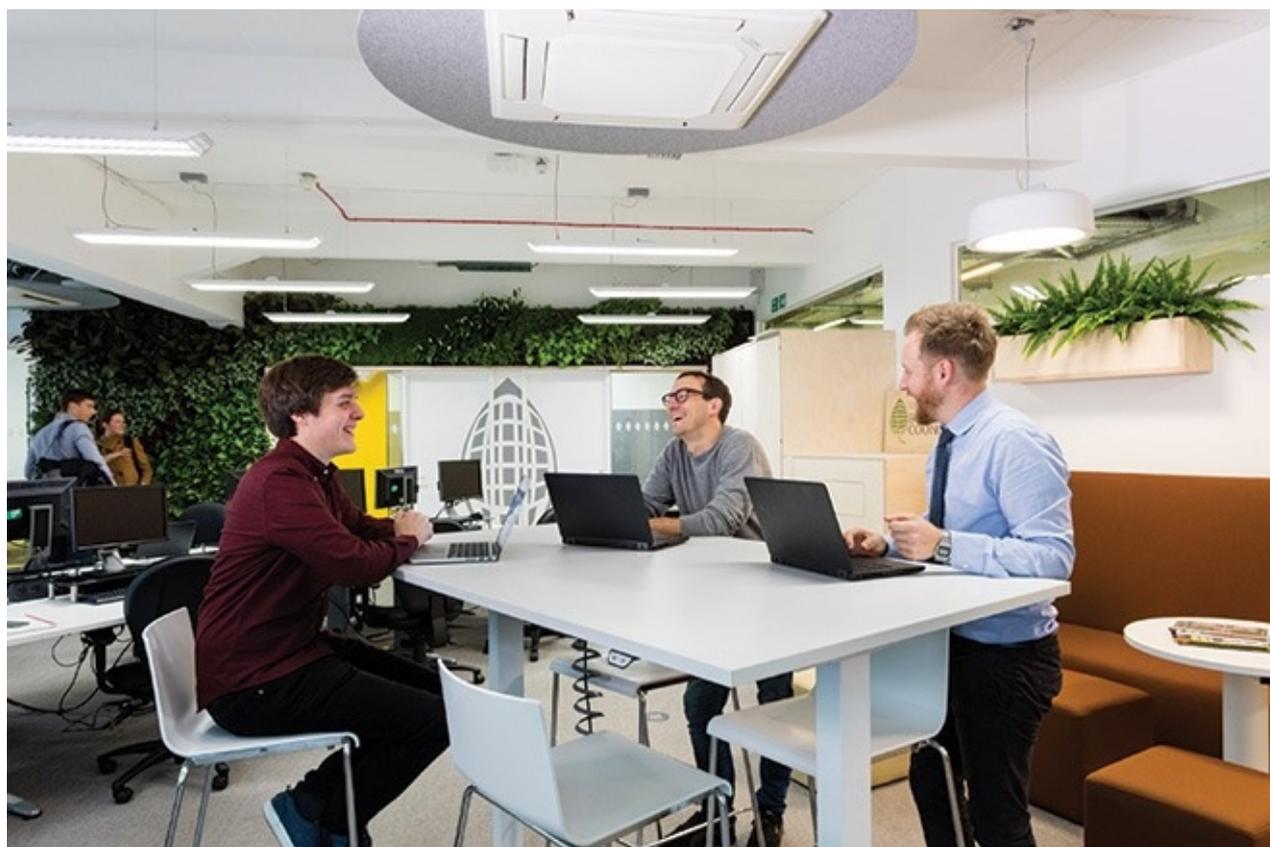


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## Sustainability: Efficient offices

24 January 2017 | By Adam Mactavish, Renee Scarlett, Anthea McDermott

How do you create an energy-efficient office that is cost effective and great for the workforce? Currie & Brown's Adam Mactavish, project manager Renee Scarlett and cost manager Anthea McDermott describe how UKGBC refurbished an office with the UK's lowest level of embodied carbon



### 01 / Introduction

The introduction of private rented sector minimum energy efficiency standard regulations in April next year can be expected to spur many landlords to invest in energy efficiency measures to improve their buildings.

Smart occupiers will also consider taking advantage of the opportunity offered by such works to make other improvements to the working environment for their staff; the benefits of doing so could be far more valuable than any associated energy saving. While industry will welcome the increased work, it would tarnish the energy savings achieved if we are collectively left with a mountain of prematurely wasted materials that necessitate a huge outlay in embodied carbon to replace them.

The UK Green Building Council (UKGBC) was determined to show that it is possible to create a great office that delivers a high-quality, healthy and efficient working environment while retaining much of the existing materials and furniture, recycling 98% of waste and recording the lowest level of embodied carbon for a UK office refurbishment.

UKGBC's project team included architect Barr Gazetas, engineering and sustainability advisor Cundall, carbon specialist Sturgis Carbon Profiling and contractor Morgan Lovell. Currie & Brown provided cost and project management.

## 02 / The brief

Together with the client, the project team defined 23 separate performance indicators to help shape and measure the project. While the project aimed to set exemplary standards, its overarching goals are familiar to most estate teams, for instance to:

- Maximise the quality of the available space and ensure its efficient utilisation
- Make good use of existing assets, such as materials and furniture
- Provide a safe, healthy and productive working environment
- Reduce the environmental impact of the fit-out activity and subsequent operations.

