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*ESRC 2<sup>nd</sup> Research Seminar*

*Energy Policy & Climate Change: the  
Contribution of Complexity Science*

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Prof. Eve Mitleton-Kelly

Director

Complexity Research Programme, LSE

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# *ESRC Research Seminars Competition 2007/8*

## *6 Co-Applicants*

- Prof. Eve Mitleton-Kelly, Director, Complexity Research Programme, LSE (Principal Organiser)
  - Prof. Brian Salter, Professor of Politics of Biomedicine, Centre for Biomedicine and Society, King's College London
  - Prof. Jeff Johnson, Professor of Complexity Science and Design, Open University
  - Prof. Peter Allen, Professor of Evolutionary Complex Systems, Cranfield
  - Prof. Robert Geyer, Professor of Politics, Complexity and Policy, Lancaster University
  - Alex Paraskevas, Senior Lecturer, Oxford Brookes
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# *Applied Complexity Theory as the New Framework for Management and Public Policy*

**Sem. 1 with KCL** at LSE ‘*The Global Governance of New Health Technologies*’ – 26 November 2008

**Sem. 2 with OU** at LSE: ‘*Energy Policy & Climate Change: the Contribution of Complexity Science*’ – 24 March 2009

**Sem. 3 at Cranfield:** ‘*Modelling of Policy Decisions*’ – **10 June 2009**

**Sem. 4 at Lancaster:** ‘*Complexity and the International Arena*’ - **6 Nov 2009** + papers to be published in special issue of ***Cambridge Review of International Affairs*** in June 2010

**Sem. 5 at Oxford Brookes** ‘*Terrorism and the Complexity of Soft Targets: The Case of the Tourism Industry*’ - Feb/Mar 2010

**Sem. 6 at LSE** ‘*Complexity as a Framework for Public Policy*’ - June/July 2010

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## *Objectives*

- Identify the grand challenges that could be addressed by complexity science
    - *Scoping of new policy-oriented research to address the problem of sustainable energy provision in the context of climate change*
  - Develop ideas for multi-disciplinary research project proposals
  - Publish papers on seminar topic by speakers & participants
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## *2<sup>nd</sup> Seminar Programme - morning*

- 09.30 Welcome and introductions  
Prof. Eve Mitleton-Kelly  
Prof. Jeffrey Johnson
- 09.55 Energy Futures: the Challenge  
Prof. David Elliott & Dr Stephen Peake, OU
- 11.10 Coffee
- 11.30 Complexity Science & Policy  
Prof. Sir Alan Wilson, UCL
- 12.45 Lunch
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## *2<sup>nd</sup> Seminar Programme - afternoon*

- 14.00 Energy Policy & Climate Change  
Lord Puttnam - video interview & discussion
- 15.00 Research Funding
- 15.20 The Grand Challenges  
Panel to add to challenges  
(Peter Allen, Stephen Bishop, Godfrey Boyle,  
Diana Mangelagiu, Yasmin Merali)  
Participants to add to challenges
- 15.50 Tea & discussion of grand challenges in  
small groups
- 17.00 Report back & next steps
- 17.30 Wine & nibbles
- 18.00 Finish
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# *Challenges Submitted by Participants*

## **Some Key Issues:**

- **Security of supply** – both energy sources and electrical power supply
  - **Demand-side management** - e.g. consumers' perception and behaviour on energy saving
  - **Environmental impact** – emissions, global warming and geographical footprint
  - **Economics** – competitive energy and power markets with no discrimination
  - **Diffusion** of new energy technologies (e.g. smart metering, micro-generation)
  - **Government energy policies**
  - **Future of regulation** in the energy industry
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## *Challenges: Tools & Techniques*

- Develop quantitative **tools and techniques** to model *co-evolutionary dynamics*
  - EMK: + qualitative tools and methods
    - Assessing and forecasting effects of adaptation
  - **Agent-based modelling** to investigate how different approaches to individual behavioural change, may impact on an organisation's overall energy consumption
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## *Challenges: Tools & Techniques*

- Over the last decade there have been significant advances in the field of E-science with regard to large-scale information exchange and data analysis in complex systems
    - e.g. *grid, cloud and cluster computing, Web Services, and Common Information Model (CIM)*
  - At present these tools and techniques have not been fully exploited by the energy and electrical power industry sectors
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## *Challenges: Renewables*

- **Reliability of forecasting of *renewable power supply* and fluctuations in demand** on many spatial and temporal timescales
  - Operating, controlling and optimisation
  - Interdisciplinary approach from meteorological forecasting to modelling complex power grids on local, regional and national scales
  - Modelling the response of the market and social systems to the changes that will be necessary to adapt to an inherently intermittent power supply
  - EMK: MET & NERC Joint Climate Research Programme
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## *Challenges: Work, Home, Urban & Info*

- Pro-environmental behaviour in the **workplace**
  - The interaction between energy efficiency and conservation technologies and human behaviour in the **home environment**
  - EMK: contributions at citizen & community levels
  - Appropriate **infrastructures for urban areas** to foster low carbon emissions in a context of climate change
  - **Information about trade agreements and their implications** across domestic public policy areas, to enable policy makers and the public to understand and take account of those implications
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# *Challenges Submitted by Participants*

## **Cambridge Centre for Energy Studies**

- **Data assimilation** from multiple space, air, and ground remote sensing platforms **for climate and emissions monitoring**;
  - Combining climate models with local climate data measurements for **accurate analysis of short and medium term climate variations**;
  - Analysis of **vulnerabilities in social systems** when exposed to multiple stressors, e.g., abrupt environmental change;
  - Identifying appropriate **policy interventions at unstable interfaces** between complex systems which exhibit significant internal instability and are exposed to abrupt environmental change.
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## *Process*

- Network
  - Put your name down for small group discussion in one area + register your interest in other areas
  - Add more challenges during the day
  - If you would like to lead the discussion on one topic, then take the opportunity at the Grand Challenges session to say so
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*Thank you*

*E.Mitleton-Kelly@lse.ac.uk*

*www.lse.ac.uk/complexity*

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