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## Empire State Building 32nd Floor, U.S.A.

### Case Study 55

#### Aspects of Sustainability

This project highlights  
the following:

##### Social Aspects

Human Resources  
Corporate Community  
Involvement  
Business Ethics  
Health and Safety

##### Environmental Aspects

Energy and Climate  
Materials  
Ecosystems  
Local Impacts

##### Economic Aspects

Project Selection  
Supply Chain  
Value Added

Skanska U.S.A. relocated its New York headquarters to the 32nd floor of the Empire State Building, which it designed and retrofitted to LEED® (Leadership in Energy and Environmental Design) Platinum for Commercial Interiors, the highest ranking established by the USGBC (U. S. Green Building Council). The office was awarded LEED Platinum status in July 2009.



### Project Introduction

The 102-storey Empire State Building in New York was completed in 1931 and is one of the most iconic skyscrapers in the world. The building has undergone modernisation since 2006, which has allowed open planned offices and encouraged larger companies to relocate there. Skanska secured a 15-year lease of the entire 32nd floor of the Empire State Building in 2008.

Skanska managed the redevelopment of the 2,260 m<sup>2</sup> floor, and completed the planning, design, procurement, retrofit, LEED (Leadership in Energy and Environmental Design) documentation, administration and commissioning of the project. The retrofit was completed in 8 weeks and generally involved the creation of open planned workspaces around the perimeter and executive offices at the core. Approximately 80 full-time employees are based at Skanska's Empire State Building office, including New York construction

units, a commercial development team and corporate offices.

Skanska's Empire State Building office was designed and retrofitted to LEED for Commercial Interiors Platinum certification, and has become the first Platinum Commercial Interior in the Empire State Building. LEED for Commercial Interiors is a voluntary U.S. Green Building Council certification intended to encourage and guide the construction of more sustainable and energy efficient interiors.

### Contributing Toward Sustainable Development

The 32nd floor of the Empire State Building was redeveloped into an energy efficient office that obtains half its energy from renewable sources. Energy efficient systems and measures include efficient cooling and ventilation systems, daylight





and space occupancy sensors, and the installation of energy-rated appliances. The office is a healthy and productive environment that has been designed to be functional and flexible to meet the needs of Skanska over the 15-year lease. During construction, project partners were involved in the project from the design stage and thorough occupational safety considerations ensured no site accidents occurred. Environmentally responsible construction materials were used on the project, such as certified, recycled and low-VOC substances. Local subcontractors and workers were contracted and regional construction materials were sourced where possible. Construction waste was sorted and recycled, and the creation of waste materials was avoided by retaining original interior features of the Empire State Building.

## Social Aspects

### Project partner involvement

Skanska conducted an initial daylong planning session with project partners to draw on the expertise of the entire project team. Project partners included the architect, subcontractors and the owner of the Empire State Building, W&H Properties. A seven-point mission statement and an action plan were created during the planning session.

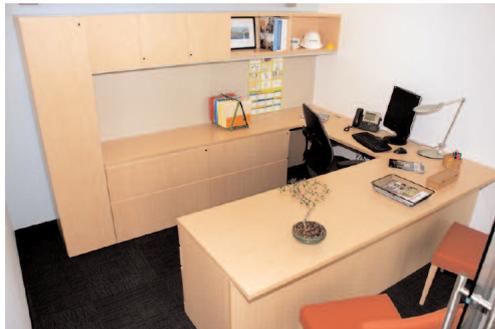
### Occupational safety

A large number of workers were involved in a relatively small project area, but no lost time accidents occurred on the project due to thorough safety considerations. Potential falls from the raised flooring system were avoided by only removing tiles when necessary for installation purposes. Perimeter tiles were permanently removed to allow installation access. Safety barriers and signage were positioned around temporary openings and the perimeter to prevent falls from the raised flooring.

### Healthy and productive office environment

Skanska's Empire State Building office is a healthy and productive office environment, which promotes good indoor air quality and maximises natural light. The office can be naturally ventilated through operable windows or by a pressurised raised floor ventilation system, which promotes clean air by filtering out approximately 80 percent of airborne particles. The under-floor ventilation system is individually controlled and enables employees to easily manage the airflow in their working environment. The HVAC (Heating, Ventilation and Air Conditioning) system was flushed out for nine days during occupancy, and the system complies with the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) indoor thermal comfort standards. All sealants, paints and adhesives used in the project met LEED requirements for non-toxicity and natural materials were selected to avoid indoor air pollution and promote a healthy working environment. Natural light in the office is maximised by 2.4 m high windows, glass partitions that allow light to penetrate the building and almost every workstation is no further than 4.5 m from a perimeter window. Consequently, 90 percent of the office space has full daylight access and all full-time occupants have an external view





of New York City and the horizon. Sunlight that can cause eyestrain for occupants is reduced by window shades that are controlled by a timer. During construction, Skanska monitored and managed the air quality and indoor lighting in the office according to the SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) voluntary standards.

