



wholeSEM Annual Conference 2015
6 & 7 July 2015
Hybrid Energy Modelling – Linkages
and Interdisciplinarity





About the Whole Systems Energy Modelling Consortium (wholeSEM)

The whole systems energy modelling consortium (wholeSEM) is a ground breaking, multi-institution initiative to develop, integrate and apply state-of-the-art energy models.

Our aim is to employ extensive integration mechanisms to link and apply interdisciplinary models to key energy policy problems, with substantive bilateral engagement with stakeholders in academia, government and industry. Funded by EPSRC, the consortium is led by University College London and consists of Imperial College London, the University of Cambridge and the University of Surrey. The consortium is led by Professor Neil Strachan and administered by Liz Milner, both based at UCL Energy Institute.

Energy models provide essential quantitative insights into the 21st Century challenges of decarbonisation, energy security, energy equity, and cost-effectiveness. Models provide the integrating language and framework that assists energy policy makers – focusing at different scales and time periods – to make improved decisions and trade-offs in conditions of pervasive uncertainty. Whole systems energy modelling also has a central role in helping energy supply companies to make technical and economic decisions with regard to future energy technologies and infrastructure, as well as in the assessment of the potential role of societal and behavioural change.

Follow us on Twitter at @wholeSEM. We welcome you to tweet and share your thoughts about our event using the hashtag #wholeSEM15



Engineering and Physical Sciences
Research Council

wholeSEM is funded by EPSRC from July 2013 through June 2017 (EP/K039326/1)

EPSRC is the main UK government agency for funding research and training in engineering and the physical sciences, investing more than £800 million a year in a broad range of subjects - from mathematics to materials science, and from information technology to structural engineering.

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wholeSEM Annual Conference 2015 - Hybrid Energy Modelling - Linkages and Interdisciplinarity

The overall aim of the 2nd annual conference of the Whole Systems Energy Modelling (wholeSEM) consortium is to present energy models, to compare and contrast approaches, and to discuss the insights they provide. The conference will explore the linkages between different areas that have traditionally been analysed with separate methodologies. This includes an understanding of the strengths and shortcomings of current energy modelling, conceptual issues in combining disciplinary approaches, and the benefits and pitfalls of hard- and soft-linking of energy models.



#wholeSEM15 @wholeSEM

Date:
6 & 7 July 2015

Venue:
Buckingham House, Murray
Edwards College

Day 1: Monday 6th July 2015

Buckingham House Foyer

10.30 Registration & refreshments

Lecture Theatre

11.00-12.30: Plenary session

- Welcome to Cambridge, to the wholeSEM consortium, and to our 2nd Annual conference: Julian Allwood, University of Cambridge
- Keynote, Mark Howells, KTH Royal Institute of Technology, Stockholm 'Supporting Policy Coherence - Challenges and Successes in Extending Energy Systems Models to other Resources'
- Respondents: Adam Hawkes, Imperial College London; Martin Haigh, Shell; Mark O'Malley, University College Dublin

Buckingham House Foyer

12.30-13.30 Lunch break

13.30-15.00: Concurrent sessions on modelling methodologies

Seminar Room 1	Seminar Room 2	Lecture Theatre
<p>Session 1a: Codifying and modelling social energy practices and demand changes</p> <p>Chair: Thomas Roberts, University of Surrey</p> <p>Speaker A: Malcolm Jay, Department for Transport 'The GB National Transport Model – demands and uncertainty in road transport energy forecasts'</p> <p>Speaker B: Ruchi Choudhary, University of Cambridge 'Energy Efficient Built Environments: from unit to city scale'</p> <p>Speaker C: Kevin Lomas, University of Loughborough 'How and when are UK homes heated: from measurement to modelling'</p>	<p>Session 1b: Improved modelling of technological change and diffusion</p> <p>Chair: Birgit Fais, UCL</p> <p>Speaker A: Oliver Rix, Baringa and Dr Ren Orans, E3 'Long term energy system modelling: comparing UK and California'</p> <p>Speaker B: Brian O'Gallachoir, University College Cork 'Developing and using a multi-model approach – One size fits all does not work'</p> <p>Speaker C: Chris Heaton, Energy Technologies Institute 'Developing UK energy scenarios from ESME modelling'</p>	<p>Session 1c: Interdisciplinary modelling of the whole energy system I</p> <p>Chair: Matthew Winning, UCL</p> <p>Speaker A: Alison Hughes, University of Cape Town 'Hybrid Models: Modelling Development Aspirations and Mitigation in South Africa'</p> <p>Speaker B: Joe DeCarolis, North Carolina State University, 'Energy Scenario Exploration with Modelling to Generate Alternatives (MGA)'</p> <p>Speaker C: David McCollum, IIASA 'Breaking down non-cost barriers to technology adoption is critical for the transport-energy transformation'</p>

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15.00-15.30 Coffee break and Student poster session 1 – with rapid fire presentations

15.30-17.00: Concurrent sessions on modelling methodologies

Seminar Room 1	Seminar Room 2	Lecture Theatre
<p>Session 2a: Incorporating spatial and temporal detail in infrastructure Chair: Marianne Zeyringer, UCL Speaker A: Russell McKenna, Karlsruhe Institute for Technology 'Is there an optimum scale for energy autarky?' Speaker B: Keith Bell, University of Strathclyde 'It's got to work: the engineering detail in modelling electric power systems' Speaker C: Goran Strbac, Imperial College London, 'Role and value of flexible technologies in supporting cost-effective evolution to a low-carbon energy system'</p>	<p>Session 2b: Energy-land-water trade-offs and constraints (the Nexus) Chair: Zeniada Sobral-Mourao, University of Cambridge Speaker A: Alex Archibald, University of Cambridge 'Towards the development of a community UK Earth System Model' Speaker B: Iain Morrow, AEA-Ricardo 'Energy Models for Policy' Speaker C: Holger Hoff, PIK 'Modeling the land-water-climate nexus - what are links to energy?'</p>	<p>Session 2c: Interdisciplinary modelling of the whole energy system II Chair: Hannah Daly, UCL Speaker A: Chris Dent, Durham University 'Linking energy systems models to real systems: model calibration and emulation' Speaker B: Jonathan Cullen, University of Cambridge, 'Resource efficiency in steel-making' Speaker C: Sheila Samsatli, Imperial College London 'A general spatio-temporal model of energy systems, STeMES, and its application to integrated wind-hydrogen-electricity networks in Great Britain'</p>

Lecture Theatre

17.00-17.30: Wrap-up session on model methodologies and model linkages, plus Q&A

Chair: Ilkka Keppo, UCL

- Discussant 1: Alec Waterhouse, DECC
- Discussant 2: Peter McGregor, University of Strathclyde

Emmanuel College, St Andrews Street, Cambridge CB2 3AP

19.00 for 19.30: Conference Dinner

After Dinner Speaker: James Smith; ex CEO of Shell UK, current Chair of Carbon Trust

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Day 2: Tuesday 7th July 2015

