SILCOCK DAWSON & PARTNERS

WHOLE LIFE-CYCLE CARBON ASSESSMENT FOR

.BIG YELLOW SELF STORAGE COMPANY LTD
ALPHA HOUSE 24-27 REGIS ROAD, KENTISH TOWN

VERSION 2.1

Issued by:-

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CONTENTS

.BYSS ALPHA HOUSE, 24-27 REGIS ROAD, KENTISH TOWN

WHOLE LIFE-CYCLE CARBON ASSESSMENT

PROJECT REVISION SHEET

.BYSS ALPHA HOUSE, 24-27 REGIS ROAD

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Prepared by: A Sturt

Revision	Date	Details	Changes	Author	Checked
1.0	28-06-2022	Draft for Comment	-	A Sturt	
2.0	26-07-2022	Final Draft	PV capacity increased	A Sturt	
2.1	29-07-2022	For Planning	Minor Comments	A Strut	N Purdy

EXECUTIVE SUMMARY

This Whole Life-cycle carbon assessment demonstrates that the development has a very low embodied carbon content, due to the light weight construction of the building and the use of highly recyclable materials, such as steel and recycled wood products for the mezzanine floor constructions.

The upfront and whole life carbon emissions are significantly lower than GLA and LETI benchmarks for office buildings which is the closest building type with a benchmark.

The Energy Usage Intensity (EUI) of this type of building is low and data from recently completed and operational buildings indicates an EUI of 12.7kWh/m2.yr, LETI set suggest a benchmark of 55 kWh/m2.yr for an office building. The development also includes a large PV array, which exceeds the zero carbon requirement described for Part L compliance and is predicted to generate the equivalent of 85% of the energy consumed within the development.

The whole life carbon emissions for a self storage building are expected to be lower than an office, however, the proposed development is significantly lower than the GLA target at 28% of the benchmark embedded emissions, with a nett energy usage of just 2.4kWh/m2.yr, once renewable energy generation is considered.

1 INTRODUCTION

Silcock Dawson and Partners have been appointed by .Big Yellow Self Service to provide a Whole Life Carbon Assessment as part of their Circular Economy approach for the proposed new development at Alpha House 24-27 Regis Road.

The development comprises the redevelopment of the site and the construction of a self storage facility (use class B8) and flexible office space (Use class E(g)(i)), together with vehicle and cycle parking and landscaping.

2 POLICY REVIEW

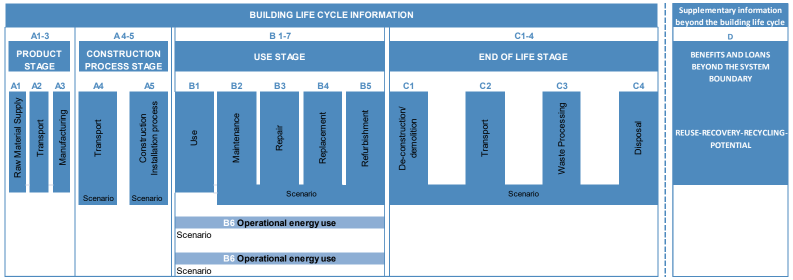
This Whole Life Cycle (WLC) assessment responds to Local Plan Policy CC1 and Supplementary Planning Guidance Energy Efficiency and Adaptation Section 9 Reuse and Optimising Resource. This report summarises the carbon emissions resulting from the construction and use of the development over its entire life, including its disassembly, demolition and disposal. The assessment captures a building’s operational carbon both regulated and unregulated energy use, in conjunction with the development’s embodied carbon emissions thus providing a relatively true picture of a building’s carbon impact on the environment.

3 METHODOLOGY

The development Whole Life-cycle Carbon (WLC) assessment is designed to inform and influence the early design stages to enable better early-stage decision-making by providing feedback on the environmental impacts of the building information modelling (BIM) design choices.

This WLC assessment is scientifically based and uses International Organisation for Standardisation (ISO) – standardized method for assessing resource consumption and environmental impacts of a given product, system or service over its entire life cycle (EN 15978-2012, ISO 14040-2008; ISO 14044-2006: ISO 21931-1, 2010). The WLC modelling within this report was conducted using the OneClick LCA software as part of the concept design update for RIBA Stage 2-3. In the assessment following life cycle stages according to EN 16627 were included:

Figure 1 – Building lifecycle stages



The International Standard ISO 21930 and European Standard EN 15804 set out a common life-cycle model for building and construction works. The life-cycle model includes modular definitions for the life-cycle Stages, allowing each stage to be compared in isolation with other projects.

The product stage information (A1-A3) is always represented combined for building level assessments, as are end of life stages (C1-C4) in most cases. Depending on the purpose of the WLC other stages may be omitted or be replaced with a scenario in absence of detailed information.

