Graduate research position (Masters or PhD) in

The optimisation of buildings together with national energy systems

Buildings and urban areas are currently designed and optimised independently of national-scale energy systems. However, there is a trade-off between benefit and expenditure at the two levels, so future energy policy should explore the links between them. This research project will optimise buildings (their energy performance and local renewables), district systems (technologies and networks) and national systems (large-scale renewables, transmission and distribution infrastructure) together using a multi-scale model. This will account for the spatial and temporal distribution of energy demands and resources, and the bottle-necks caused by network infrastructure. The work will link recent models developed that link the building and urban scales with those at the national scale. The outcome will be a holistic optimisation process able to explore important questions regarding renewable energy policy.

The research objectives are as follows:
- Evaluate and select existing energy systems models at the building, district and national scale.
- Investigate the modelling approximations necessary to bridge multiple scales.
- Adapt the models above and link them together to provide a single holistic optimisation.
- Test the holistic model on suitable case studies.
- Assess performance compared to current approaches.
- Derive policy implications based on the outputs of the model.

Requirements
Applicants should have a strong background in engineering, physics or computer science. Familiarity with building energy simulation, mixed-integer linear programming and multi-objective optimisation are highly desirable. Some experience in programming is essential, and knowledge of Python is desirable. Mastering the English language is required.