

# GREEN BUILDING COSTS, SAVINGS, AND VALUE

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A Study of the Value of Green Building  
and Sustainable Practices in the Czech Republic

June 2013



Prepared by the **Costs, Benefits, and Values of Green Buildings Task Group** of the  
**Czech Green Building Council.**

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This publication/project was realized with the financial support of the National program for support of energy savings and renewable energy sources use for 2012 – The EFEKT Program of the Ministry of Industry and Trade of the Czech Republic.

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**Czech Green Building Council**

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*Finally, our great thanks go to Henry Hanson and Carlo Marzot, for their independent peer review of our research methodology and findings, throughout the development of our study and report. Their experience in the Central and Eastern European market combined with their focus on green building from the design and engineering perspectives, led to their invaluable input into the development of our project.*

## FOREWORD

*During the founding of the Czech Green Building Council in 2009, two of the fundamental issues that drove the formation of the council were the desire for more information about green building costs and for more clarification of the real commercial benefits of green building.*

### **An excerpt from the founding principles of the CZGBC:**

*"The CZGBC will drive research critical to the expansion of green building. – Return on investment and costs are critical to the decision of deciding to build green buildings.*

*The CZGBC will provide outreach and partnership between other green building organizations, which will drive the green building mission forward. – Researching the costs and benefits of green buildings will create synergy between members of the council and the green building supplier network."*

In order to address these two critical issues the Green Value task group – a multidisciplinary panel of council members – was created to prepare a professional design study specific to the Czech Republic; which would quantify the differences in the up-front cost and both short and long-term values of new commercial green buildings relative to typical regional practices.

A major hurdle for the implementation of sustainable development practices locally has been the lack of a **reliable and comprehensive assessment of green buildings** specifically addressing the Czech market. Our study aims to provide a reputable comparison of office building valuation between more sustainable 'green' building practice and typical Czech design and development practices, to guide developers in this interim period before more green projects are realized, and complete direct data can be compiled.

### **Key criteria of the Green Value group's study include:**

- realistic review of typical local projects
- sample of regional-specific design solutions
- accurate anticipated energy savings
- estimated effects on operating costs

Based on the results of our study it seems that developers and owners can afford green projects within typical project budgets and that these projects represent real value for their invested money.

## TASK GROUP MEMBERS

The GREEN VALUE group was created from a multidisciplinary group of Czech Green Building Council members to prepare a professional design study specific to the Czech Republic. The group is made up of volunteers from a broad range of professionals practicing in the Czech design and real estate development market.

The group is comprised of **architects, engineers, sustainability consultants, quantity surveyors, contractors, real estate consultants, construction managers,** and **product suppliers** from many locally represented companies.

Each active member company has provided assistance in their area of expertise to develop the study, whether it is the building and system designs of the Architects & Engineers, or the cost and value estimating of the Quantity Surveyors and Real Estate Specialists.

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## About the peer reviewers

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Mr. Hanson is the President of the Hanson Design Group, practicing architecture and landscape architectural design since 1988. He has been an Associate Professor at the Czech Technical University in Prague (ČVUT) Faculty of Architecture since 2008 teaching landscape architecture and sustainability, as well as being an Adjunct Associate Professor for North Carolina State University's College of Design, Prague Institute.

### CARLO MARZOT

Mr. Marzot is the Managing Director of E&Z International, with broad experience in the Czech Republic and throughout Central Europe. His engineering career spans more than thirty-five years, specializing in MEP design engineering, pre construction and construction experience with both domestic and international companies. His extensive knowledge covers all phases of engineering, management, and problem solving.

## Glossary

<b>Base Code Compliant project (BASE)</b>	The most basic building, only just complying with (but not exceeding) the minimum Czech code requirements
<b>Typical Best Practice project (BEST PRACTICE)</b>	The most common recent commercial building type, incorporating a traditionally accepted international level of performance and finish, above the minimum code requirement
<b>Green Building project (GREEN)</b>	A high quality and commercially-viable building, which incorporates a number of sustainability practices and/or technologies
<b>LEED</b>	Leadership in Energy and Environmental Design – an international certification system for the evaluation of the sustainability of buildings
<b>BREEAM</b>	BRE Environmental Assessment Method – an international certification system for the evaluation of the sustainability of buildings
<b>SBToolCZ</b>	Sustainable Building Tool, Czech Republic – a Czech adaptation of an international certification system for the evaluation of the sustainability of buildings
<b>Prague Research Forum</b>	A group of real estate agencies (CBRE, Colliers International, Cushman & Wakefield, DTZ, and Jones Lang LaSalle) who share non-sensitive information with the aim of providing clients consistent, accurate and transparent data about the Prague office market
<b>RICS new rules of measurement</b>	The RICS new rules of measurement: Order of cost estimating and elemental cost Planning from May 2009 is the common and consistent guidance used to measure areas and building works items for the purpose of order of cost estimates and cost plans; as well as giving guidance on providing a structured approach for dealing with the other constituents needed to calculate cost estimates, cost limits or cost targets.