09.00 - 11:00: Concurrent sessions on linking interdisciplinary modelling topics

Seminar Room 1	Seminar Room 2	Lecture Theatre
<p>Session 3a: Practices and demand linking to Technological transition Chair: Kavin Narasimhan, University of Surrey</p> <p>Speaker A: Evelina Trutnevyte, ETH 'Mission (im)possible: Embracing parametric, structural and socio-political uncertainties in modelling energy transitions'</p> <p>Speaker B: Martino Tran, University of Oxford 'A general framework for modelling techno-behavioural dynamics on networks'</p> <p>Speaker C: Sonia Yeh, UC Davis 'Opportunities and Challenges of Incorporating Consumer Choices and Consumer Behavior in Energy-Economy-Engineering-Environment (4E) models'</p> <p>Speaker D: Thomas Roberts, University of Surrey, 'The Complexity and Dynamics of Household Energy Practices'</p>	<p>Session 3b: Technological transition linking to Infrastructure spatial and temporal detail Chair: Marko Aunedi, Imperial College London</p> <p>Speaker A: Kenneth Karlsson, DTU 'Heat saving and district heating potentials for TIMES-DK'</p> <p>Speaker B: John Barton, University of Loughborough 'High-Temporal-Resolution Analysis of GB Power System Used to Determine Optimal Amount and Mix of Energy Storage Technologies'</p> <p>Speaker C: Kannan Ramachandran, PSI 'Aspirations for electrification: Does the future electricity demand profile matter for electricity supply? - Temporal aspects of energy system modelling'</p> <p>Speaker D: Nazmiye Balta-Ozkan, University of Cranfield 'Urban economics and energy use: from pounds to electrons'</p>	<p>Infrastructure spatial and temporal detail linking to Energy-land-water nexus Chair: Shelia Samsatli, Imperial College London</p> <p>Speaker A: Helen Houghton-Carr, CEH 'Global modelling of water availability and water use under current conditions and future scenarios'</p> <p>Speaker B: Andrew Lovett, University of East Anglia 'Spatial modelling of the energy-land-water nexus: challenges and opportunities'</p> <p>Speaker C: Richard Taylor, E4tech 'Introducing the Bioenergy Value Chain Model: spatial optimisation, linkages and insights'</p> <p>Speaker D: Rick Lupton, University of Cambridge, 'Integrating land, energy and water at different scales in Foreseer'</p>

Buckingham House Foyer

11.00-11.30 Coffee break and Student poster session 2 - with rapid fire presentations

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11.30-13.00: Concurrent sessions on linking interdisciplinary modelling topics

Seminar Room 1	Seminar Room 2	Lecture Theatre
<p>Session 4a: Practices and demand linking to Infrastructure spatial and temporal detail</p> <p>Chair: Thomas Roberts, University of Surrey</p> <p>Speaker A: Benjamin Hobbs, John Hopkins University 'Which Oversimplification is the Worst Sin? Lessons from Large Scale Transmission Planning for Renewables Using Optimization in the Eastern and Western Interconnections of the US'</p> <p>Speaker B: Vlasios Voudouris, ABM Analytics 'Towards new economy-energy models: Integrating agent-based and statistical models to incorporate spatial and temporal details'</p> <p>Speaker C: Alex Rogers, University of Southampton- 'Thermal Modelling of Homes and Buildings From Minimal Sensor Deployments'</p>	<p>Session 4b: Technological transition linking to Energy-land-water nexus</p> <p>Chair: Dennis Konadu, University of Cambridge</p> <p>Speaker A: Geoff Hammond, University of Bath 'Environmental footprint analysis as an integrating tool for evaluating the energy-land-water nexus'</p> <p>Speaker B: Olga Ivanova, PBL Netherlands Environmental Assessment Agency, 'EXIOMOD model: a General Equilibrium approach to life-cycle analysis of energy futures'</p> <p>Speaker C: Marta Dondini, University of Aberdeen 'Ecosystem Land-Use Modelling & Soil C GHG Flux Trial (ELUM)'</p>	<p>Session 4c: Interdisciplinary modelling of the whole energy system III</p> <p>Chair: Sandy Skelton, University of Cambridge</p> <p>Speaker A: Phil Summerton, Cambridge Econometrics 'Hybrid modelling to assess the socio-economic consequences of a low carbon transition: Insights from E3ME applications'</p> <p>Speaker B: Garima Vats, Ritu Mathur, TERI 'Interdisciplinary methods in energy & resources modelling'</p> <p>Speaker C: Birgit Fais, UCL, 'Large-scale deployment of marine energy technologies – what could be the benefits of a strong national market?'</p>

Buckingham House Foyer

13.00-14.00: Lunch

Lecture Theatre

14.00-15.00: Final session on application of linked models to decision maker needs plus Q&A

Chair: Nilay Shah, Imperial College London

- Discussant 1: Filippo Gaddo, Arup
- Discussant 2: Jan Imhof, Aurora Energy Research
- Discussant 3: David Joffe, Committee on Climate Change
- Discussant 4: Jonathan Radcliffe, University of Birmingham

15.00-15.20: Conference round up and close – including prizes for best 3 posters

Seminar Room

15.30 – 17.00: wholeSEM Advisory Board (By invitation only)



Dr Alex Archibold is NCAS-Climate Lecturer in Atmospheric Chemistry Modelling at University of Cambridge. Alex's research interests are in trying to understand the role that atmospheric chemistry plays within the Earth system. This ranges from understanding the effects of changes on composition to

radiative forcing, to understanding the fundamental causes for changes in the composition of the atmosphere. Alex read chemistry at the University of Bristol (2003-06) before pursuing a PhD on numerical modelling of atmospheric dispersion and degradation of trace gases. Alex came to Cambridge in 2009 to work with Prof. John Pyle as an NCAS-climate postdoc, working on the UM-UKCA chemistry-climate model.



Dr Nazmiye Balta-Ozkan is a Senior Lecturer in Environmental/Energy Economics at School of Energy, Environment and Agrifood (SEEA) at Cranfield University. She recently led a NERC/UK Energy Research Centre (UKERC) funded project on 'Scenarios for the development of smart grids in the UK'. She was

awarded an international grant on smart homes. Her main research interests include integration of environment-economy-energy models, social construction of smart grids, spatial understanding of energy system transitions and associated implications for policy and planning. Nazmiye holds a PhD in Regional Planning from the University of Illinois at Urbana-Champaign. She was part of the UKERC Phase 1 Energy Systems Modelling theme and a secondee to DECC Strategy Directorate to provide analytical support to the 'Carbon Plan' using UK MARKAL Energy System model in 2011. Ozkan has participated in and led research and consultancy projects for a wide range of funding bodies including: EPSRC, Committee on Climate Change, Defra, DfT, European Commission, E.ON and U.S. Environmental Protection Agency.



Dr John Barton is a Research Associate at the Centre for Renewable Energy Systems Technology (CREST), Loughborough University. His first degree was in Engineering in 1989, at Jesus College, Cambridge University. Upon graduating, John worked for Rolls-Royce plc (aero engines) in Derby for 11 years, on the

research and design of compressors and fans. John moved to Loughborough University in 2000 to study Renewable Energy, receiving an MSc with distinction in 2001 followed by a PhD in 2005 in the subject of modelling energy storage with intermittent renewable energy. John has also been a director of Air Fuel Synthesis Limited, www.airfuelsynthesis.com. He is currently working on two EPSRC funded research projects: Realising Transition Pathways to a Low Carbon Economy (RTP), and Integrated, Market-fit and Affordable Grid-scale Energy Storage (IMAGES). John has developed a time-step model of the UK's energy supply and use called Future Energy Scenario Assessment (FESA).



