D4FC Factsheet 13:

Harnessing nanotechnology to combat climate change

Contact details

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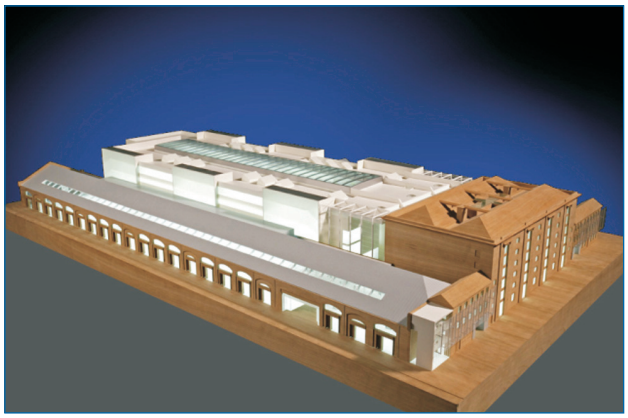
General project information

Name of project:	Harnessing nanotechnology to combat climate change – using a multi disciplinary approach to design an effective adaptation solution for the built environment, initially through a case study project the new UAL campus at King's Cross London
Location of project:	King's Cross Central, London
Type of project:	Both new buildings and some Grade II listed structures
Cost of project:	About £120m

Project team

Client:	Central Saint Martins College, University of the Arts
Designer/architect:	Stanton Williams
Developer:	Argent Group, Kings Cross Central site developer

Other organisations involved (and their role): Atelier Ten (environment engineers), Nanoforce technology (materials research and development), Central Saint Martins College (researcher and designers)



Project description:

This interdisciplinary project is investigating the potential of nanotechnology and advanced material engineering to provide innovative and cost effective climate change adaptation solutions for future retrofitting. The case study project the Central Saint Martins (University of the Arts) King's Cross campus covers about 40 000sqm and is to be operational in September 2011. The building aims to be an exemplar for a 21st century learning environment. Great importance has been placed on ensuring the building embodies best practice in sustainable design and has been designed to allow maximum scope for adaptation.

The client brief requesting high flexibility of usage of space and best natural light provides clearly defined specific challenges and the team is exploring two main themes:

- how to capitalise on nanotechnology solutions to sustain/increase daylight capacity while reducing infra-red penetration into the building envelope during hotter summers
- how to capitalise on nanotechnology to increase thermal mass capacity during hotter summers.

The innovative aspect of this project lies in the interdisciplinary nature of the team, which brings together nanotechnologists, engineers, architects and designers at the same table. The client and end user is also integrated into the team.

Project timescales and dates

The case study project at King's Cross started construction on site in January 2009 (following enabling works) and is due for completion in July this year.

Design period: basebuild concept design work started in 2006. Planning/Listed Building permission was granted April 2008.

Operation and monitoring period: the aim is to monitor building performance over the next few years. The replacement of glass and ETFE is assumed at a later date. Key criteria should be to maintain the quality and colour of the light within environment of an arts college.

CIBSE Engineering a sustainable built environment

Technology Strategy Board Driving Innovation

Knowledge Transfer Network Modern Built Environment

Further project details

1 What approach did you take in assessing risks and identifying adaptation measures to mitigate the risks?

- several different climate change models were reviewed and the team settled on the CIBSE future weather data predictions for London. Atelier Ten has undertaken a detailed analysis of the CIBSE future weather datasets to investigate the changes in temperature and other weather conditions and their efefcts on the CSM/UAL building
- identification of key opportunities for intervention in the King's Cross building were defined in the first mapping workshop.

2 How have you communicated the risks and recommendations with your client? What methods worked well?

- the consortium is benefiting from the contribution of an academic from Central Saint Martins College, who is also providing a communication channel to the head of college and other relevant individuals. This is one of the strong aspects of this project as the team benefits from the involvement of a group of students who will be future users of the building. A set of meetings with the Head of College was also agreed at the start of the project to ensure a two-way discussion around the future of the building.

3 What tools have you used to assess overheating and flood risks?

- this project was only looking at the overheating aspect of climate change in hotter summers. The focus was broken down into two specific challenges: management of light versus heat and thermal mass of the building. These are the challenging areas where nano technology can be used
- Atelier Ten conducted various modelling of adaptation technologies to the current constructions to evaluate how the building can be adapted in future. Computer modelling was used for heat/light distribution through one of the studios.

4 What has the client agreed to implement as a result of your adaptation work?

- as the technologies recommended are not yet commercialised and the strategy is for 2050 and further, they will not be adopted in the immediate future.

5 What were the major challenges so far in doing this adaptation work?

- how to maintain good colour rendering while reducing infrared, critical to an art college environment
- understanding what nanotechnology is and can offer (language barrier)
- communication of technological information and climate data to cross disciplinary consortium (language barrier)
- cost and reliability of new materials
- conservativeness of building industry in use of novel materials
- limited time for development of materials.

6 What advice would you give others undertaking adaptation strategies?

- having a focus and to be aware of the communication barriers because of working in a team from multi disciplinary backgrounds. Also having a cross sector consortium and working with individuals from different industries can be greatly beneficial in exploring new ideas and creating technology fusions while finding new applications for existing technologies.