Situating International and Interdisciplinary Energy and Environmental Research in Challenges of Sustainability Governance
Why is a socio-cultural anthropologist addressing a NERC event?

- An interdisciplinary department of Anthropology at Durham, integrating socio-cultural, evolutionary and medical anthropology.

- Joint supervision of postgraduate research on issues of primate ecology conservation and human-wildlife conflict, where poor people and forest resource protection regimes need to resolve and redefine controlled use patterns.
Nearly 30 years of work in Nepal on changes in relations between the Tamang indigenous people and the Langtang National Park.

This has dealt with problems of protected areas and politically marginal poor people;

mostly recently the 2015 earthquake - I expect several people in the room might be connected to applications involving the causes and consequences of earthquake vulnerability.

Durham responded with collaboration among depts Earth Sciences, Geography, Archaeology, Anthropology, Applied Social Science - Come to Durham BNAC conference April 16-17th.

Key question of who is listening to the voices of the people most affected by the disaster? (Same question regarding energy access)
Thanks to UK public and academics’ ongoing concern for the people of Nepal
Pressure to reduce use of fuelwood by households and enterprises since heightened awareness of climate change, and policies to promote energy transition from biomass to renewable alternatives.

This was my entrypoint to the energy field at the time of the launch of DEI.

2012 grant from DECC to set up the Low Carbon Energy for Development Network (Nafees Meah)
Durham & Loughborough (Ed Brown) run the network, with input from Sussex, Imperial, UCL, Strathclyde and overseen by a Management Cttee with DFID, UKERC, UKCDS, KTN, Energy4Impact, Practical Action, Ashden Awards. Understanding Sustainable Energy Solutions programme (EPSRC, DFID, DECC) consisting of 13 projects (LCEDN.com/USES)
Final USES workshop this December in Kenya
Energy challenges beyond the grid

not just a geography of grid connection but putting sustainable energy into better condition of accessibility to the 1.2 billion unconnected people. Systemic transition in capacity for research and innovation on renewables in the Global South

SE4All – without energy no development, - but a corollary is that levels of energy consumption are frequently taken as an index of ‘development’

Transforming Energy Access (DFID) funding for LCEDN since Dec 2016.
Innovation for different time horizons

- New paradigm
- Less disruptive change
- Future unknown
- Disruption
- New role for old tech
- Seeds of future in the present

Innovation for different time horizons
Disruptive technologies and the unserved market

Diagram:
- Pico-solar and SHS
- Grid

Graph:
- Level of performance required by average users
- Product performance
- Unfilled need
- Excess quality: Most customers uninterested in this region
- Technology is "good enough" and therefore irrelevant. User experience dominates.
- High technology: Consumers want more technology, better performance
- Consumer commodity: Consumers want convenience, reliability, low cost...

Transition point: where technology delivers basic needs
The way energy is generated and used in the UK is changing; moving away from large centralized generation and supply, towards community based, low carbon energy generation coupled with energy efficiency measures to reduce demand.

The UK government has made a commitment to support innovations that deliver solutions to the energy tri-lemma, namely:

- To develop affordable and secure sources of energy supply
- To integrate future demand and energy supply into a flexible, secure and resilient energy system
- To reduce GHG emissions at point of use.
Innovation themes

Solar PV

The latest developments in solar PV are associated with making PV panels more efficient and at a cost that poorer communities could afford either by changing the material of the PV panel or by introducing a hybrid technology to boost the performance of an existing panel.

Funded project:

**Nava Technology Ltd** aims to prove the technical feasibility of a potentially disruptive technology that can reduce the levelised cost of solar energy. Navatec has developed a nanostructured hybrid tandem technology that is printed on top of a silicon solar cell and boosts efficiency by >3%, producing more electricity from the same unit area.
Anaerobic Digestion (AD)

The latest developments in bio-energy in the UK focus on AD. Feedstock from sewage, agricultural, and landfill material allowed to decompose in the absence of air produces methane, which can be used in heating, cooking, water heating and gas powered cars.