Keith Bell is the ScottishPower Professor of Smart Grids at the University of Strathclyde. He joined the University in 2005 having previously gained his PhD at the University of Bath and conducted research in Naples and Manchester, specialising in analysis of risk in power systems. For a number of years, he was a system

development engineer with National Grid where, among other things, he led the development of new planning tools and the revision of the security standard for BETTA. Since joining Strathclyde, he has been involved in a number of UK and European transmission and distribution research projects concerned largely with grid integration of renewables but also regulatory issues. He is a Chartered Engineer, a co-Director of the multi-disciplinary UK Energy Research Centre (UKERC), a member of CIGRE Study Committee C1 on System Development and Economics and a member of the Council of the IET Power Academy, an initiative to promote electric power engineering as a graduate career.



Jonathan Cullen is a University Lecturer in Energy, Transport and Urban Infrastructure in the Department of Engineering at the University of Cambridge. He holds an MPhil in Engineering for Sustainable Development and a PhD entitled 'Engineering fundamentals of energy efficiency', both from the University of

Cambridge. Jonathan was employed as Research Associate in the WellMet2050 research programme and worked on novel material efficiency options for reducing demand for energy intensive materials, which is described in the book entitled 'Sustainable Materials: with both eyes open'. Jonathan is currently a co-investigator on the UK InDemand project and his research interests include whole energy systems, energy and material demand reduction and low carbon-energy technologies.



Joseph DeCarolis is an Associate Professor in the Department of Civil, Construction, and Environmental Engineering at NC State. His research is focused on the interdisciplinary assessment of technologies and public policies that promote long term environmental sustainability. He is particularly interested in

developing robust decision-making strategies for climate mitigation by conducting analysis with technology-rich energy system optimization models. Before joining the CCEE faculty, Dr. DeCarolis was an environmental scientist at the U.S. Environmental Protection Agency in the Office of Research and Development. He received his PhD in Engineering and Public Policy from Carnegie Mellon University in 2004, where his dissertation focused on the economic feasibility and environmental impacts of large-scale wind power.



Dr Ruchi Choudhary is associate professor in the Department of Engineering at Cambridge since 2008. She teaches in the Civil, Structural and Environmental Engineering Division of the Department of Engineering. Prior to joining Cambridge, Dr Choudhary was assistant professor of building technologies in the

College of Architecture at Georgia Institute of Technology in Atlanta, USA (2004-08). She has also taught in the Sustainable and Environmental Design Unit at the Architecture Association in London (2007-09). She received her PhD in Architecture from the University of Michigan in 2004. Dr Ruchi Choudhary specializes in building simulation with a particular interest in multi-criteria modelling of energy demand and environmental characteristics of the built environment. Her research is on simulation-based methodologies for energy management of buildings; uncertainty quantification in building simulation models; integration of novel building technologies and renewable energy supply systems; and multi-disciplinary interactions influencing energy consumption of the built environment. Her recent research focuses on developing tools and methods for analysing energy consumption of large sets of buildings. These have resulted in two parallel investigations: one on how to represent and evaluate relevant and large-scale research and policy questions through physics-based models, and second, how to quantify uncertainties in model outcomes.



Dr. Chris Dent is Senior Lecturer in Energy Systems Modelling at Durham University. He holds an MA in Mathematics (Cambridge, 1997), PhD in Theoretical Physics (Loughborough, 2001) and MSc in Operational Research (Edinburgh, 2006). Since 2007 he has worked full time in energy systems analysis,

with interests including reliability analysis, economic modelling, renewables and storage integration, and decision making under uncertainty. Since 2011 he has worked with National Grid on design of technical modelling for the GB Electricity Capacity Assessment Study. He was the 2012 recipient of the IET Mike Sargeant Young Engineer Career Achievement Award, and is a Senior Member of the IEEE and Associate Fellow of the OR Society.



Marta Dondini joined the Environmental Modelling Group at the University of Aberdeen as a Post-doctoral Researcher. Her main research interests involve investigating how carbon storage in soils will be altered by land use change to bioenergy plantations and in partitioning soil into fractionations that match

theoretical pools in soil C models. Her main areas of expertise are in modelling greenhouse gas / carbon mitigation and mechanisms regulating soil carbon sequestration. She is a scientific reviewer for Global Change Biology, Global Change Biology Bioenergy, Plant and Soil, Geoderma and European Journal of Soil Science. She received her PhD in 2010 at the Trinity College of Dublin with a thesis on the potential of bioenergy crop Miscanthus to sequester carbon in the soil.



Dr Birgit Fais joined the UCL Energy Institute as a Research Associate in Energy Systems in September 2013. In her research work, Birgit focuses on developing and applying different types of energy system models, the representation of technological change and uncertainty in energy modelling as well as the

soft-linking of different model approaches. She is also the main contact person for the cooperation with the Department of Energy and Climate Change (DECC) on the development of the new, open-source national energy system model UKTM. Her PhD at the Institute for Energy Economics and the Rational Use of Energy (IER) at the University of Stuttgart focused on the modelling of policy instruments in energy system models.



Filippo Gaddo is the Head of Energy Economics at Arup, which he joined in 2013, and has fourteen years' professional experience working for government departments and major consulting firms. Filippo combines deep energy industry experience and economics

knowledge to support clients in developing business plans, energy policy and market strategy. Areas of recent focus have been gas and power market modelling, including electricity market design, capacity markets, energy demand forecasting, energy policy impact assessment and the economic case for investing in energy infrastructure and new technologies. He has also advised investors in the acquisition of power and gas assets across Europe.



Martin Haigh has been working for Shell for twelve years, and has been a member of the Shell Scenarios Team for the last ten. He looks after the energy modelling for the team, and has led the development of Shell's World Energy Model, which has underpinned the last two Shell scenario rounds. He speaks

frequently on energy-related issues and takes particular interests in energy technology development and environmental change. His background is mathematics, with experience in mathematical and economic modelling in the transport and telecoms industries, as well as for energy.



Geoffrey Hammond is Professor of Mechanical Engineering at the University of Bath as well as, since 2010, Honorary Professor in Sustainable Bioenergy at the University of Nottingham. His research interests are mainly concerned with the technology assessment of energy (including bioenergy and biofuel) systems, using methods

derived from the engineering and environmental sciences (such as carbon and environmental footprinting, environmental life-cycle assessment, risk assessment, and thermodynamic analysis). He is currently the PI [and Co-Leader] of the EPSRC 'Realising Transition Pathways' Consortium of nine university partners. He was the joint recipient of the Dufton Silver Medal (CIBSE, 1984), the George Stephenson Prize (IMechE, 2009), and the James Watt Medal (ICE, 2015) for three of his journal publications. His keynote/invited lectures have been presented nationally and internationally, including the Willem van Gool Memorial Lecture in Portugal. He was appointed an Output Assessor on 'Energy and Sustainability' for the UK Research Excellence Framework (REF 2014).



