University Alliance
Doctoral Training Alliance

DTA3/COFUND Programme Research Project Proforma

Page 1 – General Information

Project Code	UCEN01
Partner University	University of Central Lancashire (UCLan)
Faculty/School/Department/Research Centres	School of Engineering
First supervisor Please provide name, email address (for UA use) and weblink	Dr. Champika Liyanage https://www.uclan.ac.uk/staff_profiles/dr-champika-liyanage.php
Second supervisor Please provide name, email address (for UA use) and weblink	Dr. Ruchira Yapa (Lecturer) https://www.uclan.ac.uk/staff_profiles/ruchira-yapa.php
Third supervisor Please provide name, email address (for UA use) and weblink	Professor Yahaya Yusuf https://www.uclan.ac.uk/staff_profiles/professor_yahaya_yusuf.php
Fourth (external) supervisor	Dr. Susantha Udagedara https://www.salford.ac.uk/business-school/our-staff/business-academics/susantha-udagedara
External/industrial supervisor	
Which of the supervisors listed above is an early-career-researcher (within 5 years of completing their doctoral degree)	Dr. Ruchira Yapa
Contact details for project for informal applicant queries Email address	CLLiyanage@uclan.ac.uk
DTA Programme: Please delete as necessary which DTA programme this project relates to:	DTA Energy
Project title	Novel Energy Trading Models to encourage the use of Smart and Renewable Energy (SRE) Technologies

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.

Page 2 – Project Description

Scientific Excellence (500 words)	Despite the introduction of new SRE technologies (Smart Homes, Solar PV, etc.), their widespread use in households has been hindered by numerous factors such as high capital cost, and lack of incentives. In this project, new methods of energy trading that can be used by households will be developed. This approach is novel and, if successful, not only a significant growth in households using SRE technologies can be achieved, but energy trading models could be the way forward to revolutionize the energy sector.
Aim (400 words) You may wish to include headings – Hypothesis, Methodology and Innovations	Aim is to design and validate energy trading models that can be used by households to trade energy they save from the use of SRE Technologies with public and/or private sector. The focus of the study will be England. The project focuses on three interdisciplinary research themes - engineering, social science and business management, thus, will use a mixed methodology. Engineering methods: - Computer Simulations in order to identify potential energy generation technologies and energy savings that can be achieved; household energy usage will be first simulated using computer simulation software incorporating new SRE, energy generation, and energy storage technologies. - Field testing: to check accuracy and validate the simulation results. - Mathematical modelling to examine energy usage vs. saving in selected households.

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.

	Social Science methods: - Semi-structured interviews followed by a questionnaire with households: to identify barriers to using SRE technologies, and opportunities and potential pitfalls of energy trading. - Semi-structured interviews with private and public sector to identify their drive towards energy trading and what models can be more appealing/suitable. - Focus groups with relevant stakeholders to test applicability and practicality of energy trading models to be developed. Based on findings from both above, Business management methods will involve; - Calculating capital and life cycle cost of SRE Technologies. - Examine different energy trading methods and income streams. - Predict cost savings for households and energy buyers based on selected energy trading methods.
Strategic Relevance (300 words)	With the use of proposed approaches in this research a significant improvement in SRE usage can be achieved. In the long run, the proposed research will also fulfil some of the key Sustainable Development Goals set up by the UN towards the 2030 Agenda for Sustainable Development (particularly goals 7 – affordable and clean energy; to goal 11 – sustainable cities and communities).
Interdisciplinarity and fit with DTA3	This project directly addresses a key issue in the energy sector under three themes, i.e. engineering, social science and business management perspectives, thus it is supervised by individuals who have knowledge in these themes. Further, the project fits in very well with DTA's 'Energy' theme as it focusses on the global challenge of

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.

	ensuring future security and sustainability of energy supplies and the management of energy demand.
Industrial Relevance (300 words) Detail external placement opportunities or collaborations available as part of the project	The first supervisor is liaising with a Property Company called Mistoria Group based in Manchester for one of her previous Innovation Voucher Projects and for her current summer internship project on 'Problems associated with Zero Carbon Housing in Student HMOs (Housing with Multiple Occupancy)'. This company, given that they do Student HMOs, will be willing to try novel methods to address the problem of high energy bills. Therefore, the student will get the opportunity carry out some of the engineering methods in one of their houses over a period of 03 months (every year, if need be) during summer, when some houses are vacated. The first supervisor also has links with Prof. Alenka Temoljotov-Salaj (https://www.ntnu.edu/employees/alenka.temeljotov-salaj), in Department of Civil and Environmental Engineering in NTNU (Norwegian University of Science and Technology), Norway. It will be an opportunity for the student to get a placement at NTNU, and work at several research centres focussing on Environment-friendly Energy Research (e.g. Centre for Sustainable Energy Studies) to further his/her knowledge on the subject. The placement could be an arrangement for a period of 6 to 8 weeks. A placement in Norway will be interesting, as electricity produced in Norway is almost entirely renewable, based on significant hydroelectric resource (Nordic Energy Research - http://www.nordicenergy.org/figure/energy-consumption-by-sector/norwegian-energy-consumption-by-sector/).
Economic and Societal Impact (300 words)	Despite the introduction of new SRE technologies (e.g. Smart Homes, Solar PV), their widespread use in households has been hindered by numerous factors such

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.

	as the high capital, lack of awareness, and lack of incentives for the use of the technology. From an economical perspective, households only have the opportunity to save money on the energy units they save, when using SRE technologies. No other financial incentives are available for them, thus making the use of these technologies less attractive to a larger proportion of the society. If this can be addressed using the proposed approaches in this research; a significant improvement in SRE usage may be achieved, which will have both societal and economic benefits. In order to reduce environment and climate change impact from traditional fossil fuels, reducing energy usage and using smart and renewable energy sources remain a key requirement. However, as mentioned earlier their widespread use is limited due to a number of issues relating to social, engineering and business management spheres. The project proposers (i.e. supervisors) believe that the problems should be addressed using a holistic interdisciplinary perspective, rather than looking at them individually, so that it will lead to an optimum/improved solution that has scientific excellence.

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.

Page 3 – Admission Requirements

Specific Admission Requirements Detail any subject specific degree qualifications or disciplines, relevant skills, experience	A 2:1 or 1st Class degree in Engineering (possibly in Energy, Electrical and Electronics) or Energy Management Industry experience in energy field for at least 02 years
Minimum IELTS score	7

Co-funded by the Horizon 2020 programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 801604.