EVE WALDRON DESIGN

BRINGING THE ENTOPIA BUILDING TO LIFE:

SUSTAINABLE INTERIOR DESIGN PRINCIPLES

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CONTENTS

01 INTRODUCTION

The Entopia building is the ultra-sustainable home of the Cambridge Institute for Sustainability Leadership (CISL) situated in the heart of Cambridge city. The building project aspired to demonstrate the multitude of benefits that can be delivered by reusing existing building stock as it repurposed an old telephone exchange.

By targeting ambitious sustainable building standards including BREEAM (Outstanding), the Passivhauss 'EnerPHit' standard, and WELL (Gold) certification, alongside the application of 'circular economy' principles, this project achieved its goal in delivering an exceptionally efficient home for CISL and the Canopy incubator that places wellbeing at its heart.

Eve Waldron Design was appointed at RIBA Stage 5 (Manufacturing and Construction Stage) to collaborate with the existing design team to create interiors for the ambitious Entopia retrofit project.

02 THE INTERIOR DESIGN BRIEF

Sustainability is no longer a buzzword; the principles are becoming fundamental. Good design is as much about seeing what is there already as it is about designing something new, therefore one of the cornerstones of sustainable design is to reuse existing fit out and furniture wherever possible to create beautiful, functional spaces while minimizing the environmental footprint.

By embracing a circular economy, by creating spaces which are flexible and adaptable and by sourcing materials and products which are sustainable and made to last, we future proof our work environments and avert a throw away culture.

The CISL team were courageous in facing unexpected challenges and were great clients in our task to create interiors that reflected their mission. The following article will illustrate some of the issues that we faced and the lessons that were learned.

Our aim at Entopia was to achieve the following objectives:

- To be an exemplar retrofit but be accessible so that others can follow
- Contribute to EnerPHit Passivehaus, Bream Outstanding and Well Gold standards
- Ensure that the building is a professional workspace that CISL can use for its core impact work which includes engaging with stakeholders across business, government and finance sectors as well as across the rest of the University
- Design in flexibility to ensure future proof solutions
- Support circular design by reusing as much existing CISL furniture as possible and avoiding new purchases by sourcing second-hand products and materials
- Design using majority bio-based materials and fabrics
- Select materials to maximise sustainability credentials and use the project to test and showcase sustainable materials and help shape the marketplace of the future

A strong design relies on good space planning but once we got on board, the wall positions were set and only minor adjustments were possible. The furniture layout, lighting and electrical design need to work hand in hand, so an earlier appointment would have allowed us to contribute more significantly, especially since the sprayed on acoustic ceiling finish and surface mounted lighting made adjusting the lighting layout challenging.

03 USE OF INNOVATIVE MATERIALS

We chose to use this project to take calculated risks which might help encourage a shift to more sustainable products within the wider marketplace. The leadership team at CISL were committed to innovation and embracing new products while also supporting the use of biobased and reclaimed materials. We wanted to challenge suppliers to innovate with us.

Our focus was to support UK suppliers whenever we could but, where this was not possible, we looked to import. By showcasing new and innovative materials, we hope to encourage more UK based companies to come into the market and to make these materials more widely available.

Biobased materials were used throughout the project. We favoured local timbers but also bamboo which is fast growing and hard wearing. Compressed hemp was used as a panel facing in joinery and to make moulded chairs. Hemp is disease resistant and utilizes less water in the growing process than other crops. It can also be made into a sustainable fabric for reupholstery.

We explored the potential to use strawboard/ wheatboard to make built-in joinery. It has good sustainability credentials because it is biobased and hyper compressed so minimises use of resins and bonding agents.

However, this predominantly comes from China (via importers) so entails not inconsiderable risks around provenance and displaced environmental and human rights impacts. In time it is hoped that more European based suppliers of this product will emerge.

We therefore decided to use birch faced plywood for most of the built in joinery. Plywood came with its own complications. Just as the war between Russia and the Ukraine broke out, we learned that most of this ultimately comes from Russia so we began the process of finding alternative manufacturers. In the end we sourced plywood from Spain which had cost implications for the project.

