



IN-CONSTRUCTION ASSESSMENT REPORT

21-22 GREAT SUTTON STREET LONDON EC1V 0DY



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PROJECT

21-22 Great Sutton Street
London EC1V 0DY

PROPERTY TYPE

Five-storey commercial
building with mansard roof.

DEVELOPER

SoCo House

CONTRACTOR

Fiducia Interiors

ARCHITECT

Kennedy Twaddle Architects

PROJECT MANAGER

Consult Sustainability

ASSESSMENT DATE

April 2024



This is a refurbishment project upgrading the communal stairwells, service facilities and ground, 4th and 5th floors of the building. The scheme will also involve installation and upgrade to the front cladding façade and the creation of external space as balconies.

The scheme is for commercial use with an anticipated future use as an office and administration facility. It falls under the Green Plaque Retrofit assessment, providing an opportunity to upgrade and improve a significant part of the existing building.

In construction

The developer, SoCo House, asked that this Green Plaque assessment be carried out during the construction

*This is an **in-construction assessment report** and thus outlines the project before its completion.*

For a variety of reasons, completed projects can differ slightly from their original specifications. Consequently, we cannot guarantee that all of the environmental features outlined in this report are included as described in the completed project.

phase of the project. This means that works are being carried out and no final documentation is available.

It provides an opportunity to see how the project develops over time and allows the opportunity to witness the installation of a number of key elements that would not normally be visible.

Property

The building was constructed in 1953 following bomb damage on the site. A mid-terraced commercial building, it is of a similar style to its surrounding neighbours.

Although slightly later, the design comes from these buildings being originally developed as part of the former Charterhouse Estate in the early 20th Century.

Why sustainable retrofit?

The development is taking a significant part of the existing building and repurposing for the future use and needs. By upgrading the heating and hot water system, improving insulation and, generally, updating the internal layouts and usability, the developer is extending the building's life and achieving notable sustainability improvements.

The construction and maintenance of buildings and other structures is responsible for around half of UK carbon dioxide emissions. Around 10% of UK emissions are associated with the manufacture and transport of materials, and the construction process¹.

Commercial offices in the UK account for about 11% of energy consumption from non-domestic buildings. However,

apart from factories where industrial processes skew the building-related data, offices are currently the largest single consumers of electricity, at 15.5% of all non-domestic buildings.

Similarly, while only 7% of non-domestic buildings are over 1000 sqm in size, these large buildings account for over half of all total energy consumption. Decarbonising large buildings will, therefore, have a more significant impact on total energy consumption per building retrofitted, and so they should continue to be a focus for the industry².

More than 90% of non-energy minerals extracted in the UK are used to supply the construction industry, which consumes around 6 tonnes of materials every year for every person living in the UK³.

Significant reductions in operational energy use are possible through both optimisation and light retrofit, which generally include the most cost, and carbon-effective retrofit measures.

Optimisation and light retrofit can be landlord or tenant-led, and success depends on effective collaboration between all stakeholders. It has been found the 'average' retrofit project is not currently reaching best practice 2035-2050 targets, which the [UK Net Zero Carbon Buildings Standard](#) is anticipated to align with.

Building fabric improvements are generally necessary to reach higher levels of performance. However, these measures can have a relatively high





The office space in use (pictured left and right) and an artist's impression of one of the upper-level office suites (centre)

- embodied carbon impact and, in many circumstances, are not economically or process viable with the building stock as it is⁴.

Since the first Covid-19 lockdowns in 2020, there have been significant shifts in workplace strategies, with organisations reacting in very different ways: from relinquishing all permanent office space, to enforcing office attendance for a minimum number of days per week. This has resulted in a spectrum of approaches to work patterns and occupancy rates.

The overall trend is clear: post-pandemic office occupancy is lower across Europe, with busy periods concentrated in mid-week and

employees requiring incentives to commute.

The use of office spaces also reflects the shift towards more collaborative working practices, with technology enabling virtual calls and hybrid meetings.

Headline features

■ **Energy:** The completed refurbishment has an anticipated **Energy Performance Asset Rating (Non-Domestic Building) of B**, putting the scheme in the top 30%⁵ in England and Wales in terms of energy performance. These figures include new build non-domestic property and so intrinsically as a retrofit project the

scheme achieves very high standards comparatively. This incorporates more than 30,000 assessments carried out in the fourth quarter figures of 2023⁶.

The energy calculations for a non-domestic property under current building regulation standards are taken as a comparison between the completed project and the project prior to works, the baseline. At Great Sutton Street, the baseline Energy Performance Asset Rating has improved by 65%.

