

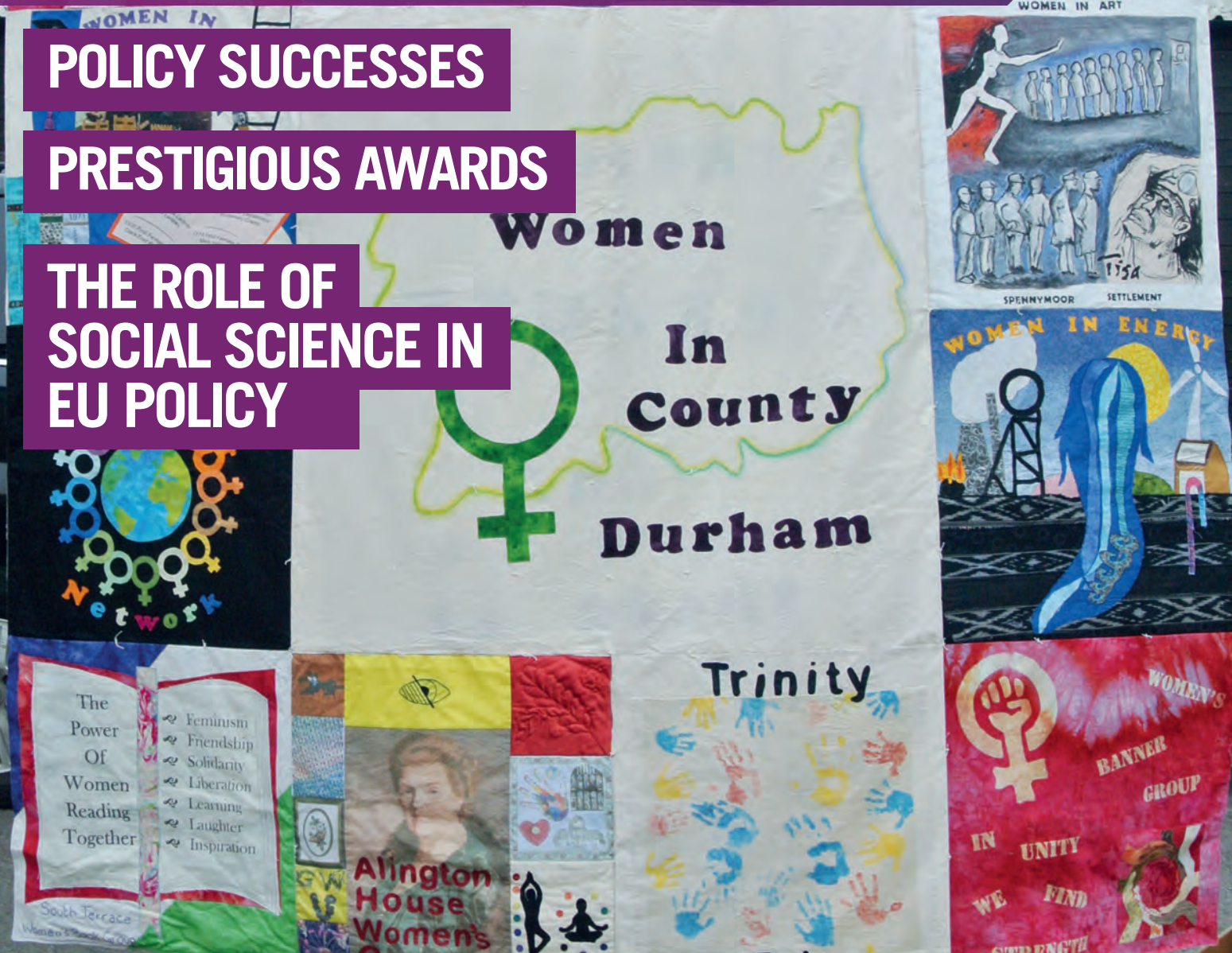
DURHAM ENERGY INSTITUTE REVIEW

ISSUE 10: SUMMER 2018

POLICY SUCCESSES

PRESTIGIOUS AWARDS

**THE ROLE OF
SOCIAL SCIENCE IN
EU POLICY**



Energy for
developing
countries

Energy
Materials
research

Durham
University
Solar Car

// A MESSAGE FROM...

EXECUTIVE DIRECTOR PROFESSOR JON GLUYAS

I am delighted to welcome you to the 10th issue of the DEI Review Magazine and the second edition since I became Director of the DEI. Yet again it has been an extremely eventful 6 months since the last edition and you can find out about many of our activities in this magazine.

I would particularly like to draw your attention to some highlights. The energy materials research group at Durham has fully demonstrated its high level research capacity and is continuing to develop strong international research ties through its successes with the new North East Centre for Energy Materials (NECEM) partnership and the International Rutherford fund success.

We will be making Energy Materials, and the life cycle of materials used in energy technologies, a key focus of this year's DEI Research Symposium on 28th September. I hope to see many of you at this event which promises some very interesting debate and discussion about whether Renewable Energy is Sustainable.

Creating a space for debate and discussion on topical energy issues is a key aim of DEI and we pride ourselves on providing reliable evidence to inform these discussions for people in industry, research, community, and policy sectors.

A key area I myself have been focusing on, in collaboration with Dr Charlotte Adams, has been to bring the potential of Geothermal Energy in the UK onto the public agenda.

Based on our research at Durham and within the BritGeothermal partnership we have organised events and briefings within the region and with Government representatives to discuss this opportunity which is currently not given enough emphasis by Government. We were extremely happy when Regional MP Helen Goodman led a debate in Westminster about Geothermal in the UK and the potential of using the abandoned mines in her constituency as a source of heating for new residential developments. We are continuing to work with Helen to ensure that opportunities are created in the UK for this technology. It is a testament to the wonderful work of Dr Adams that she was also awarded the Aberconway medal by the Geological Society this year.

A combination of photovoltaic power and geothermal energy formed the basis for a workshop held by DEI in early May here in Durham with representatives from the key universities on northern India; Jammu University and the University of Central Kashmir. The aim was to develop an initiative that could start to deliver clean, reliable, low carbon electricity to areas like Ladakh in Kashmir that currently relies upon imported diesel for power and dried dzho dung for heat.

The output from the workshop will form the basis for a Global Challenges Research Fund bid.

This commitment to community engagement at DEI goes beyond the working day and is reflected in the volunteering activity outside work that the DEI team are engaged in. All three of the DEI staff team (Lynn, Evelyn and Jacki), along with Dr Charlotte Adams and Dr Theresa Jezierski from Earth Sciences, have been involved in an exciting new initiative for County Durham – the Woman's Banner Group – celebrating the diverse roles of women in County Durham's history, politics and local community. It is wonderful that their banner will be the first all-female banner to be officially recognised by the Durham Miners' Association and take part in the Durham Miners Gala in July. This is particularly meaningful in the year which we celebrate 100 years since some women gained the right to vote.

**Find out how you can support DEIs
work at [www.durham.ac.uk/dei/
campaign/](http://www.durham.ac.uk/dei/campaign/)**

POLICY SUCCESSES

// DEI QUOTED IN SELECT COMMITTEE FINAL REPORT ON BREXIT



The European Union Select Committee Sub-Committee on EU Energy and Environment published its report on **'Brexit: energy security'** in January, looking at implications for energy supply, consumer costs and decarbonisation. Durham Energy Institute is quoted several times in the report on questions related to energy security, the Internal Energy Market, research collaboration, policy uncertainty and Euratom.

The select committee report concludes that, post-Brexit, the UK may be more vulnerable to energy shortages and asks the Government to set out how it will work with the EU to anticipate and manage such conditions.

// Find out more at
www.durham.ac.uk/dei/resources/briefings/brexit/

// NEW DEI BRIEFING: POWER FROM THE PEOPLE - PROSUMING SOLAR ELECTRICITY IN THE UK, BEYOND THE FEED-IN TARIFF

This briefing paper looks at domestic Solar PV in the UK and the increase in 'prosumers' who generate their own electricity, and consume both their own generated power as well as grid electricity.

The briefing identifies the driving forces and hindrances behind UK householders becoming electricity prosumers. What have been the drivers of the rise in PV Prosumers and what changes can we expect in the future? What implications does this have for future policy challenges?

These insights arise from the project "Power From the People" (2015-2018) funded by the Research Council of Norway (ENERGIX Programme), led by Hege Westskog (CICERO Centre for International Climate Research, Oslo), with Prof Sandra Bell from Durham University and Fridtjof Nansen Institute, Oslo.

// Find out more at
www.durham.ac.uk/dei/resources/briefings/



// PARLIAMENTARY DEBATE ON UK GEOTHERMAL RESOURCE

Research by DEI Director Prof Jon Gluyas and DEI Fellow Dr Charlotte Adams was highlighted a number of times in a Parliamentary debate on 19 July in Westminster Hall on the potential for geothermal energy in UK.

Helen Goodman, MP for Bishop Auckland, led a debate in Parliament on the potential of geothermal energy in the UK. She called on the Government to take advantage of the huge potential of UK geothermal energy resources. The debate was seen as a great success with support from other MPs across the country.

Helen explained:

"The oil and gas industry, which employs more than 300,000 people in the UK, is already struggling because of low oil prices. Developing our geothermal resources will give us enough energy to heat a quarter of UK homes for an entire century, and could create thousands of jobs.

"The environmental benefits are extremely significant too. If the 7 million homes in coalfield areas switched their gas boilers for a heat pump, 11 million tonnes of carbon dioxide emissions could be avoided every year.

"Despite this, the Government have not been prioritising geothermal energy; it is almost completely ignored in their Clean Growth Strategy. I really believe that the Government needs to start exploiting this alternative, clean energy source more effectively to give British citizens and the environment a fairer deal."

