

# Oxford Energy Network 11th Energy Day

## Innovation in Energy

28 September 2023

Oxford Martin School





# Welcome from

## Paul Shearing

### Director, ZERO Institute



Welcome to this 11th Oxford Energy Day.

The theme for this year is *Innovation in Energy* and we look forward to exploring the many facets of innovation in the transition

to zero-carbon energy systems. The pace and scale of change required in achieving the zero carbon energy transition is unprecedented, requiring not only innovative research but also innovations in the *way in which* we undertake research. Integrating research across disciplines is central to achieving timely impact and is at the heart of The ZERO Institute's plans to consolidate, grow and promote the university's world leading zero carbon energy research portfolio.

I am grateful to our guest speakers for taking the time to come along to celebrate the rich diversity of energy research at Oxford. My thanks also to colleagues who are keen to share a snap-shot of how their work is contributing to the great challenge of ensuring that system change is just and fair.

I look forward to seeing you at the Energy Network seminars and future ZERO Institute events.

Paul

## Paul Shearing

Engineering Science

Paul Shearing is Professor of Sustainable Energy Engineering at the Department of Engineering Science and Director of the ZERO Institute. He holds the Royal Academy of Engineering Chair in Emerging Battery Technologies.

# Agenda: Morning

Lecture Theatre

- 9:30 Registration opens
- 10:00 Paul Shearing — Welcome
- 10:05 Jon Saltmarsh, Energy Systems Catapult  
Energy Systems Innovation
- 10:40 Malcolm McCulloch  
Transformational Change
- 11:10 Matt Scott  
Greening Finance
- 11:30 Carolina Tortora, National Grid ESO  
Innovation in the Electricity System
- 12:00 Paul Shearing  
Innovation in Energy Research

## Lunch

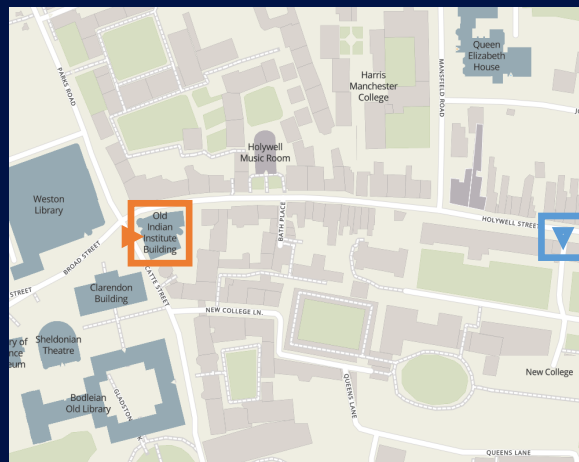
12.35–13.45

## Coffee break

15:35–16:05

## Location

## Guide



-  Oxford Martin School, Entrance 
-  New College, Porter's lodge 

# Agenda: Early afternoon

## Societal Stream 1

13:50 Tina Fawcett

Energy innovation and the Individual

14:15 Hannah Budnitz

Policy perspectives on electric mobility transitions and innovations

14:40 Phil Grunewald

New approaches to understanding and changing energy use

15:05 Charlie Wilson

Digital Innovation for Energy

Programme may be subject to change

## Physical Stream 1

13:50 Ludmilla Steier

Innovation and Green Hydrogen

14:15 Saiful Islam

Making a Materials Difference to Green Energy (Batteries Included)

14:40 Robert Hoye

Innovation in Photovoltaics

15:05 Jon Blundy

Disruptive Strategies for Resourcing Energy Raw Materials

**Seminar Rooms**

**Parallel sessions**

**Lecture Theatre**

# Agenda: Late afternoon

## Policy

16:15 Radhika Khosla

Innovation informing policy

16:40 Marina Topouzi

Innovative Financing for Retrofit

**Seminar Rooms**

## Physical stream 2

16:15 David Wallom

Energy and information

16:40 Robert House

Innovation in energy storage

**Lecture Theatre**

**Parallel sessions**

Programme may be subject to change

## Closing plenary

17:10 Pete Armstrong, Mixergy

Innovation to meet the challenges of UK retrofit

Introduced by **George Todd**, Oxford Science Enterprises

17:35 Paul Shearing

Closing remarks, reflecting on the day

**Lecture Theatre**

## Jon Saltmarsh

### Energy Systems Catapult

Jon is Chief Technology Officer at the Energy Systems Catapult. The Catapult was established to accelerate the transition to a net zero energy system and support UK innovators in creating the necessary solutions.



