Teaching and Research Thematic Cooperation: Energy

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The City of Durham
Overview

• Durham University

• Durham Energy Institute (DEI)
  – Interdisciplinary research
  – “Science and Society”

• DEI Researcher support framework:
  – Masters
  – PhD
  – Researchers

• Conclusions
About me…

A journey:

- 1998-2000 Postgraduate Lecture Course Physics Department
- 2000-2002 Director of PG Training, Faculty of Science
- 2002-2005 Deputy Dean, Faculty of Science
- 2005-2010 Dean of Graduate School
- 2011-2015 Director of Multidisciplinary Doctoral Training Centre in Energy
Durham Context

- **PhD** 1530 (48% increase from 2005)
- **Masters** 2870 (20% increase from 2005)

PhD Breakdown:
- Full Time Home Fee 52%
- Full Time O/S Fee 26%
- Part Time Home Fee 16%
- Part Time O/S Fee 6%
Durham Energy Institute

- “Science and Society” – multidisciplinary ethos to energy-related research questions, in UK: “grand challenges”
- „decarbonising energy, through focussing on the central role of society on energy technologies, renewables, and the continued but cleaner use of fossil fuels”
- Over 150 academic staff across all three faculties
- Early career researcher training framework:
  - MSc Energy & Society, MSc New & Renewable Energy (40 students)
  - Energy Centre for Doctoral Training (50 PhD students)
  - Support for early career postdoctoral researchers
- Support for this multidisciplinary approach from Industrial Advisory Board – “what the energy industry needs”
Energy Challenges: Strong Focus

We face significant global challenges in the energy domain:
- Future energy security
- Creating sustainable low carbon energy systems
- Developing affordable energy services
- Reducing the risks associated with new energy technologies

This requires interdisciplinary knowledge and collaboration between academia, industry, government and society.

The objective of the Durham Energy Institute is to work with its partners at the forefront of creating this new knowledge.

Science + Social Science = DEI

Unlocking the Research Synergies
Durham University – Structures

- Traditional structure
- Most PhD training based in departments or faculties – discipline specific
- Energy Centre for Doctoral Training (CDT) is Multidisciplinary across all faculties
DEI Early Career Researcher Training Framework

- Major strength of DEI is early career researcher training
  - Multidisciplinary environment
  - Provides different perspectives, methodologies
- Masters
  - MSc in Energy and Society
  - MSc in New and Renewable Energy
- Doctoral Research
  - Multidisciplinary Centre for Doctoral Training in Energy (CDT)
- Support for early career researchers
MSc Energy and Society

- Drawing on Engineering, Business school, Anthropology
- Socio-technical network approach
- International focus: UK, Portugal, India, Greece, USA, China

Core Modules
- Energy Context and Challenges (Core Module)
- Energy Society and Practices (Core Module)
- Energy in Practice (Field Study)
- Dissertation

Choice of 3
- Society, Energy, Environment and Resilience
- Renewable Energy and the Environment
- Key issues in Sociocultural Theory
- Statistical Analysis in Anthropology
- Energy Markets and Risk
- Computational Methods for Social Sciences
- Law of Oil Contracts

Modules offered as Short courses
MSc New and Renewable Energy

- For graduates from science or engineering degrees wanting to apply their knowledge in an energy context
- Equipping Engineers for the challenges of the renewable energy sector
- An integrated approach to engineering → solving problems across the traditional Engineering boundaries

Modules include:
- Renewable Energy and Environment
- Low carbon and thermal technologies
- Turbomachinery and nuclear power engineering
- Energy delivery and network integration
- Energy generation and conversion technologies
- Energy, markets and risk
Energy and Society: making it work

Energy as socio-technical systems and embedded practices. Some examples:

