I. The Project:

**Project Title:** 'Interrogating the technical, economic and cultural challenges of delivering the Passivhaus standard in the UK'

**Duration:** June 2013 to July 2014

**Principal Investigator:** Dr. Henrik Schoenefeldt, Centre for Architecture and Sustainable Environment at the Kent School of Architecture, University of Kent.

**Researchers:** Team of 13 MArch students (5th year) and BArch (3rd year), under the supervision of the principal investigator.

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**Project Outline:**

‘... it would be folly to directly copy details, especially those for insulation, windows and ventilation from the Central European example to other parts of the world. Instead, the details should be found to suit the climate and geographic conditions to develop a Passive House solution of each location. The following boundary conditions of each region must especially be considered:

- The local building traditions
- The specific climatic conditions’

*Quote from a lecture given by Wolfgang Feist ‘First Steps: What Can be a Passive House in Your Region with Your Climate?’*

The British government has committed to an 80% reduction in carbon emissions by 2050 and has identified increased energy efficiency of new and existing buildings as a central part of a strategy for achieving these objectives. In recent years, this has provided architects, engineers, contractors and manufacturers with the impetus to develop an increasing interest in the German PassivHaus standard. However, compared to Germany and Austria, where extensive experience had been accumulated with the design and construction over the past 25 years, experience with designing and delivering PassivHaus standard buildings in the UK is still comparatively limited. The first certified PassivHaus in the UK has been completed in 2009 and the pioneering buildings completed in the past 4 years provide critical insights into the process by which the PassivHaus is gradually been adapted to the UK context. Various studies have highlighted the challenges of applying the PassivHaus principles, which have originally been conceived and developed for buildings in the continental climates of central Europe, to the design of buildings in the UK’s temperate climate.
However, this process of adaptation cannot be fully understood through the study of technical and climatic aspects alone, but also requires research into the economic, educational and cultural barriers. The implications of skills and education, building traditions and technologies are particular important considerations. At moment, for instance, architects and contractors in the UK rely extensively on imported technologies to achieve the PH standard, and various PassivHaus projects have been delayed and compromised due to the insufficient skills and technical understanding in the construction workforce. The importance of these issues has also been stressed by Wolfgang Feist in his paper *What can be a Passive House in Your Region with Your Climate?* He argues that adaptation of the PassivHaus standard in different parts of the world cannot be achieved by the copying of Central European solutions, but requires the development of new technical solutions that take into account the specific economic contexts, skills, materials and building traditions. Yet, these challenges have also provided the impetus for technical innovation, research and skills within the UK. Some of the questions to be addressed in this project are:

- How were the PassivHaus principles adopted to meet the specific English context?
- How far was the delivery of the projects dependent on imported and skills and technologies?
- Have any attempts been made to embrace English building traditions, materials, technologies? How successful were these and what were the difficulties encountered?

**Aims and objectives:**

This project aims to interrogate the technical, economic and cultural challenges associated with implementing the PassivHaus standard in buildings in the UK through 13 detailed case studies. The first part of the study is a review of the existing literature on the application of PassivHaus principles to buildings in the UK, which is followed by thirteen selected case studies in England. Each case study will involve detailed explorations of the executed design and the environmental and construction technologies deployed. This is followed by semi-structured interviews with the contractors, clients and architects involved in each scheme. In addition to gaining insights into the design process, the objective of these interviews is to gain critical insights into the experiences of architects, contractors and engineers with the design and construction process, with a particular focus on the challenges encountered during the procurement and construction stages in each of these projects. The case are:

1. Hadlow College’s Rural Regeneration Centre, Tonbridge, Eurobuild
2. Crossway House, Staplehurst, Richard Hawkes Architects
3. Centre for Disability Studies, Rocheford, Simmonds Mills Architects
4. Hastoe Housing Association Passivhaus Development, Wimbish, Parsons & Whittley
5. Howe Park PassivHaus, Milton Keynes, Eco Design Consultants
7. 100 Princedale Road, London, Princedale
8. Montgomery Primary School, Exeter, NPS group
9. Grove Cottage, Hereford, Simmonds.Mills Architects
10. Grey Lyn PassivHaus, Faversham, Conkers Conservation
11. Underhill House, Chipping Norton, Helen Seymour Smith Architects
12. Totnes PassivHaus, Totnes, Janet Cotterell
13. Denby Dale, near Huddersfield, Devrie O’Sullivan

Each of these case studies focuses on three main areas.
Part I comprises a detailed study of the executed design and the underlying concepts and objectives. It will cover the following key areas: (a) architectural design (b) construction systems, materials and details (c) environmental technologies and (c) environmental control strategies.

Part II focuses on the design, construction and procurements process. The process is important to gain a critical understanding of the specific approaches used by architects, contractors and clients to adopting the PassivHaus standard in the design, detailing and construction of buildings in the UK. The focus is on the design and technical objectives, methods and tools deployed in the design process and construction stages. The objective is to gain insights into the specific challenges encountered at all stages of the project. This part of the research will be based primarily on interviews with clients, contractors, engineers and the architects of the project.

Part III is an environmental post-occupancy study, which will be based on interviews with building users and the collection and analysis of measured data of the indoor climate and energy consumption. This data will be used to evaluate the actual environmental performance of the building compared to the predicted performance, both from the point of energy efficiency, thermal comfort and air quality.

Bridging the gap between practice, research and teaching

The project also engages with issues raised in the latest report of the Standing Conference of the Heads of School of Architecture, which has highlighted that teaching, research and practice suffer from too much separation. One of the key objectives of the project was to create a bridge the gap between academic research, architectural practice (and the construction industry more widely) and university-based teaching. This project provides a potential model, by fostering collaboration between academic researchers, students and industry partners. Since the start of the project in July 2013 several workshops and project reviews, bringing together the research students, university-based researchers and practitioners in industry, have been held. The project has received direct financial support and/or in-kind support from:

Richard Hawkes architects
James Anwyl, Director of Eurobuild
Doug Smith, Principal Director at Tp Bennett
Patrick Osborne, Lee Evans Partnership
Philipp Proffit, Director of Princedale Homes
The PassivHaus Trust: Jon Bootland, chief executive.

The findings will be disseminated through conference presentations, journal articles and a peer reviewed eBook. [For sponsorship information please click here].