Jon is responsible for ensuring the Catapult identifies and addresses the innovation priorities that will have most impact on this mission. He has had a very varied career in innovation in the public and private sectors in both energy and defence. He has first-hand experience of how to identify and exploit opportunities for new technologies to deliver transformative change.

## Malcolm McCulloch

### Energy and Power Group, Engineering Science

Malcolm McCulloch is Associate Professor in Engineering Science and Group Leader of the Energy and Power Group at the University of Oxford



Malcolm's interests are in the area related to the domestic energy sector, development of user-centric demand side management technologies, to enable behaviour change. He has been associated with a number of spin outs, including Intelligent Sustainable Energy, Kepler Energy, and Oxford Yasa Motors. The group develops intelligent, cost-effective nano and micro grid solutions that provide a scalable pathway to distributed electrification in energy for development.

## Matthew Scott

Smith School for Enterprise and the Environment

Matt Scott is Executive Director, UK Centre for Greening Finance & Investment (CGFI). Joining CGFI from the Climate Resilience Hub at WTW, Matt previously established and led the Bank of England's Climate Hub.



Matt led the design and delivery of the UK's landmark 2019 Green Finance Strategy, setting out policies for Greening Finance and Financing Green, and helped to establish and co-chair the G20's Green Finance Study Group. He co-chairs the disclosure framework workstream of the Transition Plan Taskforce (TPT) Delivery Group, for which CGFI is joint Secretariat. Matt is an Associate Fellow at the Said Business School.

## Carolina Tortora

National Grid ESO

Anna Carolina Tortora heads the Department of Innovation Strategy for National Grid's Electricity System Operator. She currently also leads NGENSO's VirtualES programme, to develop the first digital twin of the entire energy system in the UK.



Carolina's mission is to accelerate the decarbonisation of the UK system to meet the country's ambitious Net Zero targets by leveraging new digital solutions, grid technologies and services. She is a senior advisor and mentor to some of the world's most promising battery start-ups. Prior to NGENSO, Carolina held the equivalent position at Terna Spa, where she successfully led the deployment of the EU's largest high voltage connected storage plant.



## Tina Fawcett

Environmental Change Institute

Tina Fawcett is a Senior Researcher and Deputy Leader of the Energy Group at the Environmental Change Institute. She leads the policy and governance theme in the Centre for Research on Energy Demand Solutions (CREDS). Tina is Co-I of the EPSRC Network for the Decarbonisation of Heating and Cooling and leads social research in the Energy Demand Observatory and Laboratory project.



Tina's research concerns energy use by households and organisations, and uses a multi-disciplinary approach to understand current usage patterns and explore policies for reducing energy use / carbon emissions. Her other interests include the Museum of Climate Hope ([climatehope.uk](http://climatehope.uk)) and climate change education research and outreach.

## Hannah Budnitz

Transport Studies Unit

Hannah Budnitz is a Research Associate at the Transport Studies Unit.



Hannah's current research is focused on the transition to electric mobility in the UK from the social, behavioural and policy perspectives, considering how to both tackle climate change and achieve more inclusive transport systems. She has a background in transport policy and planning, working in both the public and private sectors.

## Phil Grünewald

Department of Engineering Science

Phil is a Senior Researcher in the Department of Engineering Science and Tutor at Oriel College. He leads the EDOL programme at Oxford, which establishes a national longitudinal observatory of energy demand and makes rich data sources available for research, policy makers and the general public.



Phil has been at Oxford for over ten years, in both the Social Sciences (Geography) and MPLS divisions (Engineering). He supported the creation of the Oxford Energy Network, the Energy Systems MSc and many other interdisciplinary and cross-departmental initiatives. In 2015, Phil was awarded an EPSRC Fellowship, which laid the foundation for his current work on a data-rich and contextualised understandings of household energy demand dynamics. Phil became an Oxford Martin Fellow in 2021.

