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## City Green Court, Czech Republic

### Case Study 96

City Green Court was the first office building in the Czech Republic to achieve LEED (Leadership in Energy and Environmental Design) Platinum, and the first in the country to conduct a building embodied carbon footprint.

### Aspects of Sustainability

This project highlights the following:

#### Green Aspects

Energy  
 Carbon  
 Materials  
 Water  
 Local Impacts

#### Social Aspects

Human Resources  
 Corporate Community Involvement  
 Business Ethics  
 Health and Safety



**“The move to the City Green Court will support the PwC strategy to grow in the Czech market and to lead by example as a responsible business.”**

Jiří Moser, Managing Partner,  
 PricewaterhouseCoopers Czech Republic.

and GlaxoSmithKline. Skanska Residential Development occupies the retail space on the ground floor, which it uses as a showroom. There is also a 285 m<sup>2</sup> bistro on the ground floor. The site is partially landscaped and includes two underground parking garage levels with 232 parking spaces in total, and tenant bike storage racks. Skanska primarily relied on its own in-house services and expertise to deliver the project, including the concrete, ventilation, heating, cooling, plumbing, façade and steel structure components of the project. Skanska sold City Green Court in May 2012 to Real Estate Company for US\$ 67 million.

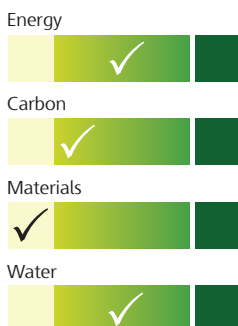
City Green Court was the first office building in the Czech Republic to achieve LEED Platinum, which is the highest level possible. Skanska also achieved LEED for Commercial Interiors Platinum certification for its office in City Green Court, with the highest LEED score in the Czech Republic to date (90 LEED points). LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to encourage and

### Project Introduction

City Green Court is located in Prague 4 – Pankrác, in an established business district on the corner of Pujmanové and Hvězdova Streets. The 8-story building offers around 16,300 m<sup>2</sup> of rentable office/retail space in total centered around a glazed atrium, which serves as a social area for tenants. The building was designed to incorporate a glazed façade, cubic balconies and a series of horizontal and vertical planes that were inspired by Czech cubism.

Skanska a.s. constructed the project for Skanska Property Czech Republic, who lease the building to several tenants, including PricewaterhouseCoopers

#### Skanska Color Palette™



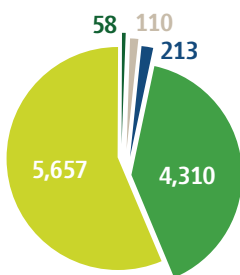
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guide the construction of more sustainable and energy efficient buildings. Skanska modified the original architectural design to ensure the highest possible LEED score, and during precertification, the project obtained maximum number of LEED points in the Sustainable Sites, Water Efficiency, and Innovation in Design and Regional Priority categories. The project also involved the first building carbon footprint to be conducted in the Czech Republic.

## Contributing Toward Sustainable Development

City Green Court is a resource efficient building that uses significantly less energy and water than conventional Czech office buildings. The building has a green roof and a rainwater harvesting system, and offers tenants flexible office spaces and healthy working environments. City Green Court has also contributed toward sustainable urban development and has promoted more sustainable modes of transport. During construction, Skanska conducted the first building embodied carbon footprint in the Czech Republic, incorporated environmentally responsible materials and ensured that no lost time accidents occurred on site. During operation, Skanska intends to raise the awareness of more sustainable buildings through a Green Education Program and tenant sustainability guidelines.



Embodied carbon emissions by construction material (tCO<sub>2</sub>)

- Concrete & concrete products – 5,657
- Metal – 4,310
- Wood – 213
- Quarry materials – 110
- Other materials – 58