## Acronyms & Abbreviations

<b>Code</b>	Base Code Compliant project
<b>Best Practice</b>	Typical Best Practice project
<b>Green</b>	Green Building project
<b>CZGBC</b>	Czech Green Building Council
<b>EU</b>	European Union
<b>MEP</b>	Mechanical, Electrical, and Plumbing engineering systems
<b>HVAC</b>	Heating, Ventilation, and Air Conditioning
<b>USGBC</b>	United States Green Building Council (USA)
<b>GBCI</b>	Green Building Certification Institute (USA)
<b>BRE</b>	Building Research Establishment (UK)
<b>RICS</b>	Royal Institute of Chartered Surveyors (UK)
<b>NLA</b>	Net Leasable Area
<b>GIFA</b>	Gross Internal Floor Area
<b>GEFA</b>	Gross External Floor Area

# 1. INTRODUCTION

The financial value of the 'Green Building' has been a central discussion of the development and construction industry for many years. Although the question has been fleshed out in some individual western markets – such as in

North America, and to a limited extent in some portions of the western European markets – due to the accumulation of historical data from years of on-going realizations of construction projects, within central Europe, and in particular the Czech Republic, insufficiently comprehensive data from the very few built projects has left a vacuum with little real or reliable data. Ever since the push for a sustainable approach to building became a widespread notion, the debate over cost and value has grown and has majorly impacted the building market. Yet, all of the involved parties in building realization – developers, investors, occupiers, and contractors – have justified their inability to promote and progress sustainable building as an endless circle of blame, or a passing-of-the-buck, as described by David Cadman as early as 2000<sup>2</sup>.



Figure 1  
**Vicious Circle  
of Blame**

Source: [www.emeraldinsight.com](http://www.emeraldinsight.com)

Why such indecision and animosity? It can be attributed to several hurdles that have, since the time of infancy of the green building movement, been mostly overcome. Firstly, the popular term 'green building' has been clarified within the industry. Although it was at first looked upon as a radical idea rooted in idealism, brought up by minority interest groups, it is now more well-known and perceived as a relatively standard approach to creating a pleasant, efficient, and healthy environment while adding value to all aspects of environmental sustainability; i.e. the building's ecosystem, architectural and engineering solutions, as well as social aspects. Secondly, the vast majority of parties involved in property development have begun to cooperate in the search for real solutions, rather than simply avoiding any change to their normal habits and practices. Thirdly, there has been a strong



legislative push for energy efficiency increases across several industries that impact how we build, specify, and occupy buildings. This also is beginning to include more legislation that directly addresses the way buildings are designed and constructed, and is being seen in much of the world's most advanced economic markets. In particular, the new and developing EU Directive on the Energy Performance of Buildings has been instrumental in driving change throughout Europe and neighboring countries. Finally, occupying customers, such as the tenant companies in office and other commercial buildings, have started to recognize the real measurable advantages that a healthy and comfortable working environment provides as a competitive business advantage.

Once this willingness to accept an adapting and growing market appeared, the economic insecurity and questioning about the pros and cons of the 'green' approach quickly arose:

- If sustainable development truly is better than the actual assumed standard, is it going to cost more? (and how and to what do you compare these relative costs?)
- If it truly is more costly, how much more will it cost? (again to what base should it be compared?)
- Will investment in green building pay off? (and how or why could it be expected to do so?)
- How long will the payback term be? (and what trends or market realities could impact the return?)

### 1.1. Significance of Existing Research

To answer these questions, a reasonable amount of relevant research has been carried out abroad where green building and sustainable practices have established a longer tradition. The company Davis Langdon undertook two significant studies on green building costs. In the first (2004), 138 buildings in the USA were reviewed, finding that there was no significant difference in the average costs for green buildings as compared to non-green buildings<sup>2</sup>. Many project development teams were building green buildings with little or no added cost, and each with budgets well within the cost range of non-green buildings with similar programs and level of specification. In the latter study, 221 US buildings were analyzed, coming to the same conclusions<sup>3</sup> (2007). Similarly, Greg Kats (2003) had performed a study of 150 buildings primarily in the US, as well as in other countries, finding that green buildings cost approximately 2% more to build than conventional ones<sup>4</sup>. However, in addition green buildings reduce energy use by an average of 33% versus the controls, resulting in significant operational cost savings. Another report suggests that green certified buildings have an average rental premium of 4-5%<sup>5</sup> by Fuerst & McAllister (2008). Furthermore, based on a sample of the sale prices for 559 Energy Star and 127 LEED-certified buildings, it was found that price premia of 26% and 25% were achieved, respectively; with higher levels of certification delivering higher premia (Ibid). This is again supported

by the outcome of another study from Eichholtz of UC Berkeley (2009) stating that, "we find that buildings with a 'green rating' command rental rates that are roughly three per cent higher per square foot than otherwise identical buildings - controlling for the quality and the specific location of office buildings. [All things being equal], premiums in effective rents are even higher - above six per cent. Selling prices of green buildings are higher by about 16 per cent."<sup>6</sup>