## Charlie Wilson

Environmental Change Institute

Charlie is Professor of Energy and Climate Change. He leads the Energy programme in the Environmental Change Institute and is a Jackson Senior Research Fellow at Oriel College.



Charlie is also a visiting research scholar at the International Institute for Applied Systems Analysis (IIASA) in Austria. Charlie's research interests lie at the intersection between innovation, people, and policy in the field of energy and climate change mitigation.

## Radhika Khosla

Smith School of Enterprise and Environment

Radhika Khosla is Associate Professor at the Smith School of Enterprise and Environment, School of Geography and the Environment, and Research Director of the Oxford India Centre for Sustainable Development.



Radhika works on examining the productive tensions between urban transitions, energy services consumption and climate change with a focus on developing country cities. She is Principal Investigator of the Oxford Martin School's interdisciplinary and multi-country programme on the Future of Cooling, which examines and helps shape the unprecedented increase in cooling energy demand growth and its relationship to the sustainable development goals. She is co-Investigator of Oxford Net Zero and co-Investigator of the ZERO Institute.

## Marina Topouzi

Environmental Change Institute

Marina is an interdisciplinary researcher at the Environmental Change Institute's Energy Programme. She has a strong background in building energy use and demand focusing on the building/user system and factors that affect buildings' energy performance from construction to in-use.



Marina's research for the Centre for Research into Energy Demand Solutions is on deep renovation policy initiatives and policy mixes across the world, including both technology-focused and people-focused policies. She is member of the BSI steering task group for the UK retrofit standards for domestic and non-domestic buildings (BSI PAS 2035: 2019 and PAS 2038), sponsored by the Department for Business, Energy and Industrial Strategy (BEIS). Marina previously worked for a decade as a professional architect.

## Ludmilla Steier

Department of Chemistry

Ludmilla is an Associate Professor of Inorganic Chemistry. Her research addresses the technological barriers that need to be overcome for renewable hydrogen to contribute to Net Zero goals as a zero-emission energy carrier and fuel. She was recently awarded an ERC Starting Grant and will launch a project to pioneer the development of next-generation photocatalysts that efficiently synthesise energy-dense chemicals with sunlight.



Ludmilla's research at Oxford is aimed at the design of atomically defined photo- and electrocatalysts that convert carbon dioxide, water and other "waste products" to energy-rich fuels and chemicals with high conversion efficiency, selectivity and long operational stability.

## Saiful Islam

Department of Materials

Saiful Islam is the Statutory Chair in Materials Modelling. Saiful's research encompasses new materials for lithium batteries and perovskite solar cells, and he leads the Faraday Institution CATMAT project on lithium cathode materials.



Alongside his research on Li-rich cathode materials for lithium-ion batteries, Saiful also studies new solid electrolytes for lithium and sodium solid-state batteries and 3D and 2D halide perovskite materials for solar cells. He has received several awards, including the 2022 Royal Society Hughes Medal and the 2020 American Chemical Society Award in Energy Chemistry.

## Robert Hoye

Department of Chemistry

Robert is an Associate Professor of Inorganic Chemistry and is also a Royal Academy of Engineering Research Fellow.

Robert's group focuses on developing inorganic semiconductors for energy applications, particularly focussing on lead-free perovskite-inspired materials. His vision is to develop a new generation of energy materials that can tolerate defects to achieve efficient performance when grown by cost-effective, scalable synthetic approaches. The research is experimentally focussed, but benefits from strong collaborations with theory groups. Robert was awarded the 2021 Imperial President's Award for Outstanding Early Career Researcher, and has received a European Research Council Starting Grant.



## Jon Blundy

Department of Earth Sciences

Since 2020, Jon has been Royal Society Research Professor in the Department of Earth Sciences. Jon is a Fellow of the Royal Society.

Jon is a geologist interested in all things magmatic from melting of Earth's mantle to active volcanoes. He approaches these topics using a combination of field observations, thermodynamics and high pressure and temperature laboratory experiments. His current research project "From Volcanoes to Green Mining" uses our understanding of magmatic systems to explore new strategies to meet the needs of the energy transition. Of particular interest is using geothermal systems associated with volcanic systems as a source of both renewable energy and critical metals.



