

ENERGY CHANGE ESSENTIALS

PROFESSIONAL SHORT COURSE

In-person at The Australian National University
Tuesday 8 November, 2022



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Australian
National
University

Institute for
Climate, Energy &
Disaster Solutions



Course background

Australia is in the middle of a major energy transformation – we are leading the world in the per capita installation rate for solar and wind energy. New technologies for energy generation and energy storage continue to revolutionise the electricity sector.

This Energy Change Essentials course is tailored for professionals across government and industry who are interested in the energy transition and who seek a comprehensive overview of the latest trends in energy technology, economics and policy.

The course is run by the **ANU Institute of Climate, Energy & Disaster Solutions**, bringing together leading researchers from across the University.



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Course information

Scope and content

The overall aim of Energy Change Essentials is to provide decision-makers in government, industry, non-government and community sectors with access to the latest ANU research and expertise on the energy transition.

Course details

This session of Energy Change Essentials will be delivered in-person at The Australian National University. The course covers five broad topics in a one-day, in-person session, as well as a group discussion, panel and Q&A sessions, and breaks. Course timings are 9am to 5pm.

Who should attend?

The course is most relevant to policymakers and practitioners in Australia and across the Asia-Pacific region. Participants from a range of backgrounds will benefit from the diversity of disciplines covered: this is an essential feature of the course, as the energy transformation will impact all sectors of our economy and society.

Important information

- To register, [click here](#) and follow the registration details as described on the page.
- Registrations close on Friday 4 November, or earlier if sold out.
- Early bird registrations are available (10% discount) until Tuesday

18 October.

- Group discounts are available for bulk registrations of three or more participants from the same organisation.
- This course will take place subject to demand. Registrants will receive a full refund in the unlikely event that the course is cancelled. Places are limited to 25-30 participants and registrations are on a 'first come - first served' basis.
- Contact the ICEDS Executive Education Coordinator, Rachel England at Rachel.England@anu.edu.au to find out more.

Full cost - \$1595 per person (including GST)

About the ANU Institute for Climate, Energy & Disaster Solutions (ICEDS)

ICEDS connects people with climate, energy and disaster risk research from The Australian National University. Our goal is to advance innovative solutions to address climate change, energy system transitions and disasters. We facilitate integrated and interdisciplinary approaches to research, teaching, policy, industry and community engagement. We also lead the ANU Below Zero Initiative, which is working to reduce the University's greenhouse gas emissions to below zero.



Program

Tuesday 8
November

9-9.15am – Welcome and introduction

Rachel England, ANU Institute for Climate, Energy & Disaster Solutions

9.15-10.15am – Energy transition, trends, options and policy

Professor Frank Jotzo, ANU Institute for Climate, Energy & Disaster Solutions

The world's energy supply is dominated by fossil fuels and their combustion is the largest source of human induced greenhouse gas emissions. Limiting climate change requires a comprehensive shift to zero-carbon energy sources. The pathway to decarbonisation involves a very large increase in renewable energy technologies, which have rapidly become affordable: nuclear power and carbon capture and storage in some instances, electrification of most direct fuel uses, and clean energy inputs in industry. Transition of energy systems of this kind and scale is not only a technical endeavour but brings economic and social challenges as well as opportunities, which will be of great magnitude in some economies including Australia. Governments have important roles in guiding and accelerating the transition.

At the completion of this session you will have gained insights into:

- Structure and trends in the global and Australian energy system.
- Scenarios for low-emissions energy systems and the

elements of future decarbonisation.

- Challenges and opportunities in the low-emissions energy transition in Australia.
- Policy approaches and the broader role of governments in energy transition.

10.15-10.30am – Break (10 mins)

10.30-11.30am – Grid integration and storage

Dr Marnie Shaw, ANU College of Engineering and Computer Science

Australia will need to massively expand its energy storage capacity as it transitions to renewable energy. Forecasts suggest we will need 6 to 19 GW of storage -- about 20 times as much as our current large-scale battery capacity.