Dr Adam Hawkes is Senior Lecturer in Energy Systems in the Centre for Process Systems Engineering at Imperial College London. He leads the energy modelling programme at the Grantham Institute and is Deputy Director of the Sustainable Gas Institute. A Chartered Engineer, Dr Hawkes has over 15 years

experience of technical leadership and management in the field of energy technology assessment and systems modelling. His work takes an integrated approach to energy system analysis across scales, infrastructures, technologies and jurisdictions. This is achieved via the formulation and application of national, regional and global energy systems models that produce pathways of energy system transition, with a strong focus on understanding the value provided by new technologies, and on understanding the engineering characteristics of successful technologies. Adam has worked on the emerging challenges in energy systems such as future roles for conventional and low carbon fuels, heat decarbonisation, mass-market integration of renewables, and the role of carbon capture in sustainable energy systems. He is currently developing a new energy systems modelling environment, to be released in 2016.



Dr Chris Heaton is a Modelling Strategy Manager at the Energy Technologies Institute Chris leads the energy modelling team at ETI, leading work on the ESME model in particular as well as coordinating modelling across the ETI. Since joining the ETI in 2008 he has worked on the ESME project through

the prototyping and development phases to its application in research projects and dissemination work. Prior to joining the ETI in 2008 he was a Research Fellow of Trinity College Cambridge, a researcher in the Department of Applied Mathematics and Theoretical Physics in the University of Cambridge, and a visiting researcher at Ecole Polytechnique, Paris. He has a BA and MMath in Mathematics, and a PhD in Applied Mathematics from Cambridge University.



Benjamin F. Hobbs is the inaugural holder of the Theodore M. and Kay W. Schad Chair of Environmental Management at the Johns Hopkins University. He has been a member of the faculty of that university's Department of Geography & Environmental Engineering since 1995. He also holds a joint appointment in the

Department of Applied Mathematics & Statistics. Since 2010, he has been the inaugural Director of the JHU Environment, Energy, Sustainability & Health Institute. His research and teaching concerns the application of systems analysis and economics to electric utility regulation, planning, and operations and to water and ecosystem management. He has published 150 refereed journal articles as well as several books. His work has received best paper awards from the Decision Analysis Society (INFORMS); the Energy, Natural Resources, and Environment Section of INFORMS; the American Geophysical Union, and the American Society of Civil Engineers, Water Resources Management and Planning Division.



Dr. Holger Hoff is Senior Research Fellow at the Stockholm Environment Institute (SEI) in Sweden and at the Potsdam Institute for Climate Impact Research (PIK) in Germany.

His main research interests are integrated water and natural resource management, climate adaptation and mitigation, the nexus,

teleconnections, and sustainable production and consumption, globally and with focus on the MENA region and sub-Saharan Africa. He has more than 20 years of experience in environment & development issues, working for different universities, research institutes and think tanks in Germany, Sweden and the Netherlands. He has also been scientific adviser to German development cooperation for more than 10 years. Previous positions include: Executive Officer for the ESSP Global Water System Project and for the IGBP project Biospheric Aspects of the Hydrological Cycle, Senior Scientist for the International Dialogue on Water and Climate, and Research Analyst for the German Advisory Council on Global Change to the German Government.



Mark Howells directs the division and holds the chair of Energy Systems Analysis (KTH-dESA) at the Royal Institute of Technology in Sweden. He has an honorary Professorship at the University of Technology in Sydney. He leads the development of the world's premier open source energy planning software; has

published in Nature journals; coordinates the European Commission's think tank for Energy (INSIGHT_E); is regularly used by the United Nations as a policy-science expert. His division undertakes research for NASA, IRENA the World Bank and others. Prior to joining KTH-dESA he has an award winning career with the International Atomic Energy Agency. As a student he was the spokesperson of World Energy Council youth program of 1998.



Helen Houghton-Carr is a Senior Hydrologist in the Water Resources Section at the NERC Centre for Ecology & Hydrology (CEH).

Within CEH, she leads a science research area concerned with assessment of available water resources in a changing world based on long-term scenarios of climate, land use and

population. She works primarily in Sub-Saharan Africa and Asia, where she has a particular interest in regional approaches to problem-solving and in expanding technical capabilities in the water sector: both research capacity in universities to improve knowledge and understanding, and institutional capacity in ministries and hydrological agencies to monitor, plan and manage water resources more effectively and sustainably. She is a committee member for the Irrigation & Water Forum (i.e. UK branch of the International Commission on Irrigation and Drainage), and also sits on the GEWEX (Global Energy and Water Exchanges) HyVic International Planning Committee for the Lake Victoria basin.



Alison Hughes has been working in the Energy Research Centre at the University of Cape Town for the past 10 years. She initially worked on energy efficiency and demand side management in the industrial and commercial sectors before joining the Energy Systems Analysis group (ESA). ESA focuses on

developing national, regional and local energy systems models for South Africa and the region and understanding the drivers of energy demand in all sectors of the South African economy. Within ESA Alison has worked mainly on national and municipal level models, with particular focus on the industrial and residential sectors within these models.



Dr. Olga Ivanova works as a senior researcher at PBL Netherlands Environmental Assessment Agency with the project on regional competitive position and economic growth of European regions. In the past she has worked as a senior researcher at Strategy and Policy group of TNO. She has coordinated the project

on the construction of the world-wide CGE model EXIOMOD, that allows for simultaneous representation of monetary and physical flows as well as the project on the construction of RHOMOLO regional-economic model of EU28 for DG REGIO. She has acted as a WP leader of the project of DG ENV called 'Assessment of Scenarios and Options towards a Resource Efficient Europe: An Analysis for the European Built Environment'. She has also coordinated the modelling Work package of DG CLIMA projects on 'Assessing the Implications of Climate Change on Employment in the EU' and 'Climate extremes: defining a pilot approach on estimating the direct and indirect impacts on economic activity'.



Jan Imhof is Head of Global Modelling at Aurora Energy Research. Jan has developed Aurora's hybrid computable general equilibrium model since its inception in 2013. He is responsible for developing Aurora's

modelling capabilities and for conducting studies on the impacts of various policy and technological assumptions and scenarios on global energy markets. Before his role with Aurora he was a post-doctoral researcher at the ETH Zurich, Switzerland, where he studied economic effects of climate and energy policy and the role of technological change. He obtained his PhD in economics from the ETH Zurich in 2012, writing about the interplay between carbon mitigation and nuclear phase-out policies. Jan's research agenda covers applied environmental and energy economics by applying energy economic modelling, computable general equilibrium modelling, partial equilibrium modelling and the integration of technology-rich bottom-up models with top-down macroeconomic models.



Malcolm Jay is a Transport Modeller with the Strategic Transport Analysis & Modelling (STAM) branch in the Department for Transport (Dft). He has developed a number of systems for the DfT including NARNAS, which merged national traffic count and detailed network data together for the first time and generated the first road 'stress maps' and

FORGE a program initially developed for producing the 1997 traffic forecasts. In 1998 FORGE played a crucial role developing the governments 'Ten Year Plan' for transport and led to the commitment to develop a National Transport Model, where FORGE still fulfils a major role



Dr David Joffe is Head of Modelling at the Committee on Climate Change. His work focuses on how best to meet emissions targets across the economy, especially in the longer term. He is leading the CCC's central analytical team for its 5th carbon budget work, which will recommend the emissions limit for 2028-32 at

the end of 2015. Particular areas of interest include path dependencies in meeting the 2050 target, including development of technologies, infrastructure, supply chains and markets, and the implications of these for near-term decarbonisation strategy. David also leads CCC's work on how scarce bioenergy can best contribute to economy-wide decarbonisation, roles for hydrogen and carbon capture and storage in a low-carbon energy system, and how shale gas production can be consistent with decarbonisation pathways. He has a PhD in Energy Policy and Technology from Imperial College.



