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Energy Systems Integration
Partnership Programme

Unlocking the Potential of Energy Users in the Energy Transition

Energy Systems Integration Partnership Programme Research Symposium

Thursday 25th October

Astra Hall, Student Centre, UCD, Belfield, Dublin 4

08:45 Registration, Tea, Coffee & Poster Viewing

Session 1 Insights into Energy Use

Chair: Prof. Steve Dorling, University of East Anglia

09:30 Welcome Address

Andrew Keane, ESIPP Lead PI, Head of Energy Institute, University College Dublin

09:40 Keynote Address

Karl Purcell, Programme Manager Behavioural Economics Unit, SEAI

10:10 Presentations from PhD and PostDoctoral Researchers

Vehicle Tax Design and Car Purchase Choices: A Case Study of Ireland, Ivan Petrov, PhD Researcher

Exploring demand-side flexibilities from wastewater treatment facilities in an integrated energy system, Dana Kirchem, PhD Researcher

Demand and Response strategies and wastewater treatment plants: Demand shedding through aeration control, Matteo Giberti, PhD Researcher

Frequency support from distributed energy resources, Ismail Ibrahim, PhD Researcher

GIS-Based District Residential Building Energy Modelling, Usman Ali, PhD Researcher

Building energy flexibility for future demand response markets, Dr Mattia de Rosa, Postdoc

11:00 PhD Student Poster Session & Coffee Break

Session 2 Flexibility and Optimisation of End Use

Chair: Prof. Graeme Burt, University of Strathclyde

11:30 Can Irish manufacturing industry become prosumers of energy?

Craig Meskell, Dept. of Mechanical & Manufacturing Engineering, Trinity College Dublin

11:50 End-User Driven Renovation: An Energy Perspective

James O'Donnell, School of Mechanical & Materials Engineering, University College Dublin

12:10 Incentives to make the right decision: policy measures to enhance consumer decarbonisation

Lisa Ryan, School of Economics, University College Dublin

12:30 Technological and economic perspectives on more sustainable data centre thermal management

Tim Persoons, Dept. of Mechanical & Manufacturing Engineering, Trinity College Dublin

12:50 Questions & Answers

13:00 Lunch & Poster Viewing

14:00 Panel Discussion: Unlocking the Potential of Energy Users in the Energy Transition

Moderator: John Curtis, Associate Research Professor, ESRI, Dublin

Geertje Schuitema, Assistant Professor, School of Business, University College Dublin

Stephen Gallagher, Director of Business Energy, SSE Airtricity

Paul Kenny, Chief Executive Officer of Tipperary Energy Agency

Eamon Ryan, Leader of the Green Party

15:30 Closing Remarks & Poster Prizegiving



Energy Systems Integration Partnership Programme

Welcome to the second research symposium of the Energy Systems Integration Partnership Programme. The Energy Systems Integration Partnership Programme (ESIPP) is a research programme focussed on the integration of Energy Systems, such as electricity and gas, along with other infrastructures including data and water. As Energy Systems evolve, they are becoming increasingly integrated. Energy Systems Integration research seeks to provide an understanding of these interactions and to identify ways to optimise these systems and energy use.

The main goal of this partnership is to build Energy Systems Integration (ESI) research capacity within Ireland. The research programme is designed to encourage collaboration between experts from academia (UCD, TCD, NUIG, ESRI and DCU), industry and the policy domain to tackle some key research challenges in ESI. Given the nature and scope of ESI, the research is necessarily multidisciplinary in nature, involving the fields of electrical, mechanical and chemical engineering, economics, consumer behaviour and psychology, and earth sciences.

This symposium aims to showcase some of the research currently underway through the ESIPP project with particular focus on energy users and consumer behaviour. The symposium programme features presentations from our research team, a keynote address from Karl Purcell in SEAI, and a panel discussion with leading stakeholders on the role of energy users.

ESIPP is financially supported by Science Foundation Ireland under the SFI Strategic Partnership Programme (Grant Number SFI/15/SPP/E3125), industry partners and a philanthropic donation by the chair of UCD Energy Institute, Mr. David O'Reilly.

