



Offsite Volumetric Construction and Low Carbon Homes

Ella Quigley PhD Researcher, Loughborough University
Email: e.s.quigley@lboro.ac.uk
Supervisors: Prof. Kevin Lomas and Prof. Alistair Gibb

Introduction

There is a need to reduce energy demand in the UK for a number of reasons, including the risks posed by climate change, dwindling resources, and energy security. Acknowledgment of this need has been growing in recent years which has led to a range of policies at national, European and international levels. Most pertinent to this research is the ambitious targets for all new homes to be 'zero carbon' from 2016.

This project will focus on the opportunities and challenges faced by the offsite construction sector in achieving such targets. It is being conducted in conjunction with an industry sponsor, Unite Modular Solutions (UMS), a manufacturer of offsite volumetric construction, and the work will focus on their buildings.



Aim

This project will investigate the potential for offsite modular construction to deliver low energy homes.

Objectives

1. Monitor selected UMS buildings, focusing primarily on energy consumption, but also on other factors such as internal temperature and window opening
2. Model the same UMS buildings using dynamic thermal building simulation tools
3. Compare the results from modelling and monitoring, and investigate reasons for any gap, finding ways to reduce this if possible
4. Perform a parametric study of UMS buildings using dynamic thermal simulation tools to investigate how low energy homes can be provided as the norm

The Challenge

The knowledge and technology already exists to build low energy homes, however, at present the costs are significantly higher than a standard home but the benefits are not perceived as financially valuable making the extra cost unattractive.

Therefore, the main challenge, which exists for all home builders, is how to ensure that all new homes can meet the increasingly stringent energy and carbon regulations at a price that is affordable to the constructor and the buyer.

Methodology

A modified experimental methodology has been chosen for this project, which is similar to an experimental methodology but has a greater focus on natural settings. At least two case studies will be carried out to investigate the real performance of UMS buildings. A range of methods will be used during the case studies, including building monitoring, computer modelling.

The Pilot Study

A pilot study is currently being conducted at the William Morris halls of residence in Loughborough. Before the pilot could begin it was essential to fully understand offsite volumetric construction and the buildings that would form the study, this was achieved from:

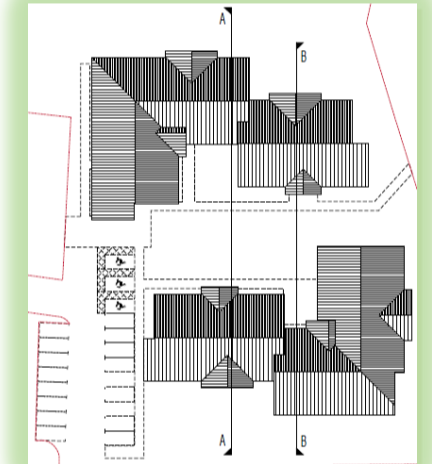
1. Factory visits



2. Site visits



3. Construction plans & details



The purpose of the study is to investigate the methods and tools selected for the project, which include:

1. Monitoring equipment



2. Modelling tools



3. Blower door tests



4. IR Thermography



5. Half hourly meter readings