- **Energy Demand**: *Carbon, Comfort and Control* investigating household comfort practices and the potential for interventions
- **Low Carbon Cities and Communities**: *Urban Transitions* - climate change experiments in urban infrastructure systems in 100 global cities; Smart Urbanisms; Haringey Partnership; Urban Climate Justice
- **Electric Futures**: Integrating social and physical science for the design of new PV; scoping the equity challenges arising from current household energy use and future low carbon transitions
- **Energy for Development**: Working with Department of Energy & Climate Change to develop UK capacity; Monitoring off-grid systems in Rwanda and South Africa; Greek energy transitions
- **Emerging Energy Technologies, Acceptance and Risk**: Fracking, Geothermal Biofuels, Renewables, Solar, grid development
- **MSc Energy and Society**: FT/PT, CPD, short courses

Technology and people
Multidisciplinary CDT in Energy

Currently 50 PhD students from:

- Anthropology
- Biological and Biomedical Sciences
- Chemistry
- Durham Business School
- Earth Sciences
- Engineering and Computing Sciences
- Geography
- Mathematical Sciences
- Physics

UK’s only Multidisciplinary Energy CDT with focus on “Science and Society"
Aim

• The CDT will be world leading in generating knowledge at the interface between energy technology and its implementation in society.

Vision

The CDT will foster:

• strong interdisciplinary ethos in energy research
• researchers who can realise the UK’s low carbon future
• continuing reputation as an internationally leading centre
• effective technical and social responses to energy issues
• public debate on technical, societal and policy issues in energy
• interdisciplinary research with national and international impact
• links between Science and Society

How do you achieve this?

Support for PhD candidates?
Issue for interdisciplinary research?

- How far can interdisciplinary research be stretched “without producing investigators who are conversant in many fields, but expert in none?”

- Not compromising integrity of existing disciplines?
Benefits/challenges for candidates

• How do doctoral candidates develop the behaviour of experienced and successful researchers?
• Bringing together candidates from different fields encourages working together and help from different perspectives
• Working in multidisciplinary teams is possibly more like the workplace, therefore, good professional training
• Avoid the narrow specialisation that some doctoral candidate have knowing a lot about not very much (breadth vs. depth)
• Candidates learn to be autonomous and very independent as they are often the ones doing the “bringing together”
Research culture

• From survey results (PRES in UK) we know that one of the scales which is consistently low is research culture or “Intellectual Climate”

• An environment in which the “rules of the game” are learned (and taught) implicitly and explicitly:
  – The appropriate/inappropriate ways of presenting a research seminar by attending seminars (implicit) and attending workshops on seminar presentation (explicit) – is this easier or more difficult in an interdisciplinary environment?
  – The “rules” around writing journal papers by being a member of a journal club (implicit) and co-authoring with supervisor (implicit and/or explicit) – again how does this happen in interdisciplinary areas?

• An environment within which one can develop shared understanding, skills, knowledge, and other attributes of success.
Disciplinary differences in approach?

Constructing new/original knowledge (research) that produces original approaches:

- **Science**
  - Positivist approach (informed enquiry)
  - Role of investigator less important, results independent of investigator

- **Social Science**
  - Constructivist approach
  - Role of investigator more prominent, results can vary depending on views, opinions of researcher often seen as important

- **Bridging the gap?** Requires a focus or common ground: Energy
Purpose of research training?  
Place in PhD? Role of supervisor?

- Best research is done by the best researchers

- How do you train the best researchers?
  - Knowledge
  - Behaviours
    - Researchers identify behaviours from peers and “leaders”
    - Training helps develop effective behaviours
    - A good environment helps with success (Energy CDT)

- Researchers need training and mentoring with good role models

- Training challenges some of paradigms of academia
  - What are added benefits of “structure”?
Possible requirements for success

- A strong focus e.g. energy
- Candidates who are prepared to “have a go” and be involved
- A well-structured learning environment, including introductions to different research approaches
- Creating a distinct and identifiable cohort of doctoral candidates that can belong to the Centre
- Empowering doctoral candidates to take new and different approaches
- Learning from others (Both supervisors and candidates)
Thank you for your attention