Dr Charlotte Adam's said:

"I am delighted that my research on geothermal energy has contributed to a debate in Westminster. I firmly believe that geothermal has an important role in the UK's future energy mix as a low carbon energy source that could be used to offset consumption of natural gas. Through the Durham Energy Institute at Durham University, we have been working with Helen Goodman on the potential of using the abandoned mines in her constituency as a source of heating for new residential developments. This research shows that there is resource in place for more than 100 homes and we are working to highlight this potential amongst developers

and planners. This research is transferrable to other mining regions and it is estimated that around one third of UK homes are located in former mining areas and could access this resource.

Finding alternative, low carbon heat sources is important because heat accounts for around half of the UK's energy demand and most of this is provided by natural gas. This has implications for our future energy security. BritGeothermal is a national research group that has been working to promote the UK's geothermal resource which we estimate has the potential to meet the UK's heat demand for many decades."

Charlotte and Jon are continuing to work with Helen Goodman to identify the best ways forward to reduce policy barriers and facilitate the implementation of new Geothermal projects in the UK.

// Find out more at
www.durham.ac.uk/dei/resources/briefings/geothermal/

// RESPONSES TO BEIS INQUIRY: 'PROPOSALS REGARDING SETTING STANDARDS FOR SMART APPLIANCES'

DEI submitted two responses to the BEIS inquiry. The first was from Dr Hongjian Sun, DEI Fellow and Head of Durham's Smart Grid Laboratory in Engineering, drawing on his insights from several EU and EPSRC funded projects focused on demand side management, Information and Communication Technologies (ICT) and smart energy systems. The second response was from Professor Sandra Bell, Anthropology, drawing on her experience of consumer interactions with smart appliances through projects such as the Customer Led Network Revolution and 'Power from the People' which focuses on domestic solar prosumers.

// Find out more at
www.durham.ac.uk/dei/partnerships/government/

DEI NEWS

// BRENT CHESHIRE APPOINTED PROFESSOR OF PRACTICE AT DURHAM UNIVERSITY

It is with great pleasure we announce that Brent Cheshire has recently been appointed as a Durham University Professor of Practice through the engineering department.

Professors in Practice are a new initiative of Durham University to recognise the expertise, experience and commitment of senior members of the practitioner community who bring public distinction and practical experience to enhance the educational experience of students at Durham University and who provide unique connections for Durham University's research and scholarship to increase its engagement with policy and practice.

We are delighted that one of the first Professors of Practice for this initiative is a distinguished expert from the energy sector with long-term ties to the Energy Institute. Brent has provided invaluable support and development advice to the DEI since its inception and has already begun his new role advising Engineering on new postgraduate training offer and helping to build a new Advisory Board for the newly expanding department.

// NEW MEMBERS OF DEI ADVISORY BOARD

DEI are very happy to welcome new members to the Advisory Board.

Patrick Erwin Policy & Markets Director, Northern Powergrid

Brian Matthews Strategic Outage Manager, EDF Energy

Paul McKeever Head of Strategic Research, ORE Catapult

Helen Stockton Research Manager, National Energy Action

DEI works closely with members of the Advisory Board to ensure that we continue to understand and lead thinking within the UK and Global Energy Industry. Members of the Advisory Board are chosen from across the technology and societal energy spectrum to provide advice, strategic support, industry links and support into new markets, collaborations and countries. Members of the Advisory Board are happy to provide guidance and support to researchers and students at Durham University.

// To find out more about our Advisory Board members go to www.durham.ac.uk/dei/advisory_board/

// HONORS LIST - RECOGNITION IN THE NEW YEARS AND 2018 QUEEN'S BIRTHDAY HONORS LIST

Brent Cheshire - CBE



Congratulations to the former UK Chairman of Ørsted (DONG Energy) Brent Cheshire, on receiving his Commander of the Order of the British Empire (CBE) for services to the renewable energy sector. Brent is an Alumni of Durham University and has been instrumental in developing the strong links between Ørsted and Durham University which led to a thriving strategic partnership between the two organisations.

Professor John Loughhead – CB



Congratulations to John Loughhead, Chief Scientific Advisor at the Department for Business, Energy and Industrial Strategy, who has been made a Companion of the Order of the Bath for services to research and development in the energy sector. John previously was awarded an OBE. John has had an important advisory role in the DEI since its inception in 2009 as a member of the Development Board and then Advisory Board. John is now an Associate Fellow of DEI.

Jenny Cooper – MBE



Congratulations to Jenny Cooper, DEI Advisory Board member and Durham University Alumni who was awarded an MBE for Energy research services in the New Year's Honors list. Jenny specialises in research and development management. Jenny was at National grid for 10 years where she was responsible for Transmission research and development and since 2014 has been an Independent Energy Innovation Specialist.

// UPDATE ON PARTNERSHIP WITH MEXICO

In July Evelyn Tehrani of DEI staff team accompanied Durham University's PVC Global, Claire O'Malley, to the launch of two Durham University English Language courses being run by Durham's English language Centre in Mexico in Culiacan, Sinaloa and Chihuahua. These courses are designed to support high calibre students from disadvantaged Mexican regions to access the world leading postgraduate opportunities at Durham and Leeds Universities. We look forward to receiving students through this programme next year to undertake energy related research.

Evelyn has also continued to support Mexican students to identify energy-related postgraduate opportunities at Durham through the CONACyT partnership and represented the University at Mexican post graduate student recruitment fairs between 12-20 April. There are currently 59 Mexican students undertaking postgraduate research and training at Durham as a result of the partnerships with CONACyT.

// DEI DIRECTOR HAS JOINED OFGEM ACADEMIC ADVISORY PANEL

Prof Tooraj Jamasb, DEI co-Director and Chair in Energy Economics at Durham University Business School has joined Ofgem's Academic Advisory panel. The panel is made up of twelve academics with a wide range of experience including regulatory economics, competition economics, behavioural economics, statistics and econometrics, and economic evaluation. The aim of the panel is to:

- Enhance Ofgem's strategic thinking and early-stage policy development.
- Enable the organisation to build wider links to the academic community by highlighting relevant work and providing recommendations for engagement on specific projects.
- Improve knowledge exchange between Ofgem and the academic community through trainings, seminars and contributions to think pieces on policy issues.

// DR CHARLOTTE ADAMS WINS PRESTIGIOUS GEOLOGICAL SOCIETY MEDAL



Dr Charlotte Adams, DEI mid-career fellow, has been awarded the prestigious Aberconway Medal by the Geological Society. This medal is awarded for excellence in applied geoscience and reflects Charlotte's ground breaking work in ultra-low enthalpy geothermal energy.

Heat can be extracted from the water flooded coal mines. The legacy of mines in the UK, their abundance and their distribution is such that most of the major population centres in the UK could have heat supplied from such mines allowing the UK to improve its energy security while simultaneously decarbonising heat. Translation of theory to practise is underway and Charlotte's work in the area has made a significant contribution to this.

Malcolm Brown, President, Geological Society of London, said:

"Charlotte Adams' work bridges the gaps between academe, industry and society. As co-founder of BritGeothermal, the UK national research body for geothermal energy, she has brought together practitioners, academics, local councils and government, to enable the exchange of ideas and development of networks that will, ultimately, de-carbonise the heating of the UK. Her success derives from her ability to translate technical and scientific information into terms accessible to local community groups – groups who are now beginning to see a future in energy provision from the legacy of the abandoned coal mines above which they live. She is a scientist with outstanding communication skills, and a worthy recipient of this year's Aberconway medal."

Professor Jon Gluyas, Director of Durham Energy Institute said:

"I am delighted to see Charlotte win the prestigious Aberconway Medal from the Geological Society. It is testament to Charlotte's skills in applying her geological and engineering knowledge of the Earth's subsurface and translating this into real world, economically attractive energy delivery projects. Her insight into the low carbon heat that could be won from abandoned and flooded coal mines could revolutionise the way the UK wins and distributes heat - this is 'big stuff', 50% of our national energy bill".

Dr Charlotte Adams is also the research manager for the BritGeothermal Research Partnership which is based in the Department of Earth Sciences.

Charlotte has both industrial and academic experience having joined industry on secondment to investigate the potential of abandoned mine workings for exploitation by ground source heat pumps and worked subsequently for several years in the renewable energy industry before joining Durham University in 2009. Her research interests include hydrogeology, hydrogeochemistry, geothermal energy and ground source heat and microgeneration.

It was a very successful year for Durham University Earth Sciences with two other winners: Professor Robert Holdsworth of Earth Sciences, previous winner of the Aberconway medal in 2006, was also recipient of the Coke Medal for contributions of great significance to Geology; and Dr George Cooper, Postdoctoral Research Associate in the Department of Earth Sciences, received the Murchison Fund for his work on pre-eruptive state of volcanic plumbing systems and the timing of the magmatic processes that lead to eruptions.

// Find out more about the awards at <https://www.geolsoc.org.uk/About/History/Awards-Citations-Replies-2001-Onwards/2018-Awards-and-Citations>

Find out more about Dr Adam's work at www.durham.ac.uk/dei/research/geoenergy/

// DR DONAGHY-SPARGO WINS PRESTIGIOUS ACADEMY AWARD



Dr Donaghy-Spargo has been recognised for outstanding impact in his field with a prestigious Royal Academy of Engineering Award after becoming one of the winners of the RAEng Engineers Trust Young Engineer of the Year competition. Awarded by the Royal Academy of Engineering, the competition recognises outstanding early career engineers with prizes of £3,000 each.

Dr Christopher Donaghy-Spargo is Assistant Professor of Electrical Engineering and Deputy Research Director for Future Energy Systems at Durham University. He is also a Durham Energy Institute Early Career Fellow and leads on DEI STEM outreach activities to schools and public events. His specialization is in heavy current electrical engineering and electromechanics, particularly rotating electrical machines under the theme of 'Energy efficiency and sustainability'

He is the author of over 25 peer-reviewed technical articles, with his first journal paper published while he was an undergraduate student – a rare achievement. During his PhD investigating high-efficiency motor technologies for industry, Dr Donaghy-Spargo won a number of prestigious awards, including the Sir Henry Royce Medal for Young Professionals from the Institution of Engineering and Technology (IET). He has been elected to sit on the IET's main board and serves as Vice-Chair of the Electromagnetics Technical Professional Network.