We wanted to minimize the use of Melamine Faced Chipboard (MFC) and aimed to use this only where it came as second-hand and in good condition. MFC is very difficult to repair and can be damaged easily.

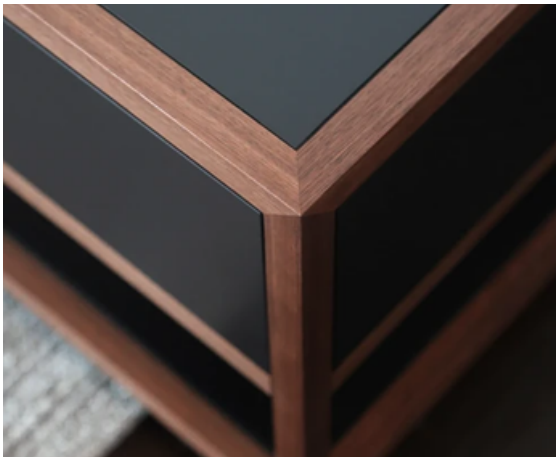
There are many new and innovative products that can replace this. We faced table tops in sheet material called Rezign made by Planq from recycled fabrics (green from army uniforms, blue from denim and white from white denim). Some of these innovative materials are currently only produced abroad eg Richlite which is FSC-certified paper and resin that is pressed into boards that can be used for multiple purposes but would have to be transported from the USA. For items like this, there may be an argument to use some and accept the initial carbon footprint in order to create a market and encourage these kinds of innovative companies to set up nearer to home.

CISL used minimal carpet throughout. Carpet was retained from the previous fit out to use on the stairs only. As it was a simple dark grey, it fortunately worked well with the colour scheme that we proposed.

To ensure longevity, it is best to use proven materials in high-traffic locations. In areas with lower risk of damage, less proven materials can be explored, thus encouraging suppliers to innovate.

The use of sustainable materials can extend to artwork and signage. By choosing Greenguard compliant ink and printing directly onto eco-friendly plywood, we made some bright and visually compelling stair posters to encourage staff and visitors to use the stairs over the lift. This fulfilled some of the required criteria to meet WELL Gold certification and effectively engaged the target audience in a clearly ecofriendly manner.

Lastly, bright and unique cushions covers were produced by a local tradesperson, using offcuts of materials and old fabric samples from our library. These were used around the building on the refurbished seating to create eye-catching detail at little cost.



Foresso

Richlite

We used various innovative materials (mainly for furniture) including:

- **Composite materials made of recycled textile**
- **Terrazzo woodchip and bio-based resin composites**
- **Recycled plastics (for tea point worktops)**
- **Paper based composites – for bespoke joinery**
- **Recycled CDs for furniture table tops**
- **Strawboard for tabletops was explored**
- **Wall tiles made from 98% recycled tiles**
- **Hemp sheet materials (for joinery)**

It will be interesting to find out how these new materials perform over time.

Camira Hemp fabric was used for a good proportion of the reupholstery as it is 70% Wool, 30% Hemp thus making it naturally fire retardant, renewable and compostable.

Planq

Revive Innovations

04 THE BENEFITS AND CHALLENGES OF DESIGN FOR SUSTAINABILITY

Timeless design never goes out of fashion. By avoiding fleeting trends and focusing on simple modern detailing in the joinery and tea points, using classic colours, we can design to prevent the need for constant updates and replacements driven by style whims, thereby hugely reducing the overall carbon footprint.

The following charts show the impact of the FF&E embodied carbon relative to the impact of the different elements of the building fabric. Chart 1 shows the small (12%) but significant proportion of embodied carbon contributed by the FF&E immediately following the completion of the project.

Chart 2 shows how the FF&E becomes a more significant factor in contributing to the whole life embodied carbon of a project over a 100 year timescale. Choosing second hand items and refurbishing rather than replacing offers a significant carbon saving across the lifetime of a project.

