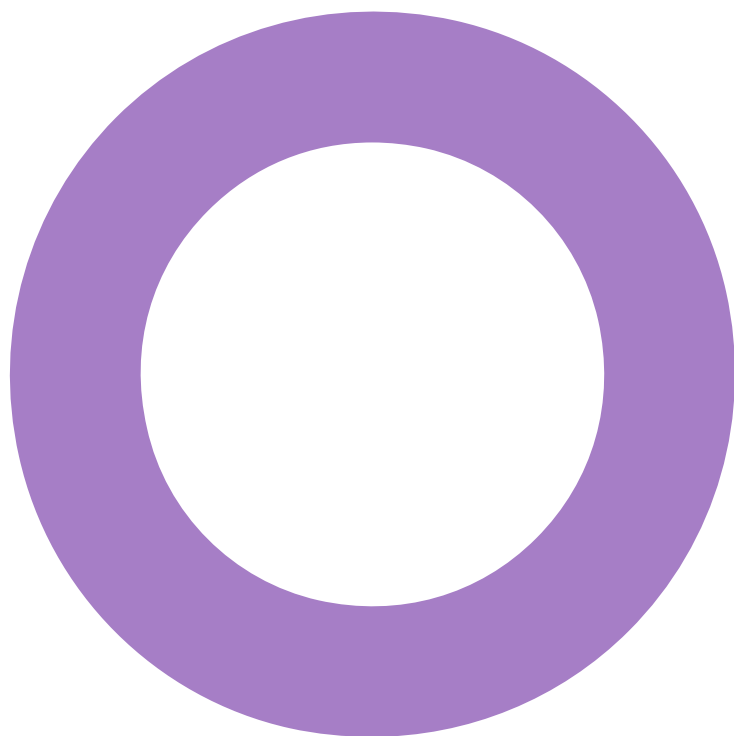


Broad Street Mall Master Plan.
Broad Street Mall, Reading, RG1 7GQ.
Inception (Reading) Sarl (c/o Moorgarth Group Ltd).

SUSTAINABILITY
ENERGY STRATEGY

REVISION E – 08 NOVEMBER 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
A	14.08.2018	Draft issue for comment	J. Nuttall	T. Smith	J. Ford
B	03.12.2018	Updated following design team review	J. Nuttall	T. Smith	J. Ford
C	17/12/2018	Minor amendment to units	T. Smith		J. Ford
D	17/12/2018	Amendment to client name	T. Smith		J. Ford
E	08/11/2019	Updating for Nov 2019 planning submission	M. Robertson	T. Smith / B. Elrick	J. Ford

This document has been prepared for Inception (Reading) Sarl (c/o Moorgarth Group Ltd) only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 23/23135
Document reference: REP-2323135-05-MR-20191108-Energy Strategy-Rev E

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Executive summary

This energy strategy has been prepared on behalf of Inception (Reading) Sarl (c/o Moorgarth Group Ltd), in support of the development proposals for the Broad Street Mall Master Plan project in Reading, hereafter referred to as the *Proposed Development*.

Following discussions with DP9 Planning Consultants, it is understood that the Proposed Development must achieve the policies within the Adopted Reading Local Plan; specifically, the zero-carbon target.

This strategy summarises the adopted policies within the Reading Local Plan documentation applicable to the Proposed Development and sets out how the Proposed Development will address and achieve the relevant policy targets.

Updated from previous submission

Planning permission was previously sought for the Proposed Development in December 2018.

This document replaces the Energy Strategy (Ref: REP-2323135-05-MR_20180813-Energy Strategy-Rev A, issued 14th August 2018) previously submitted by Hoare Lea and reflects the following changes to the scheme:

- Block D has been removed from the scheme
- Part L1A 2013 calculations have been updated to reflect the planning submission drawings provided by Corstorphine and Wright Architects.
- A further assessment has been provided to assess the Proposed Development using the proposed Part L carbon emission factors. This includes the carbon emission factors for grid electricity updated to reflect the latest guidance from the draft Standard Assessment Procedure 10.0 and 10.1 documentation at 0.233 kgCO₂/kWh and 0.136 kgCO₂/kWh respectively.
- The g-value of the glazing has been reduced from 0.50 to 0.45 to limit excessive solar gains and provide realistic mechanical flowrates to demonstrate compliance with Part L1A 2013 Criterion 3 with closed windows.

