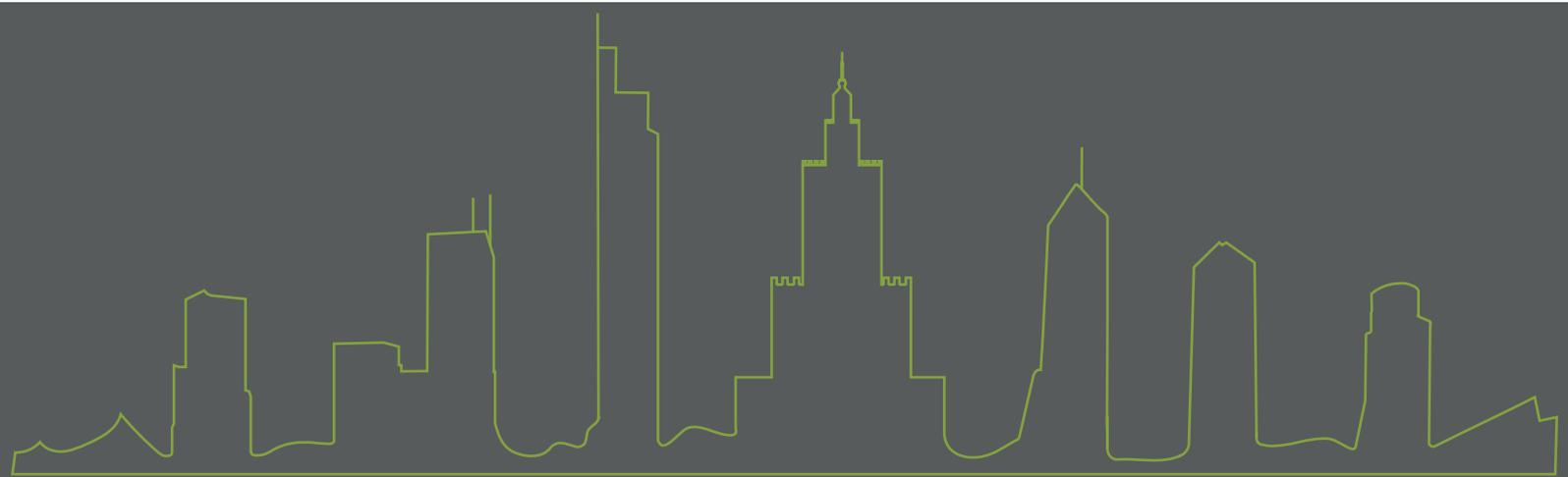


WHITE PAPER



HEALTH AND PRODUCTIVITY IN SUSTAINABLE BUILDINGS

Strategic partners



MINISTRY
OF
ECONOMY



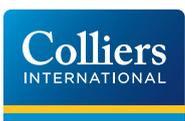
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PHILIPS

Halton

SKANSKA

Ecophon
SAINT-GOBAIN
A SOUND EFFECT ON PEOPLE

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CONSTRUCTION
MARKETING
GROUP

Construction Marketing Group (CMG) is an initiative of construction and commercial real estate companies. The group brings together people involved in strategic marketing, business development and communications. CMG's mission is to undertake activities aimed at networking; building and promoting strategic role of marketing in the construction and commercial real estate industry; educating the industry in terms of sustainable development and energy efficiency, integration in dialogue with policy makers and professional development of the group members. As part of the CMG's activities a project *Analysing the sustainable construction market in Poland* was initiated. CMG is a local partner of *Energy Efficiency in Buildings Laboratory in Poland* organized by the World Business Council for Sustainable Development (WBCSD) and partner of VISION 2050, which is a joint initiative of the Ministry of Economy, Ministry of Environment, Responsible Business Forum (FOB) and Deloitte.

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ABOUT THE PROJECT

ANALYSING THE SUSTAINABLE CONSTRUCTION MARKET IN POLAND

This White Paper is part of a research project on sustainable buildings in Poland. The project was initiated by BuroHappold Engineering within the scope of the Construction Marketing Group (CMG). The full project consists of two phases.

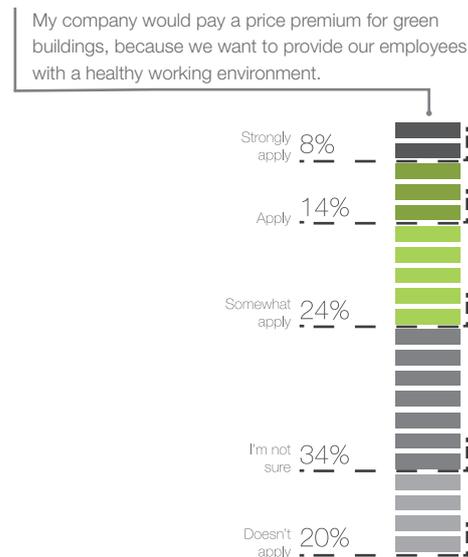
The first phase was an analysis of the market perception around sustainable buildings. Project partners included Colliers International, Jones Lang LaSalle, Skanska Property Poland, Hill International, Philips Lighting, PwC, PRC Architekci, Imtech and SPIE Polska¹. The second phase consists of analysing data and the benefits of sustainable buildings in the Polish market.

During the first part of the project, with the use of an online survey, CMG explored the perception of the value of sustainable buildings among developers, investors and main tenants in six categories (general awareness, asset value, operating costs, construction costs, workplace productivity and health, and risk mitigation). Among other findings the study showed that 54% of respondents did not agree, or were not certain that, their firm would be willing to incur higher costs of purchasing or renting a green building for the purpose of providing their tenants or employees with a healthier workplace². This indicated that there is low market awareness regarding the full scope of attributes of sustainable buildings and the extent of their impact on the health, well-being and productivity of tenants.