He was a Chartered Engineer by the age of 28, working with Dyson, where he led industrial research and development projects before returning to academia. He has gained both Chartered Mathematician and Chartered Scientist status, demonstrating his extensive technical achievements, and his commitment to the profession and continuing professional development.



SHAPE ENERGY – THE ROLE OF SOCIAL SCIENCE IN EU ENERGY POLICY

SHAPE ENERGY is the €2m European platform for energy-related social sciences and humanities (energy-SSH). Social sciences and humanities research has played less of a role to date in shaping European energy policy than Science, Technology, Engineering and Mathematics (STEM) disciplines. SHAPE ENERGY aims to develop Europe's expertise in using and applying energy-SSH. Their Platform bring together those who 'demand' energy research – including businesses, policymakers, and NGOs, who can use it to develop practical initiatives – with those who 'supply' that research.

The SHAPE ENERGY funded 10 interdisciplinary and cross-European 'think pieces' that explore, critique and showcase the ways that different disciplinary approaches can (and should be) integrated for the betterment of future EU energy policy. DEI members are leading on 2 of these.

// The two think pieces that have been written will be published later this year in a collected volume of other Social Science and Humanities perspectives by Palgrave, and online via the SHAPE ENERGY website. <https://shapeenergy.eu>

// TOWARDS A POLITICAL ECOLOGY OF EU ENERGY POLICY

Professor Gavin Bridge (Geography) received a small grant from SHAPE ENERGY Platform to develop a 'Think Piece' on what the interdisciplinary field of Political Ecology can bring to the analysis of EU Energy Policy.

Funding enabled Gavin to assemble an international writing team that drew on several of his previous research collaborations, including a large interdisciplinary training network in political ecology funded by the European Commission (www.politicaecology.eu) and a project on energy infrastructure supported by the UK's Newton funding (<https://www.sciencedirect.com/science/article/pii/S2214629618302251>). The writing team included:

- Ryan Wyeth (Durham University Geography),
- Prof. Stefania Barca (University of Coimbra),
- Dr Ethemcan Turhan (KTH Royal Institute of Technology, Stockholm) and

- Prof. Begüm Özkaynak (Boğaziçi University, Istanbul).

Writing began with a workshop at the Centre for Social Studies, University of Coimbra in Portugal, that brought together expertise in environmental history, energy studies, economics, political ecology and human geography. Participants developed a set of ideas about the evolution of EU energy policy and the specific contributions of political ecology to social science research.

Political ecology first emerged in the 1970s as a critical response to technocratic and managerialist approaches to the environment. It has subsequently evolved, and is now a well-established interdisciplinary social science field with a record of work in relation to environmental policy and socio-ecological conflict. It examines how economic and political power shape social and environmental outcomes, and is informed by both critical social theory and the experience of social movements. It pays close attention to

how social power is sustained through scientific concepts and popular discourses around management of society-environment relations (e.g. scarcity, security, efficiency and risk). It also unsettles and problematizes dominant forms of knowledge by generating alternative data and concepts, often through research on and with marginalised social groups.

To date, there is little research on (EU) energy policy from a political ecology perspective. The Think Piece argues, however, that social science research on energy policy can draw on several insights from political ecology's substantial record of work on environmental conflicts. A political ecology perspective often expands the range of voices heard when researching energy policy issues, offering a distinctive 'view from below'. The alternative concepts, analytical scales and histories originating from the experience of affected communities and environmental justice organisations can significantly enrich – and transform – policy analyses.

// CROSSING BORDERS: PERSPECTIVES ON EUROPEAN ELECTRICITY INTEGRATION

The think piece focuses on the variety of energy-related Social Sciences and Humanities (energy-SSH) research. It aims to unpack its implications for energy policy by bringing together four different SSH scholars into a conversation about their research and policy engagements. Focusing on European electricity systems integration, their projects have been funded by the EU Horizon 2020 and various public and private bodies nationally and subnationally.

Working within history, political science, sociology, and science and technology studies, their research covers unique aspects of electricity integration in different SSH disciplines – including:

- long-term historical continuities and changes in European energy integration;

- influence of political actors in the European Energy Union;
- impacts of international energy integration in the management of energy systems and markets; and
- building of socio-technical and material systems that underpin European energy infrastructures.

The think piece starts from these interests and explores different notions of energy systems integration in the EU and from different disciplines; what evidence there is on energy systems integration from different disciplines; and what policymakers expect from energy-SSH research.

Our think piece is valuable for the future of energy policymaking by exploring

- what is unique to the 'energy' problems in the matter of integration;
- what could be considered 'successful' integration and what is being 'integrated' in energy systems integration;
- what different SSH disciplines can contribute, how they emerged in the energy context, and with what implications for energy policy; and
- suggesting future ideas for interdisciplinarity, and policy interactions.

// Please feel free to contact the lead author Antti Silvast for further information: antti.e.silvast@durham.ac.uk

ENERGY MATERIALS RESEARCH UPDATE

// NEW NORTH EAST CENTRE FOR ENERGY MATERIALS (NECEM) LAUNCHED



The official launch of the new North East Centre for Energy Materials (NECEM) was held in March. NECEM is formed

between the universities of Newcastle, Durham and Northumbria, uniting the breadth of expertise present at the three sites to tackle industry-led challenges in energy materials.

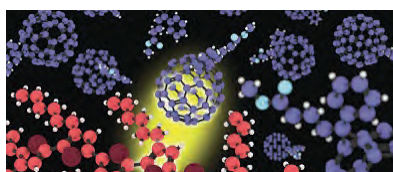
The main focus of NECEM will be to address one of the most fundamentally critical elements of all energy systems, **namely the interfaces between the materials within it and their interaction with the environment in which they operate.**

The Centre is a platform to facilitate cooperation with local, national and international industrial partners to:

- lead the UKs research into energy materials, along with 5 partner centres;
- be a world-leading programme for the understanding and manipulation of interfaces in energy materials;
- identify new areas of research through engagement with industry;
- deliver breakthroughs in understanding interfacial and surface processes leading to the discovery of new functional materials and methods for Energy Generation, Capture, Storage and Distribution.

The nascent Centre was supported by a DEI funded Symposium in April 2017 which showcased the wide ranging energy materials expertise across the region's Universities.

It brings together engineers, chemists, and physicists to develop high performance materials to improve efficiency in energy



generation, storage and transmission whilst further enhancing the region's expertise in tackling the energy challenge.

The assets for NECEM include the breadth of expertise within marine energy (tidal and wave energy), solar (photovoltaic and solar fuels by photoelectrochemistry), fuel cells (hydrogen and alcohol based, also enzymatic and microbial), energy storage (Li-Ion, redox flow batteries), biomass (gasification, fermentation and direct conversion to heat or even electricity) and local smart grid structure (with concurrent production and consumption of renewable energy).

The Durham University team, will contribute particularly in the areas of solar energy, simulation, and the advanced analytical tools needed to observe how materials behave at a molecular level.

Durham Researchers are: Dr Chris Groves (Durham Lead, Engineering), Dr Douglas Halliday (Physics), Dr Paul Hodgkinson (Chemistry), Dr Alton Horsfall (Engineering), Dr Michael Hunt (Physics), Dr Budhika Mendis (Physics), and Dr Natasha Shirshova (Engineering).

"The new research centre is an exciting opportunity to examine how, at the micro level, materials and interfaces can be designed to address the bigger energy challenges facing our world"

// Find out more at www.durham.ac.uk/dei/research/energy.materials/

// 1ST NECEM SUMMER SCHOOL ANNOUNCED: X-RAYS FOR ENERGY MATERIALS – 5 TO 7 SEPTEMBER

NECEM is pleased to announce its first summer school dedicated to the use of x-rays in the understanding and development of energy materials.

This summer school, held at Newcastle University, is open to EPSRC eligible PhD researchers from across the UK free of charge.

The school includes expert speakers in both diffraction and spectroscopy.

The summer school also includes wider academic training in 'How to publish your work' from the editorial team of *Energy & Environmental Science* and 'How energy materials researchers can feed into Parliament and how Parliament uses science research' delivered by the **Department for Business, Energy & Industrial Strategy** select committee.

Networking and opportunities to showcase your research in flash presentation style will also be available.

// Get updated on the summer school and register your interest at <https://research.ncl.ac.uk/necem/summerschool/>

// DEI WELCOMES INTERNATIONAL RUTHERFORD FELLOWS

In February Dr Paul McGonigal (Department of Chemistry) and Dr Alyssa-Jennifer Avestro (Durham Energy Institute Early Career Fellow in Chemistry) were successful in securing funding to host talented early career researchers in energy material at Durham Energy Institute.

The four Rutherford Strategic Fellows in Organic Energy Research (RSFs) have now arrived in Durham from India, Malaysia, and Mexico.

- **Dr Abhijit Mallick** from Indian Association for the Cultivation of Science (IACS) has joined **Dr Paul McGonigal's Research Group in Chemistry**;
- **Dr Ali Huerta** from Universidad Autónoma de Nuevo León, Mexico has joined **Dr Chris Groves' Group in Engineering**;
- **Dr Kai Lin Woon** from University of Malaya, Malaysia, has joined **Prof Andy Monkman's Group in Physics**; and
- **Dr Pavan Yerramsetti** from Indian Association for the Cultivation of Science (IACS) has joined the **Dr Alyssa Avestro Group in Chemistry**.

The RSFs will push the boundaries of organic energy materials for storage, generation, and transmission alongside experts from the Departments of Chemistry, Physics, and Engineering. Engaging in a collaborative and interdisciplinary 'discovery-to-device' approach to materials research.

Guided by one of four expert hosts from Durham the RSFs will:

- (i) synthesise electronically active molecules and materials (Chemistry),
- (ii) characterise their properties using advanced spectroscopies, crystallography, and microscopy (Chemistry & Physics), and
- (iii) evaluate promising materials ex-device and within bench-scale energy storage prototypes (Engineering).