We hope you enjoy the day. For more information on ESIPP please get in touch with one of the team or visit www.esipp.ie. The presentations will be made available on our website after the event.

Session 1: Insights into Energy Use



Andrew Keane, University College Dublin

Andrew Keane is Head of the Energy Institute at University College Dublin. Andrew is the Lead Principal Investigator in the ESIPP project and his research interests include the impact of new energy resources on the power system from the residential network up to the high voltage transmission system.



Prof Steve Dorling, University of East Anglia (UAE)

Steve Dorling is Professor of Meteorology, School of Environmental Sciences in UEA. He is a research group member at the Water Security Research Centre and the Centre for Ocean and Atmospheric Sciences. Steve is a Chartered Meteorologist with many interests in how weather and climate interface with environmental problems. His main current research activities address science which tackles the major over-lapping security challenges facing the world in food, water and energy.



Karl Purcell, Programme Manager, Behavioural Economics Unit, SEAI

Karl Purcell is the Programme Manager of the Behavioural Economics Unit in the Sustainable Energy Authority of Ireland (SEAI). Prior to SEAI, Karl previously worked in the Department of Public Expenditure and Reform in Ireland applying behavioural economics to public policymaking. He has published a number of papers summarising his work on the website of the Irish Government Economic Evaluation Service (IGEES). Karl holds an Honours Bachelor's Degree in Business Studies (Finance) from Dublin City University and an MSc in Behavioural Science for Management from the University of Stirling. He is an active member of the Irish Behavioural Science and Policy Network.



Ivan Petrov is a PhD researcher working as part of the Consumer Behaviour in an Integrated Energy System Work Package (MSP3) within the Markets & Strategic Planning research strand of ESIPP.



Dana Kirchem started as a PhD researcher in September 2017. Her research topics are the energy-water nexus and demand-side flexibilities from wastewater treatment plants in an integrated energy system



Matteo Giberti's PhD is titled 'Energy System Integration in Wastewater Treatment' under the supervision of Prof Eoin Casey.



Ismail Ibrahim commenced his PhD in UCD in September 2015 under the supervision of Dr Terence O'Donnell in the area of Distributed Energy Resources



Usman Ali is a Ph.D. student under the supervision of Dr James O'Donnell. Research interests include Energy Simulation & Modelling, Machine Learning, Data Mining and Intelligent Computing.



Dr Mattia De Rosa joined UCD in July 2017 as Senior Researcher. His current research is mainly focused on energy modelling of buildings, renewable energies and waste heat recovery and thermo-economic analysis of investments.

Session 2: Flexibility and Optimisation of End Use



Professor Graeme Burt, Institute for Energy and Environment, University of Strathclyde

Graeme Burt is a professor of electrical power systems within the Department of Electronic and Electrical Engineering at the University of Strathclyde, where he co-directs the 270+ strong Institute for Energy and Environment. He is an active researcher with responsibilities including as Director of the Rolls-Royce UTC in Electrical Power Systems, Lead Academic for the PNDC, Grid Theme Lead for the Energy Technology Partnership, and Spokesperson for the Board of the international DERlab Association.



Dr Craig Meskell, Trinity College Dublin

Dr Craig Meskell is an Associate Professor in the Department of Mechanical and Manufacturing Engineering in Trinity College, Dublin. His technical expertise is in the area of unsteady fluid mechanics, especially when coupled with noise, vibration or structural interaction. For nearly a decade, he has focussed his work almost exclusively on power generating and energy conversion applications.



Dr James O'Donnell, University College Dublin

Dr James O'Donnell joined University College Dublin (UCD) in June 2013. Prior to this, he worked as a senior Scientific Engineering Associate in the Building Technology and Urban Systems Department of the Lawrence Berkeley National Laboratory (LBNL). His current work focuses on the development and deployment of interoperable data models to support optimum building operation underpinned by Building Information Models (BIM) and whole building energy simulation tools.