In order to face this challenge, and as part of the second phase, BuroHappold Engineering came together with experts and partners (Colliers International, Skanska Property Poland, Philips Lighting, PRC Architekci, Ecophon and Halton) and formed a technical committee in order to answer the following questions:

- Why and how should businesses measure the impact of their buildings on their people?
- What common approach should we apply in the local market?
- How does the global framework presented by the World Green Building Council (WGBC)⁴ apply to the Polish market?

Figure 1: Analysing the sustainable construction market in Poland. Market perception study³



1, 2, 3. Construction Marketing Group. 2013. *Analysing the sustainable construction market in Poland. Market perception study*. Warsaw, Poland: http://issuu.com/constructionmarketinggroup/docs/analysing_the_sustainable_construct.

4. World Green Building Council. 2014. *Health, Wellbeing and Productivity in Offices. The next chapter for green building*. Accessed May 14, 2015. <http://www.worldgbc.org/activities/health-wellbeing-productivity-offices/>.

MAIN CONCLUSIONS

Sustainable buildings are not only more energy efficient but are also able to improve the well-being and efficiency of the people working in them.

It is necessary and feasible for businesses to measure the impact of their buildings on their employees. Most of the data needed have already been collected in various places in an organisation or are relatively easy to access. What needs to be addressed, however, is how buildings influence people's health, well-being at work and subsequent productivity.

The overall organisational measurement framework proposed by the WGBC and analysed as part of the project can be adopted as a regular approach for the Polish market.

Multiple studies⁵ show that sustainable design is key to success. Investors need to ensure that elements such as indoor air quality, (ventilation and thermal control), light quality, acoustic comfort, spatial configuration, biophilia, view out and access to amenities are adequately addressed.

The aim of this White Paper is to encourage businesses to investigate the real impact their buildings have on their people. The methodology we propose will allow businesses to collect the information they need in order to be able to understand this link and to implement the changes needed to start to enjoy the financial benefits related to improved health, well-being and productivity.

5. Please refer to Bibliography section.

INTRODUCTION

"At BuroHappold Engineering we are aware that a well-designed building combines a minimal negative impact on the environment with a positive impact on people's health and well-being. We regard such buildings as sustainable buildings."



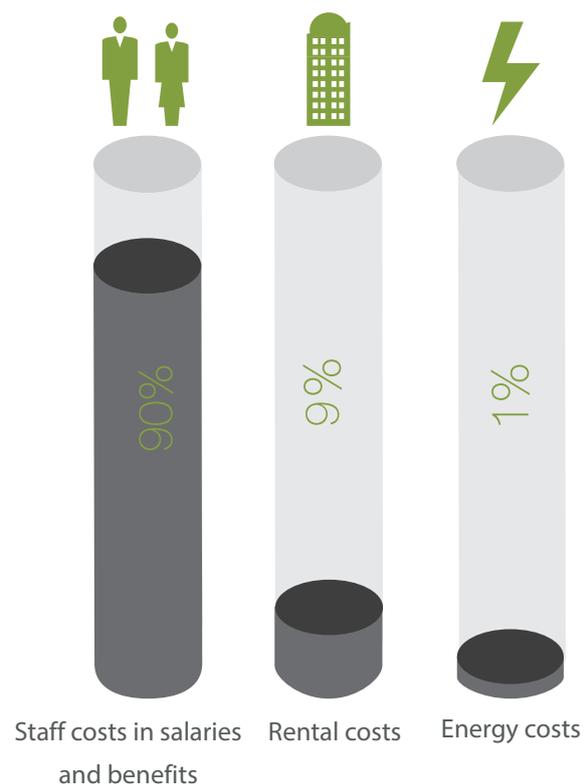
Ian Booth
Partner
BuroHappold Engineering

The aim of this White Paper is to raise business awareness of the positive impact sustainable buildings have on people and the possible financial benefits. The document is intended for investors, business leaders, tenants and real estate agents.

The link between people's health and their productivity is irrefutable. A range of research cited in the Bibliography section⁶ shows that attributes of sustainable buildings such as clean indoor air or access to daylight have a proven positive impact on people's health. Nevertheless, the impact of a building on people's well-being and productivity at work is often underestimated by companies as it seems difficult to prove the business case behind it.

The real costs for most companies are related to staffing costs, including salaries and benefits. These costs account for about 90% of typical business operating costs⁷. Any improvement in workers' health and productivity may have much greater financial implications for the employer than energy or water savings. So why do we not include this in the return on investment of a sustainable building?

Figure 2: Typical Business Operating Costs⁸



6. Please refer to Bibliography section.

7, 8. World Green Building Council. 2014. *Health, Wellbeing and Productivity in Offices. The next chapter for green building*, p. 6. Accessed May 14, 2015. <http://www.worldgbc.org/activities/health-wellbeing-productivity-offices/>.

This White Paper builds on a report *Health, Wellbeing and Productivity in Offices* published by the World Green Building Council in 2014. The report highlighted the real business case for sustainable buildings and proposed a comprehensive high-level framework for measuring organisational outcomes and relating those back to the physical features of sustainable buildings and employee perception. The framework is a result of workshops and consultations with over 50 consultants from various companies globally. BuroHappold Engineering, together with experts and partners (Colliers International, Skanska Property Poland, Philips Lighting, PRC Architekci, Ecophon and Halton)

undertook a review of the methodology presented in the WGBC report. During four working sessions, local market specialists in such fields as human resources, marketing, building services engineering, architecture, acoustics, BREEAM (BRE Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design) certification, attempted to examine the global framework and highlight the issues, analyse and describe the problems and indicate that there is a global solution that can be applied successfully in the local market.

The key questions the workshops aimed to answer were:

- *Why and how should businesses measure the impact of their buildings on their people?*
 - *What common approach should we apply in the local market?*
 - *How does the global framework presented by the WGBC apply to the Polish market?*
-

WHAT IS THE BUSINESS CASE FOR SUSTAINABLE BUILDINGS?