Funded project:

**Straw Innovations Ltd** is exploring the use of rice straw as a feedstock for AD in the Philippines. Rice is the world's number one food crop, but its stems and leaves (straw) are a major waste product in developing countries, especially in Asia where around 300 million tonnes of it are burned each year for disposal, damaging the environment and human health.
Reduced irrigation for energy crops

Innovate UK has funded projects which explore the possibility of growing energy crops on land that is currently too arid to support food crops.

Funded project:

The DryGro system reduces the amount of water required to produce biomass by 99% compared to conventional agriculture, CO2i Ltd will explore the production of biofuel in Kenya and examine the potential for application in other arid areas. It is anticipated that the Drygro system will reduce the negative impacts on food production, water security, biodiversity and land tenure associated with existing biofuel production methods.
Energy Storage

Innovation in energy storage is focused on batteries and flow cells (electrical), phase change materials and inter-seasonal storage (heat/cold) and hydrogen (gas) where the hydrogen has been produced from non fossil fuel feedstock.

Funded project:

**Swanbarton**, a UK SME, is working with University of Botswana and UK partners to test the technical and commercial feasibility of a system to support electricity consumers in Botswana. The system will help householders and businesses by ensuring that essential services are not interrupted by the power cuts that frequently occur in the region.
Innovation themes

Energy Management

Energy management challenges relate to the inability to monitor, control & collect payment for electricity in off grid locations with little or no connectivity. Innovative solutions to this challenge include the use of mobile technologies such as PAYG key fobs connected by Bluetooth technology and low cost WAN to provide a mini grid to off grid communities.

Funded project:

**Africa Power Ltd** is testing a ‘Solar Home System’ in Tanzania and Zambia. These low-cost energy systems are integrated with a portable PAYG key-fob, an innovation that manages payment and data collection, using Bluetooth technology for transmission in remote, low/no-connectivity areas.
The LCEDN database structure

Section

Individual Researcher  Institution  Project

Classification

Cross cutting fields

Unique field

Section relevant field

Individuals involved
Institutions involved
Associated projects
Total number of individual researchers: 425
Number of UK institutions: 37
Total number of institutions: 136
Total number of projects: 137

<table>
<thead>
<tr>
<th>In database</th>
<th>Recently received</th>
<th>Future sources</th>
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<tbody>
<tr>
<td>• All RCUK projects</td>
<td>• RAEng</td>
<td>• British Academy</td>
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<td>• DFID/RCUK</td>
<td>• Royal Society</td>
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<td>• Innovate UK</td>
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<td>• UKERC database</td>
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<td>• range of other smaller funders</td>
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Energy poverty
Energy security
Climate change
Environment
Clean water
Air quality
Economic development
Projects: Funded value by technology type
Solar PV

**Strengths:**
- Strong capacity in materials science and new PV technologies
- Connection to Pay-As-You-Go – new research on blockchain
- Alternative mini-grid infrastructures

**Opportunities:**
- Manufacturing technology, process monitoring and new production processes
- Standards and certification
- Smart-Grids, more coordinated assessment of alternative grid architecture, demand-profiling (GIS-based), data management.
- Fuller integration with social science based work on productive uses, community governance etc.
- eCook – cooking with solar PV
Bioenergy

Strengths (complex – wide-ranging):

- Assessment of whole bioenergy systems and sustainability assessments
- Bioenergy feedstock development (plant science)
- Processing and conversion technology
- Clean cooking stoves and fuels

Opportunities:

- Anaerobic digestion and gasification
- Regional studies on new conversion techniques, performance of feedstocks and conversion technologies
- Biomass value chains
- Limitations of clean cooking and alternatives to them
Energy storage

**Strengths:**
- New batteries being developed in relation to electric vehicles
- Significant research into utility scale storage in the UK (Birmingham Centre for Energy Storage (BCES) - £12 million EPSRC) – not just batteries cryogenic, compressed air etc.

