

## I PLENARY SESSION

# DELIVERING LOW CARBON BUILDING SOLUTIONS FOR THE HEALTHCARE SECTOR: CASE STUDIES OF A TEAM BASED AND PROACTIVE APPROACH FOR THE PROCUREMENT OF SUSTAINABLE INNOVATIONS

**Joram NAUTA**

*Project manager & technical consultant*

*Dutch Centre for Health Assets*

*THE NETHERLANDS*

**Gaynor WHYLES**

*Consultant Programme Manager*

*JERA Consulting*

*UNITED KINGDOM*

### 0. Summary:

The overall requirement for lower carbon healthcare facilities and equipment is becoming an ever more challenging task for the engineering and procurement functions in healthcare organizations. This article describes why and how teams of engineers, managers and buyers are taking a proactive approach to the procurement of low carbon and energy efficient solutions to the healthcare sector's building and property needs in a way that stimulates innovation and progressive improvements in the supply chain. The article will consider two cases to demonstrate this approach.

Starting from the wider EU-perspective and the necessity for low carbon solutions that enhance clinical and building performance, the authors will describe how managers of healthcare estates and facilities can make best use of their buying potential to change and profit from an historically underused potential for innovation that is waiting to be discovered in the supply chain. We will show how, by changing the procurement practice, we can create new opportunities for suppliers; and moreover better solutions for the healthcare sector i.e. a win-win situation.

To illustrate this we will refer to case study examples that originate from the pilot projects that are being executed in several European countries (from 2009-2012) with the support of both

national governments and the European Commission Lead Market Initiative for the LCB:HEALTHCARE project ([www.lcb-healthcare.eu](http://www.lcb-healthcare.eu)).

The article also presents the outcomes of a recent survey among 100 healthcare stakeholders across Europe on the barriers to the take up of low carbon solutions in the healthcare sector. The article challenges the current wisdom and surprisingly indicates that economic viability and operational risk were not regarded as the critical barriers to the implementation of low carbon innovation.

Rather the problem lays with procurement practices and approaches, which are dysfunctional when addressing the procurement of new goods and services. Also stakeholder report a lack of low carbon leadership from both the healthcare sector and the design & construction supply chain.

The consensus is that current procurement practice will not be effective in reducing the carbon footprint of healthcare facilities, in line with EU policy, due to a number of barriers and market failures. These survey findings appear to validate the LCB-HEALTHCARE project's focus on procurement-related barriers.

The work presented has been carried out with teams in a number of hospitals in the UK and Netherlands, and with the support in the Netherlands of the Dutch Centre for Health Assets and in the UK of the Departments of Health and Business Innovation and Skills. It forms part of the European Commission funded European Lead Market Initiative project: LCB: HEALTHCARE. The Low Carbon Building Healthcare Project is a European Public Procurement Network established under the EU Lead Market Initiative (DG Enterprise & Industry). It aims to provide procurement decision makers in the healthcare sector with the knowledge and tools to achieve more sustainable and cost effective facilities.

### 1.0 Necessity to change creates opportunities

There is an increasing recognition that the physical infrastructure of healthcare systems has a vital role to play in supporting the drive to achieve efficiency in healthcare. Buildings need to be planned to anticipate the future. The future will bring changes in care models, new thinking about the management of patient flow and the use of mobile or remote technologies, rising demand, all at a time of financial restrictions. This presents a significant challenge to those that design, build, renovate and manage healthcare facilities across many countries.

In addition, the future also requires movement towards low carbon economies to offset the detrimental effects of climate change. The EU has set robust targets for CO2 reduction, and

governments recognise that all public sector organisations – including healthcare – have a responsibility to act as leaders in the transition to a low carbon economy [1][2]. Anecdotal evidence indicates that healthcare building and refurbishment projects generally start with good intentions and ambitious, often ‘zero carbon’ aims, but final results often fall short of the original ambitions.

