

Foreword

Ladies and Gentlemen,

It is my great pleasure to welcome you all to **SusTEM2015** which has been organised by the Sustainable Thermal Energy Management (SusTEM) Network hosted by the Sir Joseph Swan Centre for Energy Research (Swan) at Newcastle University. The SusTEM Network is funded by EPSRC and its aims are to promote and disseminate internationally recognised research and support knowledge transfer to all stakeholders.

The SusTEM Network has been very active. In addition to organising this conference, it has recently published a chapter in Wiley's Handbook of Clean Energy Systems entitled Thermal Energy Efficiency in Industrial Processes. The Network has produced a special issue on energy storage with 43 papers published by Elsevier's Applied Energy and another special issue on clean transport with 35 papers also to be published by Applied Energy later this year. After SusTEM2015, the best papers will be selected and invited to be published in a special issue of Applied Energy. In addition, the Network has completed a review on heat pipes published by Elsevier's Renewable and Sustainable Energy Reviews. The Network is organising an industrial forum straight after SusTEM2015, and will host a joint workshop with the SIRACH Network on opportunities, challenges and new solutions for heating and cooling on the 1st of October 2015 at Newcastle University and next year will coordinate the SusTEM2016 conference to be held in China and hosted by Beijing Institute of Technology.

The Swan Centre's research focus is encapsulated by the phrase "enough, for all, forever". **Enough**: Ensuring that there is sufficient energy to meet demand through appropriate and secure resources, and the efficient and resilient conversion, distribution and use of energy; **For all**: Guaranteeing universal access to affordable energy to meet demand through technological developments and effective policy and governance; **Forever**: Safeguarding sustainable resources, the natural environment and the health and well-being of all life through environmentally sensitive practices, processes and systems.

Tackling climate change, providing energy security and delivering sustainable energy solutions are major challenges faced by civil society. The social, environmental and economic cost of these challenges means that it is vital that there is a research focus on improving thermal energy management across all sectors. During SusTEM2015, 48 high quality papers will be presented over the two days and I hope you will be stimulated by this work and go away armed with new knowledge and a renewed enthusiasm to undertake the important research needed in this field.

Have a great conference!

Professor Tony Roskilly

Director

Sir Joseph Swan Centre for Energy Research

Keynote Speakers

Professor Bob Critoph, University of Warwick

Professor Critoph is head of the Sustainable Thermal Energy Technology group in the School of Engineering at the University of Warwick. He is principal investigator for the Interdisciplinary Centre for Storage, Transformation and Upgrading of Thermal Energy (i-STUTE). i-STUTE is one of the UK's 6 major "end use in energy demand" centres funded by the EPSRC. It develops technologies that aim to reduce energy consumption and deliver cost-effective heating and cooling which will help the UK achieve its target of a reduction in greenhouse gas emissions of 80% by 2050. The centre brings together cutting-edge engineering advances with economic, behavioural and policy expertise to produce solutions that are both technically excellent but also appealing to business, end-users, manufacturers and installers.



Professor Elizabeth Shove, Department of Sociology, Lancaster University

Professor Shove is Principal investigator for the DEMAND Centre (Dynamics of Energy, Mobility and Demand). The DEMAND Centre is one of the UK's 6 major "end use in energy demand" centres funded by the EPSRC. It takes a distinctive approach to end use energy demand, recognising that energy is not used for its own sake but as part of accomplishing social practices at home, at work and in moving around. This approach generates an ambitious research agenda that is crucial for organisations involved in demand management and in radically reconfiguring infrastructures, buildings and transport systems in line with greenhouse gas emissions targets. While greater efficiency is important, the trend is often towards more resource intensive standards of comfort, convenience and speed. In focusing on how demand is made and met, the Centre will examine changing patterns in mobility and building-related energy use and take forward a wide-ranging agenda for future research and policy.



Professor Savvas Tassou, Brunel University London

Professor Savvas Tassou is director of the Institute of Energy Futures at Brunel University London. He is also the principal investigator for the Centre for Sustainable Energy Use in Food Chains (CSEF). CSEF is one of the UK's 6 major "end use in energy demand" centres funded by the EPSRC. The centre has 3 major themes: whole system modelling and optimisation based on both bottom up and top down approaches to identify optimal ways for reducing energy use in food chains; investigation of technologies for reducing energy use at all stages of the chain; consideration of both corporate and individual consumer behaviour alongside other factors such as changing demographics and increasing awareness of sustainable living on food consumption trends and how these affect food chain structure and energy use.