It is important to emphasize that our design process became decidedly nonlinear. We couldn't simply come up with a design and then procure; instead, we had to establish guiding principles and remain flexible.This approach presented challenges and required everyone involved to be fully committed to embedded sustainability principles such as:

1. Supporting UK businesses wherever possible and considering the carbon impact of transportation.
2. Durability and Quality considered alongside price; considering value over a lifetime.
3. Looking for built in Circularity in product design so that items can easily be repaired and dismantled for recycling at their end of life.
4. Being open to innovative materials that may not be widely available or well tested.
5. Engaging with suppliers to help educate them and bring them along on the journey.
6. Being able to change and adapt as new opportunities arise as making the most of the second-hand market relies on the ability to make quick decisions.

Chart 1

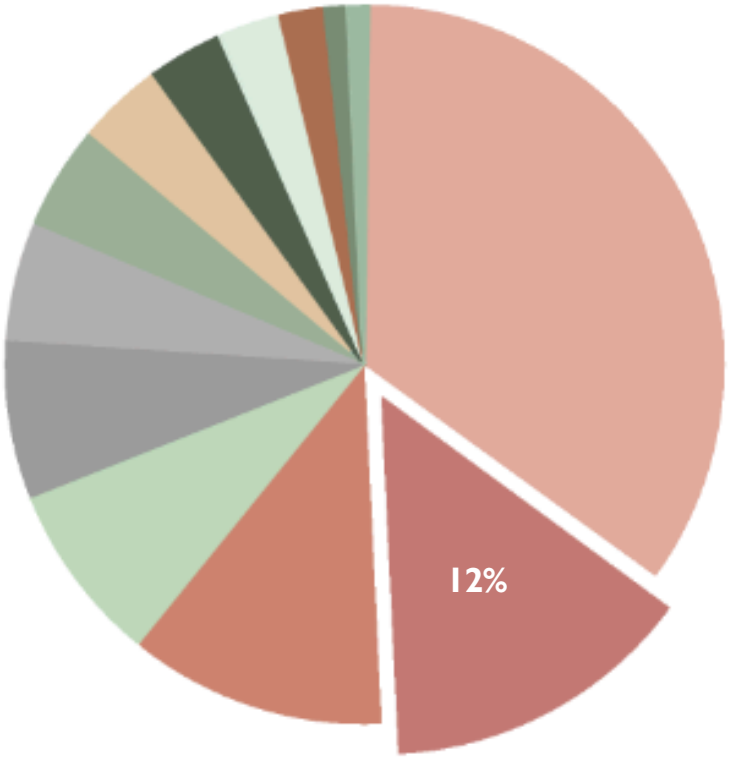
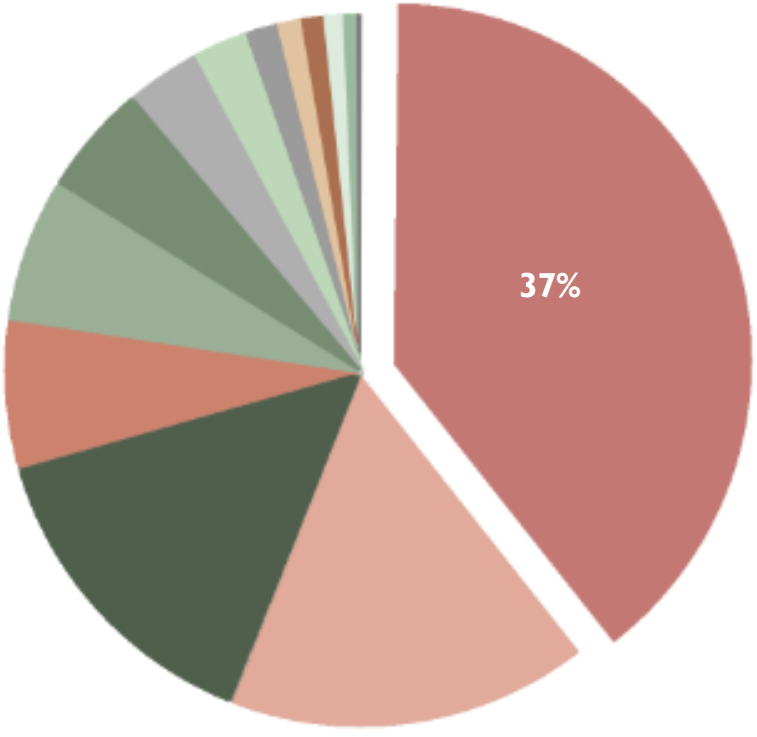