In the face of these future challenges, healthcare organisations will need the means to go further and faster in finding innovative ways to reduce energy consumption and to ensure that the health estate becomes sustainably low (or zero) carbon.

To do this will require finding more effective means to stimulate and manage the supply chain to innovate and provide better low carbon solutions in a cost effective way.

Moreover, with energy and carbon costs predicted to rise, the financial imperative for CO<sub>2</sub>-reduction means that ‘going low carbon’, can over time save money for hospitals and societies in a period where every country is faced with financial pressures.

## 1.1 Stimulating innovation for better, low carbon healthcare facilities

Traditionally the primary driver for innovation in healthcare has focused on improving clinical and medical outcomes. Much less attention has been given to innovation for progressive and low carbon healthcare facilities. The report of a recent survey conducted among healthcare stakeholders across Europe summarises the situation as follows:

### *Extract from the LCB:HEALTHCARE State of the Art Report [3]*

Europe needs to meet very challenging reduction targets over the coming decade and the healthcare buildings that are built and refurbished in the coming years will determine their carbon legacy for the future. The Low Carbon Buildings Healthcare project (LCB-HEALTHCARE) arose from the recognition that healthcare infrastructure is a major contributor to CO<sub>2</sub> emissions and the physical infrastructure of healthcare systems has a vital role to play in supporting the drive to achieve efficiency in healthcare.

When we set out on this project, anecdotal evidence indicated that healthcare building and renovation projects generally start with good intentions in terms of their carbon footprint and energy efficiency. But final results often fall short of the original ambitions and traditional procurement practices are not delivering fast enough on carbon reduction. The LCB-HEALTHCARE team has begun to uncover the barriers to more successful deli-

very of low carbon solutions and initiate stakeholder debate on how these can be addressed.

The study found excellent but isolated examples of good low carbon policy and operational initiatives in several EU countries, and we are pleased to be able to highlight some examples of projects that have shown what is possible through the adoption of lower carbon solutions and the use of innovation procurement methods. However, our recent survey of 100 European stakeholders has revealed some interesting insights on the very real barriers to low carbon innovation and adoption of low carbon technologies in this and other sectors. The consensus is that current procurement practice will not be effective in reducing this footprint in line with EU policy due to a number of barriers and market failures. These findings appear to validate the LCB-HEALTHCARE project’s focus on procurement-related barriers and the need for more demand-side interventions to create the market pull for innovative low carbon solutions. The main findings of our work so far are summarised below.

### Summary of main findings

The carbon footprint of the European healthcare sector is at least 5% of total EU emissions; similar that from its international aviation and shipping activities.

Innovation in design, construction and renovation practice is urgently needed to reduce this footprint and create the low carbon sustainable, patient-centric healthcare service models of the future.

Surprisingly, economic viability and operational risk were not regarded by stakeholders as the critical barriers to innovation. The key problem appears to be that low carbon policies have not yet influenced wholesale changes in procurement culture. In particular there was a lack of low carbon leadership from both the healthcare sector and the design & construction supply chain.

Worryingly, there are strong indications that the European debt crisis and associated public sector budget cuts are inhibiting the policy and fiscal interventions that will be needed to overcome the procurement barriers.

## I PLENARY SESSION

### 1.2 Looking forward

Healthcare organizations require solutions for their future operations which are not available 'off the shelf'. New and innovative technology, engineering solutions, goods, services, and management practices are needed. The key to them becoming available is a visible and credible demand from customers. That is, if we don't ask for what we need tomorrow, today the supply chain will not invest to deliver them for tomorrow.

We argue that if managers, engineers, and procurers take a proactive approach to managing the supply and delivery of innovative goods and services the supply chain will respond positively to meet tomorrow's needs for low carbon, sustainable facilities.

The two case studies show that adjusting the procurement process can reap significant benefits. For example, changing the way in which specifications are developed and presented to the supply chain and industry; use of outcome based specifications; early engagement with the supply chain, and other pro-innovation procurement techniques are all beneficial. To do this however needs the help of multiple stakeholders inside the healthcare organization, which have often not worked together before. We will demonstrate how this can be done with reference to specific case studies.