Dr Lisa Ryan, University College Dublin

Dr Lisa Ryan is an energy economist with research interests in the economics of energy efficiency, renewable energy and climate change. She is the ESIPP lecturer in School of Economics at University College Dublin and a principal investigator of the UCD Energy Institute. She is also a member of the board of the Sustainable Energy Authority of Ireland (the Irish national energy agency). She was the senior energy economist in the Energy Efficiency Unit at the International Energy Agency (IEA) in Paris until summer 2013.



Dr Tim Persoons, Trinity College Dublin

Dr Tim Persoons is Assistant Professor in Engineering in the Department of Mechanical & Manufacturing Engineering at TCD and Affiliate Faculty Member in the Energy Institute at University College Dublin. Tim's current research activities include multi-scale convective heat transfer in electronics thermal management systems using unsteady flows, active flow control for sustainable energy devices, and developing experimental thermo-fluid measurement techniques.

Panel Session: Unlocking the Potential of Energy Users in the Energy Transition



Moderator: Dr John Curtis, Associate Research Professor, the Economic and Social Research Institute

John Curtis is an applied micro-economist, with a focus on energy and environmental policy issues. He is joint programme coordinator for the energy and environment research at ESRI and manages the ESRI's Energy Policy Research Centre. John's energy research focuses primarily residential energy efficiency but has also covered topics related to renewables integration and emissions, including work of the North Atlantic Oscillation (NAO) weather system on the electricity market and emissions.



Dr Geertje Schuitema, Assistant Professor, School of Business, University College Dublin

Geertje is a Lecturer in Consumer Behaviour and Technology Adoption at UCD's College of Business. As a social scientist, Geertje works with scholars from many different disciplines and with industry on issues around consumer behaviour, public engagement and policy acceptance. She is a Principal Investigator in UCD's Energy Institute, Funded Investigator of the Irish Centre for Research in Applied Geosciences (iCRAG), Funded Investigator of ESIPP and Academic collaborator of the Centre for Business and Society (CeBaS).



Stephen Gallagher, Director of Business Energy, SSE Airtricity

Stephen joined SSE Airtricity in 2007 and is Director of Business Energy with overall responsibility for driving growth in the Business Energy division in Ireland. A key member of the SSE Airtricity Leadership team, his wider responsibilities include oversight for both the Northern Ireland regulated domestic business and the Energy Markets and hedging function for SSE in Ireland. He is a fellow of the Institute of Chartered Accountants of Ireland and has a degree in Business & Legal Studies from UCD.



Paul Kenny, CEO Tipperary Energy Agency

Paul is the Chief Executive Officer of Tipperary Energy Agency. He has been with the agency since 2006 and Chief Executive since 2012. He is involved with both renewable energy (wind and bio-energy) and energy efficiency projects. Paul's key technical competencies are in the areas of wind, biomass and solar energy development, energy efficiency in domestic and commercial buildings and energy efficiency in the water industry. Paul is a consultant to the Sustainable Energy Authority of Ireland, the European Commission and other utilities. Paul was named as one of the top 20 influencers' who will shape our response to climate change.



Eamon Ryan

Eamon Ryan is leader of the Green Party and has served as a TD representing Dublin Bay South since the 2016 General Election. He was the founding chairperson of the Dublin Cycling Campaign and began his political career as a Dublin City Councillor for the Rathgar – Rathmines ward. He then went on to serve both as a TD for Dublin South and as a Government Minister for Communications, Energy and Natural Resources. In recent years, Eamon has worked for a European climate organisation (www.e3g.org) and chaired the digital policy group in the Institute of International and European Affairs (www.iiea.com).