Chart 2



FF&E
Windows and External Doors
Internal Walls and Partitions
MEP
Ceiling Finishes
Frame
External Walls
Lowest Floor
Wall Finishes
Floor Finishes
Upper Floors
Roof
Internal Doors
Stairs and Ramps

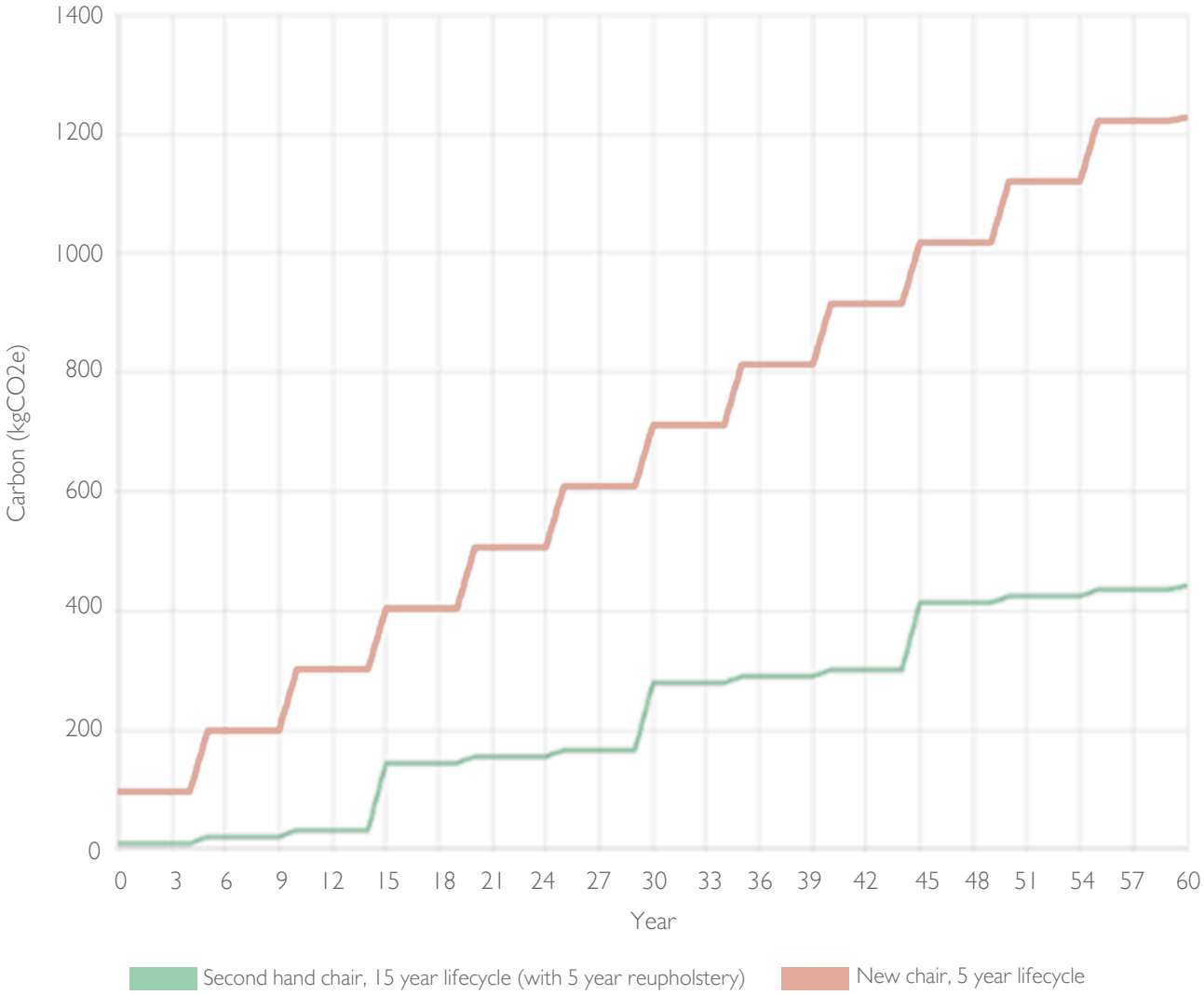
05 REUSE OF EXISTING CISL FURNITURE

CISL made it a priority to reuse as much of their own existing furniture as possible in order to minimise new materials required. The existing furniture had been catalogued in house and put into storage. Our role as designers was to evaluate this and decide, with CISL, which to reuse, which to refurbish and which to circulate back into the second hand furniture market.

It is important to note the necessity that furniture is stored with care if it is off site for long periods; the wrong humidity levels, for example, can cause warping of MDF type materials. Dismantling items to be stored flat poses risk of nail damage if care is not taken to remove these first. It is important to let contractors know your requirements clearly to avoid these issues as the environmental impact will be hugely raised if items have to be thrown away due to irreparable damage after transport and storage.

To make the repair and refurbishment of existing furniture easier, there is a need to push the furniture industry to get better at labelling. This would do much to support the circular economy. Some furniture items don't have labels at all, whilst others have clear codes whereby the original manufacturer can search back for the precise order and see what upholstery fabric was used or whether spare parts can be sourced. It would make a big difference if good, detailed labelling became standard.

The importance of reusing existing furniture is shown in the following graph. This clearly shows that reuse, repair and good maintenance of existing furniture to help prolong its use (reducing total replacements) can have a substantial impact on the carbon footprint of a project over time.



