

# DOING RIGHT BY PLANET AND PEOPLE

## The Business Case for Health and Wellbeing in Green Building

April 2018



Project Led By



Project Sponsors



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# Acknowledgements

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## Advisory Committee Members

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WorldGBC thanks Delos for their additional research support and analysis.  
 Report designed by Lauren Flückiger.

## WORLD GREEN BUILDING COUNCIL

The World Green Building Council (WorldGBC) is a global network of Green Building Councils which is transforming the places we live, work, play, heal and learn.

We believe green buildings can and must be at the centre of our lives. Our changing climate means we must reshape the way we grow and build, enabling people to thrive, both today and tomorrow.

We take action – championing local and global leadership, and empowering our community to drive change. Together, we are greater than the sum of our parts, and commit to green buildings for everyone, everywhere.

## GREEN BUILDING COUNCILS

Green Building Councils are independent, non-profit organisations made up of businesses and organisations working in the building and construction industry. As members of the World Green Building Council, they work to advance green building in their own countries, as well as uniting with other Green Building Councils to achieve environmental, economic and social goals on a larger, global scale.

Discover more about the World Green Building Council at [worldgbc.org](http://worldgbc.org)

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# Executive Summary



Buildings are the places where people work, live, play, heal and learn. They have a direct impact on our health and wellbeing. The building sector also has the largest potential for reducing greenhouse gas emissions<sup>1</sup> and contributing to the United Nations Sustainable Development Goals.

With this report we explore the dual opportunity to do right by the planet and people by showcasing pioneering green building projects that are leading the way in being resource efficient and providing healthy, productive spaces for their occupants and significant returns for their owners and investors. *Doing Right by Planet and People: The Business Case for Health and Wellbeing in Green Building*, presents fresh global evidence from around the world that building green with features that people love – from improved air quality and comfort indoors, to access to nature and amenities outdoors – provides tangible environmental, health and economic benefits.

The top three benefits are:



Reductions in energy consumption, greenhouse gas emissions and air pollutants.



Improvements to occupant wellbeing, satisfaction and productivity.



Strong financial returns for the companies owning or occupying these buildings.

In short, these world class examples clearly demonstrate the business case for green buildings.

<sup>1</sup> UNEP, "Buildings and Climate Change: Summary for Decision-Makers", 2009 at 9.

## Key findings



### Companies can save money by occupying a green building with features that benefit people

The report shows companies realising economic savings both from resource-efficient building design and operation, and from reduced staff turnover, absenteeism and presenteeism – defined as when an employee is physically present but not working productively. For example, the Akron Children's Hospital project by HKS achieved over \$900,000 USD of annual energy savings for the owner; while Cundall's UK office helped them realise over £200,000 in savings a year from lower staff turnover and sickness.



### Employees prefer green buildings that make them feel healthier and more productive

Every case study here features pre- and post-occupancy surveys showing employees are happier in their new green space. For example, Floth's net zero carbon office resulted in 94.5% staff satisfaction and better health was reported by 72% of their employees; while at Sherwin-Williams' Centro América headquarters there was a 68% reduction in reported respiratory problems and staff sick days almost halved.



### A building's asset value increases the greener and healthier it is

Delta Development Group did so well at designing their building that their tenant, Plantronics, elected to buy the building and provided a valuable return for the developer. In Hong Kong, Henderson Land Development created a highly desirable mixed-use community where green certified properties have a 40% higher resale value compared to similar developments.



Kay Jewelers Pavilion, Akron Children's Hospital. Photo credit: Blake Marvin Photography

# Executive Summary

The case studies presented in this report offer the following insights:

-  The **biggest economic benefits are realised when impacts to the environment and people are addressed jointly** from the start of building design and a clear direction to achieve key metrics such as improving air quality without sacrificing energy efficiency is set.
-  **Achievements in energy and greenhouse gas emissions reductions** coming from on-site renewable energy systems **can be incorporated with no negative impact on the design for occupants.**
-  **Employees prefer and work best** when they are **in spaces with ample natural light, good air quality and access to greenery and amenities.**
-  The **largest improvements in employee satisfaction** happen **when staff are engaged in co-designing** their new green and healthy workspaces.

The compelling results from the 11 projects in this report show the enormous advances being made in the green building world, driven by clear evidence of economic as well as environmental and social benefit.

We hope the innovation and enthusiasm captured in these case studies will inspire others in the building sector – corporate tenants, building owners and managers, designers and developers – to follow their lead and reap the benefits for their employees, clients and their business bottom line.



Arup Boston Office

# Introduction



When our first *Building the Business Case: Wellbeing and Productivity in Green Offices (Oct 2016)* report chucked up its 4,000<sup>th</sup> download, our suspicions were confirmed that there is a large and growing appetite for case studies on the tangible benefits of implementing health, wellbeing and productivity features in green buildings. We wanted to tell stories of success from which others could draw inspiration and practical guidance, and present robust data-led case studies that demonstrate the environmental, health and economic benefits.

Since publication of that report in October 2016, its global reach has been extended with translations into Chinese and other languages and summaries created by Green Building Councils (GBCs) in markets from Vietnam to Ireland.

The report was one of the first outputs of the World Green Building Council (WorldGBC)'s innovative *Better Places for People* global project. In the three years since the project's inception, great strides have been made towards affirming the link between green buildings and the health, wellbeing and productivity of the people inside them.

Whereas back in 2015, only a handful of companies were seriously researching the impact that their green buildings' health and wellbeing features could have on their employees and customers, now many companies from a wide variety of industries and regions are doing so. In fact, when WorldGBC sought expressions of interest for case studies for this updated report, we received 70 submissions from every region of the globe.

## Linking green features, occupant satisfaction and economic benefits

Launching this new report, we aim to build on the success of our previous work by showcasing world class building projects that further explore the clear and crucial links between green features, occupant satisfaction and economic benefits following WorldGBC's Metrics Framework.

Each building project profiled here has one or more **green building certifications**, including BREEAM, LEED, Green Star, BEAM, China Three Star, and ILFI's Net Zero Energy Building. That means each is designed to reduce operational energy consumption and greenhouse gas emissions, as well as water and waste. For example, we learn of a LEED Gold certified children's hospital in Ohio, USA that emits 49% fewer emissions than the US national average for healthcare facilities and a 100% fossil fuel free BREEAM-NL Excellent rated office in the Netherlands, powered by solar PV and with the highest collection of Cradle to Cradle<sup>®</sup> certified materials in the world.

Each project has also measured **occupant satisfaction** and used the results to deliver indoor spaces that occupants prefer, feel proud of and in which they feel that they are healthier and more productive. One of our office case studies reported employee sick days dropping by nearly half and staff satisfaction rising to over 91%, which they feel was achieved in part by co-designing the office with employees. Two other case studies include two of the highest ever scores reported by the Leesman Index<sup>3</sup>, a popular tool to gauge employee and occupant satisfaction.

Finally, each project has measured, or is in the process of measuring, **economic benefits** resulting from the green and healthy features and the improvements in occupant satisfaction. The most compelling examples include a blend of economic savings from resource-efficient design which reduces energy costs, as well as savings from reduced staff turnover and absenteeism – valued at £200,000 a year in one case study. Several case studies confirm that they have achieved fast returns on investment in green offices with a focus on health and wellbeing.

Despite the significant findings in these case studies, more exploration is required to further prove the link between green buildings, health and wellbeing features and a strong business case. The companies whose projects are highlighted have pledged to continue to collect data and refine methodologies and we invite others to join them.

<sup>2</sup> [International Living Future Institute's Zero Energy Certification.](#)  
<sup>3</sup> [Leesman Index.](#)

# Introduction

## Who should read this report and why?

This report achieves an exciting new milestone for WorldGBC – a majority of the case studies (seven of the 11) feature companies that are the **tenants** of the office space rather than the developer, owner/manager, architect or consultant.

That means that every company with employees should read this report and take inspiration from the case studies presented, which show how occupying a green building with health and wellbeing features can save your company money, make your employees feel healthier and more productive, and bring a positive return on your investment in a green and healthy space.

The remaining four case studies will be useful for **project developers and consultants**. They reveal that clients will increasingly demand, and may be willing to pay more for, spaces that both operate efficiently and provide an excellent indoor environment.

## Working together

At the end of this report we look towards the future – how we can continue to report, explore, learn and drive the momentum for green and healthy buildings by championing the business case. If you are inspired by the examples in this report, the WorldGBC's Metrics Framework<sup>4</sup> exists to help companies start organising to collect the data they need.

We encourage you to follow the example set by the companies featured in this report. If you are a tenant, engage your building owner or manager and convey the importance of having a green and healthy office space for your employees. If you are a developer or consultant, engage your client and convey the benefits they can expect to realise. Finally, we invite you to connect with WorldGBC and your local Green Building Council for helpful resources and the chance to showcase your efforts in future publications.

We hope you enjoy reading the report.

<sup>4</sup> See WorldGBC Metrics Framework in *What Comes Next?*, page 46



Landsec Workplace



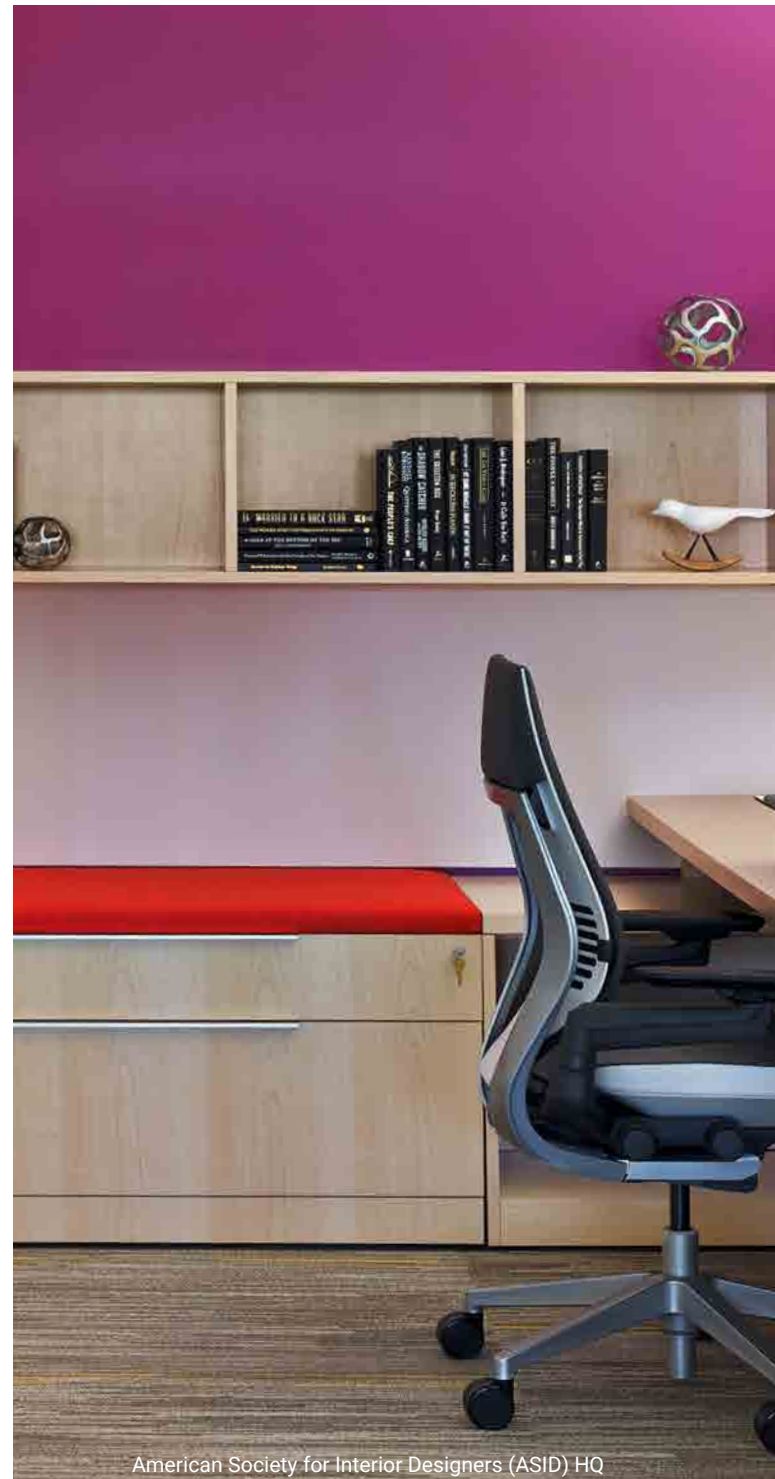
## Case study selection

WorldGBC issued a request for expressions of interest from companies to submit their project for possible inclusion in this case study report in May 2017. This opportunity was posted on WorldGBC's website and social media channels. Companies were asked to complete a simple online survey indicating the specifications of their project and the type of data they had and could share that linked green buildings with health and wellbeing features.