Buildings not only have an impact on the environment due to energy use but also due to the well-being and productivity of their tenants. As the vast majority of real costs for any business are connected to staffing costs, including salaries and benefits, and as these costs usually account

for about 90% of typical business operating costs⁹, any improvement in people's well-being and productivity may have much greater financial implications for the employer than energy savings.

As we spend on average approximately 90% of our time indoors¹⁰, poorly designed buildings and indoor environments have a negative impact on people's well-being and long-term health.

WHAT IS THE LINK BETWEEN HEALTH, WELL-BEING AND BUILDINGS?

According to the World Health Organization (WHO), health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity¹¹. The link between well-being and productivity is widely understood, but the market is not fully aware of the full scope of factors that are considered in sustainable buildings. There is also a lack of accessible sustainable building data on the market.

Environmental conditions inside buildings have an impact on our health, which was the reason for setting basic regulations for different types of buildings, including offices. Together with the development of scientific methods to measure employee efficiency, substantial evidence exists to build a link between offices and productivity¹².

The effect of Indoor Environmental Quality (IEQ) in non-industrial buildings, such as offices, schools or residential, is an increasingly important topic in public health as well as design research and practice. There are numerous studies¹³ focusing on different aspects of IEQ and its influence on employee satisfaction, productivity or absenteeism.

While some of these studies can be found inconclusive, there is consensus among scientists in Europe as well as evidence confirmed by peer-reviewed scientific papers, that increasing ventilation rates, illumination and exposure to views is strongly related to an increased perceived level of comfort, reduced risk of short-term sick leave and an increase in productivity¹⁴.

9. World Green Building Council. 2014. *Health, Wellbeing and Productivity in Offices. The next chapter for green building*, p. 6. Accessed May 14, 2015. <http://www.worldgbc.org/activities/health-wellbeing-productivity-offices/>.

10. U.S. Environmental Protection Agency. 1989. Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001 C. Washington, D.C.

11. World Health Organization. 2006. "Constitution of the World Health Organization", *Basic Documents*, Forty-fifth edition, Supplement. New York: Accessed May 14, 2015. http://www.who.int/governance/eb/who_constitution_en.pdf.

12. Barry Haynes. 2008. "The impact of office comfort on productivity", *Journal of Facilities Management*, 6 (1), 37-51.

13, 14. Please refer to Bibliography section.

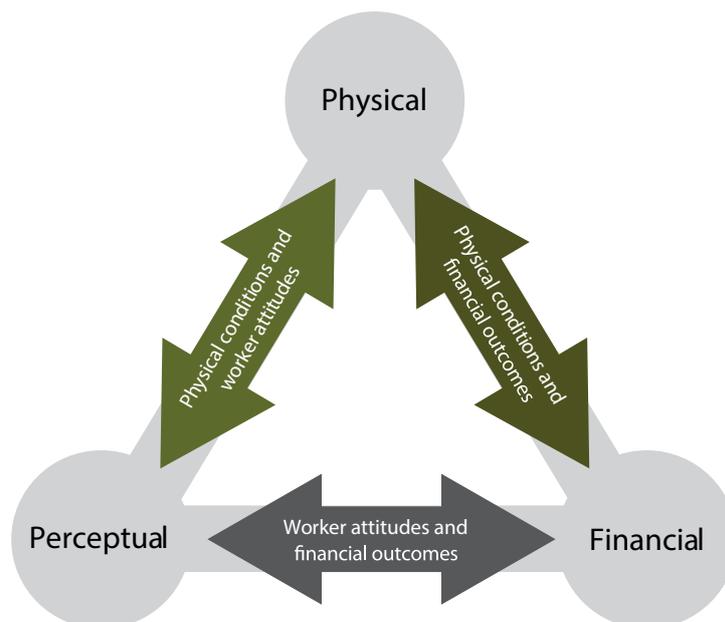
HOW TO PROVE THE BUSINESS CASE FOR SUSTAINABLE BUILDINGS?

BREAKTHROUGH WORKSHOPS IN THE POLISH MARKET

BuroHappold Engineering involved experts in such fields as human resources, marketing, building services engineering, architecture, acoustics, BREEAM and LEED certification, and formed a technical committee. The local work built on an integrated framework proposed by experts working with the WGBC.

The aim of this framework is to take the available overall company metrics and assess them at the building level. This will allow companies to begin taking an integrated approach to understanding the real impact of their buildings on their people.

Figure 3: Summary of metrics framework and key relationships¹⁵



As part of this process, three workshop discussions were held focusing on the financial, perceptual, and physical framework areas proposed by the WGBC, as well as a summary workshop to discuss all the findings to be presented in this White Paper. The key question these workshops intended to help the business community answer was: How does my building impact my people?

15. World Green Building Council. 2014. *Health, Wellbeing and Productivity in Offices. The next chapter for green building*, p. 12. Accessed May 14, 2015. <http://www.worldgbc.org/activities/health-wellbeing-productivity-offices/>.

HOW TO APPLY THE ORGANISATIONAL METRIC?

During the session joined by HR specialists, the technical committee looked at the organisational metric proposed by the WGBC.

DISCUSSION

The workshop participants agreed that the impact of buildings on people can be seen in the data companies are required to collect by employment law. It is worth highlighting

that this approach seldom requires additional costs or resources. The factors that should be taken into consideration while assessing the impact of the physical environment on people include: absenteeism, staff turnover, revenue, medical complaints and physical complaints. Below are the elements of the metric applicable for businesses in Poland.

1. ABSENTEEISM

Absenteeism: number of days (or hours) of absence due to illness annually.

The workshop attendees drew attention to various research studies demonstrating that poor indoor air quality has serious impacts on people's health. This can be demonstrated by higher rates of sickness. This measure should be considered in the context of the physical environment by applying the following:

- Companies should group all the absences into those related to health problems and other causes. Then, from the group of health-related absences, companies should take away the absences due to pregnancy or child or family-member care.
- All health-related absences should be geographically positioned to a physical place in the building.
- If the health-related absences are higher in specific buildings or areas of the office, then one needs to look for a correlation with the physical environment.

