

## Overview

City of Cardiff Council (CCC) is using Re:fit in order to optimise the energy efficiency of certain properties, improve their building performance, reduce CO<sub>2</sub> emissions and save money. Re:fit was seen as an ideal approach to tackle historic buildings and demonstrate the ability to make cost-effective improvements, paid for through energy savings, even on a 900-year-old castle.



### Cardiff Castle

Dating back to the late 11<sup>th</sup> century, the Normans would have been focused on the defensive design of Cardiff Castle. Little attention would have been given for the ability to future-proof the property to enable easy installation of energy-efficiency measures more than 900 years later. Such obstacles have not stopped the Re:fit project being able to guarantee an 18 per cent saving in energy and CO<sub>2</sub> emissions with a financial payback of less than eight years.

It's some time since the castle has relied solely on candles and oil burners for illumination and the Re:fit project will see the installation of highly efficient systems to improve the quality and efficiency of lighting. Other improvements include an upgrade to the Building Energy Management System, remote energy monitoring and heating-system improvements. This will enable at least some parts of the castle to be brought into the 21<sup>st</sup> century.

<b>Project:</b>	Historic buildings – Cardiff Castle and Cardiff City Hall	
<b>Savings:</b>	£37,400 reduction in energy spend per annum  21% reduction in annual energy use	265 tonnes of CO <sub>2</sub> per annum saved (21%)
<b>Value:</b>	£315,000*	Simple payback of 8.4 years
<b>Timescale:</b>	Installation completing in 2017	
*Part of £4 million City of Cardiff Re:fit programme		



*“The City of Cardiff is strongly committed to lowering the environmental impact and energy cost of its buildings. We are also committed to preserving important buildings. The work at Cardiff Castle and City Hall shows how we are making improvements to iconic properties without damaging their historic features.”*

*Adam De Benedictis, Energy Manager, City Operations, City of Cardiff Council*

## City Hall

Despite its grandeur, City Hall in Cardiff cost less than £130,000 to construct. Recently the annual energy bill has been higher than that original cost, but this will no longer be the case following the Re:fit project. Guaranteed savings will see energy use fall by at least 22 per cent, saving more than £30,000 per annum. New lighting, improved controls, more-efficient fans and extensive insulation will significantly reduce both electric and gas use at the property.

The success and approach of Re:fit has led to the Cardiff programme expanding to now cover 26 properties as part of a rolling programme of energy-savings retrofits.

## Summary of Energy Conservation Measures (ECMs)

Improving the energy performance of these historic buildings encompasses a wide range of energy-efficiency measures. These are listed below.

### Building Energy Management Systems (BEMS)

This involves initial work to ensure correct performance of existing controls and the addition of building-specific systems where most appropriate. The next stage covers remote management and continuous commissioning to ensure that buildings perform in accordance to occupancy requirements and are continuously optimised to reduce energy wastage.

### LED lighting upgrades

This involves the installation of high-efficiency LED lighting, either through the retrofit of LED lamps into existing fittings or the complete replacement of fittings where cost effective. This approach ensures that the works are as cost effective as possible through maximising the lifetime of the existing assets. Due to the extensive life expectancy of LED lighting over the existing installed lamps, there is a significant annual maintenance cost saving to be realised in the future by less-frequent lamp changes and the immediate effect of new lamps throughout.

### Energy-efficient fans

By replacing the existing fans, the same air volume can be delivered while significantly reducing energy consumption. A feedback loop will allow fan speed to be modulated, adjusting air volume to meet the requirements of a varying load, further reducing energy consumption. As well as reducing power consumption, this measure will reduce maintenance by eliminating belt drives.

### Valve jackets and thermal insulation

Plant and boiler rooms are due to benefit through tailored thermal insulation jackets and poor pipe lagging being addressed. This is a low technology measure that helps to support basic energy-management good practice.

## Energy efficiency and financial savings through Re:fit

Re:fit is a procurement framework and support service available to all public sector organisations in the UK. Since 2009 it has been helping organisations to deliver “spend-to-save” environmental retrofit projects that both improve their buildings and, importantly, make substantial guaranteed financial savings.

**For more information about the National Re:fit Programme**, contact [robert.mckinnon@local.gov.uk](mailto:robert.mckinnon@local.gov.uk) or phone 07920 702 297.