71 submissions were received prior to the deadline. WorldGBC staff shared the survey submissions with members of an Advisory Committee – made up of eight national Green Building Councils and five project or report sponsors. Members of this Advisory Committee scored each case study against a set of criteria and WorldGBC created a list of the top case studies. A conference call was convened in June 2017 where the Advisory Committee agreed by consensus to proceed with 15 case studies for possible inclusion in the case study report.

One-to-one calls between WorldGBC staff and each case study submitter took place in August 2017. On these calls, case study submitters were asked for further details about their project and the data and results that they could share.

Following these one to one calls and upon further consultation with the Advisory Committee, the number of final case studies proceeding to publication was reduced from 15 down to the final 11 published here.



American Society for Interior Designers (ASID) HQ

## Case study structure

Each of the case studies included in this report tells the story of a project team developing or refurbishing an indoor space to make it more resource efficient, healthier and ultimately to support the satisfaction and productivity of the people inside that building; and to save the company money on running costs.

To guide the reader, each case study follows the same structure, with five key sections:

### 1. About the Project

This section, found in the case study header, lists the green building and healthy building certifications achieved by the project and provides basic specifications such as size and number of occupants.

### 2. Key Message

This section, also found in the case study header, is a one sentence summary of the case study.

### 3. Green Features with Environmental, Health & Wellbeing Benefits

This section summarises the features of the project that help the building achieve both green building certifications and lead to the

positive occupant experience that is measured in the following section. Some green features are directly tied to energy efficiency and other resource efficiency, while other features may focus more on health, wellbeing and productivity.

### 4. Occupant Satisfaction

This section highlights the results of pre- and post-occupancy surveys. Most of these surveys are conducted by the project team with a third-party though some have been done internally. Pre-occupancy surveys help the project team identify areas that the new building must do better in, while the post-occupancy survey sheds light as to whether occupants enjoy being in the space, and also whether they feel healthier and/or more productive in the new or refurbished space.

### 5. Economic Benefits

This is the key section that ties everything else together and makes (or not) the business case for green buildings that incorporate health and wellbeing features. The key metrics for economic benefits are whether the green features of the space have improved occupant satisfaction and whether that in turn has led to positive economic outcomes.

## Methodology disclaimer

WorldGBC does not conduct its own assessment of the projects included in this report. The results presented here are those shared by the case study submitter and their project team. WorldGBC staff have scrutinised the findings and asked for follow-up where necessary to ensure the accuracy of the details provided, but cannot attest to their accuracy.

WorldGBC encourages readers of this report to engage with the case study submitter where questions or clarifications arise. Most of the case study submitters have expressed a willingness to engage in constructive dialogue to ensure that the rigour and accuracy of our work continues to improve over time.

# Case Studies



American Society for Interior Designers (ASID) HQ



### About the project

Certifications: BREEAM Excellent, SKA<sup>5</sup> Gold, WELL Gold.

1,500 m<sup>2</sup> new office facility for 170+ employees.

### Key message

Cundall's new office, which focused on improved indoor air quality, including continuous monitoring of carbon dioxide (CO<sub>2</sub>) and volatile organic compounds (VOCs), has saved the company £200,000 due to a reduction of four sick days per year per employee and a 27% reduction in staff turnover.

### Green Features with Environmental, Health & Wellbeing Benefits

#### Acoustics

Primarily a health and wellbeing benefit, sound masking and soundscaping<sup>6</sup> were incorporated in the main areas to reduce noise distractions.

#### Indoor Air Quality

Variable ventilation controls linked to CO<sub>2</sub> sensors are installed in high density areas allowing fresh air to be supplied as needed and reducing energy consumption for these units by 25%. Cundall's IEQube™ is used to continuously monitor and record air temperature, relative humidity, lux<sup>7</sup> levels, particulates, CO<sub>2</sub> and VOCs.

#### Look & Feel

By using a recycled reflective flooring, there was a 20-30% increase in daylight penetration, reducing the need for artificial lighting.

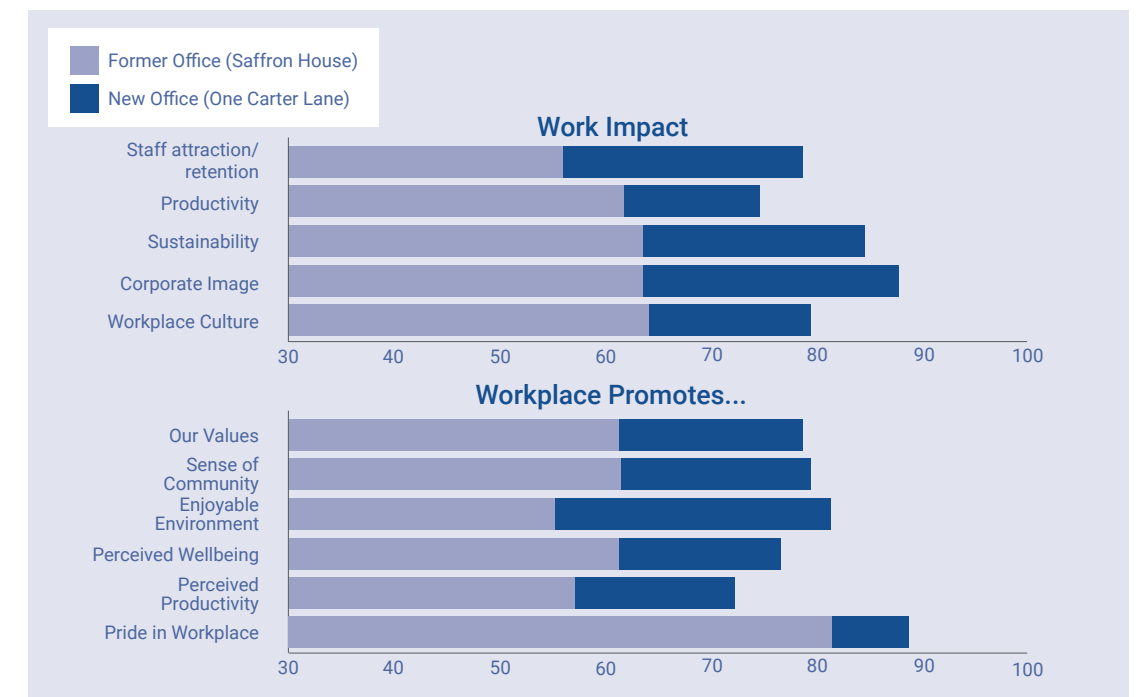
#### Location & Amenities

Generous cycle parking and changing facilities provided to encourage active transportation, along with multi-use rooms for exercise and yoga classes.



### Occupant Satisfaction

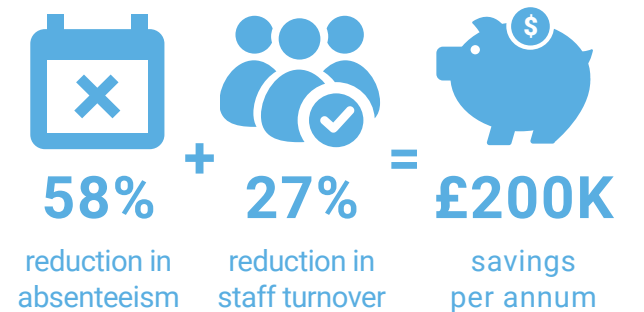
The impacts of the new workplace on important factors like staff attraction and retention, productivity, perceived wellbeing and perceived productivity were all extremely positive.



### Economic Benefits

Absenteeism dropped by more than four days per person per year, a 58% reduction. Staff turnover reduced by 27%. Taken together, these two outcomes provided a £200,000 savings per year.

WELL Certification increased the project cost by 3.6%. Based on the above noted savings, these costs had a return on investment of less than two months.



5 Operated by the Royal Institute of Chartered Surveyors (RICS) in the UK, SKA rating is an environmental assessment tool for sustainable fit-outs.

6 Defined as using sound or a combination of sounds to create a desired acoustic environment.

7 Lux is the standard unit of illuminance, equal to one lumen per square meter.

## Office Refurbishment

San Salvador, El Salvador

### About the project

Certification: LEED Gold (2009).  
1,710 m<sup>2</sup> of office space for 150 employees.

### Key message

Sherwin-Williams Centro América used an integrated design approach to deliver an office refurbishment that improved overall worker satisfaction to 91%. By tracking employee sick days, the company has calculated that a 44% reduction in sick days has saved them \$85,000 USD per year.

This project was a pilot. Design and operation principles will now be implemented across the rest of the site.

### Green Features with Environmental, Health & Wellbeing Benefits

#### Lighting

90% of workspaces receive natural daylight. Where needed, artificial lighting is provided by LED lights, delivering lighting levels between 360 to 500 lux.