Poster Exhibition

No	Researcher	Poster Title
1	Alessia Sgobba	Assessment of on-site cogeneration at a manufacturing facility in Ireland
2	Dominik Seiler	Resource transparency of industrial systems: The total costs of purified water and steam
3	Federico Caruso	Assessment of a wastewater pump energy performance
4	Hafiz Hashim Waheed	A novel approach to Fault Detection and Diagnosis in Water Distribution Systems using statistical methods
5	Tom Lupton	Compressed Air System Audit
6	Mattia De Rosa	Economic assessment of flexibility offered by an optimally controlled hybrid heat pump generator: a case study for residential building
7	Mohammad Saeed Misaghian	Optimisation of gas & electricity systems for commercial/industrial buildings
8	Mohammad Saffari	Techno-economic analysis of hybrid gas-heat pump systems for energy retrofitting of the Irish residential building stock
9	Adamantios Bampoulas	Self learning control algorithms for energy systems integration in the residential sector
10	Matteo Giberti	Demand and Response for wastewater treatment: modelling settling in the aeration tank
11	Qipeng Liu	Demand Response Strategies in large-scale wastewater treatment plant (WWTP): reject water flow equalization
12	Recep Kaan Dereli	Modeling Co-treatment of Leachate in Municipal Wastewater Treatment Plants in the Context of Dynamic Loads and Energy Prices
13	Eoin Daly	Energy Consumption in Wastewater Treatment
14	Sedeeq Nair	Water-Energy Nexus
15	Sukanya Saikia	Impacts of Rainfall Variation on Wastewater Influent Volumes: A case study
16	Assel Sakanova	Hybrid-Cooled Data Centre Server Layout Optimization for Air-Side Heat Recovery
17	Bryan Coyne	An Economic Evaluation of Future Electricity Use in Irish Data Centres
18	Jaako McEvoy	Adaptive Liquid Cooling Methods in Microchannel Heatsinks
19	Aruna Chandrasekar	Examining the variable versus stable modes operation of Power-to-Gas (P2G) for an energy storage
20	Devasanthini Devaraj	Incorporation of LNG via Floating Storage & Regasification Units into natural gas networks
21	Mohammad Ali Ekhtiari	Using Natural Gas Networks for Energy Storage
22	Arash Beiranvand	A novel topological sorting approach to assess the topological vulnerabilities of power grids
23	Taulant Kerci	A framework to include the Unit Commitment problem into Time Domain Simulation
24	Weilin Zhong	Co-Simulation for Power System and Communication Network
25	Alireza Nouri	Stochastic Rolling Flexibility Optimization in Distribution Networks
26	Cathal O'Loughlin	Examples of Hardware in the Loop as a verification tool
27	Ismail Ibrahim	Frequency Support from Distributed Energy Resources
28	Junru Chen	Smart Transformer for the Provision of Grid Flexibility
29	Valentin Rigoni	Estimation of voltage sensitivities in low voltage feeders with photovoltaics
30	Eadaoin Doddy	Post-processing Techniques for Renewable Energy Forecasts
31	Laura Cooke	Proposed Tool to Quantify Uncertainty in Future Renewable Energy Resources and Demand
32	Seanie Griffin	A Case Study of High-Resolution WRF Forecasting for Wind Energy
33	Cathal Hoare	The Dynamic District Informal Model Server
34	Mohammad Haris Shamsi	Uncertainty Quantification in Predictive Modelling of Heat Demand using Grey-box models
35	Paul Beagon	What Energy to Warm Single Family Homes?
36	Usman Ali	GIS-Based District Building Energy Modelling
37	Alireza Soroudi	Flexible Power System Operation
38	Ran Li	Evaluating Power System Flexibility Needs With Stochastic Unit Commitment Model
39	Ankita Gaur	Electrifying the Heating Sector in Ireland: Exploring the Flexibility Potential and Further Insights
40	Dana Kirchem	Exploring demand-side flexibilities from wastewater treatment facilities in an integrated energy system
41	Desta Fitiwi	Growing Data Centres in Ireland: Would This Cost an Arm and a Leg?
42	Ivan Petrov	Vehicle Tax Design and Car Purchase Choices: A Case Study of Ireland
43	Joao Monteiro Correia	An investigation of the regional correlation gradients between the North Atlantic Oscillation and solar energy resources in Ireland and the UK