A recent business case report by the World Green Building Council 2013 collected data from a number of other sources in an attempt to answer the open-ended questions that remain about the cost and value of green building. While the report provides a useful summary of peer-reviewed green building cost research; it doesn't present any new data. Thus, it produces a conclusion not all together unique than other works. It does however summarize that green buildings do not necessarily cost more to design or build when development in properly managed, and that perceptions of significant additional cost are quite a bit high than real data, and often based on anecdotal examples.<sup>7</sup>

These studies share two main characteristics. First, they are based on an adequately large sample of existing projects where actual realized cost data are available. This is important as only with the review of a large number of projects can a reliable representation of the whole be studied to come to a statistically significant set of findings. Secondly, each of the researched pools of projects comes from within the same geographic, legislative, or demographic area. The reasoning behind this concern is that differences in regular local conditions can often mean a substantial variation of costs within the construction industry. Therefore, the applicability or even reliability of results and conclusions from such study would be unusable or at least severely limited if these parameters were overlooked.

This also unfortunately means that these results can be applied to the Czech market in only a limited manner. The lack of a reliable and comprehensive assessment of green buildings specifically addressing the Czech market has been a major obstacle for the implementation of sustainable development practices locally, as investors and financial institutions demand reassurance and justification of the value of green building before putting their money into anything that has not yet been proven in the local market.

### 1.2. Aim and Structure of the Study and Report

The Czech Green Building Council (CZGBC) has recognized this gap in existing research and has chosen to take action to correct the problem. The Costs, Benefits, and Values of Green Buildings Task Group (Green Value group), consisting of multidisciplinary council members, was created to prepare a professional cost study specific to the Czech Republic. This study seeks to quantify the differences in the up-front costs, as well as both short and long-term values of new green buildings in comparison to typical regional practices, here in our local market.

This work aims to provide, in more detail, a reputable and reliable comparison of office building valuation between more sustainable green building practices and typical Czech practices; with a goal to guide investors, developers, and lenders during this interim period before more and comparable green projects are realized, and this actual realized data can be accurately compiled.

**Key criteria of the Green Value group's study include:**

- a realistic review of typical local-specific projects
- a sample of regional-specific design solutions and building systems
- an accurate estimation of anticipated energy savings, based on regional utility costs
- the estimated effects of green buildings on building operating costs
- any expected impacts to the leasing of green office and commercial space
- the projected creation of resale or long-term value of green buildings

The first step of this study served to define the methodology, which developed to include the study's assumptions, the strengths and weaknesses of this course of research, the detailed thought and input process guiding the work, and the final reasoning for each stage and conclusion. In the following sections, the findings of the completed cost analysis are presented and discussed. On this basis, conclusions on the applicability of the study throughout the market are also expounded. Finally, supporting detail of the entire work process is presented to detail the breadth of work and the technical nature of the data that supports our findings.

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## A1. A & B CLASS DEFINITIONS

The following definitions are a sample of those currently in use in Prague and preceded by the PEPCIG (Pan European Property Common Interest Group) European Market Standards:

### PEPCIG EUROPEAN MARKET STANDARDS:

Inevitably local market circumstances are likely to dictate local class of office definitions. As a guide the following features associated with the quality of office space should be used to define Grade A and B space.

Quality aspects to consider include:

1. Air conditioning system
2. Suspended ceilings
3. Floor to ceiling height minimum 2.70m
4. Flexibility of internal design
5. Either three compartment trunking for telephones, electricity and computer cable or raised floors
6. Modern high speed lifts, maximum waiting time of about 30 seconds
7. Good quality fitted carpets and wall finishes
8. Provision of secure dedicated car parking
9. Reliable telephone and communications equipment
10. Dual power supply and/or power supply system back-up
11. Humidity control

**Grade A** Reflects an above average property in that market with quality criteria being at the upper end of the scale.

**Grade B** Reflects an average or typical property in that market based on the criteria.

The members of the **Prague Research Forum** – CBRE, Colliers International, Cushman & Wakefield, DTZ, and Jones Lang LaSalle – share non-sensitive information with the aim of providing clients with consistent, accurate and transparent data about the Prague office market.