Kenneth Karlsson is a Senior scientist at Technical University of Denmark. He holds a PhD degree in Models in Energy Planning and Sustainable Development from DTU, and he is heading the Energy System Analysis group at DTU Management Engineering, Kenneth

represents Denmark in the ETSAP community and he was leading the Danish team involved in the Nordic ETP 2013 and now for the new NETP2016. He was a main researcher and author on the background reports for The Danish Commission on Climate Change Policy. He is currently project leader for a team developing a new TIMES energy system model for the Danish Energy Agency and also heading a newly started research project (www.cometsproject.dk) focussing on improving modelling of transport in TIMES models. He has been focusing his research within integrated assessment modelling (a.o. with the TIMES model), the interaction between macro-economic and technical modelling, scenario development and energy systems analysis.



Kevin Lomas is Professor of Building Simulation in the Department of Civil and Building Engineering at Loughborough University, leads the University-wide Energy Research Challenge and is a Director of the London-Loughborough Centre for Doctoral Research in Energy Demand. He has a

long-standing interest in the application and validation of computer models to the design and assessment of buildings but in recent years he has become interested in measuring energy use in buildings, monitoring internal temperatures, and understanding the way occupants interact with energy technology. He has led national and city-scale monitoring projects which have led to new insights into domestic energy demand and overheating risk. Kevin has worked in the field of buildings, their energy demand and internal environment for 30 years.



Dr Ritu Mathur has been leading the Modelling and Scenario Building activities at TERI over the last 2 decades and is currently also associated with the TERI University as Professor in the Department of Energy and Environment. An economist by training and with a PhD in Energy Science from Kyoto

University, Japan, her work largely focuses on addressing policy and regulatory aspects related to the energy sector, examining the potentials and challenges to cleaner energy choices while addressing energy security and development related considerations of developing countries, cost-benefit analysis and evaluation of synergies and trade-offs of alternative technological and policy pathways etc. Dr Mathur is a member of several committees including the Expert Group on Low Carbon Strategies for Inclusive Growth, Steering Committee on Energy Sector for India's Five Year Plans, Sustainable Growth Working Group of the U.S.-India Energy Dialogue led by Niti Aayog (formerly Planning Commission of India). She is also a Lead Author in Working Group III of the IPCC Fifth Assessment Report that deals with mitigation.



Professor Andrew Lovett is a Professor of Geography and Deputy Head of the School of Environmental Sciences at the University of East Anglia. His academic specialism is the use of Geographical Information Systems and his recent research has focused on applications in catchment management, renewable energy and

environmental economics. Andrew contributed to several projects on energy and ecosystem services in UKERC Phase 2 and is the PI for a new NERC consortium project entitled ADVENT (Addressing Valuation of Energy and Nature Together) which is concerned with valuing natural capital in low carbon energy transitions.



Dr Rick Lupton works in the Foreseer group at Cambridge on developing interactive visualisations of energy, water and land resources. Rick studied Engineering at Cambridge before joining the renewable energy consultancy GL Garrad Hassan in Bristol, where he worked on

wind turbine design and simulation tools. He later returned to Cambridge for his PhD on simulation of floating offshore wind turbines.



David McCollum is a Research Scholar with IIASA's Energy (ENE) Program, having joined the group in February 2011. He received his doctorate in transportation technology & policy from the University of California, Davis (USA), Institute of Transportation Studies in 2011, following the completion of an MSc in

agricultural & resource economics from the same institution, and a BSc in chemical engineering from the University of Tennessee (USA). Dr. McCollum's main fields of scientific interest include techno-economic analysis of advanced energy and transport technologies and the development and application of energy-economic and integrated assessment models. His research attempts to inform national, regional, and global energy and environmental policies on matters related to climate change, sustainable transport, energy security, and air pollution. Dr. McCollum authored multiple chapters of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (Working Group III) and the Global Energy Assessment.



Peter McGregor is a Professor in the Department of Economics, University of Strathclyde and Director of the Strathclyde International Public Policy Institute. He has

previously been Director of the Fraser of Allander Institute and Head of the Department of Economics, University of Strathclyde. Peter is, or has been, a co-investigator (CI) on four EPSRC Supergen Research Consortia (Marine, Wind, HiDEF, UKSHEC) and on EPSRC funded project on energy efficiency. He is also a CI on the Scottish Government-funded ClimateXChange, a Centre of Expertise in Climate Change and on an ESRC project on the economics of constitutional change. He has held visiting academic posts in Germany, Japan, Sweden and the US. He has published extensively on energy issues, for example, in Ecological Economics, Energy Economics, Energy Policy, Renewable Energy, Environment and Planning A, Journal of Power and Energy and Regional Studies. Publications on regional and national economic modelling have appeared in, for example, European Economic Review, Environment and Planning A, Economic Modelling, Oxford Economic Papers, Journal of Regional Science and Regional Studies. He is a past Editor of Regional Studies and is a Fellow of the Energy Institute.



Dr. Russell McKenna is Head of Group for Renewable Energy and Energy Efficiency at the Chair of Energy Economics, Karlsruhe Institute for Technology (KIT), Karlsruhe, Germany, where he has been working since 2009. He studied Mechanical Engineering at the University of Bath, UK, where he obtained a

Master's Degree (MEng) in Aerospace Engineering with German in 2005. He subsequently went on to undertake his interdisciplinary PhD between the Departments of Engineering and Economics at the University of Bath, which he completed in the field of Industrial Energy Efficiency in 2009. Methodologically the research group's focus lies on model-based energy system analysis as well as on the techno-economic and ecological assessment of different energy technologies and processes. In particular linear optimisation models, especially the in-house model PERSEUS (developed in GAMS) and more recently the ANSWER-TIMES model generator, of diverse energy systems are developed and applied in order to investigate diverse research questions. Thematically the group is currently focused on bioenergy, wind and photovoltaic, energy efficiency measures in an urban context, including small (i.e. micro) and large (district heating) cogeneration systems, and energy-efficient buildings.



Iain Morrow is a Managing Consultant at Ricardo-AEA. Iain's experience covers a decade as a policy maker – mostly on energy – and a decade building energy and other models. He is currently developing whole economy energy projections for several country governments, using a range of approaches. His particular

interest is in the use of models for policy making. Iain has degrees in Mathematics from Cambridge and from the London School of Economics.



Brian Ó Gallachóir is Senior Lecturer in energy engineering in University College Cork (UCC) and Director of the MEngSc Programme in Sustainable Energy. He is also Principal Investigator in energy policy and modelling research in UCC's Environmental Research Institute. His research focus is on building and

using energy models to inform energy and climate change mitigation policy. Brian is currently Chair of the IEA's Executive Committee on Energy Technology Systems Analysis Programme (ETSAP). He is also an elected member of the RIA Climate Change Committee and a member of the Technical Analysis Steering Group on Climate Change and Energy Security. Brian's research has been published extensively and has improved the knowledge base underpinning policy decisions.