**Opportunities:**
- Optimization of battery life (current technology)
- New battery development (sodium?)
- Applicability of new storage technologies
- Enhancement of hybrid mini-grids and support to EEG work on grid integration of renewables
Energy efficiency

*Strengths:*

- Wide scope of research – demand management, consumer behavior, green buildings and efficient appliances
- Outside of UK focus has largely been on lighting and cooking
- Some small-scale work on enhanced building design, industrial processes (CSR)

*Opportunities:*

- Alternatives to Air Conditioning
- Role of Certification and Standards (Construction) - Labelling
- Enhancement of Urban Planning and Design (strengthening of local governance)
- Efficient Appliance developments for use with SHS and Mini-Grids – quality of electricity supply?
Other technologies

- Opportunities: wind energy, wave energy, geothermal

Energy modelling

- Strengths: UK is a world leader. National level modelling (integrated analysis of all energy systems); techno-economic analysis of energy systems (HOMER), economic and econometric analysis of rural renewables deployment (decision analysis, demand analysis etc.)

- Opportunities: Regional/ global level modelling, GIS-enabled modelling, inclusion of business and social science researchers, modelling involving wider development agenda
Policy, institutions & governance

Strengths:
- energy policy diagnosis, policy analysis,
- quantitative modelling for policy,
- political economy analysis; socio-technical analysis, public sector reform

Opportunities:
- Policy implementation analysis, integrated energy policy, policy capacity development
- integration of energy policy with other sectoral policies,
- institution building, strengthening public administration, local governance, urban governance
Research themes

Socio-cultural

**Strengths:**
- Growing body of work
- Anthropology, social-technical transitions, gender, political economy, innovation studies, stakeholder and community engagement, capacity building

**Opportunities:**
- Longitudinal Studies
- Differential Impact Analysis / Political Economy / Gender
- Social-technical transitions – enhancing innovation
- Cultures of Energy Use
Partnerships for Skills Development:
An LCEDN Programme of Support for DFID’s Transforming Energy Access Initiative

Supporting TEA: The First 6 Months
Work Stream One

(a) Integrating the UK Energy and Development Research Space

(b) LCEDN Community Building Activities
Dominant themes:

- New **Technological Developments** or new forms of deployment of existing technologies (e.g. the development of new cookstoves, new storage options for PV systems, smart-grid technologies for mini-grids, development of pay as you go systems etc).

- A search for methodologies to take new technological developments ‘to scale’ via the development of new ‘**delivery models**’ designed to accelerate the deployment of renewable energy technologies in pursuit of the achievement of the international access targets.
**What’s missing?**

- Danger of *untested assumptions* about the benefits of access to modern energy services (be it access to modern cooking fuels, lighting, communication technologies, entertainment, cooling, motive power or machinery) and their impact on *pre-existing patterns of poverty, marginalization and exclusion*.

- Need for *longitudinal studies* which assess those impacts and recognise the *diversity* of impacts.

Maasai women's cooperative selling solar lanterns, Shompole wilderness
Key points

- Governance and quality of institutions are just as important as markets and technology.

- Cultures of innovation: there remains a strong emphasis upon disembodied ideas of North-South technology transfer and a lack of focus on effective mechanisms for supporting in-country innovation.

- Cultures of use: energy research needs to be reoriented around the social practices that energy facilitates (user-perceived value) as opposed to the traditional focus on energy infrastructure itself.

- Fair contracting: the relations between Northern and Southern researchers and how the actual research is conducted.
**Work Stream 1(b)**

LCEDN Community Building Activities.

**Progress:**

(a) Briefing Papers and Publishing Programme

- Tied to the development of new website. September launch.
- Working papers archive – Pre-publication site for rapid dissemination of latest research.
- Briefing papers:
  - Getting key issues into the public domain prior to formal academic publishing
  - Summaries for stakeholders
  1. Local energy governance,
  2. Integrating gender into energy research,
  3. Social science aspects of energy and development research,
  4. Equity and energy justice
- Discussions with publishers.
Progress:

(b) Researcher capacity building workshops and partnering prizes

- Energy Catalyst Six.
Progress:

(c) Short-term placement programme

Placements.