2. STAFF TURNOVER

Staff turnover: percentage of regular, full-time employees leaving employment (voluntarily or involuntarily) in a given year.

Many organisations track employee turnover as a normal business procedure. As it is rather costly to replace an existing employee, companies should also look for correlations with the physical office environment. Interestingly, as many as 72% of interviewed tenants in the Polish market agreed that sustainable buildings can improve the attractiveness of the firm in terms of obtaining or maintaining employees¹⁶. Thus, the following approach was recommended by the workshop participants:

- If an organisation performs entry interviews, a set of questions about the building should be added.
- Organisations should measure the total turnover during the previous 12 months. This should be corrected according to the standard turnover rate accepted for the industry.

16. Construction Marketing Group. 2013. *Analysing the sustainable construction market in Poland. Market perception study.* Warsaw, Poland: http://issuu.com/constructionmarketinggroup/docs/analysing_the_sustainable_construct.

- The exit interview should address the impact of the physical environment on the employee.
- Staff turnover is worth tracking in relation to specific buildings or areas of the office. While some employees may not attribute their decision-making to comfort in the work environment, the level of comfort may influence their thinking and decisions.

3. REVENUE

Revenue: revenue per division/department/team, per building/building zone, and/or per employee.

This metric falls under the most important parameter for business: productivity. Companies seldom review revenue trends in relation to particular properties. To fully understand the business impact of a company's internal environments, revenue should be broken down on a building-by-building basis. This metric can be applied by organisations with multiple locations. The steps to follow were agreed during the workshops and include:

- Record revenue on an office-by-office, or department-by-department basis.
- Group offices where individuals are performing similar functions.
- Compare unit revenue per individual or per square metre.
- Compare results and where results are substantially different, consider possible physical causes.

Workshop participants admitted that revenue can be difficult to measure as it depends on so many factors other than buildings. As well-designed buildings can improve health and well-being, this effect should be reflected in higher revenue or net profit.

4. MEDICAL COMPLAINTS

Medical complaints: incidents of reported or documented medical complaints resulting from the physical work environment or work activity.

Many workshop participants commented that if buildings have an impact on employees' health, then one should assume a higher number of medical complaints in buildings designed without features that promote health and efficiency:

- Track the number of medical complaints, job-related incidents and accidents on a building-by-building basis.
- Track cases when job-related illness has been reported.
- Benchmark medical complaints, job-related incidents, accidents, and cases of job-related illness across the portfolio and determine those properties that have levels significantly above the average number of complaints.
- One of the factors to be considered in Polish market is the number of pairs of glasses subsidised by an employer to be used for computer work.
- Where results are substantially different or unexplained, consider possible physical causes.

5. PHYSICAL COMPLAINTS

Physical complaints: number and type of complaints reported to the company of physical discomfort associated with the work environment or work activity.

Physical complaints are usually collected by organisations but on a rather ad hoc basis or the data are only known to the facility manager or office administrator. As various studies show, complaints about thermal comfort, noise, air quality and light quality usually have an impact on staff productivity. Thus, the following recommendations developed during the workshops should be applied:

- Track and record physical complaints reported by all employees, even the minor ones that usually go unnoticed – a company policy should be in place.
- All physical complaints should be assessed in relation to a physical place in a building (geo-positioning). Where rates are noticeably higher in a building or location, consider possible physical causes.
- Track the speed of response to a complaint and whether a complaint was resolved in a satisfactory way.

HOW TO APPLY THE PERCEPTUAL METRIC?

Perception survey: a study or research project conducted with the goal of collecting impressions about a company, product, programme or issue. Surveys may be verbal, written or electronic, and can range in length. The primary distinction of a perception survey is that it is intended to discover opinions rather than factual data.

During the session joined by HR and marketing specialists, the technical committee looked at the perceptual metric proposed by the WGBC's framework.

DISCUSSION

The organisational metric discussed during the first workshop addressed the objective indicators of health, well-being and productivity. People's attitudes about the physical environment are harder to quantify but still may have significant impacts on human performance. The technical committee agreed that tracking perceptions can provide the missing link between the physical environment and health and efficiency. Additionally, the costs of administering a perception survey are relatively low in the local market, and the value outcome very high. Many organisations do undertake regular perception surveys but seldom ask questions about health and efficiency in relation to the physical office environment. The workshop participants pointed out that survey outputs must not be over-relied upon in isolation. However, correlation analysis against organisational and physical metrics provides a powerful tool for better

understanding the impact of the office on its occupants. Key drivers, objectives, organisational structure and outputs will vary across different organisations, and surveys will need to account for these differences if at all possible. However, as a general rule, surveys should attempt to address health, well-being and productivity as part of the same exercise. In order to compliment the organisational and physical metric, the perception survey should investigate such areas as: general perception of the building and its location, indoor air climate, light comfort, acoustics comfort, office design and layout. The technical committee stressed that:

- Perception studies do not require a specialised infrastructure to implement, as simple tools for on-line research can be used.
- For a study to be valid it should engage the largest possible number of employees.
- The survey and its purpose should be communicated to staff in a comprehensive way and staff should be encouraged to participate.
- Staff taking part in the survey should understand that the main objective is to improve their overall satisfaction.

The results of the survey will allow an employer to take corrective actions in order to improve the overall level of satisfaction among employees. Such an approach will undoubtedly have a very positive impact on overall employee engagement.

The WGBC's report highlighted several readily available methodologies on the market that enable both building managers and tenants to assess environmental comfort and pinpoint underperforming areas, which the workshop participants agreed were valuable:

- The Occupant Indoor Environmental Quality (IEQ) Survey™ from the Center for the Built Environment at UC Berkeley
- The Gallup Workplace Audit
- The Leesman Index
- Building Use Studies (BUS) Methodology

The methodologies listed above are focused on quantifying workplace performance and perception of indoor environmental comfort indicators. The leading certification schemes relating to sustainable buildings (LEED, BREEAM, and DGNB) also encourage satisfaction surveys among building occupants as well as post-occupancy evaluation.