It was essential that a rigorous approach was taken to setting out the project targets and aspirations, together with the approach to measurement and reporting.

In addition to cost and programme targets, objectives included:

- Securing at least 10% improvement in staff satisfaction, productivity, comfort and absenteeism when measured as part of post-occupancy evaluation
- Achieving energy consumption of below 100 kW/m<sup>2</sup>
- Diversion of at least 95% of waste from landfill
- Reusing/repurposing 98% of existing fixtures and finishes
- At least 50% of all new materials to be from recycled content by cost
- At least 70% of all materials to be recyclable at the end of their life
- A minimum of a 15% reduction in embodied carbon compared with a typical benchmark project
- At least 90% by cost of all materials used to be VOC-free
- Achieving high air quality standards for VOCs, PM10, PM2.5 and CO2.



## 03 / Management tools and solutions

In addition to the array of resources in a project manager's toolkit, delivering on the client's targets required the development of additional resources to help in evaluating design, materials and product options in more detail.

The team developed a simple but effective matrix for storing data on each of the options they were considering, with each team member providing information relevant to their particular field of expertise. This tool helped to clarify decision-making while also providing information for measuring and benchmarking performance.

Applying circular economy principles, the project made extensive use of product reconditioning, reuse and repurposing, which together with the purchasing of upcycled pre-owned products, helped to save money, carbon and waste.

This included:

- Reusing glazed partitions
- Repurposing glazed partitions as whiteboards in meeting rooms
- Reconditioning existing ventilation units and providing enhanced noise attenuation
- Reusing existing furniture for office desks, with any redundant furniture sold or donated to others
- Reupholstering and reusing existing office chairs
- Purchasing upcycled chairs and tables for breakout spaces.

Following the effective use of pre-existing assets, the specification of innovative products helped to further reduce the carbon impact of the refit. Examples included the use of low-carbon and biodegradable bio-composite wallboard, low-carbon insulated ductwork, paint containing 80% recycled content and acoustic baffles comprising 65% post-consumer waste.

Sturgis Carbon Profiling maintained a record of embodied carbon and recycled content performance at each design stage, identifying where decisions or options would respectively increase or save the embodied or whole-life carbon of the refit.

## 04 / Benefits

The project delivered a major change in the quality and performance of the office space, creating a variety of working environments including breakout spaces, a collaborative area, private meeting rooms and a boardroom. Some of the key improvements included:

- The volume of fresh air supplied to the space was increased more than sevenfold
- Extensive internal planting, including a green wall, provides a connection with nature and, together with selection of floor finishes that trap atmospheric pollutants, helps to improve indoor air quality
- A new LED-based light system delivers significantly better light consistency and quality while reducing energy use and carbon emissions by 48%
- 98% of the original fixtures and finishes were reused or repurposed, while recycled content represented nearly 20% of the new materials used in the project by cost
- More than 98% of waste was diverted from landfill, with only 6 kg/m<sup>2</sup> of waste generated by the fit-out
- Embodied carbon was 139 kgCO<sub>2</sub>e m<sup>2</sup>, around 22% below a standard office fit-out and the lowest ever recorded in the UK.

Feedback on the quality of the working environment has been very positive. A formal post-occupancy evaluation process is programmed to start later this year to quantify the impact of the refit on staff wellbeing and performance.

As well as the benefits to UKGBC, staff and visitors and the reduced environmental impact, the resource-efficient approach to the project realised major cost savings totalling an estimated £57,000 (£350/m<sup>2</sup>). The savings achieved from reusing, repurposing and reconditioning fixtures and finishes are shown in Table 1 below. In addition, the purchase of reconditioned furniture, at around half the price of equivalent new products, enabled higher-specification items (such as an electric height-adjustable table) to be procured.

Table 1: Estimated savings from resource efficiency measures

Product	Efficiency resources	Saving	Saving per m <sup>2</sup>
Raised access flooring	Reused	£11,025	£68
Glazed partitioning	Reused	£24,000	£148
Fan coil units	Reused	£9,000	£56
Furniture	Re-upholstered	£4,400*	£27*

Product	Efficiency resources	Saving	Saving per m <sup>2</sup>
Doors – timber	Reused	£3,100	£19
Doors – glazed	Reused	£5,370	£33
	Total	£56,895	£351

\* net saving after cost of re-upholstery is included.

Savings are based on Currie & Brown's stage 2 cost estimate of the cost of purchasing equivalent new products. The scheme was procured under a design and build procurement route and followed a two-stage tendering process driven by Currie & Brown's cost management team.



## 05 / Conclusion

Much has been written about the potential benefits of investing in our workplaces to create modern, efficient spaces that accommodate new working styles. The available productivity benefits and operational energy savings are substantial, and need not come at the expense of waste and embodied carbon.

The relatively short life expectancies of office fit-outs make them ideal candidates for circular economy solutions that extend the life and value of materials.

Simply by taking a little time to identify what is of value in an existing space, thinking creatively about how it might be reused and then drawing on the growing range of low-impact materials and high-quality pre-owned products, it is possible to save money and carbon and still transform your workplace.

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