Comparison of cumulative carbon over 60 years of a new chair being replaced every 5 years, versus a second hand chair, being reupholstered every 5 years and totally replaced every 15 years (Report produced by Architype for CISL on Embodied Carbon in March 2023 REF / 10370, page 7)

06 FURNITURE PROCUREMENT FROM THE SECOND-HAND MARKETPLACE

Over 63% of the furniture on the project (on a per item basis) was procured from the second-hand market. Our aim was to use good second-hand furniture wherever possible, while creating a cohesive and uplifting design that supports wellbeing.

We tried to choose mainly brands known for their durability and classic timeless design which wouldn't go out of fashion and so avoid the cycle of constant updates and replacements. These pieces not only retain their value for resale and repurposing but also tell a story of the value of good design and sustainability.

The practise of sourcing second-hand furniture has advantages for wellbeing. It significantly cuts down exposure to off gassing of Volatile Organic Compounds (VOCs) which are found in many paints, foams, varnishes and dyes and which can have adverse health effects. These should have already dissipated from second-hand items and therefore these will have a positive impact on indoor air quality and employee wellbeing compared to new furniture.

We also tried to refurbish the items only where there was irreparable damage or where a component would significantly undermine the design scheme – in which case we looked to replace with an alternative component that had a lower environmental impact. We deliberately chose to leave minor damage alone and accept the imperfections.

We favoured the use of solid oak for meeting room tables (on reused second-hand bases). Solid wood can be reliably spliced together to meet dimensional requirements, can be easily repaired, sanded back occasionally, and will last decades.