The **Building Emission Rate** has dropped by 68%, this is the measure of kg/CO₂ per m². The primary energy use at Great Sutton Street has dropped from 316 kWh(PE)/m² per year by 67%⁷.

- In addition, a new Daikin VRV heat pump cooling and heating system will be installed, offering efficient comfort control for the commercial space.

Heating in the communal toilets will be provided using newly-installed Dimplex heaters. Hot water will be produced from the Daikin system linking to an insulated mega flow store, which conserves heat, avoiding the need for substantive pumping.

Initial calculations suggest the office space will use circa 66.8kWh/m² of energy on heating, hot water, auxiliary appliances and lighting. As there is no commercial price cap for energy, it is important the developer obtains the best contract for the end user when finding a supplier.

■ **Air tightness performance⁸** has been assumed to be 25m³/(h.m²)@50pa at this stage in the energy calculations. This is a notional figure, not uncommon in this form of development. Air tightness is a key environmental parameter that can significantly improve performance and consideration could be given to testing on future projects.

■ The development has created some usable **balcony and terrace spaces**, and has considered providing an external water supply to allow planting schemes to be added.

■ The development's design promotes **sustainable water use**. The building is equipped with water-saving features,

such as low-flow taps, shower heads and low-use toilet cisterns. These deliver high levels of water efficiency without compromising performance.

■ **Minimising the use of pollutants** and sourcing sustainable materials was given a high priority.

The team works with multiple key suppliers of materials and products and specified the avoidance of volatile organic compounds where feasible in, for example, paint and decorating products. Resin-based composite wood products were also carefully sourced, and vinyl and carpets have all been chosen with pollutant impact in mind.

■ **Waste management**, both on site and in-use, has been carefully considered. Material storage areas are clearly and securely set out, just-in-time delivery principles are applied for certain materials and clearly demarcated areas for waste and recycling are also available.

The methods employed are clearly designed to promote circular economy systems without the issues associated with site 'space and waste'.

■ **Building materials** are all selected from the [BRE Green Guide to Construction](#), a resource that analyses material for their impact relating to several environmental factors.

■ All **timber products** are [FSC](#) or [PEFC](#) accredited.



FIDUCIA

An established design-and-build company, Fiducia specialises in refurbishments, dilapidations and construction projects in the commercial sector, predominantly in London and south-east England.

Fiducia has made a number of procedural and policy decisions to identify areas of environmental impact and meet current environmental legislation and compliance obligations.

Among other standards, the company holds ISO14001 accreditation, which defines criteria for an [environmental management system \(EMS\)](#).

While this does not set out environmental performance requirements, it does provide a framework for setting up an effective EMS that helps organisations improve resource efficiency and reduce waste and costs.

ISO14001 certification provides evidence that an organisation is measuring and reducing its environmental impact. The standard can also be integrated with other management functions to help companies meet their environmental and economic goals.

kennedytwaddle

Based in Dalston, east London, Kennedy Twaddle Architects are involved in the design and refurbishment of residential and commercial buildings.

The company's areas of interest



About the development team

ranges from newbuilds to historic listed properties, and were winners of last year's Stephen Fry Public Engagement Awards.



As part of a strategic partnership, Fiducia engaged Consult Construct as employer's agent and project managers on the Great Sutton Street project to provide technical, cost and procurement oversight.

A multi-disciplinary construction and property consultancy, Consult Construct provides specialist services such as building and quantity surveys, and mechanical and electrical engineering.

The company works with Consult Sustainability to design and procure

energy-efficient schemes for mutual clients.

SoCo House

A property investment company, SoCo is rising to the demand for more sustainable commercial development.

The company is looking for opportunities to address this even where there is no obligation to do so in partial refurbishment projects such as Great Sutton Street.

The developer is also in the process of designing and procuring similar schemes in Clerkenwell that have the same sustainability goals of achieving an EPC rating of B or above.

SoCo believe that, once these schemes have received planning permission, they are likely to go live within the next six to 12 months.



By upgrading the heating and hot water system, improving insulation and, generally, updating the internal layouts and usability, the developer is extending the building's life and achieving notable sustainability improvements

The Green Plaque Retrofit assessment is a new method of looking at the environmental performance and sustainability of buildings that have been refurbished and upgraded.

Though the retrofit methodology is applicable to both residential and commercial buildings, the statutory requirements driving the process on the latter are less detailed.