Mark O'Malley, is the Professor of Electrical Engineering at University College Dublin (UCD). He is the director of the UCD Energy Institute and Electricity Research Centre, a multidisciplinary, multi-institutional, industry-supported research activity. O'Malley is also co-founder of the International Institute for

Energy Systems Integration (IESI), a global community of scholars and practitioners engaged in developing an efficient world energy

system. He is a Member of the Royal Irish Academy and a Fellow of the Institute of Electrical and Electronic Engineers. He is recognized as a world authority on grid integration of renewable energy and has active research collaborations in Europe, China and the United States, in particular with the National Renewable Energy Laboratory.



Dr. Ren Orans founded Energy and Environmental Economics (E3) in 1989. An economist and engineer, he has focused throughout his professional career on the challenges facing the electricity industry. He is a trusted advisor to a broad range of clients that have included government agencies, utilities,

system operators, regulators, independent power producers, energy technology companies, public interest organizations, and investors. He has led E3 teams on numerous high-impact and high-profile projects that have required both rigorous technical analysis and the ability to effectively distill actionable insights to help E3's clients make informed decisions as they develop innovative projects, programs or policies.

Dr. Orans' pioneering work in utility planning has centered on the design and use of area and time specific marginal costs for both pricing and evaluation of grid infrastructure alternatives which is the fundamental basis of many of the utility and regulatory planning and policy models in the U.S. E3's modeling work focuses both on detailed distribution planning and ratemaking as well as long term scenario modeling of the changes to the energy sector under high renewable and aggressive GHG targets. Dr. Orans received his Ph.D. in Civil Engineering from Stanford University and his B.A. in Economics from the University of California at Berkeley.



Dr Jonathan Radcliffe is a Senior Research Fellow at the University of Birmingham, where he is Policy Director for the Birmingham Energy Institute (<http://www.birmingham.ac.uk/energy>). His research focuses on policy and techno-economic analysis of energy systems, in particular enabling the deployment of energy

storage. He is co-Director of the £12m Birmingham Centre for Cryogenic Energy Storage, which is developing novel thermal materials and processes, with a grid-connected pilot-scale energy storage plant on campus. He is also co-Director of the £4m national Energy Storage Supergen Hub for whom he leads engagement with policy makers and regulators, and is developing a National Roadmap for Energy Storage. He has other projects with FCO and Innovate UK. Jonathan studied physics at Imperial College and Cambridge, worked for several years on atmospheric modelling at the UK's Met Office, before moving into science and innovation policy in posts around Government and Parliament.



Kannan Ramachandran is a Senior Scientist in the Energy Economic Group at the Paul Scherrer Institut, Switzerland. He leads the development and application of technology-rich TIMES family of models spanning from whole energy system to wider EU electricity systems with high temporal resolution. He has

been involving in coupling of TIMES model with CGE and electricity-grid models. Earlier, Kannan was a member of the UK energy system modelling team at the UK Energy Research Centre. He also developed MARKAL energy system model for Singapore government. His research interest includes development of methods for coupling sectoral models; and integration of spatial features in energy system models. Kannan has multidisciplinary degree in energy engineering and project management. He has more than fifteen years of industrial and research experiences in energy domain. Kannan performed comprehensive research on life cycle analysis of power generation technologies and worked in many wind energy projects in India.



Oliver Rix is a Partner in Baringa's Energy Advisory practice, and has over 20 years' experience in European energy markets. Oliver was a founding Director of Redpoint Energy, which merged with Baringa in 2012, where he helped build clients including the UK's Department of Energy and Climate Change

(DECC), Ofgem, and major European utilities and investors. Oliver's work has spanned detailed policy and regulatory analysis in electricity and gas markets, commercial and risk management advice for energy wholesale and trading organisations, asset valuation and investment advisory, fundamentals and price modelling of both electricity and gas markets, and trading and risk software development and implementation. Oliver has led Baringa's long term decarbonisation work, including the design and development of full energy system models, incorporating all sectors of the economy, including transport, buildings, industry and power generation.



Dr Thomas Roberts has a background in Human Geography and Environmental Sociology with a wide range of research interests focusing on public perceptions and understanding of environmental interventions, ranging from the designation of marine protected areas to the development of new low

carbon energy infrastructure. His current work on the WholeSEM project focuses on advancing our understanding of demand for energy from households by exploring the changing nature of social practices related to energy use, developing agent-based models that explore how demand co-evolves with changes in practice, supply and energy policy. In addition he is the Principle Investigator on a complimentary project funded by the British Council, which is exploring the possibility of using the concept of invisibility to frame our understanding of the way in which people construct environmental values.



Prof. Alex Rogers is a computer scientist at the University of Southampton. His research focuses on the application of artificial intelligence and machine learning to real world problems addressing issues of sustainability. Most recently, these have included future energy systems such as the smart grid, and he

has led projects totaling over £2M in this space. He is also the co-founder of Joulo, an online system that provides personalised energy advice to households using low-cost temperature loggers and intelligent online algorithms. Joulo was spun out of the University of Southampton in 2014 and acquired by Quby, a smart thermostat manufacturer, in 2015.



Dr Sheila Samsatli is a Research Associate at the Centre for Process Systems Engineering at Imperial College London. She received her PhD in Chemical Engineering on fuel cell systems modelling and optimisation from University College London. Her research interests include hydrogen and fuel cells,

energy storage and spatio-temporal modelling of energy systems. In particular, she has been involved in the development of ETI's Biomass Value Chain Model. Before coming to London, she worked as an Assistant Professor at University of the Philippines.



James Smith is chair of the Carbon Trust, chair of the advisory board of the Grantham Institute on Climate Change at Imperial College and LSE and chair of the Conservatoire for Dance and Drama. He is on the board of London South Bank University and chairs the

University's enterprise company. He is a former President of the Energy Institute. He chairs the advisory board of the Association for Black Engineers in the UK and the Science Council's strategy group on diversity. Before retiring he was on the advisory boards of Opportunity Now and Race for Opportunity, the employer groups for gender and racial diversity. James retired from Shell in 2011 after 7 years as Chairman of Shell UK. He joined Shell in 1983. He and his family lived for a period in Malaysia and Brunei. He worked on Shell business in a number of Middle Eastern countries and in the US. He was head of technology in Shell Chemicals.



Goran Strbac is a Professor of Energy Systems, with extensive experience in advanced modelling and analysis of operation, planning, investment and economics of the electricity system. He led the development of novel advanced analysis approaches and methodologies that have been extensively used

to inform electricity industry, governments and regulatory bodies about the role and value of emerging new technologies and systems in supporting cost effective evolution to smart low carbon future.



Philip Summerton is a director at Cambridge Econometrics who specialises in climate and energy policy and its impact on markets and the wider economy. His role at Cambridge Econometrics it to develop and lead research projects that require in depth quantitative analysis of energy-economy interactions across

and between all sectors of the economy. As an example, Philip recently led a major techno-economic assessment of decarbonising cars and vans for the European Climate Foundation (ECF) called “Fuelling Europe’s Future” which was awarded “Outstanding Low Carbon Publication” in 2014 by the Low Carbon Vehicles Partnership. Philip has a first degree in economics (BSc) from the University of Bath and a second degree in Sustainable Development (MSc) from the University of London (jointly awarded by Imperial College London and SOAS) which he was awarded with Distinction.