In this lecture we will discuss why we need energy storage and which storage options are available. We will also discuss challenges and opportunities in the integration of storage, and why environmental and social values, as well as technical and economic factors, are important when planning storage.

At the completion of this lecture you will understand:

- The role of storage in the energy transition.
- The importance of technical, economic and social considerations that affect energy storage integration.



Program

Tuesday 8
November (cont.)

11.30am-12.30pm – Communities and regions in the energy transition

Dr Rebecca Pearse, ANU School of Sociology and ANU Fenner School of Environment & Society

This transformation in how we produce and consume energy is a process of rural social change. Fears of job losses, regional economic decline and frustration with government and the green movement are visible in the social landscape of energy. This lecture explores the social geography of the energy transition as it materialises for rural communities. We look at the research documenting anxieties and priorities of workers and community members in the Hunter Valley (NSW) and La Trobe Valley (Vic). Then we'll compare these concerns and experiences to perspectives of rural people within two of the NSW Government's Renewable Energy Zones. Conclusions be drawn about the importance of locally community-led planning and industrial policy to facilitate regional economic diversification.

At the completion of this session you will have gained insights into:

- Energy transition as a rural spatial shift
- Key concerns and needs of different rural communities
- Best practice in just transition policy.

12.30-1pm – Break (15 mins)

1.15-2.15pm Hydrogen as energy vector

Dr Fiona Beck, Zero-Carbon Energy for the Asia-Pacific Initiative

As the global energy sector transitions from a reliance on fossil fuels to being based on variable renewable energy, there is a growing need to find replacements for hydrocarbon fuels and feedstocks. Hydrogen could provide the missing link between clean energy technologies and industrial energy uses, as well as providing fuels for energy applications that cannot be easily electrified. In this lecture, we will provide a background to the opportunities and challenges that an emerging hydrogen industry might face, as well as the key technologies that need to be scaled up to enable hydrogen to play a role in the energy transition.

At the completion of this lecture you will understand:

- The role hydrogen and hydrogen derivatives could play in a decarbonised energy sector.
- An overview of the key technologies and the challenges of scaling them up.
- Insights into some of the roadblocks and uncertainties that an emerging global hydrogen industry will face.



Program

Tuesday 8
November (cont.)

2.15-3.15pm Energy economics and policy

Dr Thomas Longden, **Zero-Carbon Energy for the Asia-Pacific**

Greenhouse gas emissions have increased with economic growth, and this relationship needs to be reset in order to limit climate change. Carbon dioxide from fossil fuel combustion is the largest source of greenhouse gas emissions, but some other sources matter as well. Significant reductions in emissions could be achieved at moderate cost if cost effective policies were implemented, but the politics of implementation and adjustment remain difficult. Nevertheless, the lower cost of clean technologies bodes well for future climate change mitigation policy success.

- At the completion of this lecture you will understand:
- Trends and drivers in global and national emissions
- Building blocks of decarbonisation of the economy
- Economic costs and opportunities of reducing emissions
- Policy approaches and experiences with the implementation of climate policies in Australia and other countries.

3.15-3.45pm – Break

3.45-4.15pm – Group activity

4.15-5pm – Panel discussion and Q&A with lecturers



** Program timings and lecture titles/abstracts are subject to change without notice, where necessary to deliver the course.*



Biographies

Professor Frank Jotzo (Institute of Climate, Energy & Disaster Solutions (ICEDS) and Crawford School of Public Policy, ANU)

Frank is Head of Energy at the ANU Institute for Climate, Energy & Disaster Solutions, and Professor at the ANU Crawford School of Public Policy, where he directs the Centre for Climate and Energy Policy. He is joint editor-in-chief of the journal *Climate Policy*, and a lead author of the Intergovernmental Panel on Climate Change (IPCC) forthcoming Synthesis Report. He has been involved in a number of policy research and advisory exercises, including as senior advisor to Australia's Garnaut Climate Change Review, and advisor to national governments and Australian State and Territory governments. He has led collaborative research programs including on decarbonisation, coal transition, and China's climate and energy policy. As an environmental economist, his research focuses on policy relevant aspects of climate change, energy, and broader issues of environment, development and economic reform. He teaches at Crawford School.

