

Greentowers—setting a New Global Standard Transforming Deutsche Bank’s Head Office into a Green Building

Passion to Perform



Summary

Deutsche Bank’s Head Office, its prominent 155-meter twin towers in Frankfurt am Main, Germany, are undergoing Europe’s largest building renovation to become one of the most environmentally friendly skyscrapers in the world – “Greentowers”.

- As part of its commitment to sustainability, Deutsche Bank intends to make an active contribution to climate protection. The building’s energy consumption and CO₂ emissions are to be reduced by at least 50%.
- By 2010, the bank will have invested around €200 million in the full-scale modernization of its Group Head Office, originally constructed in 1984, to transform it into a “green building”. A visible symbol is being created with “Greentowers” that stands for the efficient use of resources as well as a high quality working environment – a model example for sustainability setting a global standard.
- The project also shows just how much potential for optimization and sustainable energy efficiency are possible for existing buildings as well as how a “green building” approach can be worthwhile in a wide variety of ways, even as an investment in existing properties.
- Thanks to an improved integration in the immediate city surroundings as well as a range of attractive new services, the urban neighborhood increases in value.







Modernization concept

- Due to the need to improve fire protection systems, an in-depth analysis of the building was launched, leading to a comprehensive and integrated renovation concept for the property.
- Transforming an existing skyscraper into a “green” building retroactively is a complex task, requiring the close cooperation of everyone involved: owner, architects, technical planners and technicians.
- For the modernization of the Group Head Office, the renowned Milan-based architect and designer Mario Bellini is handling the architectural design, and a comprehensive approach to an overall aesthetic concept was developed to comprise energy efficiency, user comfort and life cycle costs.
- **The overall concept takes the following aspects into account:**
 - Saving energy
 - Using renewable energy sources
 - Efficient use of all resources
 - Repairs and maintenance
 - Intelligent building technologies / fire protection systems
 - High quality architecture
 - Optimal working conditions
- Simultaneously, the bank is taking advantage of this opportunity to create a new workplace environment for its staff, clients and visitors and to structure the use of space more efficiently through new workplace concepts.



“Greentowers” – innovative sustainability

“Greentowers” will verifiably set new standards for future projects – leading to sustainable improvements.

	Materials Recycling: 98%	Recycling of 30,500 tons of material + reuse of construction elements for 15,000 m² of office space
	Heating energy Reduction: 67%	67% savings per year = heating energy for approx. 750 households
	Electrical power Reduction: 55%	Savings of 55% = annual power consumption of approx. 1,900 households
	Water Reduction: 74%	74% saved per year = enough water to fill 22 Olympic-sized swimming pools
	CO₂ emissions Reduction: 89%*	Reduction of 89% per year = 6,000 cars / travelling 12,000 km
	Occupancy ratio Increase: 20%	After the renovation, up to 600 additional employees will benefit from the upgraded work environment

*With reference to the primary energy

98% of the materials recycled

- The complete renewal of the building’s technical facilities and systems requires a careful selection of materials oriented on the ecological requirements and needs of a modern and efficient workplace.
- This also applies to the disposal of materials. For this reason, dismantling and demolition work was carried out in accordance with sustainability criteria.

Of the 30,500 tons of demolition material, only two percent had to be disposed of through conventional means – all of the other material was returned to the corresponding industries or reused in construction.