## Green Aspects

### Energy

#### Energy efficiency

The building is designed to annually use 79 kWh/m<sup>2</sup> of energy, which is 56 percent less than the Czech building code that demands office buildings use no more than 179 kWh/m<sup>2</sup>. The building's atrium allows natural ventilation in the summer months caused by rising air in the atrium, which draws air from the office floors without the use of mechanical ventilation. Mechanical ventilation

is provided by a low-pressure ventilation system that includes efficient Air Handling Units (AHUs) with a specific fan power that use less than 2.0 kW/m<sup>3</sup>/s, compared with a typical Czech system that uses between 2.5 and 3 kW/m<sup>3</sup>/s. All AHUs have a nighttime cooling mode, which allows the use of colder outdoor air to pre-cool the premises at night when conditions allow in preparation for the next working day. The AHUs also have an average heat recovery efficiency of approximately 55 percent as some of the exhaust air is used to heat the underground levels and the atrium during cold periods. Chilled beams efficiently distribute cool fresh air to realize energy savings of between 25 and 30 percent compared with conventional fan coil units. External shading fins are angled toward the sun's orientation on the south and west façades, which help to avoid excessive solar heat gain together with interior and exterior blinds. An advanced lighting system was installed that includes occupancy and daylight sensors, and LED (Light Emitting Diode) lighting for some common spaces, to reduce energy use by 62 percent compared with a conventional lighting system. The building also has an automatic central lighting shutdown function in the office areas. Energy efficient district heating is sourced from a local cogeneration power plant.



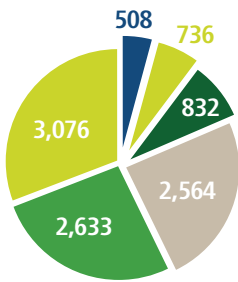
### Intelligent energy management

City Green Court is equipped with tenant sub meters that accurately measure individual energy and water use. Sub metering encourages tenants to be more resource efficient and make further energy savings.

### Carbon

#### Carbon footprinting

The project's embodied carbon footprint, including construction materials, on site activities and transportation, was calculated to be 11,034 tCO<sub>2</sub> in total. Construction materials were responsible for 93.8 percent of the total footprint, with on site activities and Skanska's transportation responsible for 6.2 percent of the footprint. Skanska used



**Embodied carbon emissions by construction component (tCO<sub>2</sub>)**

Concrete frame – 3,076  
 Floor slabs – 2,633  
 Foundation – 2,564  
 Columns & beams – 832  
 Façade – 736  
 Other components – 508

its own internal carbon footprinting tool to carry out the analysis. Skanska will use the City Green Court's footprint as a benchmark with which to perform value engineering and realize embodied carbon savings on future projects in the Czech Republic.

## Materials

### Environmentally responsible materials

Low-VOC (Volatile Organic Compound) adhesives, sealants, paints, coatings and carpets were used on the project. All timber used on the project was certified according to the Forestry Stewardship Council (FSC). Recycled pre-consumer and post-consumer materials accounted for over 15 percent of the materials used on the project. Materials that included recycled content included the project's steel (25 percent), reinforcing concrete (33 percent), fly ash concrete (5 percent), insulation (up to 84 percent), gypsum boards (100 percent) and façade glazing (10 percent).

### Waste management during construction

81 percent of the project's construction waste avoided being sent to landfill. In addition, the majority of the demolition waste from the existing buildings when the site was cleared was diverted from landfill and reused as backfill material off site.

### Waste management during operation

The building has comprehensive waste sorting facilities throughout the office spaces to separate paper, plastics, metals, glass and corrugated cardboard. A professional waste management company serves the building's central sorting station.

## Water

### Water efficiency

The building uses around 25 percent less water than a typical Czech office building, and annually saves around 5,000 m<sup>3</sup> of water through efficiency measures and rainwater harvesting. Water efficiency measures include waterless urinals, dual flush toilets, automatic shut off fixtures and low-flow taps. A rainwater harvesting system collects rainwater into a 150 m<sup>3</sup> tank. The system filters the rainwater, which is used by the building's cooling towers and for landscape irrigation.

### Stormwater management

The rainwater harvesting system captures and stores around 50 percent of the site's total precipitation, and the landscaped areas capture and store a further 40 percent. Rainwater harvesting and landscape infiltration significantly reduce



pressure on the municipal stormwater system and help minimize surface runoff, which can cause localized flooding and water pollution.

## Other Green Aspects

### Raising awareness of more sustainable buildings

Skanska compiled "Tenant Design and Construction Guidelines" that explain how tenants can make the most of the building's efficiency features, through recommended "sustainability strategies", and how they can certify their spaces according to LEED CI certification. The recommended strategies include mechanical, electrical, plumbing, layout, lighting and operations measures, which can often enhance the performance of the building with minimal investment costs. By occupying City Green Court, tenants have a solid platform with which to certify their office space to LEED CI if they wish.

