Project Streamer - Introduction

Project Streamer is an industry-driven collaborative research project on Energy Efficient Buildings (EeB) in the healthcare district, funded by the European Union. It is a European initiative with a 4 year duration which commenced in September 2013, and is aimed at reducing the energy use and carbon emissions of both new and retrofitted buildings in healthcare districts of the EU by 50% in the next 10 years. There are 19 partners (5 large companies, 6 small / medium enterprises, 4 research institutes, 3 public hospitals and 1 private hospital) from 9 countries across the EU.

All manner of mixed building types will be analysed, ie acute hospitals, clinics, offices, laboratories, kitchens, laundries and educational buildings.

The Rotherham NHS Foundation Trust (TRFT) is the UK healthcare participant alongside partners from France, The Netherlands and Italy. AEC3 is working alongside TRFT providing detailed information via advanced design tools such as BIM (Building Information Modelling) and GIS (Geographic Information System) which will result in a mechanism that will allow an informed decision to be made as to which MEP (Mechanical, Electrical & Plumbing) interventions are implemented in order to maximise energy and carbon reductions. AEC3 are using COBie software (Construction Operations Building Information Exchange) which is a data format for
the publication of a subset of building model information focused on delivering building information, not geometric modelling.

These tools will investigate the building / area selected under various categorisations such as typological, spatial, functional, fabric, facilities and medical equipment.

The four hospitals (France, the Netherlands, UK and Italy) are each involved in case studies to verify the expected results.

There are over 400 NHS Trusts in the UK and over 75% of building stock was constructed before 1975. Therefore for the purpose of the UK Demonstration Case, the focus has been on energy efficient retrofitting rather than new build. If Project Streamer delivers the desired outcome there is enormous potential for significant energy reduction across the healthcare estate not only in the UK but all across Europe.

**Partners**

**Hospital Case Studies**

AOUC, Florence, Italy  
Rijnstate Ziekenhuis, Arnhem, the Netherlands

TRFT, UK  
AP-HP, Paris, France
SMEs

Ipostudio Architects Ltd, Italy
AEC3 Ltd, UK
De Jong Gortemaker, Algra Architects & Engineers, the Netherlands
DEMO Consultants BV, the Netherlands
Becquerel Electric Srl, Italy
DWA BV, the Netherlands

Construction Firms

Bouygues Construction, France
Locum AB, Sweden
NCC AB, Sweden
Mostostal Warszawa Spółka Akcyjna, Poland
Mazowiecka Agencja Energetyczna, Poland

Research Institutions & Universities

Nederlandse organisatie voor Toegepast Natuurwetenschappelijk Onderzoek TNO, the Netherlands
Karlsruher Institut fuer Technologie, Germany
Commisariat a l’Energie Atomique et aux Energies Alternatives, France
Centre Scientifique et Technique du Batiment, France

Rotherham Hospital Case Study

TRFT has selected two areas for this project: The Outpatients Dept (OPD) and the Ophthalmic Ward (Ward B6). A study in the Netherlands (Bouwcollege) into the healing environment categorised different types of building. Is it possible to include the different types, or explain the concept, why mention it otherwise? The two areas selected at Rotherham Hospital fit into the following categories. The OPD is ADMIN and Ward B6 is HOTEL.

OPD has a Gross Internal Floor Area (GIA) of 1,090 m² and represents approximately 1.33% of the total site area. The Heated Volume (HV) of the OPD is 2,780 m³ and represents approximately 1.58% of the site heated volume.
Both areas have similar construction and building infrastructure. Both have timber framed single glazed window units, a combination of old and inefficient lighting and basic heating controls.

The OPD is located on Level C near to the main entrance and consists of 8 areas:

- Reception A
- Reception B
- Reception C
- Reception D
- Reception E (including Respiratory clinic)
- Reception F (including Audiology Dept)
- Ophthalmology Dept (Eye clinic)
- Oral & Maxillofacial (Dentistry)

The OPD is open from 0800-1800 Monday to Friday and from 0800-1700 on Saturday. The main OPD will deal with up to 300 patients per day with 34 staff. Maxillofacial is a separate department within the OPD area and is open from 0800-1800 Monday to Friday, seeing up to 50 patients per day with 12 clinical and 8 admin staff. The Ophthalmology Dept is also a separate area within the main OPD and is open 0800-1800 Monday to Friday, seeing up to 100 patients per day with 12 staff. OPD has a total of 68 rooms with 4 circulation corridors.

It is expected that the energy saving interventions considered for this area will include:

- LED lighting with presence and daylight controls
- Underfloor heating
- Improved ceiling insulation
- Cavity insulation
- External wall cladding

Ward B6 has a Gross Internal Floor Area (GIA) of 623 m² and represents approximately 0.76% of the total site area. The Heated Volume (HV) of the ward is 1,589 m³ and represents approximately 0.9% of the site heated volume.

Ward B6 is the Ophthalmology ward and is located on Level B. The normal operating hours for this unit are between 0800-1700 Monday to Friday. Ward B6 contains 34 rooms with two circulation corridors.