The changes result in a reduction in the Part L Criterion 1 site wide compliance margin from 4.40% to 2.20% using current carbon emission factors. When using the revised projected carbon emission factors, the carbon emission savings for the scheme over the baseline increase to 54.1% and 72.7% for the 0.233 kgCO₂/kWh and 0.136 kgCO₂/kWh electrical carbon factor scenarios respectively.

Planning Policy

The Adopted Reading Local Plan states that applications for residential development should achieve the following targets:

Policy	Requirement
H5; Standards for New Housing	a. All new build housing outside the Central Area as defined on the Proposals Map will comply with the nationally-described space standard. b. All new build housing will be built to the higher water efficiency standard under Regulation 36(3) of the Building Regulations. c. All major new-build residential development should be designed to achieve zero carbon homes; d. All other new build housing will achieve at a minimum a 19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations. e. All new build housing will be accessible and adaptable in line with M4(2) of the Building Regulations where it is viable, unless it is built in line with M4(3) f. On development of 20 or more new build dwellings, at least 5% of the dwellings will be wheelchair user dwellings in line with M4(3) of the Building Regulations.
CC4; Decentralised Energy	In meeting the sustainability requirements of this plan, developments of the sizes set out below shall demonstrate how consideration has been given to securing energy for the development from a decentralised energy source, including CHP (Combined Heat and Power). Any development of more than 20 dwellings and / or non-residential development of over 1,000m ² shall consider the inclusion of a CHP plant, or other form of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision. Where there is existing decentralised energy provision, including a CHP plant or a district energy network present within the vicinity of an application site, further developments of over 10 dwellings or non-residential development of 1,000m ² will be expected to link into the existing decentralised energy network or demonstrate why this is not feasible.

Table 1 Adopted Policy; Standards for New Housing and Decentralised Energy

A revised Sustainable Design and Construction Supplementary Planning Documents (SPD) will contain more detail on achieving this requirement, but in general, this will mean as a minimum a 35% improvement over the 2013 Building Regulations plus a contribution of £1,800 per tonne towards carbon offsetting within Reading (calculated as £60 per tonne over a 30-year period).

Approach

This report evaluates the Proposed Development against the energy hierarchy; Be lean, Be clean and Be green. The building fabric performance was informed by the Part L1A 2013 Target Fabric Energy Efficiency (TFEE) criteria.

In the latest edition to the Building Regulations, dwellings must demonstrate that the fabric efficiency is equal to or better than the ‘notional’ building.

The non-domestic areas of the Proposed Development i.e. retail areas were assessed as a ‘shell only’ assessment in lieu of the fit-out details for these areas and therefore are assumed not to show any improvement over the Part L 2013 Target Emission Rate (TER).

Approved Part L compliance software NHER plan assessor was used to for the Part L1A compliance calculations.

Energy strategy summary

The Energy Strategy has been developed using a ‘fabric first’ approach through the ‘Be Lean’, ‘Be Clean’, ‘Be Green’ energy hierarchy:

Be lean.

Be Lean – passive design measures.

The Part L calculations undertaken demonstrate that the dwellings meet the requirements of Part L1A i.e. the annual carbon emissions are less than the Target Emission Rate (TER) and the Fabric Energy Efficiency (FEE) is better than the Part L Target Fabric Energy Efficiency (TFEE).

Domestic	Non-Domestic	Site-wide
31,404m ² Gross floor area	1,580m ² Gross floor area	32,984m ² Gross floor area
2.40% Reduction over Part L1A baseline	0% Reduction over Part L2A baseline	2.20% Reduction over Part L baseline

Table 2 Be lean results summary.

Be clean.

Be Clean – use of energy networks.

