CO(L)LABORATORY

2025 PhD Studentships

Scalable Virtual Power Plants: Supporting community energy systems in Nottinghamshire through innovation

About the Project

Nottinghamshire, like many regions in the UK, is facing growing challenges with rising energy costs, fuel poverty, and a reliance on external energy providers. These issues leave communities with limited control over how they produce and use energy. Virtual Power Plants (VPPs) offer an innovative solution by connecting local renewable energy sources – such as wind turbines and solar panels – into an aggregated, coordinated system that can balance energy supply and demand. This approach empowers communities to generate and store their own clean energy, reducing costs and helping them become more energy-independent.

This project will explore how VPPs can help address these challenges by focusing on the Sustainable Hockerton initiative, Nottinghamshire's very own pioneer in community-led renewable energy. Sustainable Hockerton and their sister organisation, the Hockerton Housing Project, already operate community-owned and operated wind turbines and solar panels (3 wind turbines and 7 solar PV, totalling over 400kW). This research will develop a scalable model for integrating these energy sources into a VPP for Hockerton and wider Nottinghamshire communities.

In addition to Sustainable Hockerton, the research will engage with other local community energy initiatives across Nottinghamshire, ensuring that the project reflects the diverse energy needs and priorities of the region. This engagement will help share knowledge and best practices, making the findings relevant to a wide range of local stakeholders.

Further, this research will evaluate the social and economic impacts of VPPs while also investigating the regulatory frameworks needed to support their wider adoption. This research offers Nottinghamshire the chance to be at the forefront of cutting-edge energy solutions. The findings will provide a roadmap for other communities to adopt VPPs, contributing to a more resilient, affordable, and sustainable energy system.

About the Project

This project has been co-created and is supported by researchers from Nottingham Trent University (NTU), the University of Nottingham (UoN) and partners at Sustainable Hockerton and Hockerton Housing Project. The successful candidate for this project will be enrolled at Nottingham Trent University.

Project Aims

The overall aims of the project are:

1. To evaluate the feasibility and scalability of integrating Sustainable Hockerton's renewable energy assets into a VPP.
2. To develop a scalable VPP model that addresses the technical, economic, and social needs of Nottinghamshire's communities, supporting cost reduction, energy security, and sustainability.
3. To identify policy and regulatory frameworks that can enable the widespread adoption of community-based VPPs across the UK, overcoming existing barriers and leveraging lessons from successful local and international projects.

Supervisory Team

1. Lead Academic Supervisor: Dr. Tom Rogers (NTU)
2. Academic Co-Supervisor(s): Prof Yupeng Wu (UoN), Dr Vahid Vahidinasab (NTU)
3. Community Supervisor(s): Simon Tilley (Hockerton Housing Project), Dr Geeta Lakshmi (Sustainable Hockerton)

Key Details

Host University:	Nottingham Trent University
School / department:	School of Science and Technology
Start date:	01 April 2025
Financial offer:	Tuition fees covered in full (worth approx. £15k across full PhD programme). Monthly stipend based on £19,237 per annum, pro rata, tax free.

Key Details

Working hours	Full-time (minimum 37.5 hrs 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

Competencies

Co(l)laboratory Core Competencies		
Category	**Competency**	**Assessed: Application (A), Interview (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 the socio-economic context and impact of renewable energy projects.	A / I	Experience with energy system modelling or similar.	A / I
Strong understanding and proficiency in using digital tools and software for technical purposes.	A / I	Experience using digital tools and software for data analysis and energy modelling.	A / I

Competencies

Project Specific Competencies			
Essential	**Assessed: Application (A), Interview (I)**	**Desirable**	**Assessed: Application (A), Interview (I)**
Working knowledge of energy policy in the UK.	A / I	Knowledge of Virtual Power Plants or distributed energy systems.	A / I
Understanding of renewable energy systems and community energy projects.	A / I	Previous experience with community-led sustainability initiatives.	A / I

References for Further Reading

- CIGRÉ Canada (2020). Community Storage and Virtual Power Plants: The Next Steps in Decentralized Energy Systems. Available at: https://cigreconference.ca/papers/2020/C6/303/CIGRECanada2020-Community%20Storage%20VPPs.pdf (Accessed: 18 September 2024). [Provides insight into community-based VPPs and energy storage solutions.]
- Ness, G.C., Seetharaman, K. and Nunes, A. (2024). 'The role of energy storage and virtual power plants in decarbonising power systems', Energy, Sustainability and Society, 14(1), 483. Available at: https://doi.org/10.1186/s13705-024-00483-y (Accessed: 21 September 2024). [Examines how VPPs and energy storage contribute to decarbonisation.]
- National Renewable Energy Laboratory (NREL) (2024). Virtual Power Plants: Unlocking the Grid of the Future. Available at: https://www.nrel.gov/docs/fy24osti/86607.pdf (Accessed: 18 September 2024).[A detailed report on the role of VPPs in future energy grids.]
- Energy, Sustainability and Society (n.d.). Virtual power plants: An in-depth analysis of their advancements and importance as crucial players in modern power systems. Available at: https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-024-00483-y (Accessed: 18 September 2024). [A comprehensive analysis of VPPs and their importance in power systems.]
- Interreg Europe (2021). Virtual Power Plant. Available at: https://www.interregeurope.eu/good-practices/virtual-power-plant (Accessed: 21 September 2024). [Covers practical examples of VPP implementation across Europe.]
- Rocky Mountain Institute (RMI) (2024). Virtual Power Plants: Policy Principles for the Grid of the Future. Available at: https://rmi.org/wp-content/uploads/dlm_uploads/2024/02/vpp_policy_principles_updated.pdf (Accessed: 18 September 2024). [Focuses on the policy frameworks necessary for scaling VPPs.]
- European Commission (n.d.). Energy Communities. Available at: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumers-and-prosumers/energy-communities_en (Accessed: 18 September 2024). [Explores the role of energy communities and their connection to VPPs.]
- Hockerton Housing Project (n.d.). Renewable Energy. Available at: https://www.hockertonhousingproject.org.uk/renewable-energy/ (Accessed: 18 September 2024). [Provides critical information on the subject of the case study, as well as practical insights into community-led renewable energy initiatives.]
- Ofgem (2015). Consultation Response: Virtual Power Plants. Available at: https://www.ofgem.gov.uk/sites/default/files/docs/2015/09/consultation_response_-_virtual_power_plants.pdf (Accessed: 18 September 2024). [A regulatory overview on VPPs in the UK.]

References for Further Reading

- ENTSO-E (n.d.). Virtual Power Plants. Available at: https://www.entsoe.eu/Technopedia/techsheets/virtual-power-plants (Accessed: 18 September 2024). [Technical guide on VPPs and their integration into existing energy systems.]