74% savings in water

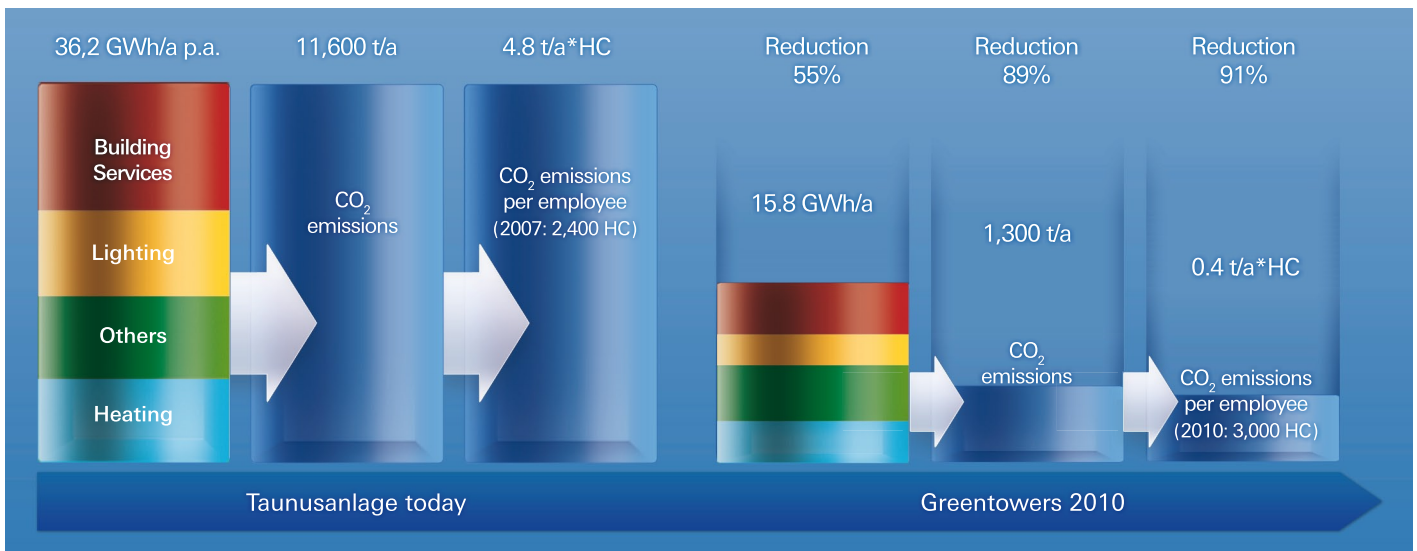
- A completely new water management system is being installed in the towers. Facility-internal water recycling, rainwater and the integration of water-saving systems will reduce the volume of fresh drinking water needed significantly.
- Rainwater and grey water are collected, treated and used for the outdoor watering systems as well as the WC and urinal flushing systems throughout the entire building complex.
- More than 50 percent of the hot water needed will be heated through a solar thermal panel system. Surplus thermal energy is redirected into the heating system.

In total, the volume of fresh water required will thus be reduced by 44,000 cubic meters each year – enough to fill 22 Olympic-sized swimming pools.

55% savings in electricity

- Intelligent systems provide for a higher level of comfort with less power consumption.
- Thanks to zone-based controls, lighting is only on when and where it is needed. The new light management system, the use of high efficiency luminants and an optimized use of the available daylight reduce energy consumption significantly.
- As cooling and heating are now based on the circulation of water, the former air exchange rate can be reduced from 6 to 1.5 times the volume. As a result, the new ventilation systems will consume less than half the electricity. The energy used for generating cooling will be significantly reduced through “free cooling”.
- The elevator technology is being completely replaced. A new traffic management system increases the transport capacity of the available elevators by optimizing transport distances and reducing waiting times.
- Depending on the travel direction and load, the elevators also generate electricity, which is fed back into the power grid. This technology and the optimized system design reduce power consumption by a total of more than 50 percent.
- Green IT solutions, including energy-saving PC technologies, multifunction devices, printer pools and servers outside the building, reduce the need for power further.

The energy thus reduced is equivalent to the total annual electricity consumption of approximately 1,900 households.



89%* reduction in CO₂ emissions

- The benefits from our efforts are for everyone. The reduction of our energy consumption and the consequent use of energy from renewable sources lead to an almost carbon neutral building.

89% CO₂ reduction each year = 6,000 cars travelling 12,000 km. p.a.

*With reference to the primary energy

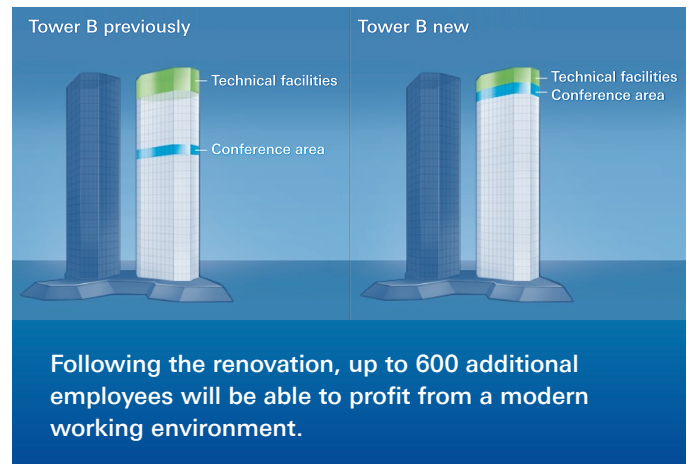
67% savings in heating and cooling energy