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Conference Agenda

Conference Day 1: Tuesday 7 July				
Tuesday, 7 July Session 1	0900-0930	Arrivals & registration		
	0930-0945	Welcome address: <i>Professor Tony Roskilly</i>		
	0945-1030	Keynote: The Dynamics of Energy Demand, <i>Professor Elizabeth Shove</i>		
		Track 1 Building Energy Performance I <i>Chair: Dr Yunting Ge</i>	Track 2 Heat Recovery I <i>Chair: Professor David Reay</i>	Track 3 HVAC <i>Chair: Dr Shuli Liu</i>
	1030-1100	Promoting Behavioural Change to Reduce Thermal Energy Demand in Households <i>Speaker: Rebecca Hafner</i>	Thermodynamic Analysis and Comparison between CO ₂ Transcritical Power Cycles and R245fa Organic Rankine Cycles for Low Grade Heat to Power Energy Conversion <i>Speaker: Liang Li</i>	Reducing Energy Load in a Retail Environment by Pre-Cooling <i>Speaker: Richard Greenough</i>
	1100-1130	Façade Based Investigation towards Lower Cooling Loads in a Typical Low-Rise Dwellings in Egypt <i>Speaker: Ahmad Elshamy</i>	A Comparison of Electric Turbo Assist and Variable Geometry Turbine Technologies for Transient Response Improvement of a Turbocharged Diesel Engine <i>Speaker: Aaron Costall</i>	Thermal Energy Management in Data Centres and its Impact on Power Consumption <i>Speaker: Morgan Tatchell-Evans</i>
		Tea/Coffee break		
	1145-1215	Forecasting the Regional Cost Effectiveness of Energy Efficiency and Decentralized Supply Scenarios for Reducing the Carbon Dioxide Emissions of Dwellings <i>Speaker: Anthony Hargreaves</i>	Modelling Investigation of a New Phase-Change Reciprocating-Piston Heat Engine <i>Speaker: Christos N. Markides</i>	Investigation into Air Distribution Systems and Temperature Control in Chilled Food Manufacturing Facilities <i>Speaker: Demetris A. Parpas</i>
	1215-1245	Managing Thermal Energy in Homes: The Role of Demand Side Response <i>Speaker: Dana Abi Ghanem</i>	An Analysis and Comparison of Pumpless Organic Rankine Cycle and Thermochemical Sorption Power Generation <i>Speaker: Huashan Bao</i>	Application of a Passive Cooling Wind Catcher within the Built Environment: Numerical and Experimental Analysis <i>Speaker: John K. Calautit</i>
	Lunch & poster exhibition			

Tuesday, 7 July Session 2	1400-1445	Keynote: UK Food Chain Energy Consumption and GHG Emissions- Challenges and Opportunities for Energy Demand Reduction, <i>Professor Savvas Tassou</i>		
		Track 1 Building Energy Performance II <i>Chair: Professor Yulong Ding</i>	Track 2 Heat Recovery II <i>Chair: Professor Nik Kapur</i>	Track 3 Cooling <i>Chair: Dr Raya Al-Dadah</i>
	1445-1515	Optimisation of Thermal Energy Storage Integration in a Residential Heating System <i>Speaker: Daniel Friedrich</i>	Working Fluid Selection and Performance Optimisation of a Domestic-Scale Solar Organic Rankine Cycle Combined Heat and Power System for Year-Round Operation in the UK <i>Speaker: James Freeman</i>	Numerical Investigations of Convective Heat Transfer during Microencapsulated Phase Change Slurry Flow in Microchannels <i>Speaker: Rabia Shaukat</i>
	1515-1545	Applications of Economised Vapour Injection Air Source Heat Pump in Residential Building <i>Speaker: Ye Huang</i>	Towards the Computer-Aided Molecular Design of Organic Rankine Cycle Systems with Advanced Fluid Theories <i>Speaker: Christos N. Markides</i>	Enhancement of Cascaded Adsorption Ice-Making System with Mass and Integrated Heat Recovery <i>Speaker: Hassan Dakkama</i>
		Tea/Coffee break & poster exhibition		
	1615-1645	Techno-economic Modelling of Biomass Fuelled Trigeneration Equipped with Energy Storage for Remote Households <i>Speaker: Ye Huang</i>	Novel Organic Rankine Cycle System for Heavy Duty Diesel Engines <i>Speaker: Angad Panesar</i>	Numerical Assessment of Battery Thermal Management System Designs Based on Liquid Cooling Method <i>Speaker: Ahmadou Samba</i>
	1645-1715	Modeling Peak Electric Load Reduction and Change in Energy Consumption for an Integrated Thermal Energy and Rainwater Storage System Coupled With a Hydronic Residential Air Conditioning System <i>Speaker: Charles R. Upshaw</i>	Experimental and Simulated Study of a Small Scale Expander <i>Speaker: Xinjing Zhang</i>	Crystallisation in High Concentrated Systems: A Modelling Approach <i>Speaker: E. Lopez-Quiroga</i>
	1715-1745	Poster exhibition		
	1745-2000	Conference dinner		

