



THE UNIVERSITY OF
MELBOURNE

**Melbourne
Energy Institute**

The Melbourne Energy Institute (MEI) delivers influential, interdisciplinary research on the transition to a clean energy system. We work with the community, industry and government on some of the world's most pressing energy challenges.

The University of Melbourne and MEI

The University of Melbourne undertakes world-leading research in many disciplines. It has the largest research expenditure of any Australian university, and the largest cohort of research students in Australia.

MEI has over 300 specialists across Architecture, Economics, Engineering, Health, Law, Planning, Science and Social Science. They include a former Chief Scientist of Australia, several recipients of Australia Day Honours, several Fellows of Learned Academics and numerous Fellows of Professional Societies.

MEI staff work together in four programs:

- Energy Systems
- Environment and Resources
- Hydrogen and Clean Fuels
- Power Generation and Transport

MEI is proud to work alongside our industry and government partners. Our partners include the Asian Development Bank (ADB), AusNet Services, the Australian Energy Market Commission (AEMC), the Australian Energy Market Operator (AEMO), the Australian Energy Regulator (AER), the Australian Gas Infrastructure Group (AGIG), BHP, CO2CRC, CSIRO, the Department of Defence, the Energy Security Board (ESB), Ford, Future Fuels CRC, General Electric (GE), Grattan Institute, IBM, Meridian Energy Australia, Mitsubishi Heavy Industries (MHI), Powershop, Siemens, and the Victorian State Government.

Collaborative research and knowledge transfer are central to MEI's work, and we welcome new partners.



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MEI RESEARCH PROGRAMS

Energy Systems

The Energy Systems Program considers how different energy technologies interact with one another and society. The program includes the technical and economic analysis of energy networks, wholesale and retail energy markets, and energy system planning.



Capabilities

- Energy network, system and market integration of renewable energy sources
- Distributed energy resources and smart grids
- Integrated energy networks and multi-energy systems
- Risk and resilience assessment of future energy systems
- Demand modelling using randomised control trials, big data and machine learning
- Retail energy markets and consumer behaviours control trials, big data and machine learning

Impact

- Modelling work commissioned by the Finkel Review
- AEMO demand and reserves forecasting using AMI data and machine learning approaches
- Modelling of electricity consumer behaviour for Billcap, Click Energy and Simply Energy
- Collaborations with AEMC and AER on power system resilience and reliability

Key Researchers

Prof. Lu Aye	Prof. Ross Garnaut	Prof. Brendon McNiven
Prof. James Bailey	Prof. Fiona Haines	A/Prof. Monica Minnegal
Prof. Howard Bondell	Prof. Glenn Hoetker	Dr. Reihana Mohideen
Prof. Michael Brear	A/Prof. William Ho	Prof. Nando Ochoa
A/Prof. David Byrne	Mr. Terence Jones	Dr. Behzad Rismanchi
Dr. Sangeetha Chandra-Shekeran	Prof. Chris Leckie	Prof. Prakash Singh
A/Prof. Robert Crawford	Prof. Pierluigi Mancarella	Prof. Kate Smith-Miles
Prof. Rob Evans	Prof. Chris Manzie	Prof. Doreen Thomas
Prof. John Freebairn	Dr. Leslie Martin	Dr. Maria Vrakopoulou

Environment and Resources

The Environment and Resources Program examines the interactions between our energy systems and the environment. This program includes energy resource extraction and use, and how current energy systems influence environmental and human health, including legal and economic implications.



Capabilities

- Air quality and health impacts
- Environmental chemistry and fluid dynamics
- Geology and geochemistry of oil, gas and other basin resources including carbon capture storage
- Modelling of the carbon cycle and climate change
- Resource economics
- Resource Law

Impact

- Deepen our understanding and minimise uncertainties in geological carbon storage for CO2CRC, ANLEC R&D and BHP
- Determine anthropogenic trace gas distribution and residence time to inform UNFCCC processes
- Model the consequences of nations' energy policies to inform governments and UNFCCC
- Measuring and forecasting air pollutants in cities to inform urban design and policy development