#### Indoor Air Quality

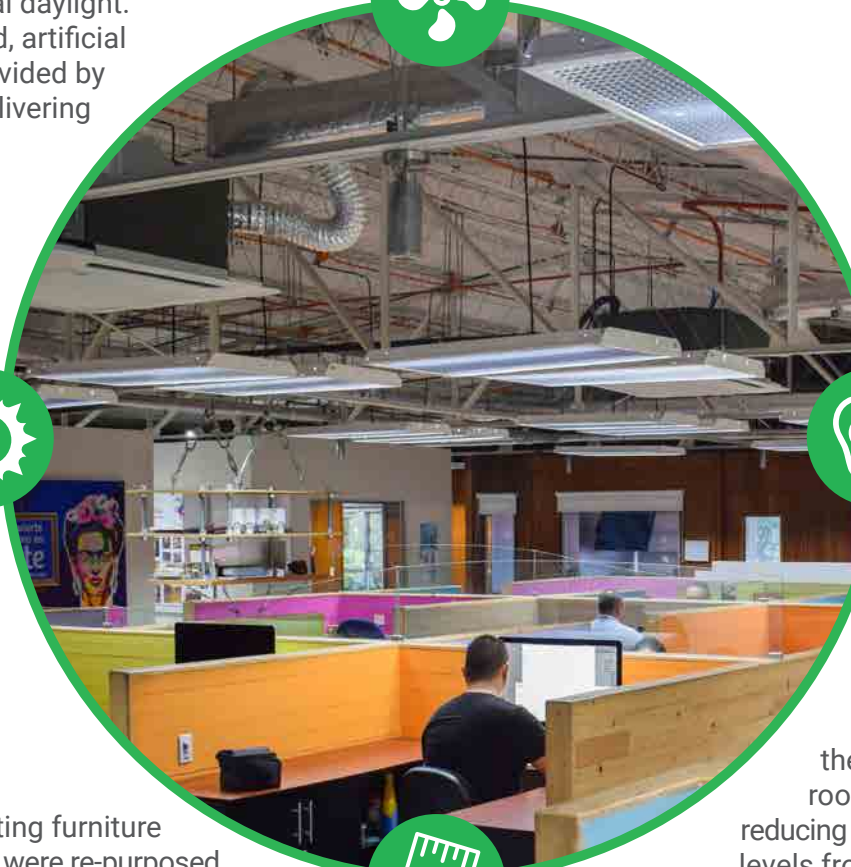
Through enhanced outdoor air injection and continuous monitoring, CO<sub>2</sub> levels in the building are kept between 600 to 1,100 parts per million (ppm). All building and furniture materials, including paint, are low or zero VOC.

#### Acoustics

Primarily a health and wellbeing benefit, a new thermo-acoustic roof was installed, reducing internal noise levels from 60 decibels (dB) to 40 dB.

#### Materials

89.9% of existing furniture and finishings were re-purposed from the old office to the new. Wood products with sustainable forestry certifications were selected to ensure a reduced carbon footprint. The company's research and development lab also developed a low-VOC water-based wood protector to ensure low-VOCs would be realised.

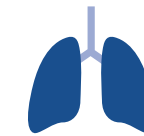


### Occupant Satisfaction

An internal survey of staff completed in 2017 showed positive results:



**64%**  
reduction in reported allergy problems



**68%**  
reduction in reported respiratory problems



**91%**  
overall employee satisfaction

### Economic Benefits

Since moving to the new building, absenteeism has reduced by 44%. Sherwin-Williams has calculated total annual savings of \$85,000 USD per year.



**44%**  
reduction in absenteeism



**\$85K**  
USD savings per annum

*"Our Centro América headquarters staff includes a medical clinic with one full-time and two part-time medical doctors and one full-time nurse. This clinic offers standard medical services and we asked them to record all illnesses and to track this data for the employee file, making it easy to measure the number of sick days taken annually by each employee. From this collection of data we were able to determine the dollar value of the change in the number of sick days taken by employees after moving to our new office. Using the average employee salary of the people working inside the building, we were able to calculate savings of \$85,000 USD from our first full year in our new office – money that can go to myriad other programs rather than being lost due to preventable employee illness and absenteeism."*

– Juan Francisco Sifontes, President and COO, Sherwin-Williams Centro América

## Plantronics Office

Hoofddorp, the Netherlands

### About the project

Certifications: BREEAM-NL Excellent, Leesman+, WELL (registered).

3,531 m<sup>2</sup> of office space for 135 employees sits within a larger masterplan office park.

Partners: Delta Development Group, VolkerWessels and Reggeborgh Groep, with masterplan and building design by William McDonough + Partners.

### Key message

By integrating health, wellbeing, and 'smarter working solutions' from the start through the use of Cradle to Cradle® design principles, the new headquarters for Plantronics at Park 20|20 improved the productivity and performance of employees and delivered a healthy return to the developers.

### Green Features with Environmental, Health & Wellbeing Benefits

All buildings are fossil fuel free; rooftop solar provides up to 15% of electricity needs; and Delta Development and partners invested in a 480 kilowatt peak (kWp) offsite solar farm located five kilometres from the office park to supply most of the additional electricity needs. A centralised system provides 100% of cooling needs and 75% of heating needs via water pumped from the man made Park 20|20 canal.

Since the occupant is a producer of professional communications equipment, office acoustics were of particular importance. The office boasts an extensive biophilic programme, comprised of green walls and water features, which ensures not only good air quality but helps create and maintain tranquil work environments.

#### Acoustics

Sound levels continuously monitored and an automated sound-masking system, utilising the indoor water features, adjusts decibel levels seamlessly. All areas are designed to minimise sound wave reverberation through, for example, 100% sound absorbent ceilings.



#### Thermal Comfort

A heating, ventilation, and air conditioning (HVAC) system was installed that allows user control within 3.6 metre grid zones. Meeting rooms incorporate software to optimise temperatures based upon the number of attendees.



#### Indoor Air Quality

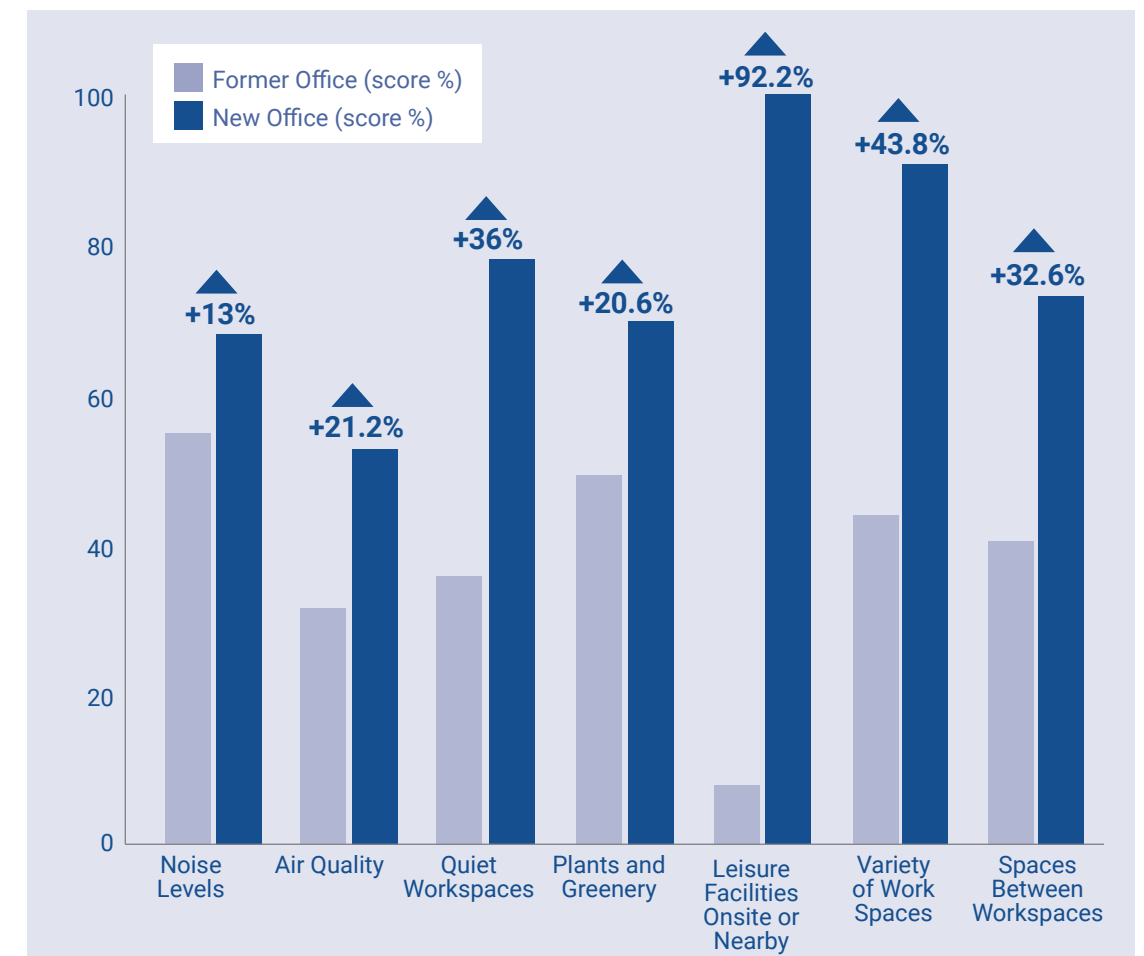
Extensive biophilia and Cradle to Cradle® certified™ materials ensure good air quality. CO<sub>2</sub> levels are actively managed to stay between 500 and 1,000 ppm.



### Occupant Satisfaction

Delta Development engaged Plantronics extensively in six weeks of workshops to identify pros and cons of their previous office and co-design their new healthy, smart working, Cradle to Cradle® inspired office. This process allowed Delta to zero in on several priorities for the client's employees and to optimise these directly together with Plantronics and the design/build team. A post-occupancy survey

using the Leesman Index revealed significant improvements in employee perception of the workplace features and services supporting their health and their ability to be productive. The Leesman Index score (Lmi) of 82.3 represents a 6.6 point improvement on the previous office and remains one of the top 10 scores achieved globally (among companies with 50 or more employees) at the time.



## Plantronics Office



### Economic Benefits

#### Developer Perspective

Planning and certification under BREEAM and Cradle to Cradle® allowed Delta Development to deliver a highly desirable building for their tenant. The client was so pleased with the building concept and design that the client asked to purchase the building outright. The developer has estimated a savings of €624,000 in reduced financing costs.

#### Client Perspective

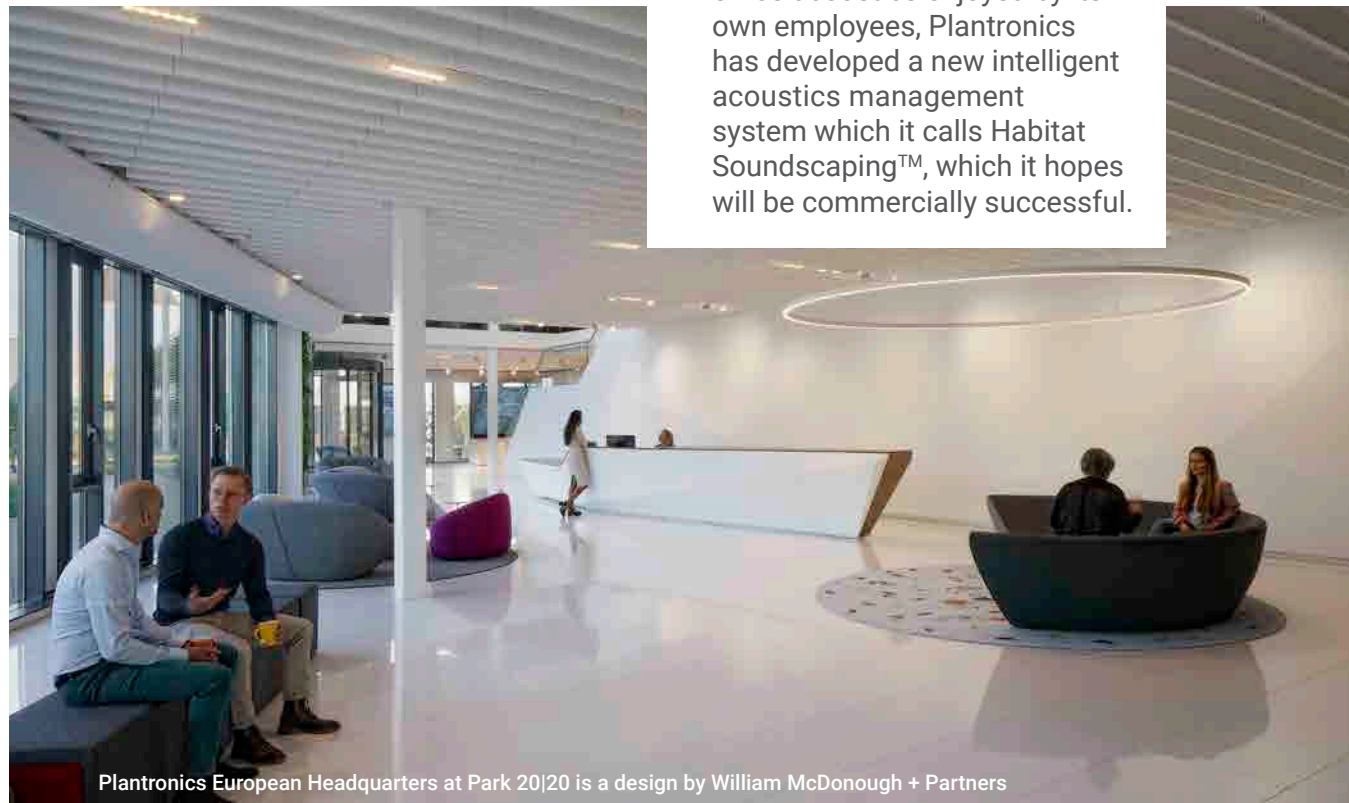
Plantronics, as the owner of the building, will realise the savings from the roof-mounted solar PV system, estimated to be €600,000 over the life span of the system. The company also estimates a value of €2.1 million per year due to improved employee productivity in the new office<sup>8</sup>.