- New, super-insulating triple paned windows and improved insulation keep the heat out in the summer and reduce heat loss in the winter. As every second window can be opened, less air needs to be moved through mechanical ventilation, thanks to the natural air circulation – the indoor comfort will increase.
- Spring and fall are when heating and cooling are often needed simultaneously. The coupled heating and cooling system makes it possible to simultaneously produce both in one synchronized and energy efficient process.
- Free cooling on the roof is used to generate cooling during the transitional seasons. In the summer, cooling is produced by turbo coolers and excess heat is given off through free cooling.
- An energy efficient heat exchange system will reduce the consumption of energy even further. District heating will be used for peak periods, which means heat will no longer have to be generated in the building.
- The new heating and cooling radiant ceilings use the building's mass for thermal storage. Thermal activation of the cement ceilings tangibly increases the efficiency of the coupled heating and cooling system.
- Another positive effect is that the compact technology allows for an increased ceiling height, from 2.65 m. to 3.0 m.

The heating energy saved is enough to heat approximately 750 homes for a year.

20% greater space efficiency

- The new space usage concept and new, compact technology increase the efficiency of the building's usage.
- Modern equipment and an improved office infrastructure make it possible to use office space flexibly and create optimal working conditions.
- Space-saving building technologies result in smaller facilities control centers, which provides 850 m² of additional office space.



LEED certification

- As a member of the U.S. Green Building Council, we will be making the results of the renovation of our Group Head Office according to sustainability criteria verifiable through the certification: "Leadership in Energy and Environmental Design" (LEED).
- Here, Deutsche Bank is aiming for the highest possible award.



Deutsche Bank's Greentowers will be the world's first renovated skyscraper with an LEED Platinum certification.

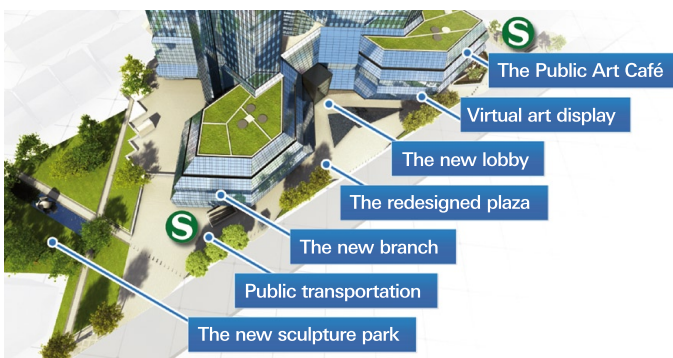
“Greentowers” – a renovation project that sets new benchmarks

Through innovative and pioneering measures, we are combining the implementation of ecological sustainability criteria with the creation of a state-of-the-art working environment. Our staff members, clients and visitors will find optimal conditions for their meetings and for work.



Public area

- The public profits from improved urban surroundings, from the new range of attractive offers and from the numerous design changes in the outdoor areas.



Facts and figures

- Constructed 1979-1984 in Frankfurt a. M., Germany, as Deutsche Bank's Group Head Office
- Height: 155 meters
- 4 floors in the base +
34 floors in Tower A
36 floors in Tower B
3 floors as an underground car park
- Gross usable area: 120,000 m²
- Net usable area: 102,000 m²
- Energy savings following renovation: 19.8 GWh p.a.
- Renovation timeframe: 2007-2010

The project's technical innovations

- Reliable and efficient technologies are used and optimally integrated for the renovation of the Taunusanlage property.
- Several technical systems have been optimized, redeveloped or newly developed for the Greentowers project. In our use of water, we are installing the world's most advanced flushing technology.
 - The optimized heating and cooling ceiling system is equipped with newly developed radiant elements for the thermal activation of the building's mass – resulting in a 20% higher thermal output than conventional systems.
 - The windows opening parallel to the façade are equipped with motorized scissor hinges – making it possible to have natural ventilation even at wind speeds of up to 180 km/h.
 - The tubular lights especially designed for the office floors are equipped with high-tech prism technology – achieving a light output of 86%.
 - The use of a newly developed, intelligent room booking tool will improve user convenience for the selection and booking of conference rooms – to nearly double room occupancy rates.
 - The GreenGain® toilets fixtures have a highly efficient flushing technology – using 30 percent less water than comparable modern systems.