The individual healthcare organization has an important role to play by adopting best practice procurement methods and becoming more proactive in the way it manages its supply chain(s).

### 2.0 Demonstration projects – setting new standards

In this section we will highlight two pilot projects that illustrate how procurement processes have been adjusted to get better, more sustainable outcomes for healthcare organizations.

These pilot projects demonstrate that public hospitals are ideally placed to provide a 'credible' demand for new goods and services, be it for innovative lighting, ultra low carbon energy, zero waste solutions, infection management, energy efficiency and other facilities management services. This makes them capable of stimulating the market to supply what is needed, when it is needed, at an affordable price.

#### 2.1 Case study 1: The Erasmus MC new bed cleaning challenge – Rotterdam, The Netherlands

Erasmus MC is the Netherlands largest (academic) hospital and is renewing its complete hospital infrastructure in the period 2009-2017. Part of this operation is the renewal of the old bed washing facility that currently provides almost all of the clean

and disinfected beds and mattresses for the hospitals daily operational needs. This currently exceeds 70.000 beds per annum and is expected to increase in future. The existing machine is labor intensive, and uses a large volume of water and energy to operate. In brief, it is expensive and out of step with the hospitals sustainability policies and objectives. The current machine is nearing the end of its life and needs to be replaced within the next 2-3 years. This gives the hospital time and opportunity to explore the possibility of procuring a more efficient, more effective and sustainable solution.

"Patient care is foremost and clean beds are essential for patients, and the timely delivery of clean beds is seen as an important issue for the staff of the Erasmus MC" said Frank Raymaekers (sector manager healthcare support & logistics).

#### 2.1.1 Process

This project is driven by the policy direction of energy saving, efficiency, reducing water use and wastewater discharge, to create a more efficient and effective way of dealing with soiled beds to support the day-to-day operations of the Erasmus MC. The Erasmus MC wants to stimulate the market and explore new approaches and ideas from across the supply chain to find better solutions than currently exist. By adopting 'innovation procurement' thinking, it hopes to receive the best possible (future) offers in a procurement process. The joint procurement and operations project team at Erasmus MC will define (for the first time on this scale) the outcomes and characteristics that they are looking for and then plan and carry out a market sounding exercise.

The formed project team has started to look at this earlier than they would normally in a (European) procurement process. This is to allow time for the industry to respond and to develop new innovative solutions to meet the output specifications the Erasmus MC is setting. There are safeguards in place to ensure that the solution will be in place on time. If the market is not responding in the anticipated way (i.e. no alternative solutions can be provided) the Erasmus MC is falling back to the regular procurement of a bed washing facility. It is expected that this will not be needed on the basis of initial market testing.



Picture 1 image of new Erasmus MC Rotterdam (planned opening 2017)

### 2.1.2 Key Features to date

- Involvement of various different departments of the Erasmus MC (Facilities Management, Purchasing, Microbiology, Estates) in the project team that otherwise would not have met in this way to discuss what they are looking for.
- Thinking about alternatives outside the box provides new insights in how and why operational procedures have ever been established and if they are still useful (often not!).
- Outside involvement from other hospitals that are interested in the outcomes. In this way the solution is not one-off and tailor-made for the Erasmus MC, but can also be used for interested third parties, a strategy to enhance the market interest for this procurement.
- There is a real need and a solution is needed in a matter of a few years. Solving the problem will not only reduce the carbon footprint, but will also save money.
- Do not underestimate the marketing effects of being a front runner and ask for new and innovative products. Your suppliers will appreciate this opportunity and experience shows that they come back with even more ideas.

## 2.2 Case study 2: Getting the most out of suppliers;

### *Ultra Efficiency Lighting for Future Wards Project at the Rotherham NHS Foundation Trust*

The project sought to meet two key requirements:

- A step change in the patient experience
- A step change in the efficiency of lighting

It was initiated through the Department of Business Innovation and Skills as a demonstration project and with pump priming funding from the Department of Health. The opportunity for innovation was presented by an 8 year refurbishment programme beginning in 2010. The vision of the CEO for a 'Hospital of the Future' was a key driver.