Finally, inspired by the tranquil office acoustics enjoyed by its own employees, Plantronics has developed a new intelligent acoustics management system which it calls Habitat Soundscaping™, which it hopes will be commercially successful.



**€2.1M**

estimated value per year due to improved employee productivity<sup>8</sup>



Plantronics European Headquarters at Park 20|20 is a design by William McDonough + Partners

<sup>8</sup> Delta has estimated increased employee productivity as follows: by calculating from the difference in a pre- and post-occupancy Leesman Index survey, the perceived productivity by the buildings users saw an increase of 11.7%. When projected on the number of employees and the average revenue per employee, this increase in productivity represents an estimated value of € 2.1 million per year.



Plantronics European Headquarters at Park 20|20 is a design by William McDonough + Partners

### About the project

Certification: LEED Gold for Healthcare (2009).

36,800 m<sup>2</sup> facility; 75 bed neonatal intensive care unit; 6 bed high risk obstetrics program; and 39 bay pediatric emergency department.

### Key message

A lean integrated design process resulted in a sustainable and comforting environment for children and resulted in increased patient, family and staff satisfaction.

The hospital is operating with 48.5% lower greenhouse gas emissions than the United States' national average for healthcare facilities. It was completed 54 days early and \$44 million USD under budget, with a significant improvement in occupant satisfaction.

### Green Features with Environmental, Health & Wellbeing Benefits

This hospital campus achieves an energy use intensity (EUI) of 129.7 kBtu/ft<sup>2</sup> and emits 48.5% fewer greenhouse gas emissions than the US national average for healthcare facilities. Several key green features not only support the energy efficiency of the buildings but also the health, wellbeing and comfort aspects, including:

#### Indoor Air Quality

Materials with low-zero VOCs provide air quality benefits, as well as safety, infection control, functionality, durability, and aesthetics. 30% of all furniture meets specific VOC requirements.

#### Lighting

Double height lobby space reduces need for artificial lighting. Natural lighting is also preferred by staff and patients.

#### Biophilia & Views

Views of outside as well as extensive use of indoor plant imagery brings nature indoors.

#### Interior Layout

Three-storey convening stair in the main lobby promotes exercise.

Photo credit: Blake Marvin Photography



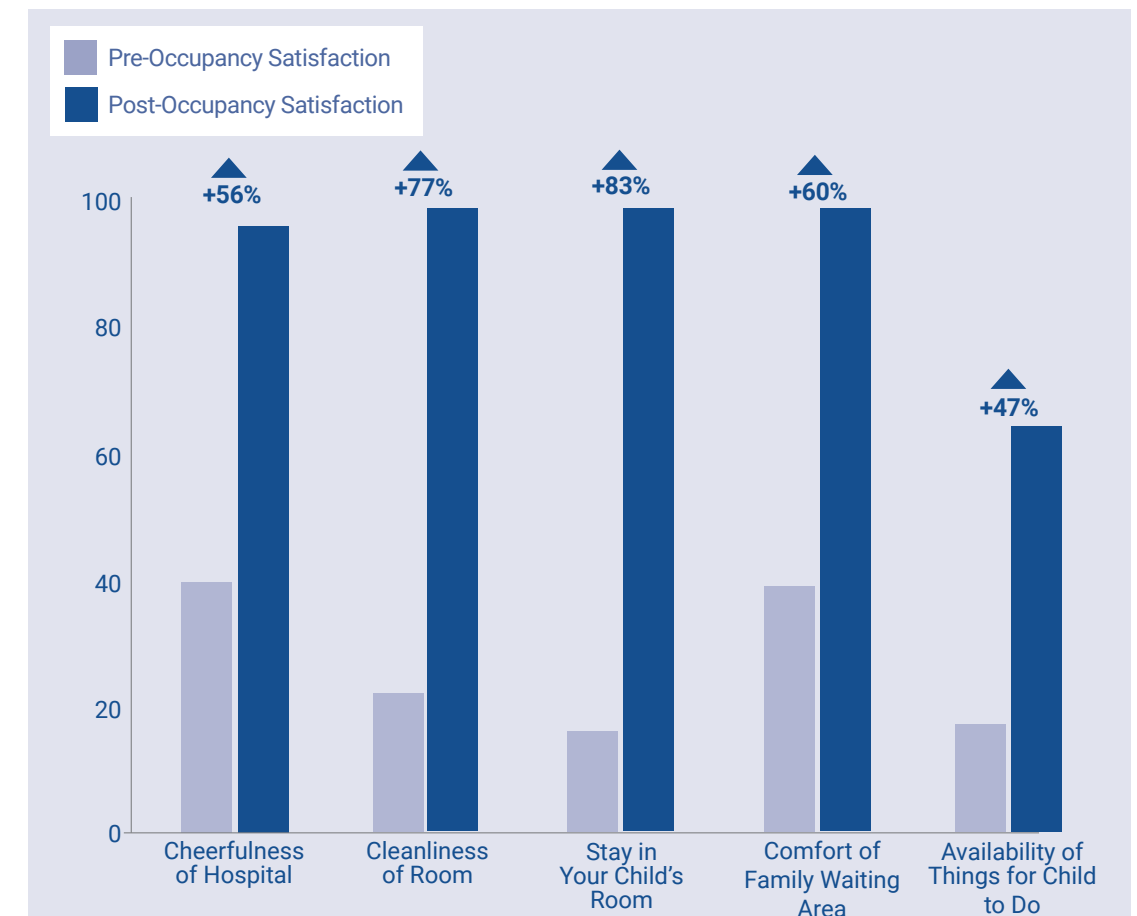
### Occupant Satisfaction

In a hospital context, occupant satisfaction includes two components: staff satisfaction and patient/family satisfaction.

76% of hospital staff were proud to work in the new hospital building and 76% would recommend it to family and friends. On key features of facility operation, hospital staff agreed that lighting levels and air quality, in particular, supported their work.

For the patient and family perception, pre-occupancy and post-occupancy surveys were conducted by the healthcare analytics organisation Press Ganey. The results show an average improvement of 67% in patient/family satisfaction with the space.

Overall, the facility received a score of 4.06 out of 5, with the reviewers agreeing with, or strongly agreeing with, statements relating to patient and family.





### Economic Benefits

In addition to being a LEED Gold certified building, which is designed to support the health and wellbeing of patients and staff, this facility was also delivered under budget and earlier than expected. The project team used a lean Integrated Project Delivery (Lean-IPD) approach to improve planning and decision making throughout all stages of building design and construction.

Ultimately, the project was completed \$44 million USD under budget and 54 days ahead of schedule, while achieving the positive outcomes above – proving that green building, with a focus on health and wellbeing can be achieved on a cost effective basis.



Project achieves  
**\$900K**  
USD in annual  
energy cost  
savings and was  
completed  
**\$44M**  
USD under  
budget



Photo credit: Blake Marvin Photography

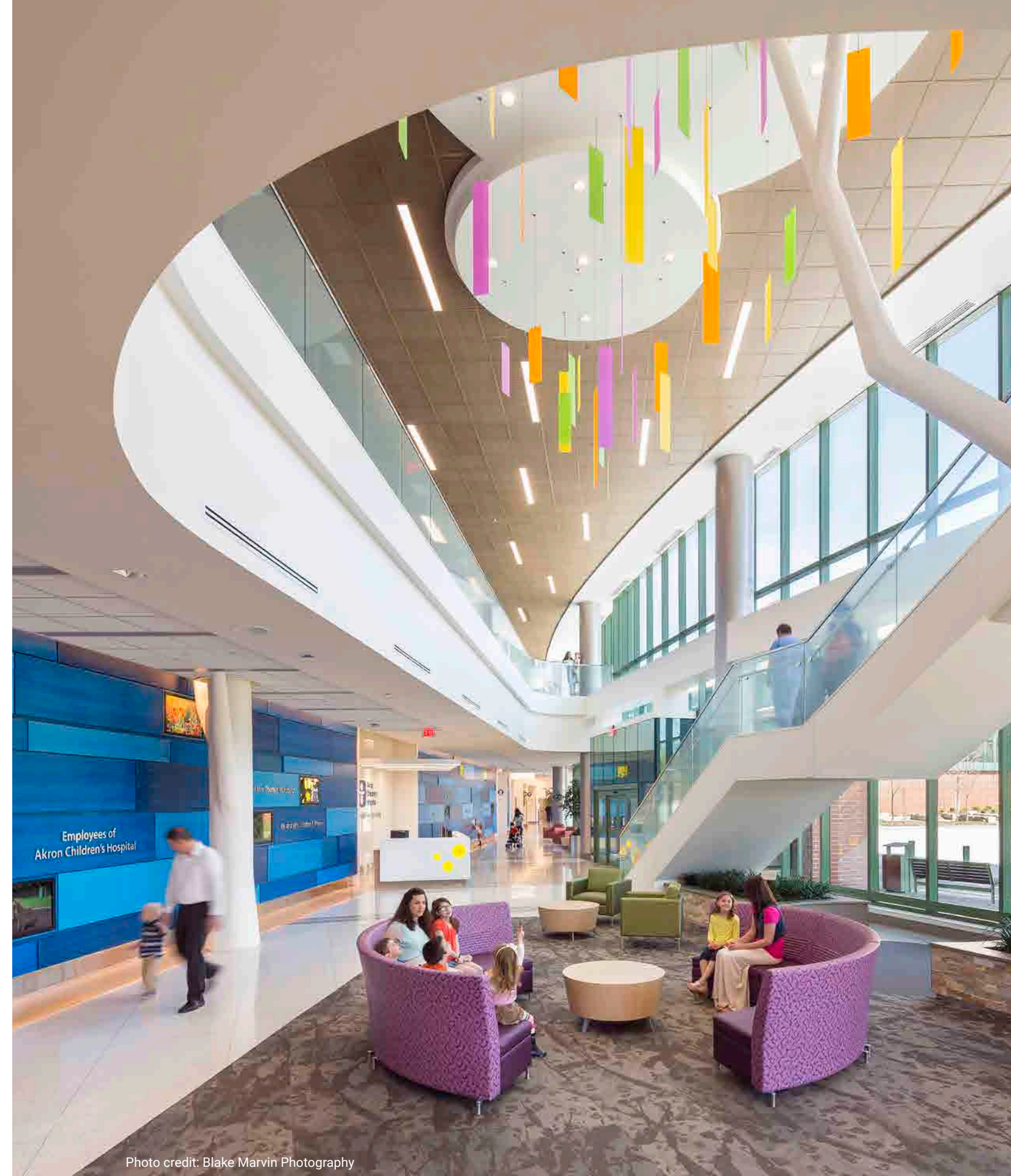


Photo credit: Blake Marvin Photography

## Double Cove

Hong Kong

### About the project

Certifications: LEED Gold for Neighbourhood Development; HK-BEAM version 4/04 Platinum; and China Green Building Design Label Three Star rating.