Companies and institutions seeking to take a more holistic approach to the indoor environment can also use the recently developed WELL Building Standard that is entirely dedicated to enhancing human health and well-being. The current version of the standard, released in October 2014, can be applied to new construction and major renovations, tenant improvements and core and shell developments and is designed to complement the LEED Green Building Rating Systems as well as other standards available on the market. WELL Building Standard Precondition 86 – Post Occupancy Surveys, uses the Occupant Indoor Environmental Quality (IEQ) Survey™ core question areas, which cover acoustics, thermal comfort, furniture and spacial layout, workspace

light levels, odours, stuffiness and other air quality concerns, as well as drinking water access. In order for the survey to be valid, it needs to include responses from a representative sample of at least 30% of regular occupants.

HOW TO APPLY THE PHYSICAL METRIC?

"Individual performance is significantly affected by the conditions of the working environment. The latest studies have proved that investment in improved indoor climate is very cost-effective. In offices, the most significant factors affecting the performance of workers are thermal environment and air quality. Even though numerical physical measures define accurately different factors of the indoor environment, only the perceived quality determines the total performance of the building from the user's point of view. With high system performance, it is possible to create a healthy and productive working environment in an energy-efficient manner."



Prof. Risto Kosonen
Director of Research and
Development of Office Segment
Halton Oy

During this working session, the technical committee looked at the physical metric proposed by the WGBC's framework. This session was enriched by the presence of Professor Risto Kosonen from Aalto University in Finland and Director of Research and Development of Office Segment at Halton Oy. Below is a summary of the discussion and key recommendations for businesses in Poland.

DISCUSSION

The technical committee discussed the feasibility and relevance of measuring factors identified by the WGBC with regard to the peculiarities of the Polish market. A common observation was that some of the proposed directly measurable physical criteria may be difficult to record under current industry practice in Poland.

Moreover, the advanced evaluations of certain issues recommended by the WGBC may require a strategic simplification to achieve the necessary level of feasibility in the Polish market. For the same reasons, the technical committee agreed to withdraw some of the measurements or evaluations recommended by the WGBC for the purposes of the local methodology in order to enhance the feasibility of the research and achieve a more practical approach at an acceptable cost in terms of accuracy. Among the directly measurable factors, the working group identified sets of variables which should be investigated together as connected issues characterising different aspects of the work environment and associated with the same sorts of sensations.

1. INDOOR AIR QUALITY

Indoor air quality: quality of air in the building environment influencing breathing comfort and thermal sensations.

- Most pollutants affecting indoor air quality come from sources inside buildings, although some originate outside. Typical pollutants of concern include combustion products such as carbon monoxide, particulate matter and environmental tobacco smoke, substances of natural origin such as radon, biological agents such as moulds, pesticides, lead, asbestos, ozone (from printers and some air cleaners), and various volatile organic compounds (VOCs) from a variety of products and materials¹⁷.
- The building occupier should measure a broad range of parameters related to temperature comfort and lack of pollutants, as well as its refresh rates. This group of parameters should give extensive information on risks related to breathing problems or unsatisfactory thermal sensations.
- In order to ensure satisfactory air quality, this must be taken into account at all stages of design, starting with the concept of the building or even choice of location. External factors such as the presence of pollutants in the air as well as climate and micro-climate have to be taken into consideration. Pollutants may have artificial (industry, vehicular traffic) or semi-natural (agricultural) origin.

They can be characteristic for the chosen location or emerge as a result of activities connected with the development, such as generated vehicular traffic, HVAC exhaust etc. Thorough analysis of the place, but also profile of the planned operations on site, are key to optimal design.

2. LIGHT QUALITY

Light quality: accessibility to natural and artificial light and the light parameters influencing well-being.

- Taking into account both natural and artificial light, its intensity and distribution so that visual comfort is secured — as visual comfort is undoubtedly one of the key productivity drivers and, at the same time, eyesight problems are widely associated with poor working conditions – special consideration has to be given to the subject.
- As daylight seems to be the healthiest type of light, not to mention that it is also the cheapest, the struggle for natural light is always worth the effort. During building design, architects must consider not only the building envelope with windows and interiors but also the interactions between the building and its surroundings, including both obstacles for the light and objects acting as reflectors. Current design tools and engineering expertise enable building designers to simulate and maximise daylight. This is a challenging task involving balancing of multiple and often contradicting factors (direct sunlight and thermal comfort).

17. U.S. Environmental Protection Agency. 2008. *Report on the Environment. What are the trends in indoor air quality and their effects on human health?* 2-73. Washington D.C.

- Design of artificial lighting is focused on the qualities of the natural ideal, in order to be well received by the human senses, while remaining energy efficient.
- Choice of artificial light sources and their positioning is only half the story. Suitable controls enabling zoning and change of characteristics (e.g. adjustable LEDs) are the key challenges to adopting the lightscape to current patterns of activity in the building environment.

3. ACOUSTIC QUALITY

Acoustic quality: acoustic stressors generated by building users, including speech, building components, and the widely defined surroundings.

- An acoustically comfortable building requires solutions on multiple levels, from the master-plan and general spatial concept to interior details. This includes both reducing the noise at source (i.e. building ventilation plants, speech noise) and isolating different acoustic zones.

- Workspaces designed for interactive communication and knowledge transfer can often be a source of disturbance for co-workers who are trying to concentrate.
- To avoid a lack of privacy, it is important to counteract the spread of noise, particularly disturbance due to conversations, which is often found to be most disruptive. Rooms should be designed so that sound propagation is reduced efficiently.
- To make open-plan premises functional for a given purpose, it is important to define the level of sound absorption needed to keep noise close to its source. Background noise should be controlled to stay at a level that is not annoying, while providing speech privacy.
- In spaces designed for speech – meeting and tele-conference rooms, phone booths – clarity of sound is desired, which is obtained by reduction of unwanted reflections from ceilings and walls.

