

Progressive building energy models for facility management

Dr Daniel Fosas, The University of Edinburgh
Professor David Jenkins, Heriot-Watt University

Timeline

Deadline for applications January 21st (Wednesday)

Shortlisting January 23rd (Friday)

Interviews January 26th-27th (Tuesday-Wednesday)

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The **Edinburgh Research Partnership in Engineering (ERPE)** scholarships programme brings together research in Engineering from the University of Edinburgh and Heriot-Watt University and it has shortlisted 18 projects to compete for 6 studentships open to candidates that meet home status criteria.

As one such projects, we now welcome applications to select one candidate to compete in the final round.

Project

Existing buildings entail a third of the energy consumption in the world and contribute a similar share of greenhouse gas emissions. At the same time, they have been shown to have a large potential for improvement in both fronts. Just enhancing operations of what is already in place is estimated to reduce energy and operational emissions by 20% on average.

A significant area of work has focused on whole-building analysis and simulation to rigorously understand performance of existing assets. Here, building audits are combined with physics-based models to improve understanding of what is built and to devise ways to improve operations and retrofit packages. However, such an approach requires specialist knowledge and can easily become onerous given time, interrelationships of physical processes, and resources needed. In addition, it does not link well with metering and building management systems as they only monitor part of the building.

This project seeks to investigate the role of progressive energy modelling to assist facility managers understand and improve the performance of existing assets. Building systems can be modelled in a wide range of ways, and it is possible to isolate components for dedicated analyses. Then, they can be extended to include further parts relevant to the system. As an example in HVAC systems, heating/cooling generation via heat pumps or boilers could be analysed with a dedicated model, aided by monitoring points typically implemented, like supply/return temperatures or partial loads. Once it is verified that the system works as expected, the model can be extended to represent further parts of the whole system, like losses in distribution systems, emitters, or links with ventilation systems.

Compared to whole-building simulation, this is a bottom-up modelling approach that conceives buildings as a jigsaw of systems that have a closer correspondence with established monitoring practices in facility management. It simplifies complexity, offers faster feedback cycles, retains meaning to explore alternative ways of operating buildings, and could be done in a way that paves the way to whole-building modelling as required.

We are seeking applicants wishing to advance the state of the art in this area, including exploring the role of model complexity, model interoperability, and influence on facility managers' decision-making processes.

About this call

The nomination is made by the prospective supervisory team and must be completed by January 30th following a competitive selection process. Afterwards, the nominated candidate will proceed directly to the final interview round with ERPE's independent panel in the second half of February, which will decide the final allocation of the 6 studentships.

The funding conditions of the studentship are set by the funders of ERPE and institutional policies:

Eligibility Open to home status candidates only, see additional entry requirements for the PhD [here](#).

Stipend Enhanced above [UKRI rates](#) (varies per academic year; estimate for 2026-27 is £22.6k).

Duration of the studentship 42 months (3.5 years of funding).

Research and training grant £5000 for the duration of the project.

Start date Expected for September 2026, but could be postponed until June 2027.

Further information

This is a **joint PhD project** between The University of Edinburgh ([Dr Daniel Fosas](#)) and Heriot-Watt University ([Professor David Jenkins](#)). The context of the work will be the campuses of these institutions.

A background related to building performance simulation and/or building services engineering would be important for the project. The project will require development of building simulation models, off-the-shelf and bespoke ones. Familiarity or *willingness to learn* programming languages like Python, Julia, or R will be important as well as data mining techniques.

The candidate will have access to the combined training opportunities at both institutions, which covers both specialist scientific training as well as transferable professional skills. The candidate will have the opportunity to become a teaching assistant following formal training and to contribute to wider training and outreach activities.

Applications

We welcome applications from all qualified candidates via email (see above), and we wish to particularly encourage applications from groups underrepresented at this level. To apply to this opportunity, you will need to:

1. Meet eligibility criteria listed above.
2. Prepare key documents for conditional admission in the PhD programme (see [here](#)). Please note that we *do not* require references at this stage, nor a full 2-page research proposal but rather a 1-page outline with your plans for the project (see guidelines [here](#)).

A formal application to the PhD programme **is not** needed at this stage. The nominated candidate will have to submit a formal application by January 30th.