### Historical building restoration

The project restored the floor's original interior features and retained 44 percent of the non-structural components, such as the columns and perimeter drywall, by avoiding demolition where possible. The original terrazzo flooring, which is a composite of natural marble chippings set in cement, remained intact in the core of the building and was restored.

### Functional and flexible office design

Most of the floor is open-planned space that allows a variety of office styles without requiring extensive future redevelopment work. Movable walls allow the easy creation of large open areas or more confined spaces. The space is also designed to accommodate a greater number of office workers in the future; Skanska plan to employ around 15 additional employees between 2009 and 2011. Two restrooms were added to the floor to ensure compliance with the Americans with Disabilities Act.

### Sustainability education

Skanska's headquarters is the first LEED Platinum certified office interior in the Empire State Building, and the project has featured in several journals concerned with green construction. The project demonstrates that historic buildings such as the Empire State Building can be renovated into more sustainable offices, and may encourage similar retrofit projects.

### Promoting sustainable urban development

The Empire State Building is located in central Manhattan, with easy access to services and amenities. The area surrounding the Empire State Building is served by several modes of public transport, including trains from the Grand Central Terminal and Penn Station, New York City subway lines and city bus services. Bicycle storage and shower facilities are available to Skanska employees.

## Economic Aspects

### Regional construction employment and materials

Around 60 workers were involved on the floor during the peak of construction. All subcontracting firms were based in and around New York City and the entire workforce was signed up with local unions. 28 percent of the materials used in the project were manufactured within 800 km of the building. Materials sourced from the New York City area included drywalls and office furniture.

### Efficiency savings

The investments in energy efficiency were based on the 15-year lease period, and are expected to save around US\$ 300,000 throughout the period due to reduced energy consumption. The office is also equipped with energy meters to allow Skanska to monitor their consumption and identify further energy efficiency improvements that lead to additional savings.

## Environmental Aspects

### Environmentally responsible construction materials

Low VOC materials used on the project included adhesives and fire proofing materials. Many of the project materials included recycled content, such as the cork flooring, carpet tiles, movable walls and the raised flooring. Recycled content accounted for 23 percent of the construction materials used on

the project. A surfacing known as PaperStone was also used, which is a non-toxic material made from recycled paper, cashew nut oils and water-based resins. Over 90 percent of wood used on the project was certified by the Forest Stewardship Council, which ensures that timber is sourced from sustainable forests. Skanska has also agreed to follow the Empire State Building's green cleaning program, which involves using only environmentally responsible cleaning products.

## Waste management

Effective construction waste management promoted waste recycling and reduced the amount of refuse sent to landfill. Over 80 percent of the construction waste from the project was sorted on site and recycled by specialist companies. Construction waste was avoided by retaining as much of the building's original materials as possible, and by working with suppliers to minimise packaging brought to the site. The office is also equipped with sorting facilities for recyclable office materials.

## Energy efficiency

The office is equipped with energy efficient systems and appliances, and Skanska consumes approximately 45 kWh/m<sup>2</sup> per year for electricity and cooling. Space heating in the Empire State Building is generated by a basement steam heating system, which is provided by the building owners for a flat fee and is unmonitored. Skanska installed a steam heating meter to monitor their office heating consumption, despite the fact that doing so would not yield a financial benefit. Daylight and space occupancy sensors optimise the artificial lighting to ensure that the office uses over 35 percent less energy than the ASHRAE 90.1 lighting standard. The cooling and ventilation systems are energy efficient with zoning functionalities, sensors that increase or normalise airflow depending on occupancy, and monitoring and alarm systems to ensure optimal performance. The office has been equipped with Energy Star rated equipment, such as monitors and printers, and the eight conference rooms were equipped with projectors rather than LCD screens to reduce energy consumption and heat gain.

## Water efficiency

Skanska's Empire State Building office uses around 40 percent less water than the baseline 1992 energy act. Water saving fixtures include dual flush toilets, low-flow fixtures, and waterless urinals. Skanska intends to closely monitor water consumption in the office and reduce consumption where possible.

## Renewable energy

Skanska has agreed an initial two-year contract with the non-profit organisation CRS (Center for Resource Solutions) to supply around half the office's electricity with energy from renewable sources. An initial agreement in 2009 and 2010 has been made to supply 144,000 kWh of renewable energy generated by wind, biomass and hydro electrical power plants.

## Learning From Good Practice

Skanska's New York office is the first LEED for Commercial Interiors Platinum certification in the Empire State Building, demonstrating the company's commitment to sustainability. The retrofit has also created a healthy and productive workplace that will have lower energy consumption and operating costs than a conventional office throughout the 15-year lease.

