CO(L)LABORATORY

2024 PhD Studentships

Pathways to Net Zero: Assessing Technical Potential for Community Adoption of Decentralized Energy in Chetwynd

Project Aims

The UK was the first major economy to pass a net zero emissions law, legislating a net zero emissions target by 2050, aiming to reduce emissions by 78% by 2035. The cost of retrofits to properties to reduce emissions will be significant, with recent local research highlighting that the average cost of retrofitting for energy efficiency in Nottingham will be £69,000. As most homes in England are owner occupied, the implication is that the majority of this investment will fall on homeowners. With the present cost of living crisis, homeowners need economic and social justification to make such significant investments.

This research project focuses on the Chetwynd Neighbourhood Forum area as a case study, assessing adoption of technologies like rooftop solar PVs and heat pumps, and exploring community perceptions of these technologies. Community-led approaches like collective purchasing can increase adoption by aligning solutions with residents' priorities. However, though
Chetwynd has outlined ambitious sustainability goals in its Neighbourhood Plan, research indicates that willingness to invest in solar PV installation is inconsistent.

Through investigation of new heating technologies and lower-cost renewable energy systems, this project will us use artificial intelligence and data sciences methods (like technology feasibility modelling), to simulate and assess the energy needs of local homes. The research will assess the technical potential of an AI-driven simulator to generate realistic, real-world energy solutions and scenarios with which residents and community stakeholders to engage.

In partnership with Chetwynd Community Interest Company (CIC), this interdisciplinary project will investigate advanced technical solutions to encourage the uptake of net zero housing through self-funded and community-led initiatives. It looks to increase understanding of net-zero technologies and options for community participation, which will directly inform Chetwynd's emerging community energy initiative, ensuring the technologies employed reflect residents' needs.

This project has been co-created and is supported by researchers from Nottingham Trent University, the University of Nottingham, and partners at Chetwynd Community Interest Company. The successful candidate will be enrolled at the University of Nottingham.

Project Aims

1. Engage with the Chetwynd community to understand energy demand and use, and their perceptions and engagement with new heating technologies and lower-cost renewable energy systems.
2. Co-develop community energy solution scenarios of renewable systems to align technical potential with community priorities and acceptance.
3. Develop an interactive AI-driven simulator of the planning scenarios for the deployment of solar PVs and heat pumps, assessed using a community-driven approach to inform and facilitate Chetwynd's transition to net zero carbon.

Supervisory Team

1. Lead Academic Supervisor: Prof Rong Qu, UoN
2. Academic Co-Supervisor: Dr Alan Fewkes, NTU
3. Academic Co-Supervisor: Prof Lucelia Rodrigues, UoN
4. Community Supervisors: Mark Trought and Ian Ward, Chetwynd Community Interest Company

Key Details

Host University:	The University of Nottingham
School / department:	School of Computer Science
Start date:	03 April 2024
Financial offer:	Tuition fees covered in full (worth approx. £15k across full PhD programme). Monthly stipend based on £18,622 per annum, pro rata, tax free.
Working hours	Full-time (minimum 37.5 hrs per week), or part-time (minimum 20hrs per week).
Working Style:	Primarily in-person at host university. Flexible working supported. Working pattern to be agreed between successful candidate and lead supervisor.

Competencies

Co(l)laboratory Core Competencies		
Category	**Competency**	**Assessed: Application (A), Interview (I)**
Comprehension and evaluation	Strong understanding of the project and its subject matter.	A / I
	Analytical, researcher mindset with keen attention to detail.	A / I
	Communicate complex concepts with clarity and precision.	A / I
	Able to identify connections, patterns, gaps, and irregularities in information/data.	I
	Able to interpret data/information confidently with logic and empathy to derive meaning.	I
Social and emotional	Demonstrable experience of responding effectively changing contexts, information and demands.	A
	Ability to persevere in the face of challenges/failures and to remain constructive in developing solutions.	A
	Demonstrable passion for learning with clear drive and curiosity to undertake this specific research project.	A / I
	Willingness to immerse oneself in the research subject matter and make a contribute to new knowledge through a PhD.	A / I
	Strong desire to make a positive community impact through the research.	A / I
	Willingness to think deeply about complex concepts and engage with academic ideas and theory.	A / I
Preparedness and potential for success	Experience of working, collaborating and communicating effectively with different stakeholders.	A
	High level of self-motivation and ability to work with minimal guidance.	A / I
	Strong organisational and time-management skills with the ability to balance and prioritise multiple tasks.	A / I
	Ability to identify potential challenges and complexities and thoughtfully consider possible solutions.	A / I
	Able to identify the technical, personal, or professional skills required for a task and take action to develop these.	A / I
Community Context	Genuine desire to undertake community-engaged research over more traditional approaches to research.	A
	Understand the impact of and need for the inclusion of diverse experiences and points of view in research.	A / I
	Appreciation/understanding of the importance of community insight and experience in the generation of new knowledge.	A / I
	Awareness/understanding of the broader societal context related to the subject matter of the project.	A / I

Project Specific Competencies			
Essential	**Assessed: Application (A), Interview (I)**	**Desirable**	**Assessed: Application (A), Interview (I)**
Understanding of net zero challenges and technologies	A / I	Experience in data acquisition, data handling, algorithm development and coding.	A / I
Understanding of concepts like machine learning and data science.	A / I	Experience conducting field work and demonstrations in a relevant setting.	A / I
High level of IT proficiency with the ability to learn and use open-source packages and tools.	A / I	Previous experience in machine learning and data analysis.	A / I
Experience in a relevant professional or community environment	A / I	Background in engineering and interdisciplinary fields, ideally related to energy	
		Familiarity with the context of the Chetwynd area.	A / I

References for Further Reading

- Chetwynd Neighbourhood Forum, 2017. Chetwynd Neighbourhood Plan. Available at: https://www.broxtowe.gov.uk/media/9603/chetwynd-the-toton-and-chilwell-neighbourhoodplan.pdf.
- Kalro, M., Chakravarthi, C. and Taylor, J., 2022. Developing a Smart Local Energy Network for Chetwynd Neighbourhood Forum. Unpublished student project, University of Nottingham.
- Walker, G. and Cass, N., 2007. Carbon reduction, 'the public' and renewable energy: engaging with socio-technical configurations. Area, 39(4), pp.458-469. [4] Rogers, J.C., Simmons, E.A., Convery, I. and Weatherall, A., 2008. Public perceptions of opportunities for community-based renewable energy projects. Energy policy, 36(11), pp.4217-4226.
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- Tingey, M., Webb, J. and Hawkey, D., 2017. Local authority engagement in UK energy systems: highlights from early findings.
- Brisbois, M.C., 2020. Powershed politics: Making renewable energy territorial. Environment and Planning E: Nature and Space, 3(3), pp.750-774.
- Wilson, C., Crane, L. and Chryssochoidis, G., 2015. Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy. Energy Research & Social Science, 7, pp.12-22.
- Butler, C., Parkhill, K.A. and Luzecka, P., 2021. Rethinking energy demand governance:
- Exploring impact beyond 'energy saved'. Energy Research & Social Science, 77, p.102146.
- Mallaband, B., Staddon, S. and Wood, G., 2020. Exploring mobility and energy injustice through a peer-to-peer transport community. Energy Research & Social Science, 69, p.101646.
- Hey J., Nathanail P., Ozcan E., Siebers P.O., and Robinson D., 2023, Surrogate Optimisation of Energy Retrofits in Domestic Building Stocks using Household Carbon Valuations, Journal of Building Performance Simulation, 16(1).