Conference Day 2: Wednesday 8 July

Wednesday, 8 July Session 3	0900-0930	Arrivals & registration		
	0930-1015	Keynote: Heating and Cooling to 2020 and Beyond, <i>Professor Bob Critoph</i>		
		Track 1 Modelling and Optimisation <i>Chair: Dr Yaodong Wang</i>	Track 2 Thermal Management & Power I <i>Chair: Professor Phil Eames</i>	Track 3 Heat Exchange I <i>Chair: Dr Christos Markides</i>
	1015-1045	Optimal Integrated Energy Systems Design incorporating Variable Renewable Energy Sources <i>Speaker: Oluwamayowa Amusat</i>	Characterisation of CPO-27Ni Metal Organic Framework Material for Water Adsorption <i>Speaker: Raya Al-Dadah</i>	Investigation of Refrigerant Side-Heat Transfer Coefficient of Finned-Tube CO ₂ Gas Coolers Using Computational Fluid Dynamics (CFD) <i>Speaker: IDewa M.C. Santosa</i>
	1045-1115	Thermal Investigation of a Large and High Power Unbalanced Cylindrical Battery Module <i>Speaker: Odile Capron</i>	MIL101Cr MOF – Water Adsorption System for Cooling and Power Generation Using Waste Heat <i>Speaker: Fadhel Al-Mousawi</i>	Optimizing Operations of Crude Refinery Preheat Train and Furnaces: Influence of Preheat Train Management on Furnace Operation <i>Speaker: Edward Ishiyama</i>
		Tea/Coffee break		
	1130-1200	A Unified Framework for Model-Based Multiobjective Process and Energy Optimisation under Uncertainty <i>Speaker: Vasileios Charitopoulos</i>	Thermodynamic optimization of a PCM-air latent energy storage system: a design procedure based on local entropy generation maps <i>Speaker: Adriano Sciacovelli</i>	Numerical Simulation Study of Vapor-Liquid Two Phase Flow with Dirt Blockage Effect inside Channels <i>Speaker: Xiangyun Liu</i>
	1200-1230	Hybrid, Plug-in Hybrid, and Electric Vehicle Energy Consumption Sensitivity to the Combined Effects of Driving Cycle and Ambient Temperature-induced Thermal Loads <i>Speaker: Richard A. Simmons</i>	Simulation of a Refrigerated Display Cabinet Integrated with Phase Change Materials <i>Speaker: Falah Alzuwaid</i>	Modelling and Experimentation of Thermal Flat Plate Solar Collector Design Parameters <i>Speaker: Iman S. El-Mahallawi</i>
	1230-1400	Lunch and poster exhibition		

Wednesday, 8 July Session 4		Track 1 Thermal Networks <i>Chair: Professor Neil Hewitt</i>	Track 2 Thermal Management & Power II <i>Chair: Dr Jun Peng</i>	Track 3 Heat Exchange II <i>Chair: Dr Nicolas Miche</i>
	1400-1445	A Hybrid Thermo-chemical District Network Technology <i>Speaker: Philipp Geyer</i>	Experimental Investigation of Rheological Characteristics of Phase Change Material Slurries <i>Speaker: Zhiwei Ma</i>	A Study on the Cooling Performance of a Natural Draft Dry Cooling Tower under Crosswind and a Proposed Enclosure to Improve the Cooling Efficiency <i>Speaker: Weiliang Wang</i>
	1445-1515	Spatially Detailed Optimisation Modelling of UK Heat Network Potential <i>Speaker: Francis G. N. Li</i>	Economic Analysis of a Jatropha Biodiesel-fired Power Plant in Nigeria <i>Speaker: Giuseppina Di Lorenzo</i>	Quantifying the 'Implementation Gap' for Antifouling Coatings <i>Speaker: Ole Mathis Magens</i>
	1515-1545	Modelling Industrial Waste Heat Recovery from a Steelworks with Heat Storage to Supply Low-carbon Heat for District Heating <i>Speaker: Rob Raine</i>	Site Utility System Design with Operation Scheduling under Uncertainty <i>Speaker: Li Sun</i>	Experimental Investigation of Gas Cooler/Condenser Designs in a Co2 Booster System <i>Speaker: Konstantinos M. Tsamos</i>
		Tea/Coffee break		
	1600-1630	The Impact of Urban Canyon on the Thermal Performance of Solar Roads <i>Speaker: Diana SNM Nasir</i>	Blowoff Propensity, CRZs and Turbulence using a Range of Syngas Compositions for Gas Turbines <i>Speaker: Hesham Baej</i>	Numerical Investigation of a Cross Flow Air-To-Water Heat Pipe-Based Heat Exchanger used in Waste Heat Recovery <i>Speaker: Joao Ramos</i>
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