Durham University produces **world leading research in energy materials** across multiple departments in the sciences and social sciences. These activities target a range of applications, including **photovoltaics, fuel cells and batteries**, and **materials for nuclear fusion technologies**. The organic photovoltaics research at Durham University is a shining example of interdisciplinary collaboration with the group including modellers and experimentalists who work together to produce cutting-edge research.

RSFs will join this vibrant multidisciplinary community of researchers who are supported by the Durham Energy Institute.

// Look out for upcoming DEI seminars and activities featuring our new Rutherford Fellows www.durham.ac.uk/dei/projects/rutherford/



RESEARCH UPDATE // ENERGY IN DEVELOPING COUNTRIES

// POWERING CONFLICT, FUELLING RESISTANCE: IS THE RENEWABLE ENERGY SECTOR REPLICATING 'BLOOD OIL'S' INJUSTICES IN SOME AFRICAN CONTEXTS?

Dr Joanna Allan's three year research project *Powering Conflict, Fuelling Resistance*, funded by a Leverhulme Fellowship, focuses on renewable energy's more questionable activities in Africa. Mainstream discourse envisages green energy as the unproblematic solution to 'blood oil,' where the concept of 'blood oil' describes cases where the fossil fuels industry has been embroiled in colonialism, violence and environmental destruction. Yet Dr Allan's research suggests that the renewable energy transition is replicating 'blood oil's' injustices in some African contexts.

She seeks to understand how and why this replication is occurring, and how it can be resisted. To do so, she is critically interrogating the use of green energy by authoritarian regimes and their industry partners, and, through interviews, ethnographic fieldwork and ecocritical analysis of resistance literatures, she investigates the coping strategies and resistance of indigenous communities faced with energy injustices. Dr Allan thereby aims to contribute to a green energy transition that serves justice for

marginalized communities as well as for the environment.

Dr Allan commenced her research fellowship in March 2018, hosted by the department of Hispanic Studies in the School of Modern Languages and Cultures (MLAC). One of her key case studies in the project is Spain's ex-African colony of Western Sahara, which has been occupied by neighbouring Morocco since the Spanish exit in 1975. There, oil multinationals and solar and wind energy companies partner the Moroccan regime to respectively drill and build developments on occupied land, against the express wishes of the indigenous Saharawi people. Saharawis that have protested against these activities have been beaten, imprisoned and subject to other human rights abuses. Key scholars in the environmental humanities have called attention to the merits of combining research with activism, in order to ensure impact and public engagement alike. Dr Allan has worked for several years with Western Sahara Campaign UK, Western Sahara Resource Watch and the Saharawi people's representatives to fight similar

resource exploitation, resulting in several divestments and three successful court cases over 2016-2018 in the European Union and South Africa against the plunder of fisheries, agricultural produce and phosphates. She hopes that her current academic research might inform similar action on unscrupulous energy developments.



// DEVELOPING PERFORMANCE-BASED DESIGN FOR FOUNDATION SYSTEMS OF WIND TURBINES IN AFRICA (WINDAFRICA)

Dr Ashraf Osman, Associate Professor, Department of Engineering is leading a major GCRF project to accelerate the development of wind energy in Africa by providing reliable and economical foundation solutions.

Africa is facing the challenge of generating more power to meet existing and future demand. Currently, about one-half of Africa's total population is lacking access to electricity. However, the continent is well endowed with renewable energy resources; it is estimated that about 35% of the world resources for wind energy are located in the continent. There are many challenges which hinder the development of infrastructure for wind energy in Africa. Designing suitable foundations to sustain the loads typically applied by wind turbines represents a particular challenge. Site investigations have shown that many areas that have been identified as suitable for wind turbines are underlain with expansive

soils. These soils are particularly sensitive to soil moisture changes; as the water content of the soil increases during the wet season, the soil swells causing surface heave. During the dry season, shrinkage occurs producing settlements. This seasonal shrink/swell cycle can cause significant damage to buildings directly founded on these soils.

WindAfrica project aims to provide design for the foundations of wind turbines in unsaturated expansive soils. The main objectives of this project are:

- To perform, field tests and centrifuge tests on the cyclic response of foundations on unsaturated expansive soils
- To perform an extensive laboratory study on samples of soils taken from potential wind energy locations in Africa
- To develop a numerical analysis code to allow detailed studies to be performed on

foundations with various geometries and configurations.

- To develop a simplified semi-analytical model for foundation deformation and bearing capacity.
- To provide foundation design guidelines for wind turbines in Africa.

WindAfrica has received £1.27M from the Engineering Physical Sciences Research Council through the Global Challenges Research Fund (GCRF). The GCRF scheme supports cutting-edge research that addresses the challenges faced by developing countries. WindAfrica is led by Durham University and Dr Osman is the Principal Investigator.

// Find out more at www.durham.ac.uk/dei/projects/windafrika/

// LCEDN AND THE TRANSFORMING ENERGY ACCESS (TEA) INITIATIVE

Since December 2016, the Low Carbon Energy for Development Network (LCEDN) has been working on an 18 month programme funded by the Department for International Development (DFID) as part of their Transforming Energy Access (TEA) Initiative.

The objective of DFID's TEA initiative is "(to) deliver new technologies and robust evidence on the critical barriers hampering systemic change and scaling up energy access, working with Southern researchers and entrepreneurs to drive locally relevant innovation and delivery."

LCEDN have been funded to deliver a partnerships for skills programme to help fast track the Skills and Expertise workstream of the TEA initiative. This work has been divided into two areas:

1. A programme of skills development and research/innovation integration, which focuses on mobilising and developing energy and development capacities and expertise across research and innovation communities in North and South and strengthening the coordination of UK energy and development research and innovation.

The LCEDN have been working with partners

on a **review of the current state of UK research and innovation** in this area to identify key institutions and research centres, thematic areas of excellence, research funding trends over the last decade, emerging research themes and key areas for potential further development of research and innovation capacity.

There has also been a focus on **research community capacity building** by funding activities such as: two capacity building workshops held in Nakuru, Kenya and Edinburgh; partnering prizes to enable early career researchers to begin to build the capacity and networks needed for larger grant proposals; and a short-term placement programme for post-graduates and early career researchers.

Two major international conferences bringing together international researchers, practitioners, policy makers and funders have also been organised during this time. The first of these were held in Durham in September 2017 and in Loughborough May 2018.

A further emphasis of this part of the programme has been on **developing new approaches to broadening academic dissemination**, including development of the LCEDN's new website to become a hub for different kinds of information about low carbon energy initiatives in a global south context. The website features information about all the Events and Initiatives LCEDN are involved in, provides different kinds of information for researchers and practitioners and also hosts a blog.

2. The second part of the TEA programme has been a **set of specific capacity building alliances with key partners and stakeholders**. Strengthening multisectoral links by bringing together different stakeholders beyond academia is a key aim for the LCEDN. Activities have included a 2-day workshop focusing on issues of gender in relation to energy, organised in collaboration with the ENERGIA international network on gender and sustainable energy, a workshop on energy governance organised in partnership with the Africa Sustainability Hub, as well as co-organisation of the bi-annual International Conference on Developments in Renewable Energy Technologies (ICDRET) in Kathmandu.

We have also held a **series of monthly webinars** organised in partnership with the Smart Villages Initiative around a number of different issues relating to the broad theme of energy access which have been well attended by a diverse set of stakeholders. The LCEDN have also supported **Engineers without Borders** in their development of a design challenge for engineering students and a programme of international volunteer placements.



// Find out more at www.lcedn.com

// ENERGY ON THE MOVE



This project, led by Dr Ben Campbell (Anthropology) and with Dr Cherry Leonardi, (History) aims to understand better and develop routes to successful energy transition for the poorest and most disadvantaged in four low-income countries: Nepal, Bangladesh, South Sudan and Nigeria.

The research examines the energy practices of very poor women, men and young people living in informal settlements in peri-urban situations in the different countries and how these are changing, drawing comparative lessons across the study countries.

It challenges conventional approaches to energy transition research. Lack of access to clean energy limits economic development, stifles people's life chances and traps millions into extreme poverty. Sustainable

Development Goal 7 makes bringing access to affordable, clean and reliable energy for the poor a necessary element in transforming the development prospects for the 1.4 million people currently without modern energy services. However, while considerable development activity is being devoted to bringing new technological products from renewable energy research centre laboratory benches into the affordable reach of the energy-poor, current approaches to energy transition are deficient, not least because they fail to take into account the specific contexts and needs of the poorest and most marginal groups in low income countries: the women, men and youth on whom we focus in this project.

The study will explore the energy practices of those who have experienced displacement as a result of environmental precarity (disasters or climate change), or political conflict, and are living in peri-urban locations but unconnected to the electricity grid. They offer a prime example of vulnerable groups whose energy requirements continue to be (poorly) met by biomass: the implications are substantial and extend beyond energy to transport and other sectors, such as food, water, health.

The study's novel purpose is to understand the range of means by which the poor access energy for light, heat and cooking fuel, and how this may have changed over time. We will also explore the wider contextual frame within which the energy practices of the very poorest in each country are being played out,

both with respect to the energy ministry and cross-ministry (e.g. transport/energy/women's affairs) relationships, and regarding NGO activities and community actions.

The study sits at the intersection of poverty, gender, environmental sustainability and conflict/fragility concerns, requires a new, holistic approach to energy transformation. Drawing on the diverse disciplinary backgrounds of the team and employing in-depth interviews, focus groups and archival research, we will build an approach which is a) highly contextual, b) firmly cross-sectoral; and c) takes an explicitly longitudinal approach, learning from past histories and incorporating experiences and debates that extend well beyond energy to include issues ranging from land access to governance, livelihoods to gender.



Credit: afh_hq flickr575

LOW CARBON DURHAM

// D-CARBONISE DURHAM UNIVERSITY

For the past eighteen months, Durham Energy Institute has been working with Durham's Estates and Buildings Department to develop a project that will significantly reduce the University's carbon emissions.

