Introduction to wholeSEM

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Modelling Long-term UK Energy Futures: Challenges and Competing Objectives

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The 5 Stages of ~~Grief~~ Interdisciplinary energy modelling

Stage	Reaction/Response by Consortium Members
#1: Denial	I can't believe my colleagues don't know: a) Neoclassical Economics b) Elementary Psychology c) Basic Engineering Principles d) The Laws of Thermodynamics
#2: Anger	Why does "inter-disciplinary research" mean **I** need to adjust **my** thinking and change **my** modelling approach ??
#3: Bargaining	I'd be OK if only my colleagues would use my methodology / underlying tenet / words I actually understand !!
#4: Depression	Have you seen the Gantt chart and all the deliverables we've promised EPSRC / our Advisory Board / wider stakeholders ….
#5: Acceptance	This multi-disciplinarity and model linking really does allow us to generate and communicate new insights on whole energy systems analysis ☺

wholeSEM Overview

- A ground breaking whole systems energy modelling consortium (wholeSEM)
  - £5.7 million (FEC)
  - 1 July 2013 – 30 June 2017
- A new initiative to develop, integrate and apply state-of-the-art energy models
  - Energy models provide essential quantitative insights into these 21st Century challenges of decarbonisation, energy security, energy equity, and cost-effectiveness
- wholeSEM will build and link energy models to provide a fundamental underpinning role for the UK's national strategic energy modelling activity
  - Provide continuity of funding to develop new models, retain human capacity, and link modelling frameworks in innovative ways to answer new research questions
- Substantive bilateral engagement with stakeholders in academia, government, industry and NGOs

People

- University College London:
  - Project lead, Technology focus
  - Professor Neil Strachan; Dr Ilkka Keppo
  - Project Administrator; 4 Research Associates
  - 12 visiting researchers

- University of Cambridge:
  - Environment focus
  - Dr Julian Allwood; plus Cambridge faculty
  - 3 Research Associates

- Imperial College London:
  - Infrastructure focus
  - Prof Nilay Shah; Prof Goran Strbac
  - 3 Research Associates

- University of Surrey:
  - Demand focus
  - Prof Nigel Gilbert
  - 3 Research Associates

Aims and Research Questions

- The key aims of the interdisciplinary wholeSEM consortium are:

  1. Undertake internationally cutting edge research on prioritised energy system topics;

  2. Integrate whole energy systems modelling approaches across disciplinary boundaries;

  3. Build bilateral engagement mechanisms with the wider UK energy systems community in academia, government and industry.

- Prioritised modelling-based research questions:

  - How does **energy demand co-evolve** with changes in practice, supply, and policy?

  - How will the endogenous, uncertain, and **path dependent process of technological change** impact future energy systems?

  - How can the energy supply-demand system be optimised over **multiple energy vectors and infrastructures**?

  - What are the major future physical and economic interactions and stresses between the UK energy system and the **broader environment**?

Outreach: Selected highlights

- **Online dissemination**
  - Website (www.wholesem.ac.uk); Twitter (@wholeSEM); Hashtag (#wholeSEM14)
- **Responsive engagement**
  - Strategic engagement with DECC (annual conference; policy-modelling workshop; UK energy modelling portfolio)
- **Conferences and events**
  - IQ Scene (Innovative techniques for Quantitative SCenarios in ENergy and Environmental research)
  - Modelling Social Energy Practices
- **UK stakeholder interactions**
  - DECC, CCC, Ofgem, ETI, National Grid etc
- **International impact**
  - IPCC, TEDx, EERA, modelling networks, foreign governments, conference keynotes, publications
- **First cohort of wholeSEM Fellows**
  - Bevan Freake (DECC); Grant Kopec (Cambridge); Russell McKenna (Karlsruher Institute of Technology)
- **Plus…**
  - Model documentation; Open source models; PhD training; Data portal; Links to broader UK academic community