Mixed-use residential project covers an area of 286,840 m<sup>2</sup>, including residential units and retail space.

### Key message

Henderson Land Developments' mixed-use community in Hong Kong has achieved numerous green building certifications and has achieved 97% occupant satisfaction. A 16% reduction in energy consumption compared to building code has been achieved and the development boasts a 40% higher resale value than comparable buildings in the area.

### Green Features with Environmental, Health & Wellbeing Benefits

#### Thermal Comfort

Double glazed curtain wall and low-e tinted glass reduces heat gain and, therefore, cooling needs in this generally warm climate.

#### Indoor Air Quality

Enhanced ventilation and the use of low-VOC materials throughout resulted in the Excellent certification for indoor air quality from the Hong Kong BEAM system. Indoor air quality sensors and ventilation control are balanced to provide good indoor air quality while being mindful of energy costs.

#### Biophilia & Views

40% of the property has greenery and there are reserved views of Starfish Bay and Wu Kai Sha Wan in Hong Kong.

#### Location & Amenities

Communal bike retail services for all residents and ample bike parking; 1.36 km of cycle trails and 2.3 km of jogging paths throughout the site.



### Occupant Satisfaction

Residents living in the development have given it an outstanding score of 97% for overall satisfaction and very high scores for a number of the features that promote health and wellbeing in this green development.



87%

satisfaction with biophilia, plants and greenery



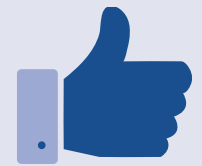
84%

satisfaction with on-site opportunities to exercise



50%

satisfaction with acoustics in flats



97%

overall satisfaction with the buildings

### Economic Benefits

The development has a 40% higher property value than nearby properties that cater to similar budgets, ages and typologies and a 21% higher value than an upcoming development in the same district. Henderson Land Developments attributes this value to the high quality green building and site development which has prioritised biophilia, air quality and access to amenities, making the site a desirable place to live.



40% higher value<sup>9</sup> than other comparable developments



9 Double Cove: 5 yrs old - value 19,390,000 HKD / comparable developments: 0-10 yrs old - value 14,000,000 average HKD values taken from Hong Kong property market value database [Centaline Property Agency Limited](#).

## ASID HQ

Washington, D.C., USA

### About the project

Certifications: LEED Platinum for Interior Design + Construction (2009) and WELL Platinum (v.1).

790 m<sup>2</sup> office space for 30 employees, within 38,555 m<sup>2</sup> LEED Existing Building Operations and Maintenance (EB:OM) Gold certified office building.

### Key message

ASID's new office headquarters was designed for environmental sustainability, and health and wellness, with a focus on indoor air quality, employee satisfaction, and productivity. In their new office, employee absenteeism has decreased by 19% and presenteeism<sup>10</sup> by 16%.

### Green Features with Environmental, Health & Wellbeing Benefits

#### Lighting

A circadian lighting strategy was implemented; the system was designed based on the demographic of the office occupants, the latitude and longitude of the office location, and the solar cycle.

#### Indoor Air Quality

The office utilises a real time dashboard to monitor environmental and air quality attributes, which helped achieve various LEED credits and WELL Credit 18 for Air Quality Monitoring and Feedback ensures CO<sup>2</sup> levels are below 800 ppm. The building used low or zero VOC materials and designers employed a Cradle to Cradle® approach, [Health Product Declarations](#), and the [Building and Institutional Furniture Manufacturers Association \(BIFMA\) Level Standard](#) for materials choice.

#### Biophilia & Views

The strategy followed the "14 Patterns of Biophilic Design". Plants, natural furnishings and products, and spatial design elements all create a sense of being in nature. This helped achieve WELL Credit 88 for Biophilia.

### Occupant Satisfaction

A survey of staff measured how satisfied they were with a number of features in their physical work environment. The most dramatically improved environmental

condition satisfaction scores include air quality, thermal comfort, access to nature, acoustics, physical comfort and light.

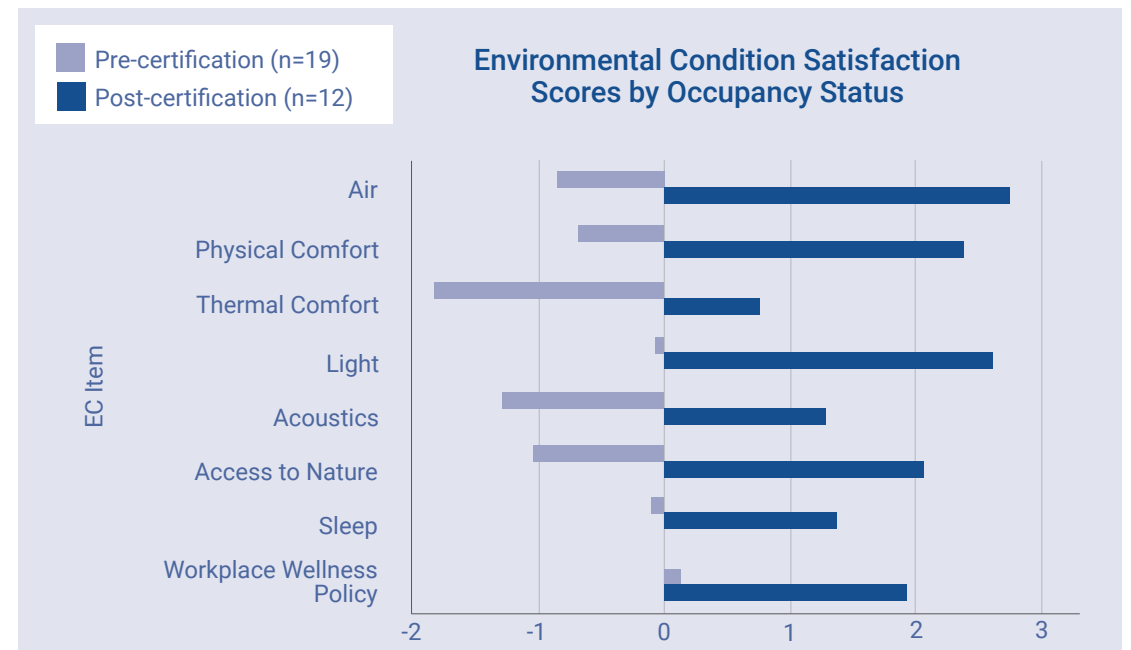


Photo credit: Eric Laignel

<sup>10</sup> "Presenteeism" is defined as an employee being physically present but not working productively.



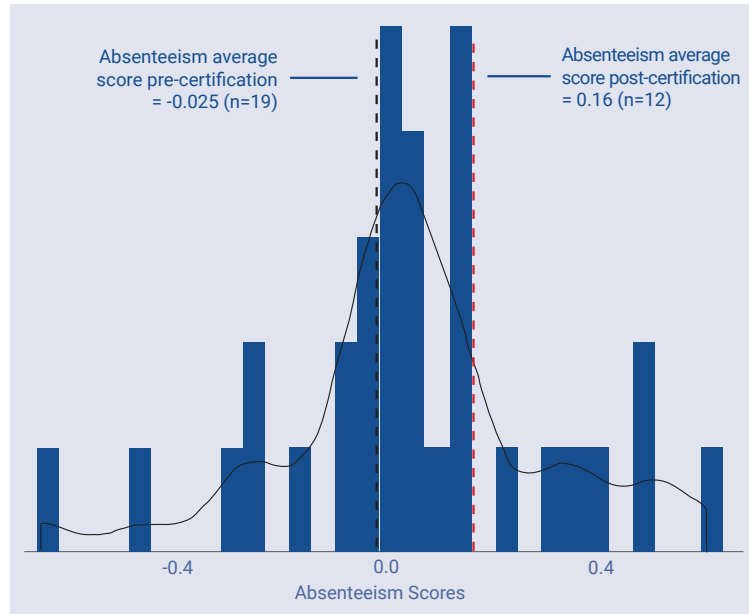


## Occupant Satisfaction

A survey of staff, conducted by Delos, measured absenteeism and presenteeism.

### Absenteeism

To quantify absenteeism, respondents were asked to report on their productivity and performance over a period of four weeks on a scale of -1 to 1. Absenteeism scores improved (less absenteeism) by 19% from -0.025 (pre-certification) to 0.16 (post-certification). This 0.16 indicates employees are working 16% more than expected by their employer, a statistically significant increase.



### Presenteeism

To quantify presenteeism, employees were asked to score their work performance from 0 to 100 with higher scores indicating higher self-rated work performance. Scores improved by 16% from 77.7 to 90. This indicates that on average, employees feel they are working at 90% of their possible performance, an increase in job performance of 16%.

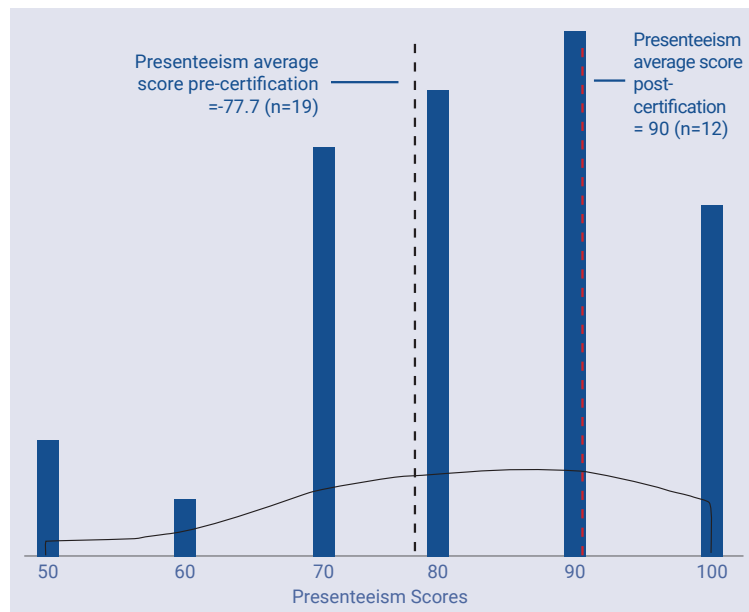


Photo credit: Eric Laignel



## Economic Benefits

The key economic outcomes realised by ASID were a reduction in employee absenteeism and presenteeism as summarised left. Using a calculation determined by ASID, which accounts for employee productivity, employee retention and energy savings, ASID will recoup its investment in the first half of its 10 year lease agreement.



