integrates home charging, PV and battery storage. Future work is looking to develop battery buffered fast chargers.	Dr Christopher Munnings / CSIRO	Nissan (Australia), Delta electronics (Australia), SME connect (Funding), Victorian Government (Funding)	
		Demonstration projects and the centre for hybrid energy systems	<p style="text-align: center;">2014 - ongoing (R&D span) </p> <p>CSIRO works with a wide range of industry partners to help them to understand how new technologies can be used within their current business model and to also allow them to hybridise technologies that they manufacture to create new products. We also work internally with groups in CSIRO to build prototypes using experimental CSIRO technology</p>	CSIRO works with many industrial partners advising them on how emerging technologies can be used within their business with the goal being to accelerate adoption of new energy technologies.	Dr Christopher Munnings / CSIRO	EnergyAustralia, Melbourne Cricket Club, Sydney Opera House, Telstra, ATCO gas, Fortescue Metal Group, Woodside,	www.csiro.au/CHES