Possible energy saving interventions that may be considered for this area will include:
- LED lighting with presence and daylight controls
- Improved and additional heating controls
- Installation of UPVC double or triple glazed window units
- Cavity insulation
- External wall cladding
AEC3 specialises in process and information improvement in the facilities and construction sector

www.aec3.com

Our UK partner AEC3 have carried out extensive work in modelling the areas based upon data supplied by TRFT. BIM is a process involving the generation and management of digital representations of physical and functional characteristics of a building. The resulting BIM provides the tools to support decision making about a building through its design, construction, operational life and demolition.

GIS integrates the hardware, software and data for capturing, managing, analysing and displaying all forms of geographically referenced information. MEP is the mechanical, electrical, and plumbing improvements that may be carried out in order to improve building energy efficiency.

Interventions that have previously been identified may then be modelled and a scientific outcome produced. Finally, these physical interventions can then be validated by capturing real metered data, both before and after any improvements have been undertaken.

The task of modelling the two areas commenced in March 2015.

The approach adopted can support both the design of new (green field) projects and the refurbishment of existing facilities. TRFT held limited information on its building in the form of as built drawings and building manuals, and this has now been supplemented through sub metering at departmental level to try and provide the necessary information to create a BIM model.
The areas will be represented as a set of attributes and as a set of named physical systems (including fabric elements), classified by purpose, and as a set of named spatial zones classified by the Streamer classification conventions. This will include cataloguing the proposed alternative intervention options for the fabric and the MEP systems. It is not intended to model individual rooms but to perform analysis based upon the characteristics of the functional departments. Similarly, it is not intended to model individual components but to perform analysis based upon the characteristics of the functional systems present, including considering the external fabric as a system.
Figure above: Acquiring a hospital design and alternative interventions where there is little structured information. The target format is COBie, a structured multi sheet spreadsheet designed to capture the design and construction information of facilities in preparation for handover of operations.

Several Key Performance Indicators (KPIs) have been developed by Streamer partners taking into account energy performance, financial performance and quality performance.

**Energy Performance**
- Energy efficiency
- Carbon emission efficiency

**Financial Performance**
- Life cycle costs and annual costs

**Quality Performance**
- Patient satisfaction
- Overall quality
- Thermal comfort
- Operational efficiency (building efficiency and travel time efficiency)

The KPIs will underpin a process of continued improvement across the projects of all the European partners.
UK Implementer’s Community Workshops

Although all four case studies differ substantially the methodology to verify all or part of the solutions is the same; ie to validate and share the results of the research. The four hospitals will then set up local workshops, known as the Implementer’s Community (IC) workshops to further discuss the topic. Dissemination of knowledge, and in particular the discussions and outcomes of the IC workshops, is an integral and important part of the process. Certain specialists and stakeholders will be involved in the IC workshops and it is intended to connect researchers, practitioners and policy makers through formal and informal collaborative activities.

Whilst the UK demonstration case will focus on retrofitting solutions, the IC in conjunction with all four of the real demonstration projects will serve as prime and sound examples of energy efficient healthcare districts, addressing both new development and retrofitting.

Objectives of the workshops:

1) To illustrate to the professional specialists and building operators of health premises the opportunities provided by BIM, boosted by the newly developed Streamer software
2) To encourage the exchange of knowledge between partners of the UK demonstration case and other companies with expertise in BIM, showing new design processes, the new instruments and the relationships between them especially IFC (Industry Foundation Classes) – the standard format for exchanging data in the construction industry
3) To utilise a scenario where each group are allocated a notional sum of money and are requested to invest in areas that will, in the group’s opinion, maximise energy and carbon reduction and provide best value financial return

Programme and type of the workshops:
The IC workshops will comprise two meetings. Workshop 1 will be held on 8th June 2016 and Workshop 2 on 7th October 2016.

The first meeting is intended to bring together topic specialists in the construction, design and engineering fields who will have expertise in energy efficient design and installation. The first session will be devoted to an overview of project Streamer and “where we are now” and discussion around the opportunities that building modelling software presents, whilst the final session will draw involvement from the participants to canvass opinion as to “how can we best invest our money to reduce our annual energy spend and lower building related carbon emissions”. It is hoped that a
specialist from within the Streamer community will be utilised to facilitate the workshops in order to maximise the expertise in this area.

Attendees to be invited will include:

- TRFT Capital Projects team
- AEC3 - Building and Architectural Information Consultants
- Utilitywise – Building Energy Efficiency Consultants
- W. Wright Electrical & Mechanical – TRFT Measured Term electrical and mechanical contractor
- Members of the Northern & Yorkshire Energy and Environmental Group (NYEEG). Input from this group may have to be in the form of a questionnaire as availability of delegates and travel could provide an obstacle to a physical attendance
- Neighbouring Trusts

The first session of the second IC workshop will provide a brief summary of what happened during the first workshop. An update of the project will be presented along with latest results obtained between the two meetings. The second session will focus on the expected outcomes and whether the ultimate goals are achievable. This will involve analysing whether the KPIs will be met, validation of results, monitoring and further good practice going forward.

Local stakeholders will also be involved in the second session as it will comprise of people who work and operate in the building environment, as well as departmental managers (such as finance or procurement) who may ultimately be required to make an investment decision into the energy efficient solutions in the future.

For further information on Project Streamer, please visit the official website at www.streamer-project.eu