Other assessments, such as [BREEAM](#), [LEED](#) and [ISO 14001](#), for example, will push the process very hard. But for a large number of schemes, these assessments can impose conditions which are so onerous as to render compliance unviable.

By contrast, the Green Plaque focuses on guiding developers on the best ways of addressing their current project's key environmental impacts and, more importantly, seeks to raise their ambitions on the incorporation of sustainability measures into their subsequent developments.

Operational use is key to commercial premises. Often, the amount of work that can be completed during the retrofit stage is limited, yet the building's future use will account for close to 80% of its total lifecycle emissions.

Consequently, the Green Plaque's focus is less on imposing demanding conditions and more on promoting the very good practices that many construction companies employ. In this way, the Green Plaque aims

to recognise and celebrate their commitments and achievements.

The assessment itself is a third-party review administered by Lifecycle Design. The resulting summary reports – like this one – are peer reviewed to ensure they are accurate and avoid exaggeration.

The aim is to establish a construction or retrofit scheme's sustainability credentials by using evidence to show what the developer has done well while, also, indicating where improvements could be made in future projects.

Observations

Heating and Hot water

The refurbishment of this premises on Great Sutton Street incorporates a heat pump for heating and cooling. The choice of appliance – the Daikin VRV IV-S – is a compact system ideal for relatively small developments.

The term VRV is a Daikin trademark and stands for 'variable refrigerant volume' – other companies use the term VRF, or variable refrigerant flow, for essentially the same technology. This circulates only the minimum amount of refrigerant needed during a single heating or cooling period.

VRV enables the refrigerant temperature to continuously adjust both the [inverter compressor](#) speed and the refrigerant temperature.

This gives users the ability to individually control several air conditioning zones at once and ensures



Control systems



Indoor units

VRV type indoor units
Residential type indoor units
(such as Daikin Emura)



Air curtain

Biddle Air curtain for VRV (CYV)



Ventilation

Heat Reclaim ventilation
(VAM/VKM) AHU
connection kit



RXYSQ4, 5TV1



RXYSQ4, 5, 6TV1/TY1



RXYSQ8, 10, 12TY1

Compact system: the Daikin VRV IV-S

the system has the capacity to meet the building load, improving seasonal efficiency⁹ by as much as 28%.

The Daikin's evaporation temperature is the widest of any similar products on the market (3°C to 16°C) and improves comfort by balancing airflow temperature. This high-performance, low-noise unit delivers a heating efficiency of 4.60 at 21°C.

Energy calculations

The energy calculation has been outlined earlier in this report. Very significant improvements are being

made through the project compared with the building before retrofitting¹⁰.

The insulation standards in the Great Sutton Street units are largely controlled by accessibility and the requirement for any change. The scheme values are comparable with similar buildings but, where appropriate, the replacement is significantly better.

The developers may wish to consider more detailed fabric improvement assessments for future projects, though this is not always easy. However, this root-and-branch action is the key to future-proofing developments and, in

- ▶ turn, can reduce operational costs for end users.

The developer will commit to monitoring the new heating and cooling system's actual energy performance during the building's use. There are two 'smart meters' installed which will assist in making this process easier.

It is intended that all others metering within the property is replaced within the next year to 18 months. The electric sockets have been designed so that appliances can be taken off stand-by to save electricity¹¹.

Large areas of the property's internal lighting has been significantly upgraded with light emitting diode (LED) strips, reducing the energy consumption required for general, space lighting. External lighting demand will also be restricted using a combination of LED fittings and passive infrared PIR sensors.

Cooling can be problematic in commercial offices. Great Sutton Street's inner-city location means that, though windows will be able to ventilate the building and aid cooling, the impact of traffic and the more general [urban heat island effect](#) will likely reduce its effectiveness.

The Daikin system provides cooling onsite and, as mechanical systems go, it is very efficient. Compared with alternatives, the potential energy savings are significant.

The ongoing savings will not be limited just to lighting, heating and cooling, though. Some appliances are being substituted with more modern,

ENERGY PERFORMANCE ASSET RATING

More energy efficient	Pre-retrofit EPC rating	Post-retrofit EPC rating	Equivalent newbuild	Building stock average
A+				
(0-25) A			13	
(26-50) B		33		
(51-75) C				51
(76-100) D	95			
(101-125) E				
(126-150) F				
(150+) G				
Less energy efficient				

energy-efficient alternatives as part of the retrofit.