### PRAGUE, CZECH REPUBLIC:

To earn **Class A** status a building must meet at least 5 out of 6 “Hard Criteria” and 5 out of 7 “Soft Criteria”.

To earn **Class B** status a building must meet at least 1 out of 6 “Hard Criteria” and 4 out of 7 “Soft Criteria”.

#### Hard Criteria:

1. Modern cable management
2. A building must feature one of the following: raised floors / suspended ceilings with power poles or cable trays / compartment trunking / provision for underfloor cabling
3. A modern air handling system
4. Adequate provision of secure dedicated car parking
5. A building location is considered when assessing this criteria
6. 24-hour access and security
7. A high quality standard finish
8. Modern lift(s)

#### Soft Criteria:

1. Clear ceiling height of at least 2.65 m
2. Prestige/quality reception area
3. Flexible design partitioning
4. Sufficient lighting
5. Sprinkler system / Fire security
6. Good accessibility
7. Public transport as well as car accessibility are considered
8. Services in the building / immediate vicinity

## A2. PROJECT BRIEF

Provide 13,000 m<sup>2</sup> of leasable Class A speculative office space in a new 5-7 story office building. The ground floor of the building should include the possibility for some mixed-use leasable space for service or retail, through flexibility of the design. The building will fit one of the three defined building types: Base Code Compliant, Best Practice, and Green Building. The issued Sustainable Building Strategies document details the individual strategies that each building type should incorporate.

The project is to be located on a 6,000 m<sup>2</sup> previously developed site located in the 1km wide band surrounding the 2km diameter Prague city center. This "City Center Edge" zone is typical of multiple project sites anticipated to be redeveloped in the near future. The site is approximately 200 m from public transit access, which gives the project a reduced parking requirement (estimated to be approximately 1 space per 80 m<sup>2</sup>). The site is oriented in a direct East-West orientation, 65 m × 92.3 m and adjoined on the west border by a local public road.

Class A definition reflects an above average property in the market with quality criteria being at the upper end of the scale. (Class B would represent the average or typical property.) To be classified as Class A, the project must satisfy 5 or more of the following "Hard Criteria" and at least 5 of the "Soft Criteria".

### Hard Criteria:

1. Modern cable management
2. A building must feature one of the following: raised floors / suspended ceilings with power poles or cable trays / compartment trunking / provision for under-floor cabling
3. Modern air handling system
4. Adequate provision of secure dedicated car parking
5. Premium building location
6. 24-hour access and security
7. A high quality standard finish
8. Modern high-speed elevators, maximum waiting time of about 30 seconds
9. Air conditioning system with Humidity control

### Soft Criteria:

1. Clear ceiling height of at least 2.65 m
2. Prestige/quality reception area
3. Flexible design partitioning
4. Sufficient lighting
5. Sprinkler system / Fire security
6. Good accessibility
7. Public transport, in addition to car accessibility
8. Services in the building / immediate vicinity

## A3. COMMON SUSTAINABLE BUILDING STRATEGIES

**NOTE:** For each individual building type, the Green Strategies are to be included as shown to the right. If an item is listed as (?) Maybe, it should only be included in this design and cost estimating exercise if it is anticipated not to have a measurable additional cost impact to the total construction cost of the proposed building.

### PRE DESIGN

Strategy*	Description	Team	CODE	BEST PRACTICE	GREEN	
1.1	<b>Integrated Design</b>	An integrated design process highlights the functional interaction of all building systems and components as a single entity. From the beginning of the design process, it brings together all of the key players involved in designing and constructing the building.	A+MEP	N	?	Y
1.2	<b>Owner Project Requirements (OPR)</b>	The Basis Of Design includes design information necessary to accomplish the owner's project requirements above and beyond a simple project brief, including: system descriptions, indoor environmental quality criteria, design assumptions, and references to applicable codes, standards, regulations, and guidelines. The exceptional element here is the increased input of the design professionals to work with the Client to better develop a more detailed set of project goals, so the Client can make more informed decisions.	Arch	N	?	Y
1.3	<b>Siting And Orientation</b>	Orientation of the building is important to maximize the use of daylighting (taking advantage of solar access, shading, and natural lighting) and can significantly affect the amount of solar-heat gain of the project.	Arch	N	?	Y
1.4	<b>Building Geometry</b>	The geometry of the building impacts the total exterior surface area; and consequently, the cost for the exterior envelope and the surface area available for heat loss. Combined with the location and extent of glazing, facade materials and insulation, this will impact the solar heat gain as well.	Arch	N	?	Y
1.5	<b>Site Location</b>	Issues, such as: Access to the site by mass transit and pedestrian or bicycle paths; Attention to the culture and history of the community; Climatic characteristics as they affect building design or materials; and Access to specific renewable energy such as underground water or deep geothermal energy.	Arch	N	N	Y

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