The Higher Education Funding Council for England have set a target for all Higher Education Institutions to achieve a 43% reduction in carbon emissions by 2020 against a 2005/6 baseline. Durham had implemented a Carbon Management Plan in 2011 to work towards achieving this goal which has achieved a reduction of 16% to date through a combination of improved energy efficiency, plant and fuel source replacement and behavioural change. This reduction has also saved the University millions in energy costs and some of this saving has been allocated to an energy saving project

budget. However, over time and following the completion of the initial energy efficiency programme it has become increasingly obvious that this larger target would not be achieved within the timescale required and a step change in investment is required to meet the target.

The 2016 University masterplan announcement of plans to expand, to increase the student population by a further 4500, and to repurpose the Stockton campus has led to increasing concerns that emissions would soon start to reverse their downward trend.

However DEI also saw these expansion plans as an opportunity to decarbonise!

Durham Energy Institute leaders have worked with Estates and Buildings to develop project D-Carbonise, a programme designed to meet and, if possible, exceed the HEFCE carbon reduction target through utilising the opportunities that University expansion offers to design and implement innovative infrastructure, sustainable education and provide the students with a low carbon experience, effectively creating a living lab for energy research and teaching at Durham.

The major challenge in the D-Carbonise

programme is to address the University's heat demand and the project aims to achieve this through utilising resources available on the estate such as minewater, geothermal, river water, wind and solar energy, coupled with our world leading expertise in smart grid and energy storage technologies. The estate faces planning constraints due to its proximity to the World Heritage Site of Durham Cathedral and so our ability to utilise wind is very limited.

To date, the D-Carbonise project has undertaken a review of the University estate and masterplan expansion proposals and has identified a 10 year plan that will achieve the required reduction, whilst also supporting the growth of the student cohort. Further work is now being undertaken to embed these proposals into the masterplan programme as well as supporting a number of feasibility projects to demonstrate the usage and effectiveness of heat from our natural assets (minewater, geothermal, waste heat).

If you are interested in supporting any of our feasibility or demonstrator projects please get in contact with Jacki Bell at jacki.bell@durham.ac.uk. We would welcome new partners, project ideas, locations and funding!



// NEW INFRASTRUCTURE FUNDING FOR SMART GRIDS LABORATORY AT DURHAM UNIVERSITY

Dr Hongjian Sun who leads on Durham University's Smart Grid laboratory has successfully secured £485,000 funding for research equipment to build a new Smart Energy Tech Hive (SETH). The funding will be used to:

- Upgrade current smart grid laboratory to a new-tech demonstration platform capable of demonstrating various smart energy technologies, such as 1) Blockchain-based peer-to-peer energy trading, 2) Internet of Things-based smart home, and 3) Renewable energy-powered markets.
- Engage with industrial partners and other stakeholders by allowing them

to test their new products or services in the SETH and to improve the impact of Durham's research in the fields of smart energy, smart grid, and smart home.

Find out more about Durham's Smart Grids Research and Laboratory at www.durham.ac.uk/dei/research/smartgrids/

// DURHAM UNIVERSITY WILL DIVEST FROM COMPANIES INVOLVED IN FOSSIL FUEL EXTRACTION



Durham University is to divest from companies involved in fossil fuel extraction, and has committed itself to becoming a major international partner in the development of green energy.

The decision to withdraw financial investments was taken by the University's governing Council.

It follows a year-long Commission on Divestment from Companies Involved in Fossil Fuel Extraction, which reviewed divestment options and the impact divestment would have on the University's finances and its ability to fulfil its charitable and strategic objectives.

Full consultation

The Commission was established following a proposal from Durham Students' Union that the University withdraw its investments from companies involved in fossil fuel extraction. The Commission included student and staff members.

The Commission reached its recommendation – that the University should divest as soon as practicable – following full consultation with staff, students and alumni. Four out of every five respondents to this consultation supported divestment.

Green energy commitment

Professor David Cowling, Pro-Vice-Chancellor (Arts and Humanities) at Durham University, who led the Commission, said: "The decision to divest from companies involved in fossil fuel extraction is an important one for the University.

"It has been taken following full consultation, and I would like to thank all staff, students and alumni who shared their views on this issue.

"Durham is a world top 100 university, a research partner of international standing and a significant employer in North East England. We are committed not only to divestment, but to becoming a major partner in the future development of green energy.

"The University is proud to be home to the Durham Energy Institute, which is already a leading centre for energy research, and we look forward to building on this work in future."

Megan Croll, President of Durham Students' Union, said: "I'm delighted that student ambitions for a fossil-fuel-free investment policy at Durham University have been realised.

"This success shows the power that students and staff, working together, have to make our community more progressive and responsible. I'd like to pay tribute to the student leaders that have put considerable effort into this work, notably the Durham SU People and Planet Society."

Next steps

The decision to divest means that the University will look to end its investments in companies involved in fossil fuel extraction that are currently part of its overall investment portfolio. These currently total less than £1.5 million.

It also means in the event of the University finding itself in the position of having such an investment, for example as part of a bequest, its policy would be to sell this as quickly as is practicable.

The University has also decided that its divestment policy stance should, where possible, inform and guide research links through constructive engagement with companies involved in fossil fuel extraction so that the University can become a major partner in the future development of green energy.

// For more information please visit www.durham.ac.uk/divestment/

// SOLID WALL INSULATION INNOVATION

For more information on our current projects go to www.durham.ac.uk/dei/projects/

Durham Energy Institute is partnering with Durham County Council in the delivery of a £2Million European Funded project to install solid wall insulation and smart heating controllers to 210 terraced homes in County Durham.

The project was created to address two key issues. Firstly, around the lack of acceptability of standard external cladding systems with many approaches failing to meet the County planning requirements. Secondly, aims to improve the industry standards and products to ensure that the resulting external wall insulation is aesthetically in keeping with the local environment as well as achieving the required reduction in heating demand.

It forms part of the County's ongoing aim to reduce carbon emissions and to provide warm and healthy homes for the Durham Community. Dr Hongjian Sun, DEI Fellow, is the Principal Investigator for the project

leading research into improvements in energy usage as well as the change in energy behaviours from the residents involved in the project. The project commenced in March 2018 and is due to complete by July 2019.

Durham project coordinator Jacki Bell said:

"The SWII project provides a great opportunity for the University to work with the local community in reducing carbon emissions, as well as understanding the way that people view their energy supplies. We are looking forward to working with the Council and opening our own doors to the residents who want to come and see the smart grid research undertake on their research."

DEI STUDENTS SHAPING THE ENERGY SECTOR OF THE FUTURE

// SUKI FERRIS, ALUMNI OF MSc ENERGY AND SOCIETY NOW AT NATIONAL GRID, SPEAKS OF HER EXPERIENCE...



My name is Suki Ferris, and I am a **Graduate Commercial Analyst System Operator** within Network Capability and Operations, Gas at **National Grid**.

I graduated from the **MSc Energy and Society** at Durham University in January 2017.

A little over a year ago I graduated from the Energy and Society MSc at Durham University. This MSc inspired me to pursue a career in the energy sector, and is the reason I gained my current role at National Grid as a part of the graduate program.

The Energy and Society MSc helped me to gain my current role because the course engaged me with real world energy problems. For example, through the MSc I was able to work with a local County Durham community on developing a sustainable domestic heating project. This project also provided me with invaluable experience in stakeholder engagement.

In addition, as this MSc is integrated within the DEI, it offered me broad opportunities to learn from and attend events within and beyond Durham University. For example, as a member of this MSc I attended a talk on the future of UK renewables at the Shard.

This course motivated me to change my career direction, surprising even myself when I realised that I wanted to work within the energy sector!

I chose to work for National Grid because I am passionate about energy, and being a part of National Grid means being at the heart of the UK energy system. Right now it is a very exciting time for National Grid, as the scale and scope of change in the UK energy landscape is unprecedented.

My typical day at National Grid involves working on a project that will help my team, Gas Network Development, model the future introduction of shale gas onto the gas National Transmission System. To complete this project I regularly meet with multiple business areas within National Grid, I have travelled to London to meet external stakeholders, and I have also travelled to Durham and Newcastle Universities to gain insight from academia. Something that has been very important to me is that even as a graduate at National Grid I feel that my contributions are listened to and valued. In addition, during my first six months I attended four interactive business training courses that helped me build the skills necessary to transition from university to the workplace.

My advice for prospective applicants to the energy sector would be to recognise the impact of your work. As energy permeates virtually every aspect of our lives, the ability to access energy has real impact on people's standards of living and economic opportunities. Meeting our growing energy demand in a way that is affordable and sustainable is arguably the greatest challenge of the 21st century, and joining the energy sector means choosing to be a part of the solution.



OTHER ENERGY STUDENT DESTINATIONS:



pwc

Tom Riley who graduated from MSc Energy and Society in 2017 is currently working in consultancy for PwC. He works with energy companies primarily, whilst also influencing FTSE100 Companies to become more sustainable in terms of business strategy and internal practices. His dissertation was focused on 'The rise of sustainable housing: energy efficiency and behaviour'.