The performance of the development is also compared against the benchmarks detailed by the London Energy Transformation Initiative (LETI) an organisation formed of construction professionals from organising such as RIBA, RICS, CIBSE, UKGBC and supported by the GLA and London Boroughs. LETI provides targets and a trajectory for all new buildings to be designed as zero operational carbon and 65% reduction of embodied energy by 2030.

4 KEY ASSUMPTIONS

Table 1 – Project key assumptions

Environmental Indicator	Life Cycle Carbon CO2eq
Assessment Period	60 Years
Functional Quantity	The Functional unit for embodied carbon is shown in kgCo2eq/m^2 of floor area A total GIA of xxxx m^2
System Boundary	In accordance with BS EN1579:2011 as shown in table 1
Software tools	OneClick LCA
Assessment scope	Building parts and life stages/modules included
Elements Considered	In accordance with RICS PS shown in the following table 2
Materials Specification	Material quantities as provided by the cost consultant. Services quantities provided by SDP engineers.
Expected Material Lifespan	As defined by the manufacturers in the EPDs.

Data sources	The data sources for this assessment include the following type: Type III environmental declarations (EPDs and equivalent) and datasets in accordance with EN 15804.Type III environmental declarations are issued by a designated programme operator adhering to the requirements of ISO 14025 EN 15804
Refrigerant Leakage	VRF assumed for reception area, using R410a with annual leakage rate of 6% and 3% end of life leakage rate. Monoblock space heating heat pumps usually use R407c with leakage rates of 2% annual and 1% end of life.
Operational Energy Consumption	The anticipated annual energy consumption both regulated and unregulated energy has been assessed in accordance with CIBSE TM54.
Water Consumption	Water consumption is based on the BREEAM Water calculator output.
Construction Scenarios	OneClick LCA's average site impact temperate climate (North) has been used
CO_2eq Emission Factors	CO_2eq Emissions from consuming electricity and water were calculated by OneClick LCA

Table 2 – Building parts included within assessment

#	Building parts/element	Building elements	Coverage
0	Facilitating works	0.1 Temporary/Enabling works/ Preliminaries	Included
		0.2 Specialist	Not Applicable
1	Substructure	1.1 Substructure	Included
2	Substructure	2.1 Frame 2.2 Upper floors incl. balconies 2.3 Roof 2.4 Stairs and ramps	Included
	Superstructure	2.5 External Walls 2.6 Windows and	Included
	Superstructure	2.7 Internal Walls and Partitions 2.8 Internal Doors	Included
3	Finishes	3.1 Wall finishes 3.2 Floor finishes 3.3 Ceiling finishes	Included
4	Fittings, furnishings and equipment (FF&E)	Building-related Non-building-related	Included
5	Building services / MEP	5.1–5.14 Building-related	Included
		Non-building-related	Not Applicable
6	Prefabricated Buildings and Building Units	6.1 Prefabricated Buildings and Building Units	Not Applicable
7	Work to Existing Building	7.1 Minor Demolition and Alteration Works	Not Applicable

8	External works	8.1 Site preparation works 8.2 Roads, Paths, Paving and Surfacing 8.3 Soft landscaping, Planting and Irrigation Systems 8.4 Fencing, Railings and Walls 8.5 External fixtures 8.6 External drainage 8.7 External Services 8.8 Minor Building Works and Ancillary Buildings	Included

5 PROCESS OF BUILDING IN CIRCULARITY

Construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building will be specified. Where possible the materials will have an A or A+ rating in the green guide to specification.

During the construction phase suppliers will provide Environmental Product Declaration certificates where available that conform to the following standards.

- ISO 15804 Type 3 EPD
- ISO 14025 Type 3 EPD
- ISO 14024 Type 1 EPD.

Where newly specified materials have recycled content, suppliers will provide certification that meets good practice levels of recycled content set out in choosing construction products, Guide to the recycled content of mainstream construction products, WRAP.

6 OPERATIONAL ENERGY

The applicant has large portfolio of buildings, some of which constructed over the last five years. Due to the highly intermittent and low occupancy of the building, energy consumption from existing sites has been used to indicate the predicted operational energy rather than attempting to model the usage profiles. The sample sites used to determine the operational all have similar energy usage intensity indicating that they provide a good basis for the assessment.

7 OPPORTUNITIES TO REDUCE CARBON EMISSIONS

Concrete with a GGBS or similar cement replacement content of 30% has been used within the assessment, during the design and procurement stages the use of higher recycled contact will be investigated.

8 RESULTS

The following table indicates the results of the Whole Life Carbon Assessment undertaken for the proposed development.