Criteria for Choosing Second Hand Products:

- **These should have a good reputation for design and durability (i.e. known brands like Vitra, Boss, Brunner, Steelcase, Very Good and Proper etc)**
- **Fit in well with the rest of the design scheme**
- **Have as good a provenance as possible (i.e. we know what it is made of), though this is sometimes difficult to prove beyond doubt**
- **Only use leather if second-hand**
- **Good enough to use 'as is', or easy to repair / reupholster**
- **Solid wood or other sustainable new tops can be added to high quality existing / second-hand bases**

The advantages of using second-hand furniture are clear but there are also issues. First is the need for an iterative interior design process; as having to revisit choices based on availability can occur rapidly and then there is a need to quickly adapt the scheme to make it work. This made a close working relationship between the designer and the client an absolute necessity. It is hard to reserve second-hand items in many cases and, if possible, then only for a very short period of time.

Secondly, the manufacturer labelling of items came to be very important. For example, we needed to be clear about fire labelling and to know if the fabrics met the Crib 5 fire rating which was a requirement. Labels were not always present and it was sometimes impossible to identify the upholstery fabric that had been used.

There is a need to push the furniture industry to get better at labelling which will support circular economy e.g. if there is a repair mechanism or a recyclability then this information should be easy to obtain rather than relying on the second-hand dealers who rely on the people who bought it originally to know, retain and pass on all this information.

We aimed to find as good a provenance as possible and occasionally had to reupholster items if unsure. We generally assumed that second-hand leather was ok based on the fact that it is naturally fire retardant and easily biodegradable.

A further consideration when reusing furniture is that Environmental Product Impacts (EPDs) and comparable information across manufacturers are not available for many products.

Thirdly, second-hand sellers may not use original parts to refurbish items. This became a problem with classic Howe 40/4 chairs where the glides had been replaced with cheaper ones that didn't properly fit the chairs and thus kept rotating and falling off. To later replace these with original glides would be an unexpected and expensive exercise.

Finally, it is beneficial to source a model that is still in production where possible or at least where parts are still being made, as choosing an item that doesn't meet current regulations or will not be reparable, can lead to problems down the line. This is particularly to be thought through for items with lots of moving parts such as task chairs where breakdowns can happen more frequently, gas lifts need replacing and castors may not be fit for purpose. Many chair castors are made for use on carpet but Entopia had galvanized steel floors, so we had to replace the existing ones. We trialled many different braked casters which proved time consuming and tricky.

Points to Remember for Second-Hand Furniture Procurement:

- **Push for better product labelling in the furniture industry**
- **Create an approval system to be able to move quickly when sourcing**
- **Choose items that will have spare parts available in future**
- **Check whether original parts will be used when items are refurbished**
- **Use sustainable / biobased materials for refurbishment if this must be done**

07 SUSTAINABLE NEW FURNITURE

The UK furniture manufacturing industry is of considerable importance to the UK economy. It generates in excess of £8.3 billion of factory gate sales and employs nearly 100,000 people, with an expected growth rate of 4.10% annually. Like many other manufacturing industries, it generates significant carbon emissions, emitting over 900 tonnes of carbon per year in the UK alone, therefore there is great scope for this industry to reduce its carbon impact. Therefore, reusing and preventing furniture from going to landfill has to be the first principle of sustainability.

Whilst there are additional challenges with specifying and procuring second-hand furniture as opposed to new, taking the time to do this is one way to help reach targets such as BREEAM and WELL and become aligned with the principles of the circular economy.

Currently, the furniture companies within the industry that are engaging in carbon foot printing do so independently, utilising differing boundaries and methodologies to assess their businesses and products. The lack of a consistent and unified approach means that the data produced cannot always be comparable.

The Furniture Industry Research Association (FIRA) has developed a tool to try to estimate the embodied carbon of furniture products for members to use. This makes it easier for the industry to at least know where to start. Some companies have already become good at providing this information as a matter of course, Humanscale being one notable example.

When procuring new pieces, the priority must be for those with strong sustainability credentials. These pieces should not only meet our immediate needs but be rooted in flexibility, modularity and adaptability; thus evolving with changing needs over time. This ensures that spaces remain functional and relevant as requirements change.