"A sharing of experiences at a recent workshop helped demonstrate just how complex the office organism is and how multiple factors will determine if the companies' specific goals can be reached. Central to this theme is the leading trend towards open-plan design and the importance of office acoustics. Good working environments, for the most part, are a matter of initiative and good will. The intention of this White Paper is to highlight key areas impacting employee productivity and satisfaction and to help motivate companies to conduct observations and research on this subject."



Magda Szubert
 Concept Developer
 Office Environments
 Saint-Gobain Ecophon

4. SPATIAL CONFIGURATION

Spatial configuration: spatial arrangement of working environments and their relation to their surroundings.

- Apart from the directly measurable factors, members of the technical committee agreed that the spatial configuration of the working environment plays a vital role in health and productivity. Spatial configuration on different scales should be taken into account, such as relations between the office external amenities influencing productivity, configuration and

number of workplaces within the office, and spatial relations between a single workplace and its immediate surroundings. It is likely that contradicting concepts such as accessibility, privacy, design and nature should be considered here.

- Other elements that may play an important role in how people regard their office environment, and how they feel in it, include such factors as biophilia, view out and access to amenities.

“Colliers increasingly finds its Clients focused on the need to attract and retain generation Y talent, which places great emphasis on sustainability, the work environment and in particular the freedom to work away from the traditional desk in collaboration with others.”



Jonathan Cohen
Director
Building Consultancy
Eastern Europe
Colliers International

CONCLUDING DISCUSSION

"Each building is a prototype comprising complex patterns of activities in a unique surrounding. A sustainable building is a building which is not only resource-efficient throughout its life-cycle but also provides a high quality build environment in terms of users' health, process effectiveness and economic efficiency. Achieving optimised performance in all three mentioned comfort areas within a reasonable timeframe and budget is a task only multidisciplinary teams of experts may achieve, yet in close cooperation with the Clients (building occupants)."



Dr inż. arch. Jan Cieśla
Associate - Sustainability
BuroHappold Engineering

THE DESIGN PROCESS OF AN OFFICE BUILDING CAN IMPROVE THE PRODUCTIVITY OF FUTURE TENANTS.

During the concluding session, the technical committee highlighted that the design of an office building has a positive impact on the health and well-being of people and potentially can improve their productivity. It should take a holistic approach and look well beyond energy efficiency to include criteria around other aspects of sustainable buildings such as: indoor air quality (ventilation and thermal control), light quality, acoustic comfort, spatial configuration at a minimum. The technical committee agreed that national standards and Polish building law related to indoor environment and occupational health are limited to specifying basic parameters such as air temperature, fresh air rate, luminance

and noise level.¹⁸ Values that are in place in the standards are based on research that is not all up to date. Moreover, requirements are very general. Recently, new measures for evaluation of physical conditions in terms of working environment have been introduced. European standard EN 15251 is a document that aggregates all aspects of the physical environment that are proven to influence occupant comfort and performance. This White Paper includes references to measurement and verification methodologies and although designers of modern office buildings in Poland are using this standard, it is still not common practice.

18. Polski Komitet Normalizacyjny.1983. *Wentylacja w budynkach mieszkalnych zamieszkania zbiorowego i użyteczności publicznej*. Wymagania. PN-83/B-03430.

Polski Komitet Normalizacyjny. 2008. *Wentylacja budynków niemieszkalnych - wymagania dotyczące właściwości instalacji wentylacji i klimatyzacji*. PN-EN 13779: 2008.

Polski Komitet Normalizacyjny.1987. *Akustyka budowlana. Ochrona przed hałasem pomieszczeń w budynkach. Dopuszczalne wartości poziomu dźwięku w pomieszczeniach*. PN-87/B-02151/02.

Ministerstwo Pracy i Polityki Socjalnej. 1998. „Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 1 grudnia 1998 r. w sprawie bezpieczeństwa i higieny pracy na stanowiskach wyposażonych w monitory ekranowe”, *Dz.U.* 1998 nr 148 poz. 973.

Polski Komitet Normalizacyjny. 2012. *Światło i oświetlenie - Oświetlenie miejsc pracy - Część 1: Miejsca pracy we wnętrzach*. PN-EN 12464 - 1:2012.

BUSINESSES IN POLAND CAN MEASURE THE IMPACT OF THEIR BUILDINGS ON THEIR PEOPLE.

The business case behind sustainable buildings can be proved by measuring and showing the positive impact sustainable buildings have on people's health, well-being at work and subsequent productivity. It is necessary and feasible for businesses to measure the impact of their buildings on people.

Most of the data needed are already collected in various places in an organisation or can be relatively easily accessed. What is missing, however, is a study of how buildings influence people's health, well-being and productivity at work.

"As a result of the work, a new specific knowledge appears, which presents a different way of looking at sustainable construction. This White Paper shows a consensus gained through workshops in the context of Polish market realities and challenges. Inclusion of sustainable construction, human resources and marketing specialists has brought new quality to the discussion. The extraordinary value of the workshops was the opportunity to learn about many available innovations that positively influence the health and well-being of people."



Bogdan Ślęk
Government Affairs Lead
Philips Lighting

THE FRAMEWORK PROPOSED BY THE WGBC CAN BE APPLIED IN POLAND TO BENCHMARK OFFICES.

The members of the technical committee jointly concluded that the overall organisational measurement framework proposed by the WGBC

and analysed locally as part of the project can be adopted as a common approach for the Polish market.

"The workshops proved that the measurement framework prepared by the WGBC and 50 international organisations can be adopted by businesses in Poland. There are many ways to evaluate workplace well-being and satisfaction. These have a direct influence on employees' productivity, and so are worth taking care of. The most interesting conclusion from the workshops is that it is neither hard nor expensive for companies to measure the impact of buildings on their people."