However, the Green Plaque does not recommend replacing existing appliances simply because of the energy efficiencies they can deliver as the savings equation is not always straightforward. For instance, in some cases, the energy consumed in transporting the new systems, as well as their embodied costs¹², can outweigh much of their reduced energy consumption while in use.

Consequently, replacement policies

This table shows the EPC ratings for 21-22 Great Sutton Street pre- and post-retrofit, along with the assessed rating for an equivalent newbuild property and an average building stock rating as a whole.

The Great Sutton Street project energy assessment ratings are contained in three documents:

Pre-retrofit EPC
Design-stage EPC
BRUKL report

should account for the lifecycle energy-consumption impacts. In addition to energy consumption, replacement policies at Great Sutton Street also involves procuring appliances that are highly-rated under the [EU Energy Labelling scheme](#) and are designed for longevity and low maintenance.

Transport as a sustainability issue

The offices at Great Sutton Street are brilliantly located for access to local public transport facilities and cycle schemes. Appropriate deliveries and

- ▶ workforce travel plans have been operational during the retrofit in an attempt to optimise transportation.

Water use

There are plans to introduce a procedure for water leak recognition and monitoring. The developer is recording pre- and post-construction water use, even though the impacts on the site's water consumption may be small.

Water leaks are a significant source of water loss from commercial premises across the UK. Water is our most precious resource and so just a little care and attention can avoid unnecessary waste.

Reducing water consumption can also reduce energy use. Simple signage in bathrooms and kitchen, release taps and low-water-use appliances can reduce consumption significantly.

Biodiversity and urban greening

Small external areas are being deployed to provide outside amenity for the site's users.

The project team has committed to extending the water supply to the main terrace and assumes that future occupiers will request planters to allow the introduction of some greenery to these areas. Such plants and shrubs can become a haven for insects and, potentially, a resting spot for birds.

Pollution

Refrigerants are used in many appliances commonly found in



The scheme's proximity to public transport and cycle schemes helps to minimise its transport impact on the environment.

Finsbury was a metropolitan borough within the County of London from 1900 until 1965, when it was merged with Islington to form the London Borough of Islington.

commercial buildings. The Green Plaque is not suggesting that these appliances be removed but, instead, that retrofit project planners be appraised of the potential impact these chemicals could have on the environment.

The project team is aware of the importance of putting appropriate maintenance and monitoring systems in place to avoid leaks.

In selecting the Daikin heating



and cooling system at Great Sutton Street, the developer also included an assessment of its refrigerant's [global warming potential \(GWP\)](#) in reaching its decision.

[Nitrogen oxide \(NOx\)](#) emissions are a significant global warming gas and, as such, the developer is aware of the need to assess this when considering new appliances specific to the site's heating and hot water systems.

Energy production inevitably

- ▶ produces the emission of gases, so the NOx rating – if available – is certainly something to be aware of.

Light pollution can present significant issues for creatures of the night, in addition to our own wellbeing. The Great Sutton Street retrofit has been designed to minimise the building's impact on the immediate vicinity by reducing the brightness of lighting to levels and areas assessed as acceptable. This has been achieved by shading external light fittings which, combined with the imposition of curfews on internal lighting, have reduced light pollution.

Noise can also be a right pain in the neck for neighbours, wildlife and passers-by. The developer has, therefore, taken care to minimise building activities outside of normal working hours during the construction stage, as well as in shaping its future operation.

Volatile organic compounds (VOC) can harm air quality. Certain solids and liquids emit VOCs as gases, some of which can include a variety of chemicals that have short- and long-term adverse health effects.

VOCs are often associated with NOx, and both are significant contributors to global warming and are a direct health hazard. NOx is a far more powerful greenhouse gas than carbon dioxide¹³.

Materials

The development aims to meet the very highest standards as assessed under the Building Research

Establishment's (BRE) Green Guide to Housing Construction. This assessment considers all the elements contained in a building's materials – everything from the environmental cost of its production through to the product's future recyclability and reusability.

Most construction products achieve at least a C rating and, more usually, an A. For example, while uPVC windows may not seem particularly 'green', the materials' recyclability means this product has quite a low environmental impact and achieves a rating of A.

Decorating products and items, such as floor coverings, have been assessed on relevant regulations – notably their VOC content – and specified as compliant. The insulation materials used at Great Sutton Street have also been carefully assessed and specified to minimise the environmental impact of their use.

This is important because some insulation products can create atmospheric pollution. Insulation foam, for instance, poses a particular risk because of the gassy blowing agents used in its manufacture and its subsequent environmental impact as a result of their global warming potential.