Neil MacDougall completed the MSc New & Renewable Energy in September 2014. He was the recipient of the Ørsted scholarship and now coincidentally works at Ørsted as a Fleet Operations Engineer. His dissertation was on 'Cost-Benefit Analysis of Redundancy in Offshore Electrical Collection Networks'. He said: **"I wanted to do a masters in renewable energy so I could join the sector, and help make positive, tangible changes to the world. Having the masters meant I was able to get a job working in renewables industry right after I completed the course. The course had good links with industry, so was geared towards real life applications; it was really valuable for me to join the sector knowing not just theory, but the shape of the industry and the key companies involved. I'm now working at Ørsted, having had previous roles in RWE Innogy and Romax Technology."**



The **MSc Energy and Society** course, in association with the Durham Energy Institute, is an innovative postgraduate programme designed to appeal across the disciplines. The programme draws on leading experts in energy studies at Durham from Anthropology, Engineering, Geography, Physics, Economics, Humanities and other departments. It is taught through intensive block-teaching, group field-study, original dissertation research and a range of optional modules designed to complement the core teaching. **Find out more about the MSc Energy and Society course:** <https://www.dur.ac.uk/engineering/postgraduate/taught/energy/>

The **MSc New and Renewable Energy** course is designed to equip our graduates with the skills required to meet the growing challenge to achieve energy and environmental sustainability through the application of new and renewable energy technologies. The programme aims to enable students to develop the capacity to solve problems across the traditional Engineering boundaries and to have an appreciation of complete energy systems from source to end user, to have knowledge of the relevant technologies and to understand the interactions between them. The programme also provides students with the opportunity to develop skills in research, development, design and project management through individual and team-based project work. Find out more about the MSc New and Renewable Energy course: <https://www.dur.ac.uk/courses/info?id=15523&title=New+and+Renewable+Energy&code=H1K609&type=MSC&year=2018>



Robert Hinchley, who graduated from the MSc Energy and Society in 2017, secured a graduate position at Engie UK which he will be starting in September. For the first six months he will be working on building energy and sustainability audit in London and then rotating through a further three placements across Engie's UK operations in his first two years at the company. He is incredibly excited to start his career in the UK energy industry!



KEY STRATEGIC PARTNER DONG ENERGY STRIDES TOWARDS A RENEWABLE FUTURE AS ØRSTED



Matthew Wright, Ørsted UK Managing Director

With 2018 well underway, it's already proving to be another busy year for renewable energy with plenty of positive news on the horizon.

But before we look ahead to the coming year, it's worth a recap on the last 12 months – which proved to be a momentous year in the energy industry.

Perhaps most significantly, we saw the cost of new offshore wind projects fall by 50% and become one of the cheapest options for new power in the UK. Our Hornsea Project Two offshore wind farm was one of the catalysts of this significant price drop after being awarded a Contract for Difference (CfD) at a strike price of just £57.50 in the last round of government auctions. This project alone will be capable of bringing green energy to more than 1.6 million UK homes, supporting more than 2,000 jobs throughout its construction and up to a further 130 permanent jobs during its long-term operation.

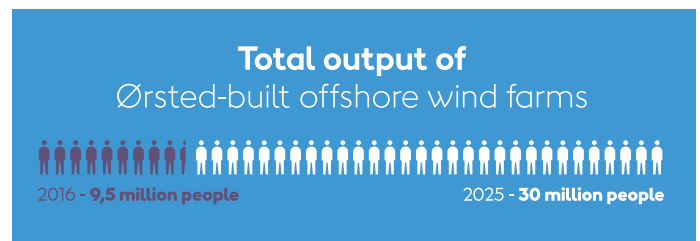
2017 also proved to be a big year for us as a company, as we took the decision to change our name. As DONG Energy (which originally stood for Danish Oil and Natural Gas), we had already moved away from our fossil fuel roots and were taking positive steps towards a green transformation. However, when we divested our upstream oil and gas business and decided to stop all use of coal in our power stations it meant that our old name no longer described who we were or who we wanted to be.

Our new name is Ørsted (pronounced *Ur-sted*), after Danish scientist Hans Christian Ørsted who helped lay the foundations for the way we produce power today. He spearheaded several key scientific discoveries, including that of electromagnetism in 1820. Inspired by his curiosity, innovation and dedication, we think this new name truly reflects our transformation into a fully-fledged renewable energy company.



Looking ahead to 2018 and beyond, things are already shaping up for big things. What's truly exciting is that the UK is leading the world in renewable technology and so I'm delighted to be at a company that's right at the forefront of this shift to a new, smarter energy system.

Offshore wind currently generates over 5% of UK electricity – enough to power more than 4.5 million homes – and this figure is set to double to over 10% in the next two years. Our Race Bank project, featuring blades manufactured at the Siemens factory in Hull, and the Walney Extension project, which will become the largest offshore wind farm in the world, will both come on stream in 2018 and play a part in achieving this increase.



Our offshore wind business is part of a successful and growing UK industry where investment in offshore wind is creating new industrial clusters across the UK. On the Humber, for example, Siemens has invested over £300m in its Hull facility, which has created over 1,000 local jobs. Construction is also well underway on our new Operations & Maintenance facility in Grimsby. In fact, Ørsted's investment in new projects in the Humber will total £6bn between 2013 and 2019.

We are also nearing completion of our world first bio-energy plant in Northwich. The project is a brand-new waste-treatment facility, which will separate recyclable materials from household waste and generate green electricity at the same time. The plant will use our patented Renescience technology and will be the first full-scale bio-energy plant in the world capable of handling household waste through enzymes, mechanical sorting and anaerobic digestion.

Alongside bioenergy and offshore wind, our UK sales business is providing our commercial and industrial customers with flexible solutions for their energy demands and green energy without any premium. This all adds up to a very healthy UK business and, crucially, one that has a central role to play in the future of our country, where the UK leads the world in decarbonising its economy.

A key element in maintaining the UK's position as a global leader in renewable energy is the development of the next generation of industry professionals. Indeed, through our partnerships with academia, we are looking to support and inspire the same innovative and pioneering spirit that drove Hans Christian Ørsted.

If we can achieve that then, we are certain that future for renewable energy is very bright.

SUPPORTING OUR MINING HERITAGE

// DEI CONTRIBUTES TO FIRST ALL-FEMALE BANNER GROUP.



DEI has been contributing to a new group set up to celebrate the diverse roles of women in County Durham's history, politics and local community.

The WOMEN'S BANNER GROUP is producing a patchwork banner made by a wide network of women's groups reflecting their heritage and ambitions and recognizing the important role of women in the County. Several female members of staff from the DEI (Charlotte Adams, Jacki Bell, Lynn Gibson, Theresa Jezierski and Evelyn Tehrani) got together to create two pieces of patchwork for the banner. The first piece is representative of Women in Energy and the second piece representative of Women in Education in relation to Durham University.

A silk banner will also be produced later this year following a series of workshops held with the fabulous Durham Bannermakers. The community patchwork banner will be paraded at this year's Miners' Gala, where it will be blessed during the service and it is hoped that funding will be in place in order for the silk banner to be produced and paraded in 2019.



The Women's Banner Group (WBG) has been working with women in local community groups, whose interests include art, politics, Trade Unions, mining history and education amongst other things, to draw upon their heritage, and each of the 12 groups have designed a section for the community patchwork banner representing their group.

The first craft session took place in the Spennymoor Settlement and was attended by over 40 women who began production on 12 separate sections for the patchwork banner representing their group, as well as individual women working together to create the central piece of the banner.

Talking about the project, Founder Laura Daly said

"2018 marks a momentous year in which we plan to celebrate the achievements of women in trade unions, communities and politics. This year is an important anniversary and so this seems a perfect time for us to begin our journey. Not only the 100 years since some women were given the vote but also 150 years of the TUC. These key points in our history have been the catalyst to the formation of our group and we aspire to raise the profile of female trade unionists, Politicians and community activists".

Mary Turner who is overseeing the production of the women's patchwork banner said

"the patchwork banner is a wonderful opportunity for women to get together to celebrate the many different ways in which they support each other and their communities. The banner shows clearly what an important and significant role women have in engaging with others throughout the County Durham area".

WBG have been recognised as an official banner group by the Durham Miners' Association, and are the first 'all female' banner group to do so. Heather Wood who organised the free café's during the Miners' Strike in 1984 in the East Durham area, and who is a member of the group said "Women being accepted into, and endorsed by Redhills, truly is a momentous occasion and one to be celebrated".

Just days before the Durham Miners' Gala, WBG held their official unveiling event at the Durham Miners' Association HG at Redhill's in Durham City. The event entitled 'Redhills Revolution: A Celebration of Women' was well attended and a whole host of musicians, including Ed Pickford and Gem Andrews gave their time free of charge in support of the work of the group. The banner was officially unveiled by the groups Patron (or Matron as she prefers to be called) local actress Charlie Hardwick





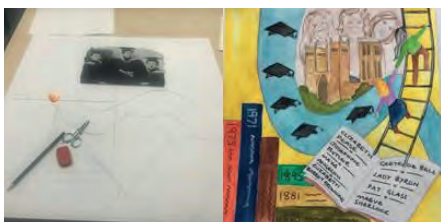
Women from across the region have been invited to nominate women who have inspired them. These women will be considered either for the main silk banner which is planned for later this year or for a book of inspiration women that the group is producing.

A fundraising page has also been set up to raise money to help with the design and creation of a Women's Banner and an array of community projects to celebrate achievements and develop local women.

Lynn Gibson, DEI Administrator, who is also secretary for the Women's Banner Group said:

"The response we have had is overwhelming, the submissions we have received of inspirational women range from mam's and nanna's to local, national and international sports personalities, musicians, academics, activists, politicians and healthcare workers and much much more."

A fundraising page has also been set up to raise money to help with the design and creation of a Women's Banner and an array of community projects to celebrate achievements and develop local women.



The fundraising page for WBG can be found at www.justgiving.com/crowdfunding/wbg

Women's Banner Group website
www.womensbannergroup.org.uk

Facebook page
www.facebook.com/womensbannergroup



/// TAKE YOUR SEAT IN THE PITMAN'S PARLIAMENT

Continuing the DEI's strong relationship with its local mining heritage and the Durham Miners' Association, DEI have sponsored a seat in the 'Pitman's Parliament' the magnificent debating chamber at the Durham Miners' Association Headquarters at Redhill's in Durham.

DEI members Lynn Gibson and Professor Sandra Bell have been working closely with the Durham Miners' Association since December 2016 as members of the Advisory Board supporting the Redhills Project Heritage Lottery Fund bid which will be submitted in the near future to preserve the building and ensure its future use as a community hub preserving the heritage of the Durham Coalfields.

The Council Chamber is a unique, purpose-built trade union meeting place at the heart of Durham Miners' Hall. For almost a century, this impressive debating chamber was the scene of the deliberations and heated discussions which shaped the lives of our

mining communities in the Durham coalfield.