Richard Taylor is a London-based Managing Consultant who joined E4tech in 2008. He has led the delivery of many of E4tech’s bioenergy and system modelling projects, focusing on topics such as biomass resource sustainability, techno-economic analysis, innovation needs, and the commercialisation status of different

conversion options. Richard previously worked within the wind power and investment banking sectors, and holds Masters degrees from Warwick University and Imperial College London. He is currently leading the ongoing development work of the “Bioenergy Value Chain Model” for the Energy Technologies Institute, working with Nouri and Sheila Samsatli from Imperial, and today will be explaining some of BVCM’s functionalities and sharing some of the new insights, generated by the ETL, gained from the model.



Martino Tran is Assistant Professor in the School of Community and Regional Planning, Faculty of Applied Sciences, University of British Columbia, and Associate at the Environmental Change Institute, University of Oxford. He is broadly interested in general theory and methods for understanding and

managing risk and sustainability in the built environment. This includes the application of systems theory, techno-economic analysis, stochastic dynamical systems, and complex networks to assess the long-term performance of large-scale engineering systems and technologies. Martino completed his DPhil in Environmental Science and Engineering as an Oxford Martin Fellow in collaboration with Engineering Sciences and the School of Geography and Environment, University of Oxford.



Dr Evelina Trutnevyte is a senior researcher at the USYS Transdisciplinarity Lab, ETH Zurich, and in the Risk team of the Swiss Competence Center for Energy Research-Supply of Electricity (SCCER-SoE). She is an energy systems analyst and modeler, specializing in energy-related decision making under risk and

uncertainty and at science-society interface. Since 2015 she holds a Swiss National Science Foundation Ambizione Energy fellowship for analysis of cross-technology and spatial risk trade-offs in Swiss electricity generation portfolios. Before her current role, in 2012-2014 she worked as a research associate at University College

London (UCL) Energy Institute. She is an engineer by training and completed her PhD studies at the Institute for Environmental Decisions, ETH Zurich.



Dr. Vlasios Voudouris is Affiliate Professor at ESCP Europe Business School. Vlasios has a wealth of experience in applied statistics and evidence-based energy policy. Vlasios has developed a unique approach to statistical modelling for energy in order to suggest practical policy solutions for the great challenge

of the 21st century - the transition to green growth capable of supporting an estimated 9 billion people by 2050, and perhaps 12 billion by 2100. In particular, Vlasios is the author of the ACEGES:Oil&Gas model & co-author of the ACEWEM model (wholesale electricity market) and GAMLSS framework. Vlasios is the Editor of the SI ‘Oil and Gas Perspectives in the 21st century’ & SI ‘The enigma of economic growth: Beyond Solow-type macroeconomic perspectives’ at the Energy Policy journal. Furthermore, Vlasios is the co-editor of the book Global Energy Policy and Security published by Springer. Overall, Vlasios has published 1 book, 2 editorials, 10 policy reports and more than 40 research articles.



Alec Waterhouse is the Head of DECC’s Central Modelling Team. His team are responsible for modelling energy and emissions projections and long term carbon reduction pathways as well as modelling other cross-cutting policies such as Combined Heat and Power. They have recently designed and built a

bespoke policy simulation language for household energy modelling. He is also implementing a cross-departmental quality assurance programme for analysis. He started his working life as an engineer before moving into Operational Research and has worked in a variety of organisations ranging from the retail to public sector.



Dr. Sonia Yeh is a research scientist at the Institute of Transportation Studies (ITS), and faculty member of the Transportation, Technology and Policy (TTP) graduate group and Graduate Group in Ecology (GGE), University of California, Davis. She is also an adjunct professor at the Department of

Engineering and Public Policy, Carnegie Mellon University. Her research focuses on analyzing possible transition paths towards sustainable future in energy and the specific resource, technological, environmental and policy challenges associated with the transitions. She leads research programs in Best Policy and Incentive Strategies for Alternative Fuel and Energy, and Energy System Modeling for the Sustainable Transportation Energy Pathways Program (STEPS) within ITS. Dr. Yeh’s expertise is in energy economics and energy system modeling, lifecycle analysis of greenhouse gas emissions, alternative transportation fuels, sustainability standards, and technological change induced by government policy. She received Academic Federation Award for Excellence in Research by the University of California, Davis in 2014 and appointed Adlerbertska visiting professor at Chalmers University of Technology 2015-2016.

wholeSEM Annual Conference 2015

Hybrid Energy Modelling - Linkages and Interdisciplinarity

#wholeSEM15

Date:
6 & 7 July 2015

Venue:
Buckingham House, Murray
Edwards College

PhD Posters

Day 1: 15.00-15.30

Day 2: 11.00-11.30

Alaa Alfakara, UCL

Towards Better Estimation of Energy Use in Dwellings: A Framework To Couple Agent-Based Modelling With A Dynamic Building Simulation Model

Stephen Clegg, University of Manchester

Assessment of the Impact of Power-to-Gas on Electrical and Gas Transmission Networks

Joel Guilbaud, UCL

Techno-Economic Modelling of Hybrid Renewable Power Systems for the Mining Industry

Heidi U. Heinrichs, University of Cambridge/Forschungszentrum Jülich

Impacts of the German energy concept on the land and water system

Daan Kolkman, University of Surrey

Developing Models for Government: Some Lessons and Considerations from Practice

Amalia Pizarro, Technical University of Denmark

Linkage of Energy and Waste Management Modelling Tools

Lydia Prieg, University of Cambridge

Bringing economic inequality into coupled macroeconomic-environmental models

Thomas Rushby, University of Southampton

Developing downstream cap and trade for household energy demand reduction

Bernard Tembo, UCL

Trade-offs in Zambia's Energy System: Identifying key drivers

Mauricio Ugalde, University of Edinburgh

Sustainable Energy Transition Strategies: a study case employing applied economic modelling

Javier Urquizo, Newcastle University

A spatial domestic energy framework for sub-city areas: a case study from the United Kingdom

Will Usher, UCL

Sensitivity Analysis of an Energy System Model

Garima Vats, TERI University and University of Technology, Sydney (UTS) Joint PhD Programme

Energy, Water and Food Security Nexus in India

Kathrin Volkart, Paul Scherrer Institut, Switzerland

Integrating global energy-economic system modelling and life-cycle assessment



Alaa Alfakara was trained as an architect at Al-Baath University, Syria. After her graduation she started working at Architectural and urban planning consultancy as architectural assistant part II, and also worked at Al-Baath University's school of architecture as a teaching assistant. She has a MSc in Intelligent Buildings

from The University of Reading and a MSc in Adaptive Architecture and Computation from UCL. Alaa's on-going doctoral research facilitates the use of Agent-Based Modelling to obtain more accurate occupant behaviour in current building simulation tools. Alaa is a doctoral student at The UCL Institute Of Environmental Design and Engineering.



Stephen Clegg is at the University of Manchester where he is a research student in the Electrical Energy and Power Systems Group. His research includes the development of methods to study the interactions between the gas and electrical sectors and their applications to wider power systems contexts and integrated energy systems.