		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B6	B7	C1-C4		D
Result category	**Biogenic carbon (kg CO2e)**	**Product Stage**	**Transportation to site**	**Site operations**	**Use Phase**	**Maintenance**	**Repair**	**Material replacement**	**Material refurbishment**	**Operational Energy use - Regulated**	**Operational Energy use - Unregulated**	**Operational Water use**	**Deconstructon Demolision**	**TOTAL kg CO2e**	**D External impacts (not included in totals)**
0.1 Toxic Mat.															
0.2 Demolition													157,950		
0.3 Supports															
0.4 Groundworks															
0.5 Diversion															
1 Substructure	-	473,394	27,466	24,362			-						11,134	536,356	- 49,792
2.1 Frame	-	597,138	998	23,656			-	8,923	-				1,831	632,482	- 294,072
2.2 Upper Floors	- 102,816	63,521	787	10,910			-						110,034	82,436	- 76,991
2.3 Roof	-	66,158	65	9,964			-						17	76,205	- 30,424
2.4 Stairs & Ramps	-	723	5	106			-						8	842	- 167
2.5 Ext. Walls	-	227,432	828	20,255			-	244	-				1,819	250,575	- 57,838
2.6 Windows & Ext. Doors	-	16,305	16	3,976			-	1,608	-				79	21,981	- 144
2.7. Int. Walls & Partitions	-	309,215	616	26,455			8,652						2,702	347,639	- 156,667
2.8 Int. Doors	- 3,575	32,427	27	252			912	32,702	-				3,823	66,293	- 22,936
3 Finishes	-	7,341	16	4,882			290	24,296	-				2,706	31,491	- 6,770
4 Fittings, furnishings & equipments	- 1,349	2,422	19	5,006			-	10,560	-				1,548	17,334	- 2,465
5 Services (MEP)	- 5	177,086	811	16,773	74,462	529	-	440,684	-	181,167	89,234	124	752	697,599	- 8,270
6 Prefabricated															
7 Existing bldg															
8 Ext. works	-	54,495	5,130	-			-	25	-				1,469	61,120	- 10,020
Unclassified / Other						6							10,200	6	
TOTAL kg CO2e	- 107,746	2,027,658	36,784	146,597	74,462	535	9,854	519,043	-	181,167	89,234	124	148,121	2,822,359	- 716,556

<u>Stages A1-A5 Product and Construction Stages</u>

Following measures to reduce whole life carbon emissions, the results indicate that is the development is just below the benchmark for similar building types.

<u>Stages B-C Use stage and End of Life (excluding B6 & B7)</u>

Carbon emissions associated with use, maintenance, repair and refurbishment/replacement and End of Life accounts for around 22% of the overall whole life carbon emissions for the development excluding B6 and B7. The assessment uses default data for maintenance and repair proportions and therefore a more accurate result is likely once maintenance strategy reports and O& M manuals are available. Where specific project data in respect to refurbishment/replacement is not available, default OneClick LCA assumptions have been used.

The results below indicate the low embedded carbon within the structure due to the lightweight nature of the construction, and the potentially high recycling content of steel that is widely used within the building both in the building structural frame, mezzanine structure and the partitions used within the storage space of the building.

Whilst not included in the results below the building services energy is also extremely low due to the small area of the building that receives space heating and the intermittent use of lighting within storage areas that are infrequently accessed. Analysis of the energy consumption from operating sites and the predicted power generated from the PV array, approximately 85% of the annual operational energy is expected to be generated renewable energy.

Modules A1-A5	Modules B1-B5	Modules B6-B7	Modules C1-C4	Module D
278	74	66	19	-90

9 CONCLUSION

Specific benchmarks for this type of building are not available, however it is possible to compare the building against other commercial uses. The LETI Climate Emergency Design Guide provides benchmark values for offices, schools and residential buildings with offices being the most appropriate building type to compare against. Additional benchmarks are also published by the GLA which also includes office buildings

Benchmark	GLA Benchmark	GLA Aspiration	LETI Best Practice 2020	LETI Best Practice 2030	Proposed Development
KgCO2/m2	900-100	550-600	<600	<350	278

The building embedded or upfront carbon (A1-A5) is at a very low level, lower than the LETI 2030 best practice benchmark due in 2030.

The Energy Usage Intensity (EUI) of this type of building is low and data from recently completed and operational buildings indicates an EUI of 12.7kWh/m2.yr, LETI set suggest a benchmark of 55 kWh/m2.yr for an office development. The development also includes a large PV array, which exceeds the zero carbon requirement described for Part L compliance and is predicted to generate the equivalent of 85% of the energy consumed within the development.

It would be expected that the whole life carbon emissions for a self storage building is lower than an office, however, the proposed development is significantly lower than the GLA benchmark at 28% of the benchmark embedded emissions, with a nett energy usage of 2.4kWh/m2.yr.