### 2.2.1 Methodology

The project team, which included the Director of Estates and Facilities, Head of Procurement and the BIS Consultant FCP Programme Manager, used the Forward Commitment Procurement (FCP) methodology to stimulate innovation in the

supply chain to meet 'unmet needs' identified as part of the programme.

The requirement identified by the project team initially were summarised as follows:

'The Trust wish to achieve a step change in the patient experience; creating a patient centred environment, including the incorporation of highly efficient, smart lighting systems that can deliver economical carbon reductions while at the same time contributing to a pleasant and healthy environment for both patients and staff'.

This requirement was communicated to the supply chain (announced in a Prior Information Notice in the OJEU) as a 'Market sounding regarding the supply of innovative and ultra efficient lighting systems for The Rotherham NHS Foundation Trust "Future Ward" refurbishment programme' i.e. the context and motivation was a future procurement as part of a major ward reconfiguration and refurbishment programme over the 7 years from 2011. This process was designed to not only give advance notice and hence allow time for innovation, but also to stimulate cross fertilisation between supply chains.

A successful market engagement process, conducted with the help of the Photonics and Electronics Knowledge Transfer Network, led to the development of a pro-innovation procurement strategy (including the use of Competitive Dialogue) and development of the following outcome based procurement specification:

'Innovative, value added, smart, ultra efficient lighting systems that can deliver the Trust's vision for Future Ward lighting, meet the operational requirements and provide added value functionality, in a cost effective way. The core requirement outcomes are:

1. A step change in patient experience
2. i.e. creating a pleasant healing environment with patients being in control of bed zone lighting levels and ambience whilst providing the lighting to perform clinical requirements and incorporating measures to reduce the risk of hospital acquired infections;
3. A demonstrable step change in energy efficiency with progressive improvements in energy efficiency and operational performance over the life of the project;
4. A fully installed, maintained and future-proofed service, for example to facilitate upgrading to more energy efficient or better products as they become available.

## PLENARY SESSION

The market engagement process facilitated cross sector fertilisation and led to the development of a pan-European consortium of companies including a lighting designer, architect, building systems manufacturer, and lighting manufacturers. A new SME, integrated medical interiors, (imi ltd) has been established to utilise the opportunity.

Stimulated by the advance warning of the forthcoming procurement, this consortium worked together in advance of the tender and was subsequently well prepared to come forward with an innovative solution that met and indeed exceeded the Trusts expectations.

The project is now in the final stages of the procurement process. The pro-innovation FCP approach has brought to the market an integrated smart 'future ward' modular built solution with integrated lighting, trunking and storage. The solution transforms the appearance and functionality of wards from a cluttered, hard to clean and poorly lit environment with little storage to one that is stream lined, easy to clean and a welcoming ward, with smart lighting that responds to patient and environmental needs and follows the circadian rhythm.



Picture 2: Image of the Future Ward solution with integrated future ready bio-dynamic ultra efficient lighting

The new well lit environment will use one third less energy than the previous poorly lit environment. It will also benefit from reduced maintenance and is future proofed i.e. the pod is designed to be able to take new lighting technology as it becomes available.

Detailed costings, verified by an independent quantity surveyor, show that the innovative solution will cost the same as a standard ward solution with not only the required step change in patient experience and lighting efficiency but also with reduced on-site build time and additional benefits.

### 2.2.2 Next steps and comments

A demonstration pod will be built at Rotherham Hospital in March 2011 where it will be subject to both clinical and facilities management staff assessment.