Key Researchers

Prof. Robin Batterham	Prof. Lee Godden	Prof. Peter Rayner
Dr. Sangeetha Chandra-Shekeran	Prof. Ralf Haese	Prof. Mike Sandiford
Prof. Peter Cook	Prof. Fiona Haines	Dr. Robyn Schofield
Prof. Michael Crommelin	Dr. Leslie Martin	Prof. Mark Stevenson
Prof. Shyamali Dharmage	Prof. Stephan Matthai	Prof. Doreen Thomas
Prof. Robyn Eckersley	A/Prof. Monica Minnegal	Dr. Claire Vincent
Prof. John Freebairn	Prof. Jason Monty	
Prof. Ross Garnaut	A/Prof. Kathryn Mumford	

Hydrogen and Clean Fuels

The Hydrogen and Clean Fuels Program integrates research into production, distribution and use of hydrogen in the energy system. The program studies electrolysis and clean fuel production, as well as hydrogen and clean fuel distribution and use in industrial and transport applications.



Capabilities

- Process engineering and techno-economics of hydrogen production from renewables and fossil fuels with carbon capture and storage (CCS)
- Advanced gas turbine and reciprocating engine systems running on hydrogen and hydrogen-derived fuels
- Assessment of hydrogen integration into the natural gas network, including Power to Gas (P2G) concepts
- Catalysis and process engineering of converting hydrogen to clean liquid fuels
- Sub-surface storage of hydrogen

Impact

- Reciprocating engine research with hydrogen and synthesis gas fuelling for Caterpillar, Ford and other partners
- Support to the Council of Australian Government's (COAG) National Hydrogen Strategy
- Provision of expert advice to the Hydrogen Energy Supply Chain (HESC) Project
- Optimisation of integrated energy systems featuring hydrogen for the Future Fuels CRC and other partners

Key Researchers

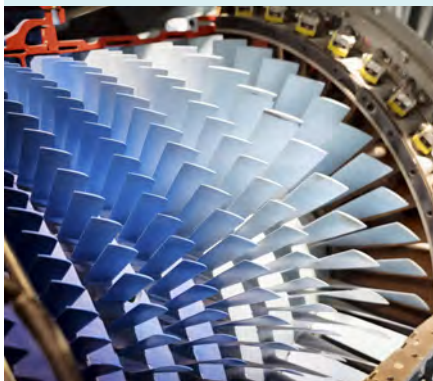
Prof. Robin Batterham
Prof. Michael Brear
Dr. Robert Gordon
Dr. Eirini Goudeli
Prof. Ralf Haese

Prof. Sandra Kentish
Dr. Gang Li
Prof. Pierluigi Mancarella
Prof. Paul Mulvaney
A/Prof. Kathryn Mumford

Prof. Geoff Stevens
Dr. Mohsen Talei
A/Prof. Yi Yang

Power Generation and Transport

The Power Generation and Transport Program brings together researchers who investigate several forms of renewable and low emission power plants for stationary and mobile applications. This includes advanced wind, solar, gas turbine, reciprocating engine and energy storage technologies.



Capabilities

- Carbon Capture and Storage
- Conventional and alternative fuels and emissions chemistry
- Gas turbine, reciprocating engine, hybrid and electric powertrain dynamics and optimisation
- Wind turbines/farms, solar PV and energy storage dynamics and optimisation
- Low drag vehicles for land, sea and air
- Materials for advanced photovoltaics, displays, lighting, and high temperature applications
- Advanced computational methods and machine learning in energy applications

Impact

- Energy efficient lighting for CSIRO and partners
- Propulsion, engines and fuels for Ford, DST Group and MHI
- Improved aircraft engine aerodynamics for General Electric
- High temperature material for the Australian Defence Force
- Modelling of real-world, solar PV performance across Australia with AEMO
- Operational forecasting of wind and solar farm power generation with Meridian Energy Australia and others

Key Researchers

Prof. Robin Batterham
Prof. Michael Brear
Dr. James Bullock
Prof. George Franks
Dr. Robert Gordon
Dr. Eirini Goudeli
Prof. Lloyd Hollenberg
Dr. David Jones

Prof. Sandra Kentish
Dr. Patricia Lavieri
Prof. Dan Li
Prof. Chris Manzie
Prof. Jason Monty
Prof. Paul Mulvaney
A/Prof. Guillermo Narsilio
Dr. Behzad Rismanchi

Prof. Richard Sandberg
Prof. Geoff Stevens
Dr. Mohsen Talei
Dr. Claire Vincent
Prof. Rachel Webster
Dr. Wallace Wong
A/Prof. Yi Yang