## Landsec Workplace

London, United Kingdom

### About the project

Certifications: BREEAM Outstanding (score of 92.3) and WELL Silver – the first office to achieve these two levels of certifications together.

4,666 m<sup>2</sup> office refurbishment accommodating 470 occupants.

### Key message

Landsec's new London workplace prioritises in-person collaboration, health and wellbeing, and indoor environmental quality within a green building. The percentage of employees feeling that the space allows them to work productively rose by 30% after occupying the new space. This high level of project and employee performance was realised with a less than 3% increase in project cost.

## Green Features with Environmental, Health & Wellbeing Benefits

### Lighting

Energy efficient LED circadian lighting used to match external light levels, with meeting rooms offering a variety of user-controlled lighting settings to suit different tasks. A bespoke LED light well adds high intensity light to the centre of the floorplate where natural light is at its lowest.



### Indoor Air Quality

Enhanced fresh air ventilation and filtration, a tightly controlled cleaning regime and close consideration of furniture glues and adhesives ensures this space has optimum air quality, tested under both WELL and BREEAM certifications.

### Interior Layout

An 11% reduction in net internal area (NIA) with a 40% reduction in allocated desks was achieved in the new space. The workspace offers 470 employees a combination of 330 fixed desks and 300 other work settings including treadmill desks, collaboration spaces and acoustically sealed quiet working booths. Internal emails have decreased by 20% as in-person interactions were encouraged through building design.

### Materials

By refurbishing an existing building, Landsec reduced embodied carbon intensity by 50% compared to comparable projects<sup>11</sup>, and 99.97% of materials were procured from sustainable sources, as defined by BREEAM.



## Occupant Satisfaction

Landsec used the Leesman Survey to assess their employees' workplace satisfaction. With a post-occupancy score of 81.7, the building recorded the highest ever index score in the UK and achieved a 44% increase on pre-occupancy scores. Feelings of working productively rose 20% and are now 21% higher than Leesman's global average.

Employee feedback puts Landsec in the top 2% of 1,900 organisations surveyed worldwide by the Leesman Index – a major recruitment tool for Landsec going forward.



over 90%

agree work environment has positive effect on workplace culture



88%

agree new office design enables productive work



40%

increased satisfaction with air quality levels



25%

increased satisfaction with lighting levels



## Economic Benefits

Landsec is meeting the challenge of calculating economic outcomes head on. It is gathering a large number of data points and is improving human resources metrics to ensure that it can accurately measure outcomes. Employees are being encouraged to provide feedback and reporting on their health and productivity.

Technology, such as medical support offered through a smartphone app, is reducing employee absenteeism.



<sup>11</sup> Measured using the British Standards Institution's BS EN 15978 protocol.

**About the project**

Certifications: LEED Platinum (v4) and Net Zero Energy<sup>12</sup>.

2,323 m<sup>2</sup> office space for 70 employees.

Project Partners: Forge, DPR Construction and stok.

**Key message**

In this Net Zero Energy building with a strong focus on occupant health and productivity, a combination of improved indoor air quality, lighting, and design aesthetics contributes to 72% of stok employees, as subtenant, indicating a better health performance and four hours less sick time per employee per year<sup>13</sup>.



**Green Features with Environmental, Health & Wellbeing Benefits**

The office is a high performance champion – operating at net zero energy by producing 105% of its annual energy needs onsite and saving 182 metric tonnes of CO<sub>2</sub>e per year compared to an average building under the applicable California building code.

**Materials**

Percentage of materials VOC free:

- 97%** Interior paints and coatings applied on-site - emissions
- 100%** Interior paints and coatings applied on-site - VOC content
- 100%** Flooring
- 100%** Ceilings, walls, thermal and acoustic insulation
- 99%** Furniture

**Indoor Air Quality**

By incorporating significant natural ventilation and specifying healthy materials, the office has an average CO<sub>2</sub> concentration of 300 ppm and low-to-zero VOC readings throughout. A focus on materials with high recycled content also minimised environmental impacts while adding to the visual aesthetic of the space.

**Lighting**

55% of the occupied space is primarily daylight throughout the year. Solatubes and electrochromic glass used in the skylights reduce glare and solar heat gain while increasing natural light – thereby simultaneously reducing energy costs while improving lighting and aesthetics for occupants.



**Occupant Satisfaction**

By designing the interior layout to split the heads-down working area from other collaborative, training, and social areas within each of the floors, the varied uses were successfully separated, allowing them to coexist with geographic distinction for better productivity. In addition to the separation of differing modes of work, the interior design incorporates a wellness room, a mother's room, well-distributed private phone rooms, in-office bike and skateboard storage, showers, and a well-equipped in-house gym with a weekly yoga class to help employees with stress reduction and overall health.

A living wine bar, featuring plants underneath the glass counter top, contributes to the sense of community created in the space in a unique and visually stimulating way. As a living lab, the building hosts external industry events every month to build community and showcase specific green and healthy building strategies for inspiration and replication within the high performance building community.

stok conducted a pre- and post-move survey with its own employees, which showed significantly increased occupant satisfaction:



**87%** reported improved work experience



**72%** reported improved health



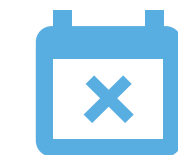
**80%** reported improved work performance



**Economic Benefits**

stok has calculated that employee sick days dropped by 25% in the new office – from an average of 18.19 hours per employee per year to 14.91 hours per employee.

This reduction has been calculated as saving the company approximately \$4,500 USD per year, in addition to productivity gains that are achieved through a healthier indoor environment, and savings from resource efficient design.



**25%** reduction in sick days



**over \$4K** USD savings per annum

<sup>12</sup> International Living Future Institute.

<sup>13</sup> Green features of this office are for the whole office, while survey results are specific to stok employees, a subtenant within the DPR company space.

**Key message**

Floth's new office is not only net zero carbon in operation – its office delivers good indoor air quality and is highly appreciated by employees, resulting in a win-win and leading by example.

**About the project**

Achieved the following firsts in Australia: 6 Star Green Star - Design & As Built (v1.1) certified rating; 6-Star NABERS IE rating.  
Registered to pursue WELL and Green Star – Performance certifications.  
1,042 m<sup>2</sup> facility accommodating 37 Floth staff on levels 2 and 3.  
15 kilowatt roof-mounted solar PV system produces 28% of its total operational electricity.



**Green Features with Environmental, Health & Wellbeing Benefits**

**Lighting**

An LED lighting system, with a power density of less than six watts per square metre, is automatically controlled with occupancy and daylight sensors.

**Indoor Air Quality**

Low-VOC paints, sealers and floor coverings and low formaldehyde engineered wood products helped Floth achieve a NABERS score of 97% for air quality. Continuous monitoring sensors are located in all office and meeting zones so that good air quality, defined as below 800 parts per million (ppm), can be consistently delivered. Post-occupancy spot testing showed better than anticipated performance with CO<sup>2</sup> at 625 ppm, zero formaldehyde readings, and very low readings for VOCs and particulate matter (PM10).

**Thermal Comfort**

For thermal comfort, the building design incorporates a high-performance envelope with low-e double glazing, thermally insulated assemblies and integral shading provided by articulation and balcony elements.

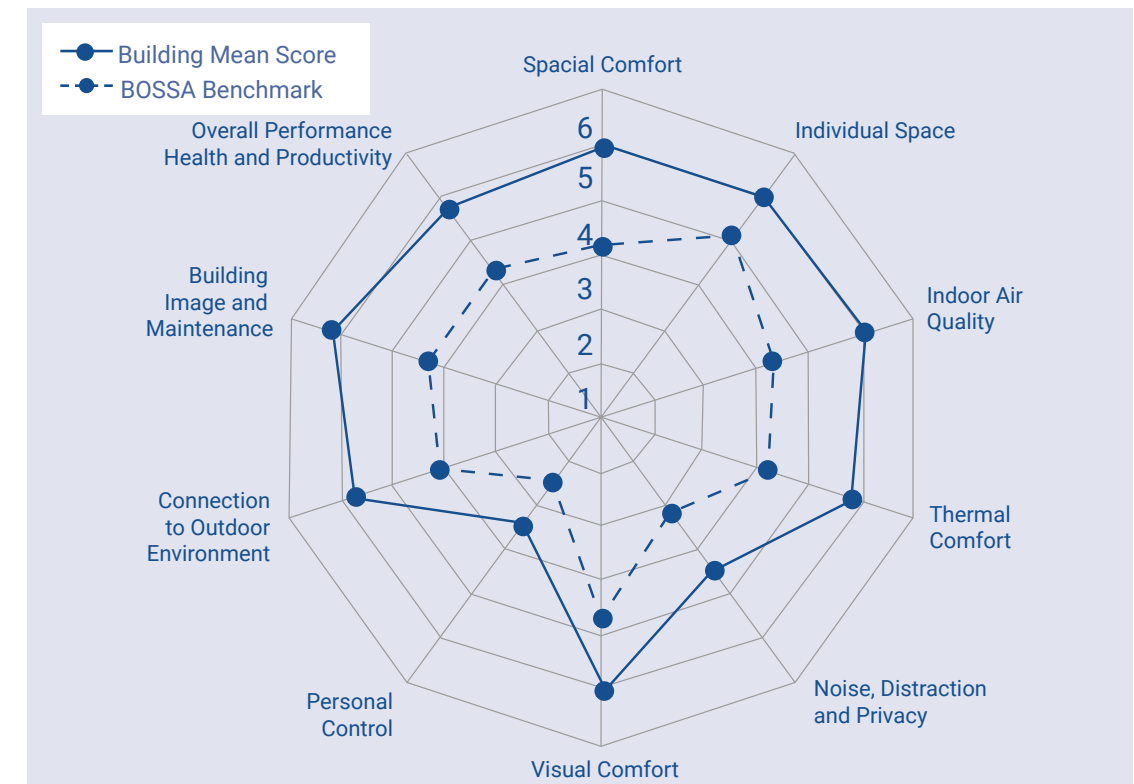


**Occupant Satisfaction**

Floth used the Building Occupants Survey System Australia (BOSSA), which is an occupant perception survey tool for Australian office buildings.

Occupants were asked to rate their overall satisfaction on a seven point scale ranging from negative to positive. Occupant satisfaction and building performance in the old office were below the BOSSA

benchmark in six out of nine areas, resulting in dissatisfaction among staff. Survey results in the new office shows that it has now exceeded the BOSSA benchmark in all areas, with particularly high scores on spatial comfort, indoor air quality and building image and maintenance. The percentage of employees satisfied with the overall performance, health and productivity of the new building is 94.5%.



**Economic Benefits**

Floth is currently calculating the economic benefit in the form of reduced absenteeism, reduced staff turnover and increased productivity.

### About the project

Certifications: WELL Gold has been achieved, LEED Platinum (v4) and Fitwel 3 Star certification.

1,132 m<sup>2</sup> facility accommodating 82 employees.

### Key message

ARUP's office fit-out in an existing building is pursuing multiple green building certifications and is achieving a 12.6% energy cost reduction compared to ASHRAE 90.1-2010. Use of circadian lighting in particular has contributed to reduced energy consumption and increased occupant satisfaction.

