

Single Building Retrofit

One Canada Square is an iconic, 50-storey, multi-occupied building in the heart of Canary Wharf. Completed in 1991, the tower is undergoing a rolling programme of energy efficiency improvements to reduce CO₂ emissions and operating costs.

> Situation

Canary Wharf Group has an all-encompassing approach to sustainable development and the environment, implementing an ISO 14001 certified Environmental Management System across all aspects of its business activities. In 2011, the company was named one of the UK's 60 Best Green Companies by The Sunday Times, for the third year running.

One Canada Square, completed in 1991, is currently the tallest occupied tower in the UK. Located at the heart of the 97-acre Canary Wharf Estate, the 800-foot high building has 3,960 windows, 4,388 steps and 32 passenger lifts.

In 2010, a number of the leases at One Canada Square expired, giving Canary Wharf Group the opportunity to refurbish large areas of the building.

An energy efficiency review identified a range of initiatives that would significantly reduce CO₂ emissions and operating costs. These included replacing some of the major plant items, which were coming to the end of their lifecycles, with more energy efficient alternatives.

Through this programme of improvements, Canary Wharf Group aims to raise the Energy Performance Certificate (EPC) rating of One Canada Square, from its current E rating to at least a D.

> Actions

The rolling programme of energy efficiency improvements includes:

- Replacing cooling towers with more efficient units and installing inverter drives on the fans. These regulate the speed of the fans by controlling power into the motor, rather than constantly running the motor at full speed and restricting the fans.
- Upgrading chiller controls and recommissioning the chilled water system to improve efficiency.
- Replacing lighting in occupied areas, stairwells and toilet areas with energy efficient fittings and updating controls to incorporate new motion sensors and daylight dimming.
- Converting the air conditioning systems serving the office floors, from fan-assisted variable air volume, to water-based systems capable of serving either fan coil units or active chilled beam. Chilled beams are more energy efficient than fan coil units, as they do not require a secondary fan and use higher chilled water flow temperatures. Where fan coil units are used, low energy Electronically Commutated, Direct Current (EC/DC) motors are employed to minimise energy use.
- Installing a gas-fired hot water heating system, using high-efficiency boilers and inverter drives on the circulation pumps. This will ultimately replace the current electric heating system.
- Installing new air handling units with heat recovery coils. In a future phase of the works, these coils will be connected to the condenser water system, saving energy by using waste heat to pre-heat outside air, and cutting the amount of energy and water used by cooling towers.
- Installing inverter drives to the primary chilled water and condenser water circulating pumps.



Canary Wharf Estate

“The energy efficiency improvements have already made significant reductions in the energy used in the building and its associated CO₂ emissions. The ongoing works will continue to achieve further savings. The improvement in the EPC rating will help align the building with more modern competitors.”

David Hodge, Director – Mechanical Engineering and Sustainability, Canary Wharf

> Challenges

Minimising disruption

How to carry out the works in the building with minimal disruption to the occupiers?

Phased replacement of the plant where it impacts on the building operation, with out-of-hours working during evenings and weekends where necessary.

Technical

How to gain the additional plant space needed for the new, gas-fired hot water heating system?

4,100 sq ft of lettable area was converted into plant space.

Technical

How to replace cooling towers at the top of a 50 storey, occupied building?

The towers were replaced one at a time. The existing towers were disassembled and taken down the internal goods lifts. All materials were sorted for recycling. The new towers were delivered "flat pack" and assembled on site.

> Achievements

> Benefits

As the works are ongoing, final energy reductions will not be known until completion.

However, the following reductions have been recorded on works completed to date:

- 47% less energy use for lighting in occupied areas across the 11 floors which have been modified so far, cutting CO₂ emissions by 803 tonnes
- 63% less energy use for lighting in toilet areas across the 18 floors which have been modified to date, cutting CO₂ emissions by 72 tonnes
- 82% less energy use for lighting in the first stairwell to be modified, saving 39 tonnes of CO₂
- 37% less energy use for air conditioning across the 11 floors which have been modified so far, cutting CO₂ emissions by 55 tonnes.

Based on this performance, annual CO₂ emission reductions on completion will be over 4,000 tonnes. It is also estimated that the programme of works will improve the EPC rating from an E (115) to a D (78).

> Financials

Using the stairwell lighting as an example:

- Capital investment: £22,000 per stairwell for replacement light fittings and new controls
- Annual energy cost savings: £5,500
- Payback period: Four years.

Additional savings are expected, as the new, energy efficient light fittings have a longer lifespan than traditional ones, which will cut replacement costs and maintenance fees.



One Canada Square – new boiler room