Joel Guilbaud is a Ph.D. student in Energy System Modelling and Energy Economics at the University College London. His doctoral thesis aims to gain an understanding of the economic potential of hybrid renewable power systems for the mining sector. He graduated in MSc. Information Systems and Organization

Research at the London School of Economics. He subsequently worked as a manager in Strategy Consulting and Transaction Advisory with Ernst & Young in Canada and the USA. Joel has over eight years of professional experience and worked with Fortune 500 clients and other market leaders in industries including: Bruce Power, Kinross Gold, Iamgold, Airbus, DHL, BlackStone, Canadian Tire, Kruger, Air Canada, Heinz, and the Hudson Bay Company. Joel has gained considerable experience in supply chain, management and finance from the various business ventures and research projects in which he was involved.



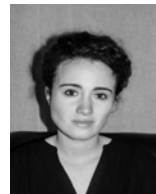
Heidi U. Heinrichs is a research associate at the Institute of Energy and Climate Research - Systems Analysis and Technology Evaluation (IEK-STE) at the Forschungszentrum Jülich in Germany since 2012. Her main field of research is energy system analysis. In this context she has applied and enhanced several energy

system models since joining the Institute of Industrial Production, University Karlsruhe, in 2007. She obtained her doctoral degree in Engineering at the Karlsruhe Institute of Technology in 2013. As part of her doctoral thesis she developed a model suite to analyse the impacts of electric vehicles on the European electricity system. Before starting her doctoral thesis she developed optimisation algorithms for applications in chemical engineering at the TU Ilmenau in Germany and studied mechanical engineering at the RWTH Aachen University.



Daan Kolkman is a PhD candidate in the Centre for Research in Social Simulation at the University of Surrey. His research interests revolve around the application of scientific knowledge to decision making. Daan got his undergraduate degree in human geography and planning at the University of Utrecht. He

obtained his masters' degree in economic geography at the University of Utrecht and the University of Groningen. His current research focus is on the use of computational models that inform policy making. The ongoing increase in the sophistication of information technology allows for the development of ever more intricate computational models. However, the understanding of the social processes that constitute the use of such models has arguably lagged behind and presents a hurdle to the effective implementation and proper use of these technologies. By considering the adoption and utilisation of model, the research aims to contribute to our understanding of modelling in policy contexts.



Amalia Pizarro is a PhD student at the Technical University of Denmark in the division of Energy Systems Analysis of the Management Engineering department, where she is conducting the project "Modelling and optimization of biomass and waste use into the energy system". Her field of research is system

modelling, optimization, simulation, with focus on use of biomass and waste, and energy planning. She is working in the development of a new optimization model that prioritizes between different current and emerging waste-to-energy alternatives in order to utilize resources in the overall best possible way. She graduated from the Technical University of Denmark in sustainable energy and she has a background on chemical engineering from the Complutense University of Madrid. Last years she has been working, as a research and a student assistant, on various international projects to evaluate, model and optimize feasibility of biogas production.



Lydia Prieg is a former Analyst at Goldman Sachs, Researcher at the New Economics Foundation, and Policy Advisor at Oxfam, Lydia is now a PhD student at the University of Cambridge. She works with input-output models and social accounting matrices to explore the impact of climate change damages

on different income groups. She estimates the indirect and induced costs of climate change that are often excluded from integrated assessment models (IAMs).



Thomas Rushby is currently studying within the ESRC Doctoral Training Centre at the University of Southampton. His interdisciplinary PhD project looks at the development of downstream emissions trading for household energy demand reduction. More specifically the research examines different

methods of allocating emissions quotas, exploring questions around energy justice and policy design. Alongside his PhD, Thomas has been working on the RCUK funded project 'Community-Based Initiatives in Energy Saving' a 4 year study aiming to assess the impact of community greening groups on a roll out program of insulation upgrades in privately owned housing. Prior to joining the University Thomas spent 10 years working in buildings engineering before completing his MSc in Architecture: Advanced Environmental and Energy Studies at the University of East London.



Bernard Tembo is an Engineer and Energy Economist with a masters' and bachelor's degrees from University of Cape Town and University of Zambia respectively. He is currently reading for his PhD at University College London, focusing on energy efficiency in Africa's copper mines and developing

countries' energy systems.



Mauricio Ugalde is an energy economist who has been involved in the analysis of complex intersections between these two topics.

Mauricio graduated Economics Sciences at the ITAM (MEX) in 2001. He did his Master's degree in Development Economics at the ISS - Institute of Social Studies, in The Hague

(NED) in 2004. He is now in the final stage of his Ph.D. at The University of Edinburgh (UK) where he's developing a soft linked Top-Down and Bottom-Up hybrid model for the Mexican Economy. His research relates to the evaluation of systemic uncertainties and path dependencies from the economic stance that arises in real life from the process of implementation and deployment of technical innovations in the energy sector. His research considers analysing the feasible sustainability innovation pathways that can be effectively reached at the aggregated level. He prospects that his research could inform trustworthy energy policy-making practice that involves the analysis of the energy systems design for the long term.



Javier Urquiza is a PhD Candidate in the school of Architecture, Planning and Landscape at Newcastle University and a project manager.

He has bachelor and master of engineering degrees in electrical engineering, a Master of Science in Civil/Environmental engineering and an MBA in Management. He has many

years' experience in modelling, engineering design, spatial analysis, control systems, power systems, environmental studies and management. Javier's doctoral work focuses on the application energy analysis in aggregating buildings as a mean to understanding relationships between detailed characteristics of the house, the energy system, the household characteristics, the climate, and the urban form. Other research interests include renewables, fuel poverty and sustainability.



Will Usher is a PhD student at the UCL Energy Institute. His research interests include techniques for analysing uncertainty in energy system models, long-term energy transitions and optimisation under uncertainty.



Garima Vats is a PhD scholar pursuing joint degree programme between TERI University, India and University of Technology, Sydney (UTS), Australia. She is a post graduate from TERI University in Environmental Studies and Resource Management with specialization in Water Resources Management. Her research

interests include resource economics, modelling and, policy research. She is keenly interested in inter-disciplinary issues and possesses broad understanding of multi-sectorial models and frameworks. Her research examines energy, food, and water security nexus in India. The research methodology adopted for this research will essentially entail developing a top-down, energy-food-water and environmentally extended Input-Output model, soft-linked with the bottom-up MARKAL model with a purpose to provide more informed, integrated, and comprehensive bases for policy development to redress the energy, food, and water security challenge in the context of India. She also served a short stint teaching Environmental Studies and Practicals to undergraduate students.



Kathrin Volkart is a PhD student in the Energy Economics group in the Laboratory for Energy Systems Analysis at Paul Scherrer Institute (PSI) in Switzerland. The topic of her thesis is the development of a novel methodology for the integration of energy-economic system modelling and multi-criteria decision analysis.

Prior to this position, Kathrin was a member of the scientific staff of the Technology Assessment group at PSI. Her work was focused on life-cycle assessment and multi-criteria decision analysis of energy technologies and energy systems. Kathrin holds a Bachelor's degree in Environmental Sciences and a Master's degree in Energy Science and Technology, both from the Swiss Federal Institute of Technology (ETH) in Zurich. During her studies, she also worked for a consultancy firm in the energy field.



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