### Green Features with Environmental, Health & Wellbeing Benefits

#### Lighting

By using a circadian-tuned LED lighting system, the lighting requirements for WELL Light Credit 54 for Circadian Lighting Design were met.

#### Indoor Air Quality

Using over 50% (by cost) materials with [DECLARE labels from the International Living Future Institute](#), the office reduced VOC levels sufficient to achieve Air Credit 1 under WELL. Sufficient fresh outdoor air provision keeps CO<sub>2</sub> levels consistently below 800 ppm, achieving Air Credit 3 for Ventilation Effectiveness under WELL.

#### Biophilia & Views

Over 78% of occupied areas have access to views of Boston's waterfront and downtown skyline.

#### Interior Layout

With sufficient provision of sit/stand desks, staff now spend only 14% of their work day sitting, compared to 40% before.

### Occupant Satisfaction

A survey measured staff satisfaction with various design features before and after moving into the new office.

The results showed a significant improvement.

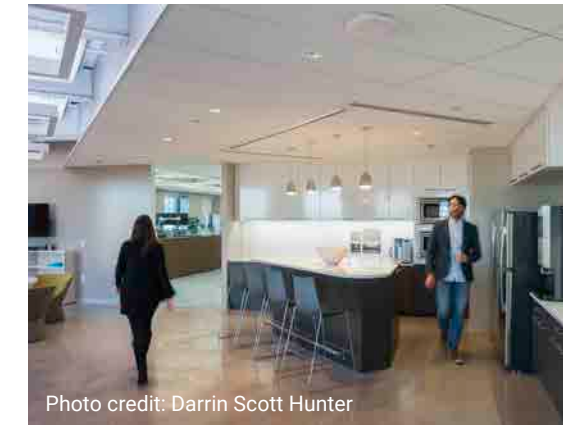


Photo credit: Darrin Scott Hunter

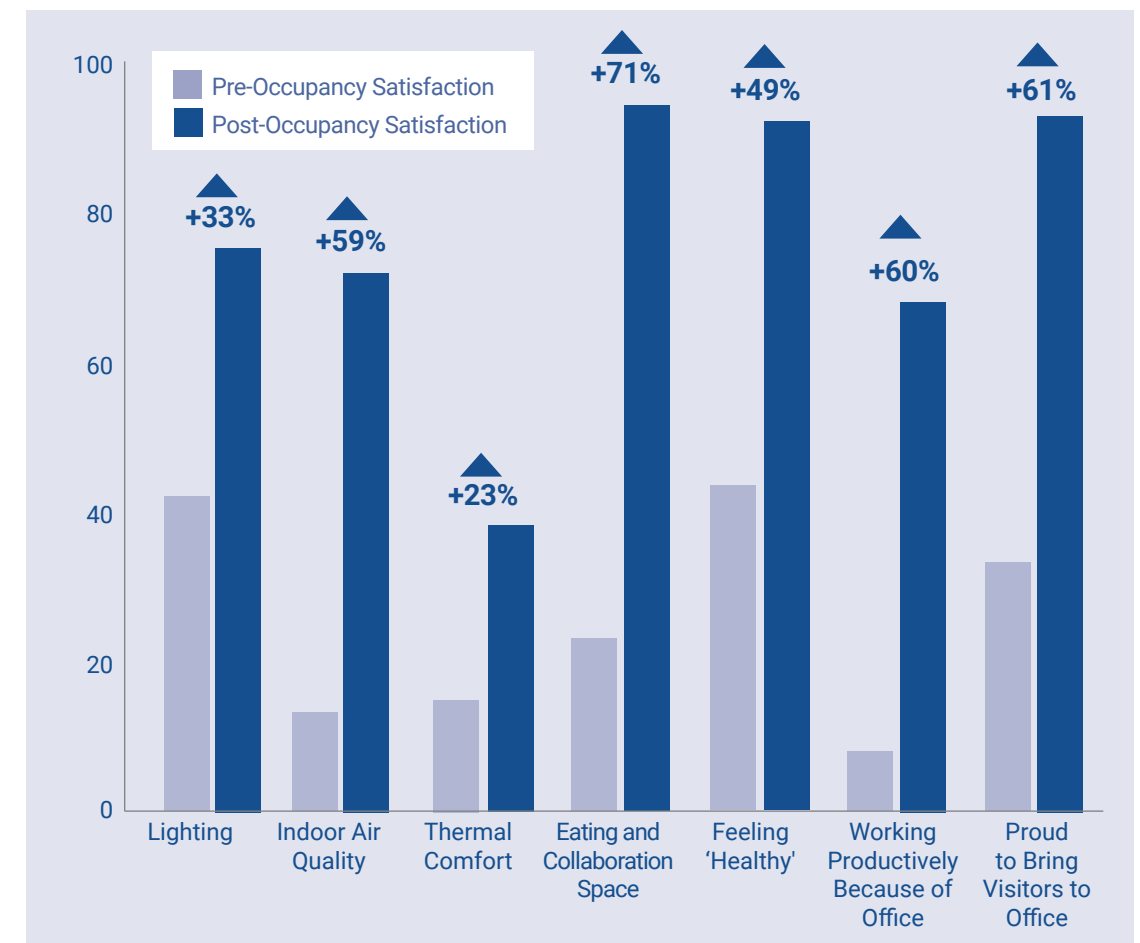


Photo credit: Darrin Scott Hunter

# ARUP

## Boston Office



### Economic Benefits

Arup's office fit-out has reduced energy costs by 12.6% compared to their previous office, which has resulted in \$4,257 USD cost savings.

Arup is currently calculating the economic benefit in the form of reduced absenteeism, reduced staff turnover and increased productivity.



**\$4,257**

USD savings due to 12.6% reduction in energy costs



Photo credit: Darrin Scott Hunter

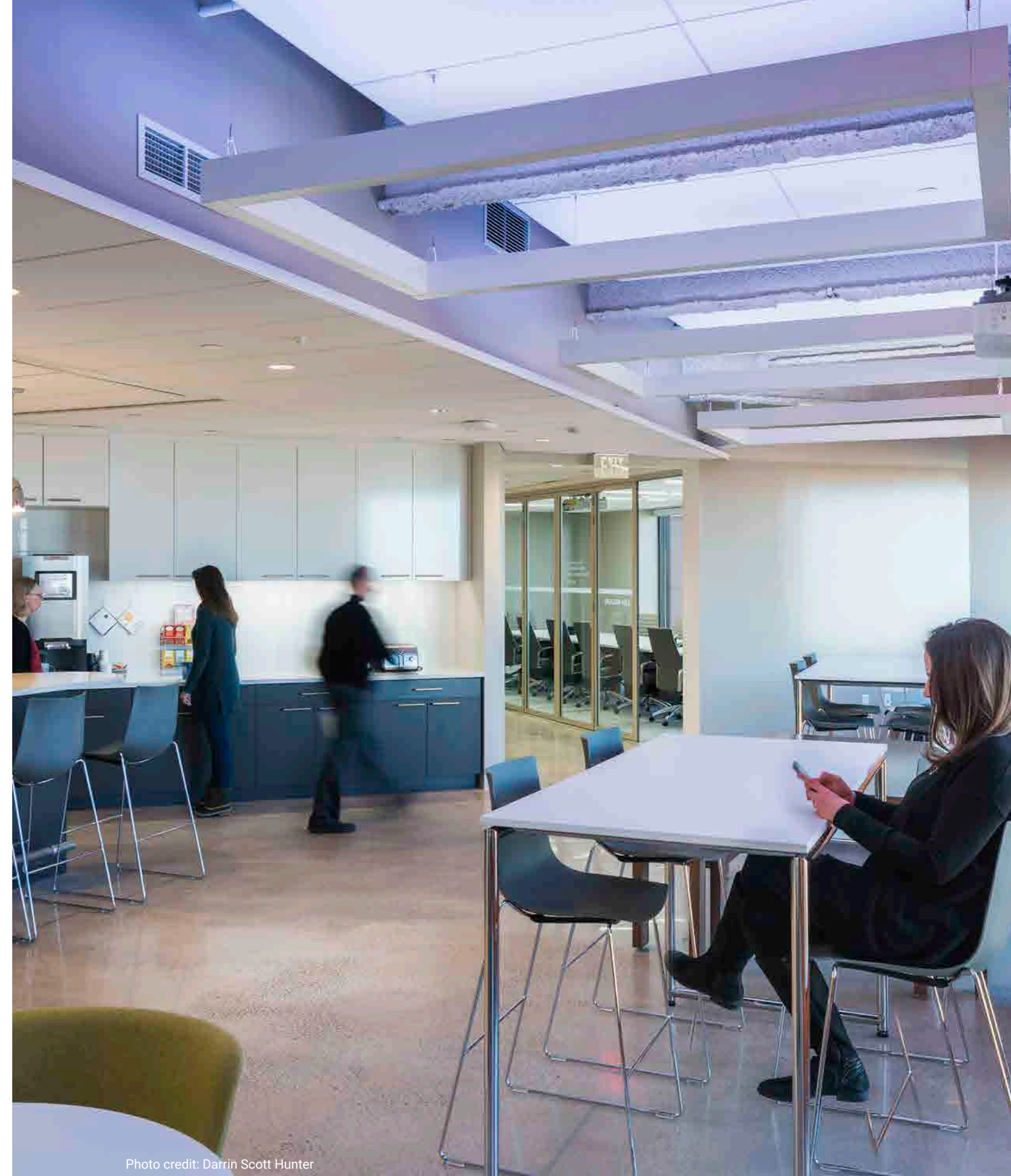


Photo credit: Darrin Scott Hunter

### About the project

Certifications: LEED Gold (2009), with the opportunity for LEED Platinum with the installation of solar panels.

2,067 m<sup>2</sup> government building bringing together seven departments who together provide a variety of social services to over 1,000 members of the public each day.

Architecture and sustainability consulting by HKS.

### Key message

The design of the building enables 95% of the staff to have workstations within 30 feet of perimeter glazing and a raised floor mechanical system allows for individual temperature controls, resulting in 34% reduction in energy costs. Additionally, 51% of the site is landscaped, with cars removed from the centre of the campus, 6,000 square feet are dedicated to bio-swale and teaching gardens, and 40% increase in community green space.



### Green Features with Environmental, Health & Wellbeing Benefits

#### Lighting

95% of the workstations are located within 30ft of a window and there are no closed offices on exterior walls. Low partitions allow access to natural light for all occupants, and every floor has an outdoor terrace for staff.

#### Indoor Air Quality

Continuous raised floor system with underfloor heating, as well as diffusers for staff, enhances occupant comfort for employees. This specifically has contributed to a 34% reduction in energy costs when compared to a building of conventional design.

#### Interior Layout

The flexible, open layout allows for easy re-stacking and organisation, and reduces furniture waste.

#### Acoustics

A subtle sound-masking system was installed to add acoustic privacy in open plan areas.

#### Location & Amenities

By Los Angeles standards, the development is well connected to public transit, with a walk to the nearest bus stop and light rail of just six minutes – a major benefit for clients.

#### Biophilia & Views

Parking was placed underground to increase the amount of public green space available to staff, clients, and the public. Staff have access to terraces on every floor with views to the public green space. The art integrated into the project reflects natural elements, such as flowers throughout.