Each Miners' Lodge sent an elected delegate to speak on behalf of the colliery workers, representing the interests of their area. Key issues would be debated and decisions voted on. Delegates would sit in a given seat with that seat number associated with their lodge. At present 150 of the seat numbers are known thanks to recently discovered list of colliery numbers from December 1950.

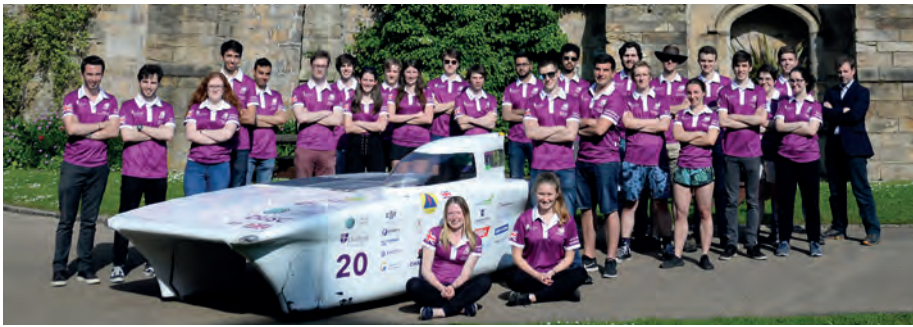
Now over a century after its opening, these seats are in need of renovation. As Grade II listed assets the Durham Miners' Association is seeking to raise funds for their renewal. A one-off sponsorship scheme has been launched where individuals, groups, families and lodges can sponsor a seat.

Further information on the Redhill's Project can be found at <http://redhillsdurham.org>



Spennymoor Labour Party Women's Section c.1930 (Credit: J.G. Teasdale)

DURHAM UNIVERSITY SOLAR CAR RACES TOWARDS A BRIGHT FUTURE



DUEM is a 50-strong student-run team that designs and constructs solar powered cars to compete in international endurance competitions. Its aim is to encourage and

further innovation in the development of sustainable solar energy for electric vehicle usage in the future. Below, Tobias MacBride Head of DUEM Business Team, provides a look at their exciting recent developments.

DUEM have had an incredibly busy 18 months. Last year, the team celebrated our 15th anniversary, making us Britain's most established solar car team. Yes, readers, in Durham of all places - a location not exactly renowned for its sunny weather - DUEM designs and engineers solar powered cars. The past 15 years have seen the team grow and develop to an unparalleled level not only of technical innovation, but breadth in their activities.

Indeed, 2017 was a milestone year for a number of reasons. The team continued to grow its global marketing push, presenting the car at events including Goodwood's Festival of Speed and building off 2016's successes at the London Motor Show, Science Museum, UN Climate Summit (COP22) and Marrakesh Formula E-Prix. Moreover, the team became a founding member of the World Alliance for Efficient Solutions. This landmark agreement was signed by the team in the presence of world and business leaders at the UN Climate Summit, COP23, in Bonn and enables us to connect with political and investor channels as well as with other groundbreaking solutions around the world, all geared to combat climate change.

However, probably the greatest event and landmark moment for the team was taking part in the 2017 Bridgestone World Solar Challenge. This is the third time DUEM have entered this global event, which attracts 45 solar car teams to Darwin every two years. The challenge sounds relatively simple - drive to Adelaide, a mere 3000km away.

However, doing so in 40-50°C heat and entirely on solar power, whilst dealing with bush fires, road trains and all whilst camping in the middle of the infamous outback, presents all competitors with a series of challenges.

DUEM started this race with a very advanced car. Based off our 2015 chassis, the car was heavily modified. New rules meant our solar array was cut by a third to 4m². We moved to a more advanced battery chemistry, enabling us to halve our battery weight to 20kg. Combined with other measures, our car weighed 250kg and a top speed of 100km/h. All of this whilst cruising on just 1kW; the equivalent of a domestic microwave!

The team and car performed extremely well in the face of difficult circumstances - particularly a couple of days of rain in outback during the race. We completed 1000km of the 3000km race on solar power, ahead of the majority of teams, and cemented our place as Britain's most successful solar car team.

The momentum we saw off the back of Australia has been immense. Our marketing push continued into 2018: we presented in front of hundreds of investors at the world-famous Faraday Lecture Theatre in London's Royal Institution in March. The team then exhibited the project at 4 Formula E races - Rome, Paris, Berlin and Zurich. This extended our substantial marketing reach still further. We have a number of exciting events in the pipeline for the summer (including Goodwood's Festival of Speed) and cannot wait to share them with you.

We will also be launching our expanded and revamped outreach programme, inspiring the next generation of students to pursue STEM careers through a number of fun, interactive activities. This builds upon outreach events we have attended in the past - including the Science Museum - as well as those undertaken in collaboration with Durham Energy Institute at places such as The Discovery Museum, Spennymoor School and EcoFest.

The DEI has provided various avenues of support and assistance to the DUEM project over the years, sharing their expertise and contacts, and helping us identify opportunities for publicising this exciting project more widely. We look forward to building on this collaboration moving forward.

The future is looking incredibly bright for our team. We have a number of opportunities available as we look ahead to a new car and still greater marketing reach and outreach activities. The team is entirely funded by sponsors and donors from around the world who connect with our students for graduate recruitment, provide us with powerful technologies to showcase, and align with our extensive marketing and outreach programmes. We'd love to speak to you, today.

I think you would agree that if the past 16 years of DUEM are anything to go by, our future is decidedly solar. But we are just at the beginning of a solar revolution, one that will change the automotive landscape forever. DUEM are at the forefront of this unstoppable tide and we cannot wait to share more with you in the months and years ahead.

Get in touch with Tobias directly to find out more about the opportunities available to you:
t.j.o.mcbride@durham.ac.uk

Follow the team on social media:
Twitter: @DUEM_Electric
Facebook: DUEM.Electric
Instagram: @DUEM_Electric.Motorsport

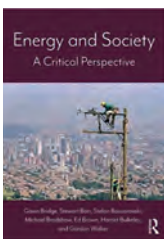
Take a look and subscribe to the team's YouTube channel at this link, including highlight videos from Australia, Formula E and much more!



NEW PUBLICATIONS

Keep up-to-date on new Energy Publications at Durham by visiting www.durham.ac.uk/dei/research/newpublications/

ENERGY AND SOCIETY – A CRITICAL PERSPECTIVE



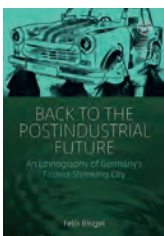
By Gavin Bridge, Stewart Barr, Stefan Bouzarovski, Michael Bradshaw, Ed Brown, Harriet Bulkeley, Gordon Walker

Energy and Society is the first major text to provide an extensive critical treatment of energy issues informed by recent research on energy in the social sciences. Written in an engaging and accessible style it draws new thinking on uneven development, consumption, vulnerability and transition together to illustrate the social significance of energy systems in the global North and South. The book features case studies, examples, discussion questions, activities, recommended reading and more, to facilitate its use in teaching. Energy and Society deploys contemporary geographical concepts and approaches but is not narrowly disciplinary. Its critical perspective highlights connections between energy and significant socio-economic and political processes, such as globalisation, urbanisation, international development and social justice, and connects important issues that are often treated in isolation, such as resource availability, energy security, energy access and low-carbon transition.

Co-authored by leading researchers and based on current research and thinking in the social sciences, Energy and Society presents a distinctive geographical approach to contemporary energy issues. It is an essential resource for upperlevel undergraduates and Master's students in geography, environmental studies, urban studies, energy studies and related fields.

For further information please visit: <https://www.routledge.com/Energy-and-Society-A-Critical-Perspective/Bridge-Barr-Bouzarovski-Bradshaw-Brown-Bulkeley-Walker/p/book/9780415740746>

BACK TO THE POST-INDUSTRIAL FUTURE: AN ETHNOGRAPHY OF GERMANY'S FASTEST-SHRINKING CITY



By Felix Ringel, COFUND International Research Fellow in the Anthropology Department at Durham University.

Dr Ringel's book on the current prospects

of a former mining city in East Germany depicts how the main industrial settlement for socialist East Germany's mining and energy workers has to work towards new futures under a different energy regime.

How does an urban community come to terms with the loss of its future? The former socialist model city of Hoyerswerda is an extreme case of a declining post-industrial city. Built to serve the GDR coal industry, it lost over half its population to outmigration after German reunification and the coal industry crisis, leading to the large-scale deconstruction of its cityscape. This book tells the story of its inhabitants, who are now forced to reconsider their futures. Building on recent theoretical work, it advances a new anthropological approach to time, allowing us to investigate the post-industrial era and the futures it has supposedly lost.

For further information please visit: <http://www.berghahnbooks.com/title/RingelBack>

DEI are hosting a book launch event for both these books on 20 July 2018, 15.00-16.30, followed by a networking drinks reception until 17.30 in the Palatine Centre,

Come along and hear directly from the lead authors of these books...

OUR LIVES WITH ELECTRIC THINGS



By Jamie Cross, Simone Abram, Mike Anusas and Lea Schick

Our lives with electric things are positively charged with meaning. Our bodies pulse with electrical activity. The electric appliances, devices, and technologies around us bring hope and anxiety, possibility and danger. Some have transformed our possibilities for reproducing, nurturing, and sustaining life. Some mediate human sociality across time and space, while others knit ecological and interspecies relationships together. Still others create possibilities for controlling, managing, exploiting, and ending life. Against this backdrop any anthropology of electricity seems to require electric things. Can we still imagine the possibility of lives without electric things? Can electric things help us to address the possibilities and limits of life with electricity? Can our lives with electricity ever be disentangled from electric

things? What are the unique capacities and material politics of electric things in different global contexts? What circuits do they make or break? All the pieces in this series share a commitment to rethinking our lives with things, using electric artifacts and materials to push beyond the taken-for-granted vocabularies of material culture and to generate novel ethnographic insights. Together, we hope they will electrify anthropology, and inspire a generation of anthropologists to think electric.