Adam Targowski
Sustainable Development and HVAC
Project Leader
Skanska Property Poland

KEY ENGINEERING CONSIDERATIONS FOR INVESTORS AND TENANTS

AIR QUALITY

- Natural ventilation or mixed-mode system
- Ceiling heights: the greater the heights available above the occupants' breathing zone, the greater the space for stratification
- Building materials: eliminations of volatile organic compounds (VOCs) and other pollutants
- Dedicated exhaust ventilation to print rooms, photocopiers and laser printers (that emit ozone)
- Specification of low and zero-emission carpets and suspended ceilings
- Specification of low or zero-emission finishes and adhesives
- Air quality sensors (CO₂) and variable ventilation intensity

THERMAL COMFORT

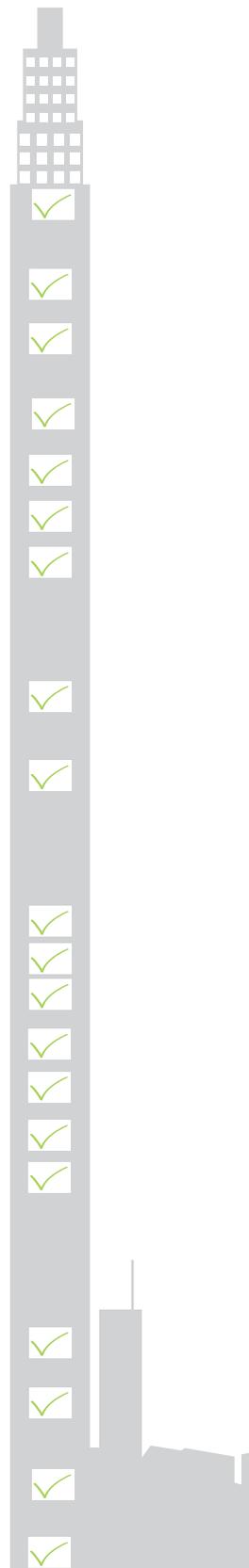
- Sensor technology and zoned controls ensuring comfort of individuals or small groups
- Adjustable external blinds connected to daylight sensors

LIGHTING AND DAYLIGHT

- Luminance levels appropriate to tasks
- High colour rendition
- High-frequency and efficient lights
- Limited glare and good visual comfort
- Presence detectors, colour changing and daylight-linking
- Artificial lighting control zoning
- Daylight/glare controls

NOISE AND ACOUSTICS

- Appropriate sound absorption of the room provided through absorbant materials on surfaces depending on the room and its function
- Controlled background noise level suitable for certain activity or room typology
- Providing the need for concentration and privacy on the one hand and the desire for openness and communication on the other
- A range of different work spaces providing various levels of acoustic privacy



INTERIOR LAYOUT AND ACTIVE DESIGN

- Task-based and social spaces
- Active design

BIOPHILIC DESIGN AND QUALITY VIEWS

- Longer distance views away from computer or written documents allowing the eyes to adjust and re-focus
- View out to nature

LOOK AND FEEL

- Low-energy lighting strategy
- Materials low in volatile organic compounds (VOCs)
- Easy to clean
- Low-VOCs cleaning
- Adjusting ceiling height to nature of tasks — high for creative tasks, low for accuracy-based (impact on HVAC strategy)

ACCESS TO AMENITIES

- Restaurants
- Retail and services
- Public transportation hubs
- Social spaces (spaces of social activity in the neighbourhood)



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Project coordination | Marketing
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COMPANIES THAT CONTRIBUTED TO THE PROJECT

BUROHAPPOLD ENGINEERING

Project leader

Described by our clients as 'passionate', 'innovative', 'collaborative': BuroHappold Engineering is an independent, international engineering practice that over the last 40 years has become synonymous with the delivery of creative, value led building and city solutions for an ever changing world. Having worked on every continent, our clients include more than 90% of the world's leading architectural practices and we have collaborated with global organisations such as the United Nations, The World Bank and UNESCO. Through our global community of driven, world-leading engineering professionals we deliver elegant solutions for buildings and cities that seek to address the major problems facing societies today.

The office in Poland was established in Warsaw in 1997 and currently employs over 100 engineers. As pioneers of user-centred design we are able to elevate tired spaces and implement new technologies that enhance space utilization, process efficiency and visitor experience. Working in diverse environments where space is often at a premium and occupant comfort, well-being and safety a priority, we link design to operational performance with clear and measurable results for clients whilst ultimately increasing reliability, performance and value of their buildings. In 2014, for the second consecutive year BuroHappold won the title of the Green Services Provider of the Year in the Eurobuild Awards Poland. Follow us @burohappold and find out more at www.burohappold.com.



Project partner

Colliers International Group Inc. (Nasdaq: CIGI) (TSX: CIG) is a global leader in commercial real estate services with more than 16,300 professionals operating from 502 offices in 67 countries. With an enterprising culture and significant insider ownership, Colliers professionals provide a full range of services to real estate occupiers, owners and investors worldwide. Services include brokerage, global corporate solutions, investment sales and capital markets, project management and workplace solutions, property and asset management, consulting, valuation and appraisal services, and customized research and thought leadership. Colliers International has been ranked among the top 100 outsourcing firms by the International Association of Outsourcing Professionals' Global Outsourcing for 10 consecutive years, more than any other real estate

services firm. Colliers International has been active in the Polish market since 1997 and operates through offices in Warsaw, Kraków, Wrocław, Poznań, Gdańsk Katowice and Łódź with over 200 employees in total. The company has been often honored for its achievements by industry organizations such as Eurobuild, CIJ Journal, CEE Quality Awards and the International Property Awards. Colliers' most recent distinction in Poland include the "Outsourcing Star", given in recognition of its status as one of the most active real estate advisors in the outsourcing sector; and the "Gazeta Biznesu" for being one of the most dynamically developing companies in Poland. More about us on www.colliers.pl.