Comments from the supply chain were enthusiastic:

"This is what gets us excited. There is somebody here who doesn't want to carry on doing the same old thing, just chipping away at energy efficiency but saying what they really need – a step change"

"What is great about this [RFT FCP] process is the commitment – the 7 year programme gives a timeframe we can really work with to plan and bring new solutions forward"

"This project made us rethink our approach and stopped us just turning up and installing to LG2 Guidance.\*" (\* *The current code for healthcare lighting standards in England*)

Also the project team itself greatly appreciated the project and the process of innovation procurement:

'We have shown that FCP really works – the Trust's Board was extremely impressed with the solution being offered. The support from BIS and DH has been invaluable.' *Director of Estates and Facilities*

"From the start we said that the solution had to be cost effective and affordable. We have not been disappointed – the outcome shows that better and more sustainable does not have to cost more". *Head of Procurement.*

"The key to success was to begin by asking for what was needed – not what we thought was available or affordable. The results have exceeded all expectations". *LCB:HEALTHCARE Pilots Co-ordinator, UK.*

The indicated benefits of this procurement of ultra efficient lighting can be summarised as followed:

Table 1 indicated benefits

FINANCIAL (ESTIMATES)	IMPROVED PATIENT EXPERIENCE	IMPROVED STAFF OUTCOMES	IMPROVED CONSTRUCTION OUTCOMES
Energy consumption saving of 30% or €5,200 per 40 beds over 10 years.	Biodynamic lighting	Better staff environment	Future ready modular design
Maintenance saving of 88% or €15,400 per 40 beds over 10 years.	Local and intuitive control for patients	Improved operational efficiency	Higher quality through factory controlled assembly conditions
A reduced construction period of 8 weeks for a 10 bay ward when using the pod, with a saving of approximately -£80,000 in prelims.	Reduced anxiety	Improved infection control	Reduced disruption during construction
The Future Ward is the same cost as a traditional build.	Improved access to daylight and the external environment	Lower maintenance requirements	Speed of installation

### 3. Conclusions, learning and emerging good practice

These two case studies have shown that changing procurement practice to incorporate pro-innovation procurement methods can stimulate the supply of better, affordable, and lower carbon goods and services to the benefit of healthcare organisations.

This can involve, for example;

- Bringing together a multidisciplinary project team to work together to define the unmet needs and requirements in outcome terms; throw out the catalogue and think about what you need or want, not what you think is deliverable or affordable.
- Communicating with the supply chain about your requirement well ahead of the procurement process to give them time to form alliances and be innovative in their response; This may mean beginning 'pre-procurement' activities such as market sounding two or more years before the formal procurement process begins.
- Demonstrating that you are a credible customer that is committed to delivering the outcomes you have defined and buying an innovative solution from the supply chain (subject to normal conditions such as delivery and budget etc). Supply chain engagement is best carried out in the context a real purchase in a defined timeframe.

Our hope is that healthcare managers, engineers and buyers can be encouraged to discover how simply changing the way goods and services are bought can deliver significant benefits, and often exceed expectations.

To enable wider adoption of pro-innovation approaches, the LCB:HEALTHCARE project will continue to publicly share the lessons and experience in managing the delivery and procurement of innovative low carbon solutions. We will outline the practical processes involved and the roles that hospital engineers, procurers and estates and facilities managers can play in delivering these much needed innovations to the doorsteps of the hospital and pilot continuing professional development materials.

The authors wish to extend their gratitude to the participating hospitals: Erasmus MC, Rotterdam, the Netherlands and The Rotherham NHS Foundation Trust, Rotherham, United Kingdom.

### References

1. European directive 2010/31/EU on the energy performance of buildings, 29<sup>th</sup> May 2010 (OJE L153/13, 18<sup>th</sup> June 2010).
2. Saving Carbon, Improving Health, NHS Carbon Reduction Strategy for England (2009);, NHS Sustainable Development. A policy to reduce 80% of CO2-equivalent emissions in 2050 compared to the baseline year of 1990.
3. State of the Art report Low Carbon buildings in the healthcare service sector (2011); LCB Healthcare project team, [www.lcb-healthcare.eu](http://www.lcb-healthcare.eu)