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Dr Marnie Shaw (Research School of Engineering, ANU)

Marnie Shaw is a Senior Research Fellow in the School of Engineering and a Research Leader in the Battery Storage and Grid Integration Program at The Australian National University.

Dr Shaw's current research interests lie in applying data analytics and machine learning to a range of data-rich problems, including the integration of renewable energy into the electricity grid. At ANU, she has been looking at how energy storage can support increasing amounts of renewable energy in the grid, while reducing energy costs for consumers, and addressing important issues around energy equity.

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Photo: ANU Media/Jamie Kidston



Photo: Supplied



Biographies

Dr Rebecca Pearse (Fenner School of Environment & Society, ANU)

Rebecca Pearse is a lecturer in environmental sociology at The Australian National University's School of Sociology and the Fenner School of Environment and Society . Previously, Beck was a lecturer and researcher in the Department of Political Economy at the University of Sydney (2017-2020). She works at the intersection of social theory and political economy.

Rebecca's teaching and research focuses on environmental inequalities, policy and social change. Beck's current research investigates the possibilities for rapid and just energy transition, with a particular focus on land and labour relations. Beck's work has been published in Australian and international journals including Sociological Review, Wiley Interdisciplinary Reviews: Climate Change, Environmental Politics, Energy Policy, and Feminist Economics.

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Photo: Rebecca Pearse, 2020

Dr Fiona Beck (College of Engineering and Computer Science, ANU)

Dr Beck currently holds a Discovery Early Career Researcher Award (DECRA) from the ARC, as well as the Future Engineering Research Leader (FERL) Fellowship from ANU. She joined the College of Engineering and Computer Science at The Australian National University as a research fellow and lecturer in 2015. She spent the previous four years as a Marie Curie Research Fellow at ICFO - The Institute of Photonic Sciences in Barcelona, Spain, employing plasmonics to enhance the performance of novel optoelectronic devices. She obtained a PhD from ANU in 2011, with a thesis on designing plasmonic light trapping schemes for applications in solar cells. She has an MSci degree in Physics from The University of Glasgow, and was awarded the Eve and Ravenscroft prize for the most distinguished graduate from the Faculty of Physical Sciences.

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Photo: Eric Byler/CECs Marketing, 2022



Biographies

Dr Thomas Longden (Zero-Carbon Energy for the Asia-Pacific Grand Challenge, ANU)

Tom is a Fellow at the Zero-Carbon Energy for the Asia-Pacific (ZCEAP) Initiative, based within ANU ICEDS. Tom holds a PhD from the University of New South Wales (UNSW) and his main areas of research interest are applied econometrics, environmental economics, energy economics and health economics. Tom's work on energy, applied econometrics and technological change has been published in leading international journals (including Climatic Change, Energy, Technological Forecasting and Social Change, Energy Policy and Health Economics). He was a Contributing Author on the AR5 WGIII Intergovernmental Panel on Climate Change (IPCC) report titled Mitigation of Climate Change.

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Photo: University of Technology, Sydney

Rachel England (Institute of Climate, Energy & Disaster Solutions, ANU)

Rachel is the Executive Education Coordinator at ICEDS, and a PhD scholar at the ANU Fenner School of Environment & Society. As an Environmental Scientist/Feminist Geographer, Rachel's research is a collaboration with women of the White Grass tribe (Tanna Island, Vanuatu) to explore their ways of knowing and doing sustainable development and to critique the United Nations' Sustainable Development Goals (SDGs). Rachel is a co founder the ANU Fenner Decolonial Research and Teaching Circle (The Fenner Circle) – a yarning circle which looks directly at issues relating to the decolonisation of academia (in particular, the sciences), and has grown in membership to 90+ people across the campus since its inception.

Prior to starting her PhD, Rachel worked as an environmental consultant with Alluvium Consulting Australia, as a policy officer within two Australian Government departments, and as an Australian Youth Ambassador for Development (AYAD) Quarantine Plant Scientist in Samoa.

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Photo: Rachel England