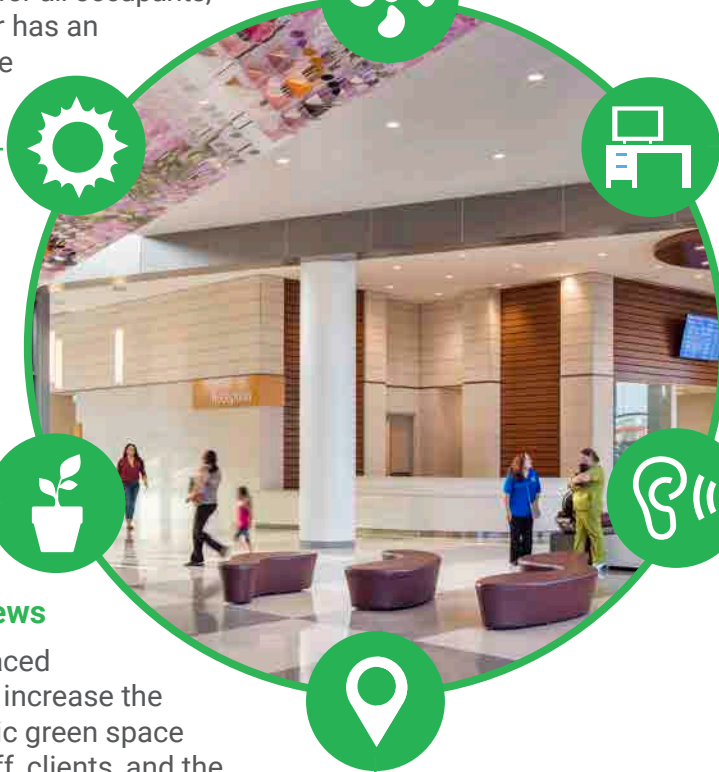


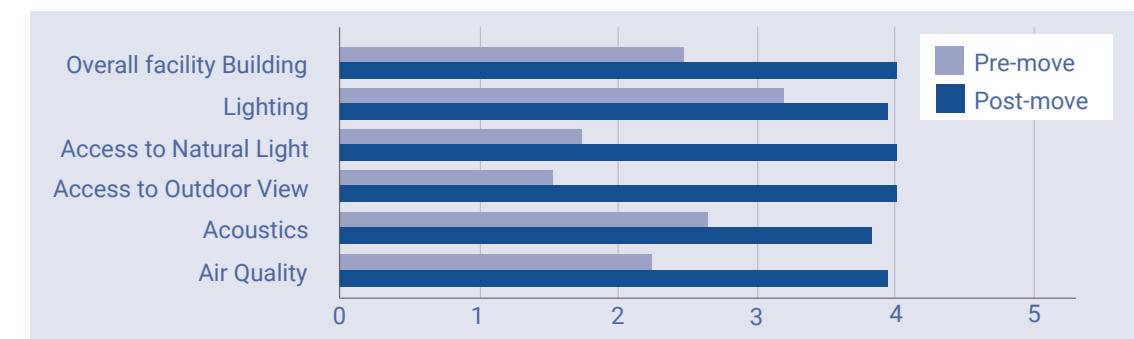
Photo credit: Blake Marvin Photography



### Occupant Satisfaction

Pre-move surveys were conducted with each of the seven government departments to ensure their input and concerns were addressed in the design of the new shared space.

Post-occupancy surveys confirm that occupant satisfaction score rose considerably across most areas. In particular:



### Economic Benefits

Economic outcomes are currently being calculated.

### Behind the Case Study

#### Raising the floor, raising standards

The raised floor system makes reorganisation of departments and furniture much simpler than with traditional hard-wall construction and ducted ceiling supply air conditioning. It also delivers significant energy savings, because the floor-supplied cooled air can be provided at a warmer temperature than cold air pushed down from the ceiling. The floor-supplied air rises naturally due to stack effect, and is returned to the system at the ceiling for cooling and recirculation.

Occupant comfort has also been enhanced by the underfloor heating and cooling system. Localised diffusers on the floor near workspaces allow individuals to tailor spaces to their own temperature preference and higher amounts of filtered outside fresh air enhance the air quality and health characteristics of the work environment.

# What Comes Next?



## Data and rigour

WorldGBC looks forward to continuing to support and promote the efforts of those companies doing the important work of proving to the greatest extent possible a cause and effect relationship between a green and healthy indoor environment and positive economic outcomes.

We encourage those companies with case studies in this report to continue to refine and publicly share their results and we encourage those projects not quite ready to share their data to work towards doing so.

## A global transformation

Championing local and global leadership and empowering our community to drive change is part of WorldGBC's mission. Through our [Better Places for People](#) project we will aim to support our GBCs to identify more good practice where it exists across the globe and plan for future case study reports to have even greater regional representation. The business case for green buildings through health and wellbeing is a universal one with the opportunity to impact markets in every corner of the globe across all building types.

Recent examples of GBC initiatives related to the Better Places for People global project linking green buildings and health and wellbeing features include:



[The Wellbeing Lab for Retail](#) was a six month, bespoke, collaborative research and learning programme, tackling the topic of health, wellbeing and productivity in retail environments. The participating teams, composed of different combinations of retailers, landlords, consultants and other stakeholders, each undertook deep dive research into a specific element of the topic. The overarching goal of the project was to strengthen the business case for sustainable design and investment decisions in the sector.



India GBC has recently launched 'IGBC Health and Well-being' to complement its existing suite of 22 rating programmes developed over the past two decades of experience. The objective of the new rating programme is to incorporate people-centric measures including physical, emotional, intellectual and social well-being alongside resource efficient building design and operation. The first project was certified under IGBC Health and Well-being rating program in February 2018.






Inspired by the Better Places for People global project, Polish GBC set up a 'Healthy Green Office' task group and has conducted a national survey among Polish employees on workplace perception. Based on almost 1,000 survey responses, Polish GBC is compiling a report that will be launched in June 2018 with the goal of raising both employer and employee awareness on green buildings and healthy workplaces.

## Supporting field and lab-based research

WorldGBC is also aware that important research efforts are being undertaken by a variety of teams to prove the business case for green buildings with health and wellbeing features and we will do what we can to support each one, where appropriate. For example, the research team at Harvard University's Chan School of Public Health is recruiting for both building owners and managers and building occupants to participate in a global study ([The Cognitive Function Study 3](#)) while Delos continues to develop innovative [research insights](#) and market leading projects.

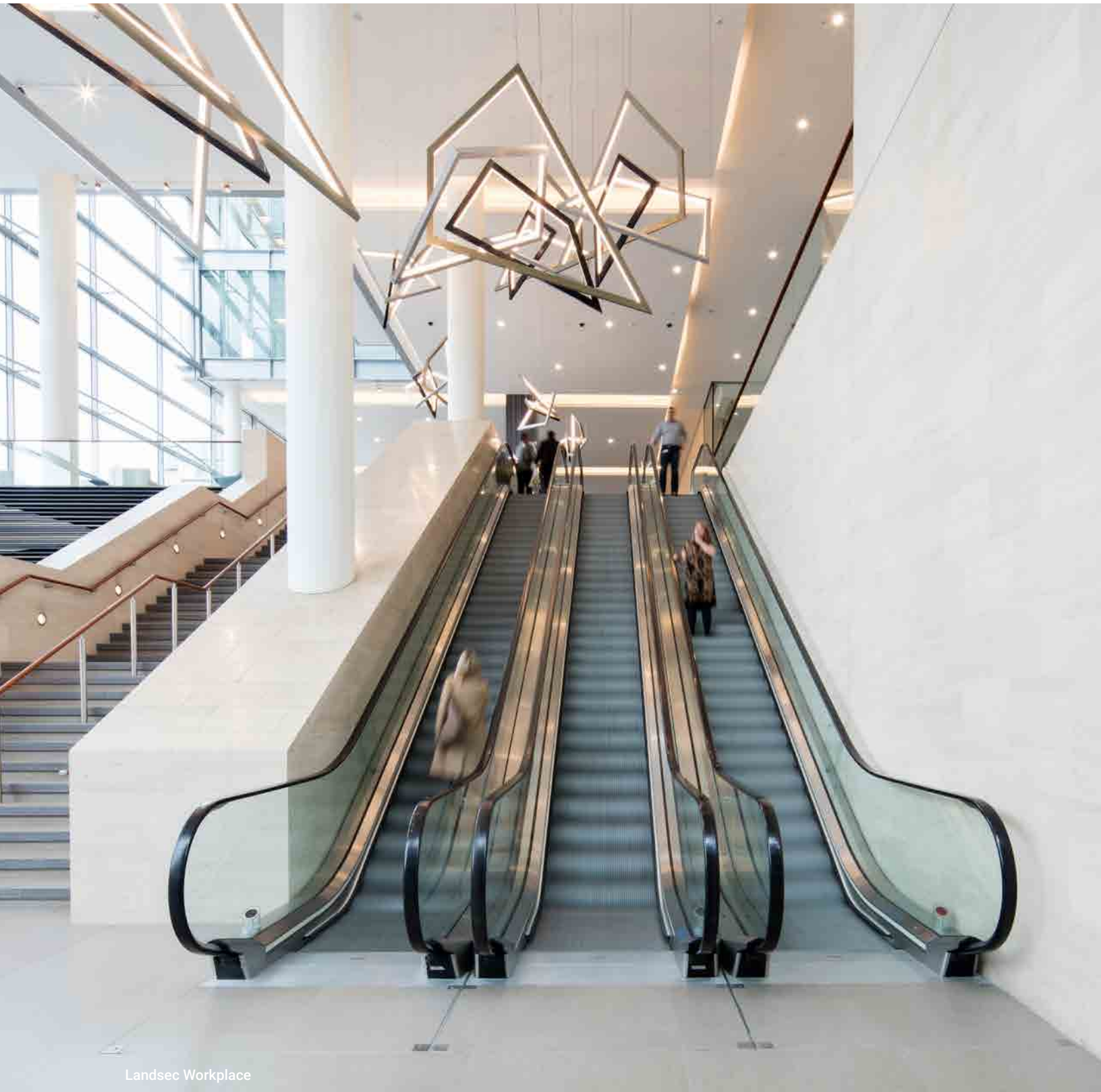
## Get started with the WorldGBC Metrics Framework

Have you been inspired by the projects in this report? Would you like to explore how you can follow their example? For companies needing help to start collecting the indoor environment, occupant experience and economic data they need, WorldGBC's Metrics Framework, summarised below, is available online<sup>14</sup> with supporting resources.

 <b>Green Features</b> with Environmental, Health & Wellbeing Benefits	 <b>Occupant Satisfaction</b>	 <b>Economic Benefits</b>
<ul style="list-style-type: none"><li>• Acoustics</li><li>• Active Design</li><li>• Biophilia &amp; Views</li><li>• Indoor Air Quality</li><li>• Interior Layout</li><li>• Lighting</li><li>• Location &amp; Amenities</li><li>• Look &amp; Feel</li><li>• Materials</li><li>• Thermal Comfort</li></ul>	Perception of the occupants' experience in the building, as measured by a survey.	<ul style="list-style-type: none"><li>• Absenteeism</li><li>• Medical Complaints</li><li>• Medical Costs</li><li>• Physical Complaints</li><li>• Revenue</li><li>• Staff turnover/ Retention</li></ul>

14 [Building the Business Case: Health, Wellbeing and Productivity in Green Offices](#)





Landsec Workplace