<https://culanth.org/fieldsights/1277-our-lives-with-electric-things>

POWER SECTOR REFORM AND CORRUPTION: EVIDENCE FROM SUB-SAHARAN AFRICA



EPRG, Cambridge Working Paper in Economics 1801

Mahmud I. Imam, Tooraj Jamasb, and Manuel Llorca

In order to reduce the influence of corruption on electricity sector performance, most Sub-Saharan African countries have implemented sector reforms. However, after nearly two and half decades of reforms, there is no evidence whether these reforms have mitigated or exacerbated corruption. Neither is there evidence of performance improvements of reforms in terms of technical, economic or welfare impact. This paper aims to fill this gap. We use a dynamic panel estimator with a novel panel data set of 47 Sub-Saharan African countries from 2002 to 2013. We analyse the impact of corruption and two key aspects of electricity reform model – creations of independent regulatory agencies and private sector participation – on three performance indicators: technical efficiency, access to electricity and income. We find that corruption can significantly reduce technical efficiency of the sector and constrain the efforts to increase access to electricity and national income. However, these adverse effects are reduced where independent regulatory agencies are established and privatisation is implemented. Our results suggest that well-designed reforms not only boost economic performance of the sector directly, but also indirectly reduce the negative effects of macro level institutional deficiencies such as corruption on micro and macro indicators of performance.

EVENT UPDATE

// INNOVATE UK VISITS

Innovate UK

Innovate UK's Infrastructure Team visited Durham University on Valentine's Day this year to meet our researchers across a range of disciplines and at various stages of Technology Readiness. Innovate are the Government's Business and Innovation Department, dedicated to supporting the development of innovative ideas through funded calls, targeted workshops and advice to potential investors and we were delighted to welcome 14 of the team to the Science Site.

Durham Energy Institute (with the assistance of Professor Geoff Williams) organised a session of briefings on key areas of research such as geothermal energy, ground movement in Africa through to the use of magnetic fields to store data (Skyrmions). The visitors also took a tour of the Thermo fluids, Smart grids and new Clean Room facility in the Engineering Department. The visit was extremely well received by Innovate staff and researchers alike.

A follow-on event was hosted by DEI in May for Innovate UK to share their expertise on how to create a compelling and successful application with Durham Researchers and Businesses. We hope that these workshops and links will lead to an increase in Durham application to Innovate UK.

Currently funded Innovate projects at Durham include Hongjian Sun's project "Electrical and thermal storage optimisation in a virtual power plant"



// www.durham.ac.uk/dei/projects/storage.optimisation/

// WORKSHOP ON POTENTIAL ENERGY SYSTEMS FOR LADAKH

Funded through HEFCE GCRF DEI hosted a workshop on 03 May, with visitors from Jammu University, India and UCL and ENI Milan Universities on potential energy systems for Ladakh (and Kashmir more generally). Durham University through DEI has had a Memorandum of Understanding with Jammu University since 2009 and DEI was used as a model for their energy institute. Ladakh is in NW India and borders on China and Pakistan. It is a remote and high area with almost no energy infrastructure. The primary (dense) energy source is imported diesel and the second most important source is yak (or more correctly dzo) dung. There are of course significant energy security and safety issues associated with diesel import and burning yak dung has a big negative effect on health. The aim of the Workshop was to discuss potential energy systems for the area focusing in particular on solar, onshore wind and Geothermal energy as potential energy sources. After the successful discussion next steps are being identified for planning a whole energy system for the area.

// N8/DURHAM ENERGY INSTITUTE ENERGY SECURITY WORKSHOP

On Friday 27 April 2018 DEI hosted the N8 Security Workshop. Aims of the Workshop were to understand how the N8 universities and partners might respond to the Industrial Strategy Grand Challenge of Clean Growth through opportunities in Energy, to share knowledge and understand the challenges and opportunities that exist in Energy research across the region and to identify areas for shared development to overcome these barriers. The event was attended by 26 delegates from Durham University, Lancaster University, Leeds University, the National Oceanography Centre, Liverpool University, Manchester University, Newcastle University, Sheffield University and York University.

// UNIVERSITY OF THE 3RD AGE CONFERENCE

Durham Energy Institute organised an energy conference on 11 April for the University of the 3rd Age (U3A) which was kicked off by Stuart Corbridge, Durham University's Vice Chancellor. The event was very well attended and led to lively discussion.

U3A is a UK-wide movement which brings together people in their 'third age' to develop their interests and continue their learning in a friendly and informal environment. The third age - is a time after you have finished working full-time or raising your family and have time to pursue your interests or just try something new.

U3A has a 'university' of members who draw upon their knowledge and experience to teach and learn from each other but there are no qualifications to pass - it is just for pleasure. Find out more at <https://www.u3a.org.uk/>

DEI organised a series of lectures which explored the history, changes and opportunities related to all areas of the energy sector including government policy, fuel poverty, Innovative energy solutions, and energy ethics.

Professor Jon Gluyas and DEI team worked closely with John Lloyd of U3A Northumbria Region to put together a programme which U3A referred to as "a really informative and interesting set of lectures on all aspects of this important subject".



// Video and audio from the day's lectures and discussions are available at www.durham.ac.uk/dei/events/past-events/u3a/



IN CONVERSATION WITH...

// PROFESSOR SIMONE ABRAM.... DEI CO-DIRECTOR FOR SOCIAL SCIENCES & HEALTH & DIRECTOR OF MSC ENERGY & SOCIETY, DEPARTMENT OF ANTHROPOLOGY

We caught up with Simone to ask about her work, research loves and aspirations for the future.

What are the real myths around energy and climate change?

I've been thinking about development issues recently, because of the research funding focus on Global Challenges. I think the greatest myth is tied to development goals, which assume that a techno-modernist lifestyle is what everyone in the world should aspire to. I recently heard a Mozambiquan sociologist, Elisio Macamo, call the Sustainable Development Goals 'the juggernaut of our dreams', which struck me as extremely apt. We have to get away from energy-intensive solutions to poverty-relief, and look at what is causing poverty in the first place. Increasing corporate capture of development is moving the world in the wrong direction, and well-meaning interventions that offer short-term relief often end up causing long-term problems. We can see this in the increasing problem of solar litter from broken, irreparable solar kits sent to the Global South. We would be better focusing on repairing, upgrading, and upskilling rather than inventing new gadgets and gizmos to make us in the North feel better about global inequality.

On the home front, personally, I think David McKay missed a trick when he told people not to worry about the small things. Taking small steps to reduce carbon emissions does contribute to the bigger picture, but, more importantly, it also makes tackling climate change available to everyone. Giving people the facts is empowering. If people understand how much energy goes into keeping machines and screens on standby, then they have a choice about how to respond. But I do agree

with him that the problem is not with individual choices, but with the lack of an overarching policy for energy reduction and the alternatives this might make available.

If you had £1million to spend on research what would you do with it?

Only £1m? I would set up an interdisciplinary energy social science research centre and employ as many young postdoctoral researchers as I could for as long as possible to do innovative and team-oriented research. The funding focus these days is all about big projects, but you get much more research for your money from smaller projects where researchers are more free to think and innovate.

Why do you think research on Energy and Society is so important?

We have very good evidence now to show how important it is to think about technologies in context, and not as stand-alone problems, and we can show what can be achieved by thinking about energy-services, rather than supply/demand or production/consumption binaries. If we don't think about energy and society together, we risk making colossal mistakes, and misunderstanding how to tackle the ones that have already been made. Students sometimes arrive to study Energy and Society with some scepticism about what all this 'society' stuff is about, but it doesn't take long before they realise that it has the answers to some of their most fundamental questions and challenges about the world. One engineer came to study how to implement smart meters in a developing country, only to realise that meters were the answer to the wrong question! Demand-management among people who have minimal and irregular access to electricity in the first place is just wrong-headed, and would probably increase

problems of energy vulnerability. I also recently talked to doctoral students about the ethics of energy projects, and one engineer asked how he could incorporate ethics into a project on machine efficiency. We started a conversation about what the machines were for, and what kind of efficiency was being prioritised, and he soon realised how his own apparently minor role was actually very powerful, with significant wider implications.

What would you say to undergraduates looking for a career in energy research / industry?

"Good choice!" The energy field is now more exciting than it has been for many years, and offers so many opportunities in so many different ways. People will always need energy, and we have a big challenge ahead to ensure that as much of that energy as possible is from renewable sources, as quickly as possible.

What is your vision for the DEI?

The DEI is truly unique, and has been the basis for some absolutely original and innovative collaborative research. With more capacity, we could scale up radically and consolidate our world-leading status. The DEI is already world-leading on interdisciplinary energy research – truly interdisciplinary and with a strong social-science involvement. Many people claim to do this, but few actually do, which makes DEI even more special. With more space, and funding for support staff, we could host visiting researchers more regularly, grow our Centre for Doctoral Training, support more grant applications and expand the number of research and teaching staff associated with the institute.

// Find out more about our Society and Energy research at www.durham.ac.uk/dei/research/societandenergy/

// Simone Abram has an undergraduate degree in Electrical and Electronic Engineering and a DPhil in Social Anthropology. Her research has brought together science studies and governance, through studies of tourism, urban development and land-use planning. Her energy interests lie in relating different disciplinary perspectives on energy and society, including the governance of energy developments, ethical questions in energy modelling, and the changing social and political significance of energies, particularly electricity.

She is a researcher at the National Centre for Energy Systems Integration (CESI). Leading on the social-science input into integrated energy modelling and bringing a Science, Technology, Society approach to energy systems integration. This entails bringing anthropological methods and perspectives to the process and conceptualisation of energy modelling, paying attention to the broader societal and ethical issues that may arise out of, or as a consequence of systems-modelling.

Simone recently helped to found a new international network on Energy Ethics and a new European network on energy anthropology. Their blog can be found at hypotheses.com/ean

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