Choosing a well-known and established quality product is likely to mean that the same item can still be purchased many years down the line and reduce the need to replace all items if a business is expanding and the items need to match.

It is important to try to choose items that have replaceable parts and can be repaired. This not only means that the furniture can be kept in use over a longer period of time but also allows for easier disassembly and recycling at the end of life. We would like to see more companies moving towards this goal. It is slowly becoming more common as consumers ask for these things.

One sustainable choice that was made across the whole building was to use manual sit-to-stand desks that work on a counterbalance system. Unlike electric desks, which rely on electricity consumption for height adjustment, manual desks operate purely through mechanical means. This clearly leads to lower carbon emissions and energy costs over the lifespan of the desk.

The use of over 25% (of the total desking) as sit-stand desks was required for WELL Gold, but we encouraged the client to install all new desks as sit-stand as this encourages healthy movement and wellbeing for staff and we consider this best practice.

When choosing new products, there is a preference for bio-based materials where possible which reduce our reliance on fossil fuels and promote environmental health. There are very few published studies on the embodied carbon of furniture but it is quickly becoming an important factor for consumers and pressure is increasing to be able to easily calculate this for new products.

Other impacts on the carbon footprint will be the distance travelled to transport furniture from the manufacturer to a warehouse and then to site, as well as which packaging materials are used. Clearly, trying to use local suppliers is best to mitigate this and sometimes packaging can be minimised or adapted if the customer asks for this.

One issue that might be worth flagging is that CISL chose not to quibble about minor defects or quality issues which would have led to returned and replaced items or in the worst case, products being scrapped. On a large project there may be manufacturing errors such as using the wrong colour for an item of upholstery. If the design impact is not too great, then it can be the sustainable choice to tolerate mistakes that we can live with.

08 CONCLUSION

Every successful project is the result of not only a great project and design team, but also strong leadership from the client. CISL had a clear vision and we worked well together to achieve this. Interior Design has a large element of inherent subjectivity but the fact that the interiors were shortlisted for a Mixology Award: Positive Impact and Workplace, as well as numerous other awards, shows the great result achieved. CISL is a global leader in sustainability and the project met the challenging environmental and wellbeing targets of EnerPHit (the Passivhaus standard for retrofit) WELL Gold and BREEAM Outstanding – believed to be a world first for having achieved all three standards.

Many of the materials specified in the fit out were made from recycled or recyclable materials. This endeavour was not without its challenges to get a real understanding of the issues. There are complexities of tracing back materials to source and this takes time and commitment.

To promote sustainable practices in interior design, we must share information. Collaboration within the industry and with consumers is essential to drive positive change and inspire others to embrace sustainable principles.

We believe in pushing the furniture market to become more transparent. Labelling should include information about fabric and materials used, repair mechanisms and recyclability, thus promoting a circular economy. Consumers should have easy access to this essential information, facilitating informed decisions

Sustainable interior design is a commitment to reducing our environmental impact while creating beautiful, functional spaces. The principles that we have outlined above can help us as we work towards a future where sustainability is at the heart of every design decision. By reusing, repurposing, and embracing new sustainable materials, we can create spaces that not only stand the test of time but also enhance our own wellbeing and contribute to a more eco-conscious future.

Points to Remember

- **Allow extra time for design**
- **Design for flexible uses**
- **Reuse and repurpose**
- **Consider second-hand**
- **Choose classic designs that won't go out of fashion**
- **Select items which offer spare parts and can be repaired/recovered**
- **Use bio-based new materials**
- **Focus on local suppliers**
- **Consider the impact of packaging**
- **If storing products for reuse, check care is being taken to retain condition**

"The team at Eve Waldron Design brought enthusiasm and creativity to our fast-paced project - a flagship retrofit for Cambridge. Their expertise has helped us embrace new ideas and opportunities for the greatest possible impact in this inspirational space dedicated to sustainability and inclusion."

Clare Shine, former CEO and Director of CISL

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