## David Wallom

Department of Engineering Science

David Wallom is a Professor in Informatics and Associate Director - Innovation of the Oxford e-Research Centre, where he leads two separate research groups, Energy and Environmental ICT, and Advanced e-infrastructure & Cloud Computing. He is Course Director, MSc in Energy Systems.



David has a diverse set of research interests. His Energy and Environmental Informatics research group plays a key role in finding solutions for energy security and climate change through building ecosystem and energy services. He researches and implements innovative digital methodologies, information and computational solutions for academic research and industrial applications.

## Robert House

Department of Materials

Rob is a Royal Academy of Engineering Research Fellow based in the Department of Materials. He was recently recognised by Forbes magazine in their list of 30 Under 30 scientists and healthcare professionals in Europe.



Rob's research group focuses on materials discovery for next generation rechargeable batteries focusing on sodium-ion and multivalent-ion chemistries, which are lower cost and more sustainable alternatives to Li-ion. He is also a Co-Investigator on the Faraday Institution's CATMAT project working to develop cathode materials for high energy density Li-ion batteries.

## Peter Armstrong

### Mixergy

Pete is CEO and co-founder of Mixergy, an Oxford University spin-out company.

The Mixergy tank was conceived in the Department of Engineering Science at Oxford University by Pete Armstrong and Ren Kang, who joined forces to compete at the 2014 Climate-KIC accelerator competition.

At Oxford, Pete studied the interplay between energy storage and the grid with a particular focus on thermal stores for domestic heating and hot water. Mixergy is building a grid-scale battery through the deployment of intelligent hot water tanks, heat-pumps and (recently) EV chargers. Earlier this year, Mixergy secured a £9.2m investment to support a new R&D centre at their Oxfordshire headquarters. Housebuilder New Product of the Year 2023.



## George Todd

### Oxford Science Enterprises

George is Associate, Deep Tech with OSE and an observer on the Board of Mixergy.

George joined Oxford Science Enterprises in 2021. He focuses on uncovering new opportunities in Deep Tech, as well as supporting the creation of new businesses and the existing portfolio.



Oxford Science Enterprises (OSE) is an independent, billion-pound investment company, created in 2015 to found, fund and build transformational businesses. Investing in companies that are part of the Oxford cluster, with a special focus on the University's science departments

# Attendees (\* speakers)

Aidong Yang	Engineering Science
Alexandra Devlin	Engineering Science
Alison Grunewald	Low Carbon Hub
Allan Paterson	WAE
Allison Arber	Materials
Alycia Leonard	Engineering Science
Amelia Griffiths	Oxford University Innovation
Anca Mihalache	School of Geography and the Environment
Andy Gilchrist	MPLS
Anupama Sen	Smith School
Carolina Tortora*	NG ESO
Ceren Zor	Sigma Lithium
Charlie Wilson*	Environmental Change Institute
Chris Llewellyn Smith	Physics
Chris Morton	
Chris Jacques	
Claire Halloran	Engineering Science
Colin Nolden	Oxford University staff
David Wallom*	Engineering Science
David Ainsworth	bp
Dawn Gordon	Oxford University Innovation
Domenica Cox	Environmental Change Institute
Eleanor Watts	Rose Hill and Iffley Low Carbon
Emilie Vrain	Environmental Change Institute
Emma Wright	STFC
Emmanuel Raptakis	Oxford University Innovation
Eric Brown	Grid Scientific
Esme Mcmillan	School of Geography and the Environment
Felippa Amanta	School of Geography and the Environment
Gabriel Patron	Waterloo, Canada
Geir Karl Njøten	Equinor
Geoffrey Sutton	
George Todd*	Oxford Science Enterprises
Gregory Rees	Materials
Gulcin Avul	Chemistry



