



School of Computing, Engineering, and the Built Environment Edinburgh Napier University

PHD STUDENT PROJECT

Application instructions:

Detailed instructions are available at :

<https://www.napier.ac.uk/research-and-innovation/doctoral-college/how-to-apply>

Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.

Project details

Supervisory Team:

- DIRECTOR OF STUDY: Prof. Robert Hairstans (Email: r.hairstans@napier.ac.uk)
- 2ND SUPERVISOR: Dr Dan Ridley-Ellis

Subject Group: Built Environment

Research Areas: Forestry & Arboriculture, Architecture, Built Environment

Project Title: The Impact of Climate Change on Timber in Construction

Project description:

Construction delivery and operation accounts for 34% global final energy use and 37% energy-related carbon dioxide (CO₂) emissions whilst extracting finite resources and destroying natural habitats. As a result, improved methods of construction delivery need to be identified that are capable of utilising renewable natural capital with an emphasis on timber as recommended by the Climate Change Committee and Environmental Audit Committee and as will be set-out by the Timber in Construction policy roadmap. Timber sequesters carbon and as a result of being light weight and relatively easily worked has the capability of being utilised within offsite and modern methods of construction to form or upgrade buildings to net zero carbon performance.

Although this is the case climate change will have a significant impact on future forest resource and how the future built environment needs to perform. The proposed PhD research will therefore undertake to develop an understanding of climate impact through the timber supply chain from “seed to building” considering

the needs of the future built environment and timber resource with an emphasis on the UK context. Within this analysis there will be full value chain review of the timber supply chain in its current form taking account of forest policies, forest management strategies, timber conversion, engineered timber product manufacture, offsite and modern methods of construction approaches and built environment applications currently with reference to new build and retrofit considerations.

Drawing upon this holistic review and augmenting it with international learnings the PhD research will engage with the industry partners and sector stakeholders to understand their current business challenges and future strategies. Within this will be considerations to the potential future market growth of timber as a construction material and opportunities within this for UK grown resource. The potential of UK timber for construction will draw upon the considerable track record of ENU taking account of regional variations in terms of species, climatic conditions, silvicultural practices and infrastructure. In addition to this is the existing research and knowledge base at ENU on how to utilise UK timber resource for engineered and mass timber products including incorporation into offsite MMC solutions.

Building upon the findings of the extensive review undertaken a methodology for analysing the influence of climate change on the UK timber supply chain is to be determined the objective of which is to determine the potential impact on future forest resource, timber construction products and the built environment. The outcomes from this will be utilised to inform future supply chain resilience strategies and identify where possible potential construction products and systems capable of being manufactured from UK sourced timber for sustainable built environment delivery. The extensive timber technology manufacturing and test facilities of Edinburgh Napier University and its partner network will provide scope to manufacture and test the product solutions derived. Further, via the industry network there will be opportunities to validate solutions with respect to real life applications and to stress test viability and scalability.

References:

- [1] Climate Change Committee
- [2] Environmental Audit Committee
- [3] Transforming Timber
- [4] Transforming Timber (napier.ac.uk)

Candidate characteristics

Education:

A second class honour degree or equivalent qualification in Built Environment subject i.e. Civil / Structural Engineering; Architecture / Architectural Technology; Sustainable Built Environment or equivalent

Subject knowledge:

The candidate should have fundamental knowledge of sustainability, timber in construction and the built environment.

Essential attributes:

- Knowledge of timber as a material
- Capable of collecting and analysing data sets and undertaking complex predictive modelling

- Competent communicator capable of engaging with industry and external stakeholders
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:

- Forestry and forest management.
- Supply chain mapping
- Timber engineering