Skanska plans to implement a Green Education Program, which is intended to inform all tenants and visitors of the building's sustainability features and their associated benefits. The program will involve the placement of information signs around the building to inform of particular sustainability features, offering guided tours and a large screen by the main reception that displays the building's resource use in real time.

### Green roofing

The building has a green roof that consists of indigenous drought-resilient vegetation planted in a 150 mm substrate. The green roof and landscaped areas cover almost half the site's total area.

### Reducing the urban heat island effect

The site's landscaping, green roofing and underground parking contribute to a reduced urban heat island effect by diminishing the extent of dark and paved surfaces on the site.

## Reducing light pollution

The majority of the building's lighting is automatically switched off between 23:00 and 5:00, and lighting in the cafeteria is reduced by 50 percent during this period. Exterior lighting is fitted with full cutoff or semi-cutoff downlighters, and the exterior lighting is designed to not trespass more than 5 m beyond the site's curb lines. Light pollution can cause adverse human health impacts and disrupt urban ecosystems.

## Social Aspects

### Occupational health and safety

There were four minor incidents on site during construction, although the Lost Time Accident Rate per million hours worked was zero.

### Healthy working environments

The building's common spaces have been designed to control indoor pollutants through measures including air filters and a permanent entry system to remove dirt from shoes. The glazed façade and the atrium allow natural light to penetrate the office spaces. The lighting system is also controlled by daylight sensors, which ensure relatively constant lighting levels and a more seamless transition from natural to artificial lighting. The office spaces, corridors and meeting rooms promote occupant acoustic comfort by softening noise through design and material selection. In addition, the natural atrium ventilation and chilled beam system are low-noise compared with conventional mechanical and fan coil ventilation systems. Chilled beams also promote occupant comfort by avoiding cold drafts. The building's HVAC system provides 30 percent more ventilation than the ASHRAE Standard 62.1-2007, and sensors verify that the system functions optimally. CO<sub>2</sub> sensors ensure that indoor concentrations do not exceed 800 ppm (parts per million), which far exceeds EU regulations that limit indoor CO<sub>2</sub> concentrations to 3,500 ppm. The atrium provides tenants with a pleasant common space with a black olive tree and ivy-covered living walls.

### Functional and flexible office design

City Green Court is designed to be functional and flexible to promote a long useful lifespan. The building has four high-speed elevators, a card access system, modern data and communications networks, and extensive storage space. The office floors can be easily modified to accommodate

single or multiple tenants. Raised floors allow under floor cabling and flexible space usage, and the flooring can be reinforced from a capacity of 3.5 kN/m<sup>2</sup> up to 5 kN/m<sup>2</sup> should clients require.

### Contributing toward sustainable urban development

The site was previously occupied by disused and derelict buildings, which contained asbestos and other hazardous materials. The site was cleared and reclaimed prior to construction. The project consequently did not directly impact upon greenfield sites or natural environments. City Green Court also contributes toward sustainable urban development by being located in an established business and shopping district that offers a wide range of services and amenities, including banks, restaurants and the Arkády Pankrác shopping centre.

### Promoting more sustainable modes of transport

The site is adjacent to three different bus routes and is close to two tramlines. Pankrác metro station, which is four stops to the city centre on Metro line C, is a 4-minute walk from the building. The building has 84 bicycle parking spaces, showers and changing facilities to encourage tenants to cycle to work. The garage also offers priority parking spaces for electric and hybrid vehicles.



## Economic Aspects

### **Regional construction workforce and materials**

Around 150 people worked on the project at the peak of construction. The majority of the construction workforce originated from the Czech Republic, most of the materials were manufactured in the country. Materials from the Prague area included the insulation and the expanded polystyrene.

### **Efficiency financial savings**

The heating, cooling and lighting systems, and water efficiency measures save approximately US\$ 1/m<sup>2</sup>/month in reduced energy and water costs. With a combined initial investment cost of US\$ 1 million, the green investments have a payback period of 5.3 years. The developers made the green investments and the building's tenants will benefit from long-term lower operational costs. One of the key energy efficient features was the advanced lighting system, which combined several individual solutions. The system makes significant energy savings and ensures a payback period of between 2 and 3.5 years, compared with a conventional lighting system.



## Learning From Good Practice

The LEED Core & Shell Platinum certification process proved useful in developing the original architectural design into a very green building that fulfills Skanska's Green Initiative principles. The signing of tenant agreements with high-profile tenants, such as PwC for their Czech headquarters, demonstrates the interest in and demand for green commercial space.