# Attendees – continued

Hang Xu	Student
Hanna Rajantie	Materials
Hannah Budnitz*	School of Geography and the Environment
Hannah Scott	Oxfordshire GreenTech
Hugo Thould	Innova Renewables
Ian Byrne	IBECCS
Ievgeniia Kopytsia	Faculty of Law
Ioannis Papakonstantinou	UCL
Jack Umenberger	Engineering Science
Jack Bruford	Engineering Science
Jack Irwin	Low Carbon Hub
Jacob Dawe	Physics
Jasper Singh	Materials
Jenny Gregory	Race for 2030
Jesus Lizana	Engineering Science
Jo Coleman	
Joe Kwiatkowski	
Jon Saltmarsh*	Energy Systems Catapult
Jonathan Blundy*	Earth Sciences
Junfu Bu	Materials
Karen Parry	Environmental Change Institute
Karl Massey	Physics Development Board
Katherine Collett	Deep Science Ventures
Khoa Le	Engineering Science
Kingsmill Bond	RMI
Konstantin Nazarov	
Konstantinos Gatsis	Engineering Science
Lawrence Haar	Brighton
Leigh Mapledoram	Materials
Len Don	Ecosync
Leon Di Marco	
Liquan Pi	Materials
Longlong Wang	Materials
Lucy Field	AFRY
Ludmilla Steier*	Chemistry

# Attendees – continued

Malcolm McCulloch*	Engineering Science
Marcel Seger	Environmental Change Institute
Marin Vukšić	Materials
Marina Topouzi*	School of Geography and the Environment
Mark Sutcliffe	
Mark Saunders	Oxfordshire County Council
Martje Köppen	Law
Marveh Forghani	Materials
Matt Scott*	CFGI, Smith School
Matthew Duhan	bp
Motoaki Sumi	Oxford Science Enterprises
Neil Young	Materials
Nethmi Kariyawasam	School of Geography and the Environment
Nicholas Jelley	Physics
Nick Eyre	Environmental Change Institute
Nicole Miranda	Engineering Science
Oktay Cetinkaya	Engineering Science
Paul Shearing*	Engineering/ZERO
Paul Beasley	Siemens
Pete Armstrong*	Mixergy
Philipp Grunewald*	Engineering Science
Poornima Kumar	School of Geography and the Environment
Pu Yang	Engineering Science
Radhika Khosla*	School of Geography and the Environment
Rajat Gupta	Oxford Brookes University
Rawan Farwana	Oxford Science Enterprises
Rob Millar	WAE
Robert Hoye*	Chemistry
Robert Weatherup	Materials
Robert House*	Materials
Robin Morris	Materials
Rui Qi	Department of Materials
Saiful Islam*	Materials
Sami Walter	Oxford Sciences
Samuel Scheuer	School of Geography and the Environment

# Attendees – continued

Samuel Hampton	Environmental Change Institute
Sarah Ball	EV Metals Group
Sebastian Bonilla	Materials
Serena De Nahlik	Oxford University Innovation
Sergio Lozano-Perez	Materials
Shikang Feng	Materials
Shuhao Pan	
Simon Evans	Lark Fleet Smart Homes
Sinan Kufeoglu	
Syed Hasan Haider	
Thomas Bryden	Engineering Science
Tina Fawcett*	Environmental Change Institute
Tom Smith	Thermofluidics
Wardatun Malatsih	Engineering Science
Weijia Yang	Engineering Science
Weiqi Hua	Birmingham
Wenjia Du	UCL
Yekatherina Bobrova	School of Geography and the Environment
Yi Yuan	Materials
Yige Sun	Materials
Yuan Quan	Student
Zsuzsa Mayer	Ecosync

*List of attendees wishing to be included in the list updated 24 Sep 2023*

## Oxford Energy Network



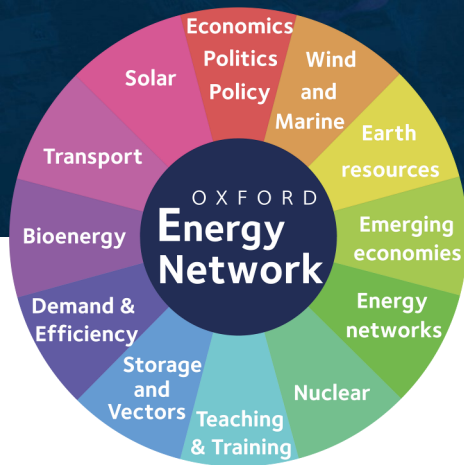
**Convenor: Robin Morris**

Materials Department



**Coordinator: Karen Parry**

Environmental Change Institute



## The **Oxford Energy Network**

connects energy researchers across the University, building on multiple disciplines to address the major challenges and opportunities to enable and accelerate the transition to a zero carbon energy system.

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