Project partner

Saint-Gobain Ecophon develops, manufactures and markets acoustic products and systems that contribute to a good working environment by enhancing people's wellbeing and performance. Our promise "A sound effect on people" is the core backbone of everything we do.

Ecophon has business units in 14 countries, delegations in another 30 countries worldwide, and approximately 750 employees. The head office is located in Hyllinge, just outside Helsingborg, Sweden. Ecophon is part of the global Saint-Gobain Group.



Project partner

Halton is passionate about indoor environments. We offer business-enhancing products, systems, and services for comfortable, energy-efficient, and safe environments to customers who value people's wellbeing. Halton is involved from target-setting to facility use and focuses on creating positive indoor environment experiences for people. Halton delivers solutions for applications ranging from public and commercial buildings to healthcare, industrial, commercial kitchen, and restaurant uses. The company is also among the most esteemed providers of indoor climate solutions for marine and offshore applications. Halton's areas of expertise and product ranges cover air diffusion, airflow management, fire safety, kitchen ventilation, air filtration, laboratory

ventilation, and indoor environment management. Halton has operations in 31 countries, with regional headquarters in Finland, USA, Malaysia. Production factories are located in 14 countries. The R&D facilities are in the USA, Canada, the UK, Germany, France, Malaysia, China and Finland. The company has been present on Polish market since 1998 delivering successfully products and solutions for various buildings: Złote Tarasy, Atrium, Deloitte House, Horizon Plaza, Alfa i Beta, Park Postępu, Miasteczko Orange, Wiśniowy Business Park, Nimbus and many others. Recognized as "Gazela Biznesu"- one of the most dynamically developing company in Poland. Visit www.halton.com to read more about us.

PHILIPS

Project partner

Philips Lighting is at the forefront worldwide as a provider of integrated lighting solutions for offices, shopping malls, hotels, warehouses and production facilities. In addition, Philips offers outdoor lighting solutions for buildings, streets and sport facilities which makes towns and cities more beautiful and safer through light.

An important aspect of lighting development is the reduction in energy consumption, which translates into lower levels of harmful carbon dioxide emissions. Lighting is responsible for 20% of the world's total energy consumption. Our goal is to develop energy-efficient solutions that make the world healthier and more

sustainable through innovation.

For a sustainable world, we see the transition from a linear to a circular economy as a necessary boundary condition. Key characteristics of a circular economy approach are customer access over ownership (pay for performance e.g. Light as a Service or pay per scan), business model innovations (from transactions to relationships via service and solution models), reverse cycles (including partners outside current value chains e.g. upstream-downstream integration and co-creation) and product reuse.

Where technology and human needs intersect – that is where we find meaningful innovation.

SKANSKA

Project partner

Skanska Property Poland is an innovative developer of green office buildings that create perfect environment for business development and provide its users with healthy and friendly space as well as perfectly blend in with the surrounding urban tissue.

The company has been operating in Poland since 1997.

Skanska Property Poland's schemes comprise high quality, LEED certified office space in superb locations. It is active in 6 major Polish markets: Warsaw, Wroclaw, Poznan, Lodz, Krakow and Katowice. The company was recognized as "Green Developer of the Year" in the prestigious Eurobuild 2014 competition.

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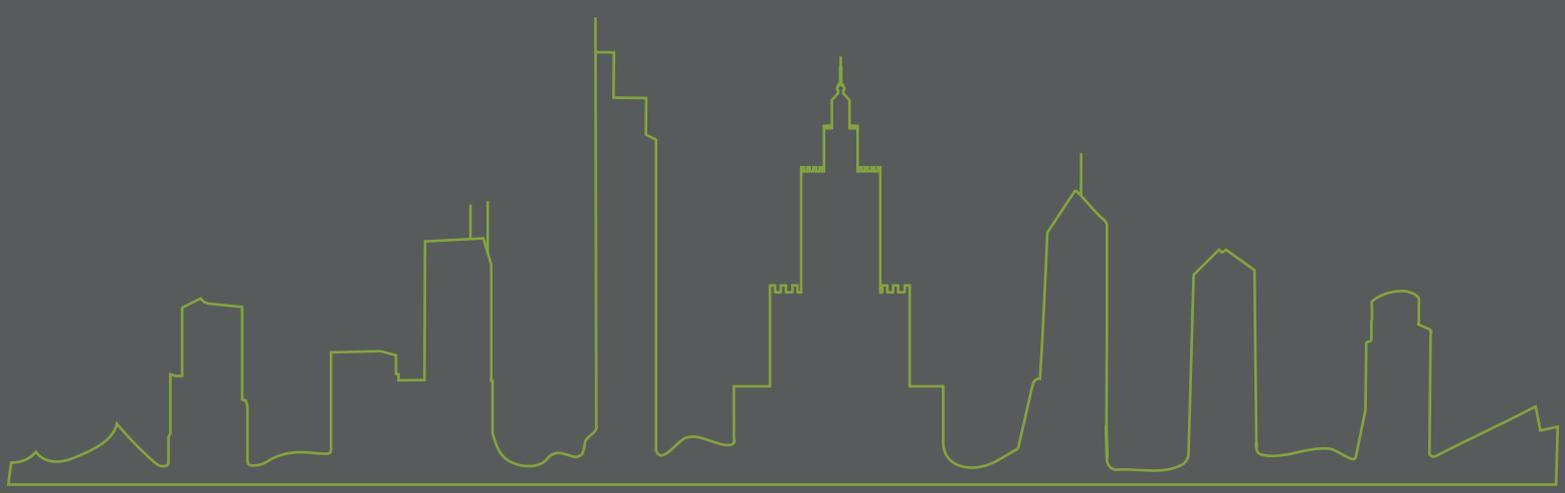
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