However, all the blown insulation materials used in this retrofit project were selected because of their low GWP rating.

All the timber used is either FSC or PEFC accredited, which means it has been obtained from sustainable sources. From a construction lifecycle perspective, the project reuses a



- ▶ large part of the existing structure, significantly reducing its embodied impact.

The retrofit hierarchy¹⁴ used assesses all the potential costs of upgrading materials and insulation as a methodology to determine the project's success.

Waste

Operationally, the building will be provided with effective and easy-to-use waste and recycling bins, both internally and externally.

Getting the right waste material in the right place is the key to preventing plastic-pollutant migration to land, river and sea and the more convenient this is to the resident the better.

A waste collection company was employed during the construction work, aiming for a target 90% diversion from landfill.

Operational use

We do not know exactly who the end user will be at this stage. This report is written during the construction stage and, although we know this site will be used as office space, the final tenant, licensee or leaseholder is yet to be agreed.

Small and medium-sized enterprises (SMEs) account for around half of all UK commercially-driven emissions. Greening business workplaces is, therefore, key if the UK's drive towards achieving its net zero targets by 2050 is to be a success.

A number of operational measures



are central to reducing environmental footprint. These include:

- Measure carbon footprint and have a plan to reduce this.
- Reduce paper wastage
- Replace single use items
- Support recycling
- Switch energy supplier
- Plan deliveries carefully

- Choose suppliers who share your environmental ambitions
- Rent or lease office furniture and appliances

Implementing measures that reduce our carbon emissions are crucial to any attempts at reducing our climate impacts. ■

Endnotes

- 1** BRE Briefing Paper: [Sustainable refurbishment – how to better understand, measure and reduce the embodied impacts](#).
- 2** UK Green Building Council: [Building the Case for Net Zero-Retrofitting Office Buildings](#).
- 3** JUTA UK: [Sustainable Development & Construction: Everything You Need to Know](#).
- 4** RPS Group: [Embodied Carbon: What it is and How to Tackle It](#).
- 5** Official Statistics: [Energy Performance of Buildings Certificates Statistical Release: October to December 2022 England and Wales](#). Published January 2023.
- 6** Official Statistics: [Energy Performance of Buildings Certificates Statistical Release: October to December 2022 England and Wales](#). Published January 2023.
- 7** This is according to energy modelling and efficiency calculations produced at the projects design stage. See: [Pre-retrofit EPC](#); [Post-retrofit EPC](#) and [BRUKL report](#).
- 8** Air tightness is a performance feature that guarantees a low leakage rate between two zones subject to different pressures and separated by a door. An air permeability test is a process of inducing a set of environmental conditions on the buildings envelope to be able to measure the uncontrolled movement of air similar to the effect wind would naturally have on the building at equivalent wind speed of 20 meters per second. To achieve this we use large door blower fans to create a pressure differential between inside and outside of the building. Using calibrated UKAS testing equipment these pressures are used to measure the air flow through the door blower fan which enables us to calculate the overall air permeability score. The maximum air tightness score is $10\text{m}^3/\text{hr}/\text{m}^2$, but anything over 5 for a newbuild – $5\text{m}^3/\text{hr}/\text{m}^2@50$ pascals – would fail.
- 9** Seasonal efficiency measures the true energy efficiency of heating and cooling devices during a period of one year. Unlike older heating and cooling systems, seasonal efficiency tracks a system's daily operations to include temperature fluctuations and standby periods.
- 10** This is according to energy modelling and efficiency calculations produced at the projects design stage. See: [Pre-retrofit EPC](#); [Post-retrofit EPC](#) and [BRUKL report](#).
- 11** [Which? experts view on stand-by appliances](#).
- 12** The embodied energy of a building includes the energy used in the component material exploitation, production, transportation and installation, the building construction, and the energy costs of the building maintenance. Sometimes the final demolition energy costs are also included.
- 13** The impact of one kilogram of NO_x on warming the atmosphere is almost 300 times that of one kilogram of CO₂. Globally, around 40% of total NO_x emissions originate from human activity – US Environmental Protection Agency.
- 14** Successful retrofits follow a simple hierarchy to sustainable energy and water use which, in turn, contribute to adapting a building to climate change impacts. To maximise the savings on energy and water bills for the least amount of capital outlay, retrofit solutions should be implemented in the following order: reduce demand; increase efficiency, source sustainably and adapt to the impacts of a changing climate.



An environmental assessment from



lifecycledesign.co.uk

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