1. **Community Energy Malawi** – supporting the roll-out of District Energy Officers

2. **Lesotho University** – supporting the planning, delivery and follow-up of 2nd EU-Africa Research Symposium

3. **REEEP** – development of new data sharing element of LCEDN work

4. **India** – support to energy and gender community of practice
Progress:

(d) PRACTICAL ACTION: Broadening academic dissemination

Objectives: Improve Targeting of Dissemination and Engagement

- Energia/LCEDN Workshop
- Semi-structured interviews
- July 2017 – Bangladesh Stakeholders Workshop
- August 2017 – Kenya Stakeholders Workshop
- Strong involvement in Durham Conference
- Embedded into ASH/ICDRET
- Strong input into design of USES Nakuru Workshop
Work Stream 1(b)

LCEDN Community Building Activities.

Progress:

(e) LCEDN Integrative activity

(a) Annual Conferences

REGISTER for 11, 12th Sept!!!
Five individual partnerships:

- EU-Africa Energy partnership
- Energia-LCEDN partnership
- ASH & ICDRET
- Engineering collaborations (RAEng, EWB)
- Smart Villages
Progress:

- Student exchange established with Durham
- Support to researcher development
- Smart Villages webinar featuring PAUWES students
- Engagement with GIZ
2nd Africa-EU Renewable Energy Research and Innovation Symposium (RERIS) 2018

Call for Abstracts

Africa-EU Renewable Energy Research and Innovation Symposium (RERIS) 2018

23-26 January 2018, National University of Lesotho

On occasion of NULISTICE 2018

Background

With the aim to foster research cooperation on renewable energy between African and European academia, private and public sector, the Africa-EU Renewable Energy Cooperation Programme (RECP) and the National University of Lesotho (NUL) are jointly organising the second Africa-EU Symposium on Renewable Energy Research and Innovation (RERIS 2018) from 23–27 January 2018 in Maseru, Lesotho. The symposium will take place on the occasion of the NUL International Science and Technology Innovation Conference and Expo (NULISTICE 2018).
Progress:

(a) USES-Energia Researcher Workshops, (b) Mainstreaming gender in TEA and other energy research programmes; (c) 3 Joint dissemination workshops; (d) webinar collaborations

- First workshop held – briefing paper, new collaborations
- Dissemination events tied to initiative to develop India Community of Practice on Energy and Gender with support from DFID India.
**Objectives:**

(b) Contribution to the Design, Development and Delivery of the 2018 ICDRET conference in Kathmandu and inputs into their ongoing programme of capacity-building

- Planning meeting to be held while Jon and Ben are in Bangladesh and Nepal respectively
- Linked to PA work
- Date set for March 2018
- Collaboration with EEG

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**Work Stream 2(c)**

Strategic Networking (Africa Sustainability Hub and ICDRET)
Work Stream 2(e)

The Smart Villages Initiative collaboration

Progress:

- Continued delivery of a programme of monthly webinars,
- An LCEDN role in the delivery of at least two Smart Villages forward looking workshops (Brussels),
- Collaboration in the production of a report on regional comparative capacity-building needs to feed into RPDC scoping activity.
Access to distributed renewable energy can affect many other SDGs positively.

Livelihoods in the global south: if ‘leapfrog’ technologies can become affordable and effective at village level, the massive pressures on migration, problems of health and sanitation in urban growth patterns could be diminished.

Sustainable farming systems, and quality of life through primary health and education supported by renewable energy can enhance enterprises and levels of community well being, and reverse the notion that progress is only found in cities or the Global North.

Need to broaden the community of stakeholders for governing energy transitions to be technologically and socially adaptive for the off-grid world.