Model-driven Change Impact Assessment within Energy Systems

**Type of award**  
PhD Research Studentship

**Department**  
Computer Science

**Scholarship Details**  
Scholarship covers full UK/EU (EU applicants who have been resident in the UK for 3 years prior to application) PhD tuition fees and a tax-free stipend at the current RCUK rate (£14,553 in 2017/18). EU nationals resident in the EU may also apply but will qualify only for PhD tuition fees

**Duration**  
3.5 years

**Eligibility**  
Home/EU applicants only

**Start Date**  
From 1 January 2018

**PhD Topic Background/Description**

Today more and more households and businesses install renewables-based generators. Yet, the current energy systems (i.e., hardware, software, regulatory framework, consumer behaviour) are built to primarily distribute energy from a central generator (e.g., a large power plant) to passive consumers. The new trends in energy generation and consumption patterns must be fully integrated into the future energy systems designs.

This project will use model-driven software engineering techniques to research the impact that changes in energy generation, consumption, and trade patterns could have upon the various aspects (e.g., price, greenhouse gas emissions) and levels (e.g., from an individual to a country scale) of the energy system. The PhD researcher will:

- Model a selected aspect of the UK energy systems at various levels: from individual generator and consumer, to village, city, and country-wide scales;
- Integrate models across various scales (e.g., how does the individual’s model relate to that at the country scale?);
- Develop cross-model change impact propagation and assessment techniques (e.g., how do individual actions affect the energy system at the larger scales?).

Since the parts of an energy system are tightly interconnected, change in one area is likely to have impact elsewhere. Thus, various models of the systems will be collected (e.g., from whole-system level, to locality; from energy market to customer behaviour) and a framework for model integration for change impact evaluation will be build.

This will require deriving a higher-level model (i.e., meta-model) for the system, defining model integration rules (e.g., some parts of different models can run sequentially, others need to interleave, etc.), and validating the integrated model execution with domain data.

To support change impact evaluation with this framework, and help handle the very large datasets that energy systems generate, the framework will be implemented as a cloud-based service.
Further Particulars

Candidate Requirements
Candidates should have a 1st or good 2:1 honours degree (or equivalent) in Computer Science or a closely related discipline.

We are looking for a self-motivated candidate wishing to perform internationally leading research.

Basic skills and knowledge required:
- Good programming skills is an essential requirement.
- The applicants would have an interest in and some previous knowledge of model-driven development, model transformations and integration.
- Experience with any of these following is an advantage, although not an essential requirement: UML modelling, domain specific languages, agent-based modelling, cloud computing, qualitative and quantitative data analysis.

Scholarship Details
Research Council £14,553 p.a. in 2017/18.

Informal enquiries
Please email Dr. Ruzanna Chitchyan (r.chitchyan@bristol.ac.uk)

For general enquiries, please email gsen-pgrs@bristol.ac.uk

Application Details
Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Computer Science Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.