The proposed servicing strategy for the development makes use of an all-electric approach; heating and domestic hot water. The site presents challenges for including an onsite energy centre to house boilers, Combined Heat and Power (CHP) and heat pumps – therefore an all-electric strategy was adopted.

Be green.

Be Green – use of Low and Zero Carbon Technology.

Due to the constraints of the development i.e. limited space for plant, no ‘green’ technology is incorporated into the energy strategy.

In order meet the carbon targets detailed in the Adopted Reading Local Plan a PV array of 9,950m² would be required.

Proposed site-wide energy strategy

Through the use of passive design; enhanced building fabric performance and efficient building services systems the Broad Street Mall Master Plan achieves a 2.20% reduction in regulated CO₂ emissions over the Part L 2013 target.

Carbon dioxide emissions after each stage of the energy hierarchy.

The following table sets out the annual CO₂ emissions for the development.

	Domestic		Non-Domestic	
	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year
Part L Baseline	588,491	409,616	48,005	21,954
Be Lean.	574,469	399,855	48,005	21,954

Table 3 Carbon emissions after each stage of energy hierarchy.

Regulated carbon dioxide savings from each stage of the energy hierarchy.

	Domestic		Non-Domestic	
	Tonnes CO ₂ /year	Percentage	Tonnes CO ₂ /year	Percentage
Savings from Be Lean.	14	2.40%	0	0%
Total Reduction:	14	2.40%	0	0%
Target Reduction:	588	100%	17	35%
Annual Shortfall*	-574	97.6%	-17	35%
Carbon Offset Payment Rate (£/tCO2)	£1,800		£1,800	
Offset Payment	£1,034,044		£30,243	
Total Offset Payment	£1,064,287			

Table 4 Regulated carbon emissions savings from each stage of the energy hierarchy.

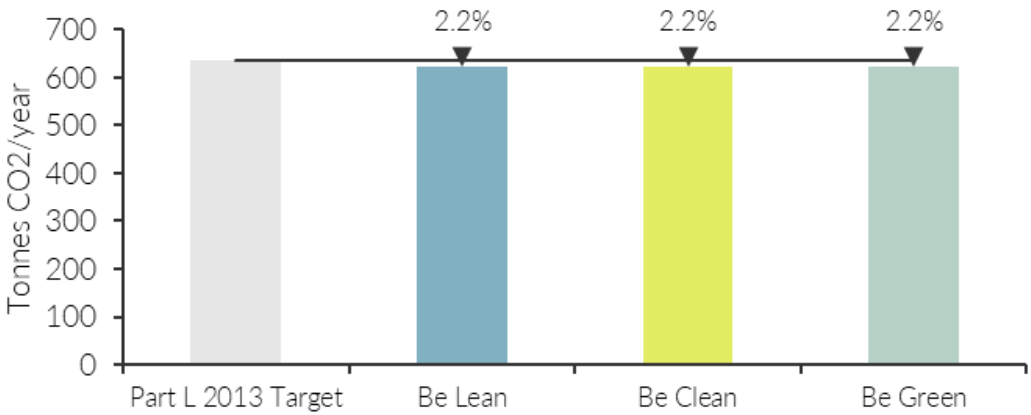


Figure 1 Regulated CO₂ Reduction; Broad Street Development

Grid Decarbonisation & Revised Part L Carbon Factors

The carbon factor of the National Grid, the amount of carbon dioxide released per kilowatt hour of electricity produced and distributed, is recognised in current Building Regulations as being 0.519kgCO₂/kWh.

As the national mix of electricity generation methods progresses towards greener solutions, the Building Regulations Part L 2013 value of the National Grid carbon factor has been shown to be substantially higher than how the grid is performing in reality.

This severely impacts the calculated emissions produced by all heat raising plant which use electricity directly or generate it to offset other emissions. Figure 2 shows how the mix of generation techniques serving the National Grid, as well as the associated carbon factor, has varied over the past six years – encouragingly, the carbon intensity of the grid has reduced to almost half its value compared to 2013.

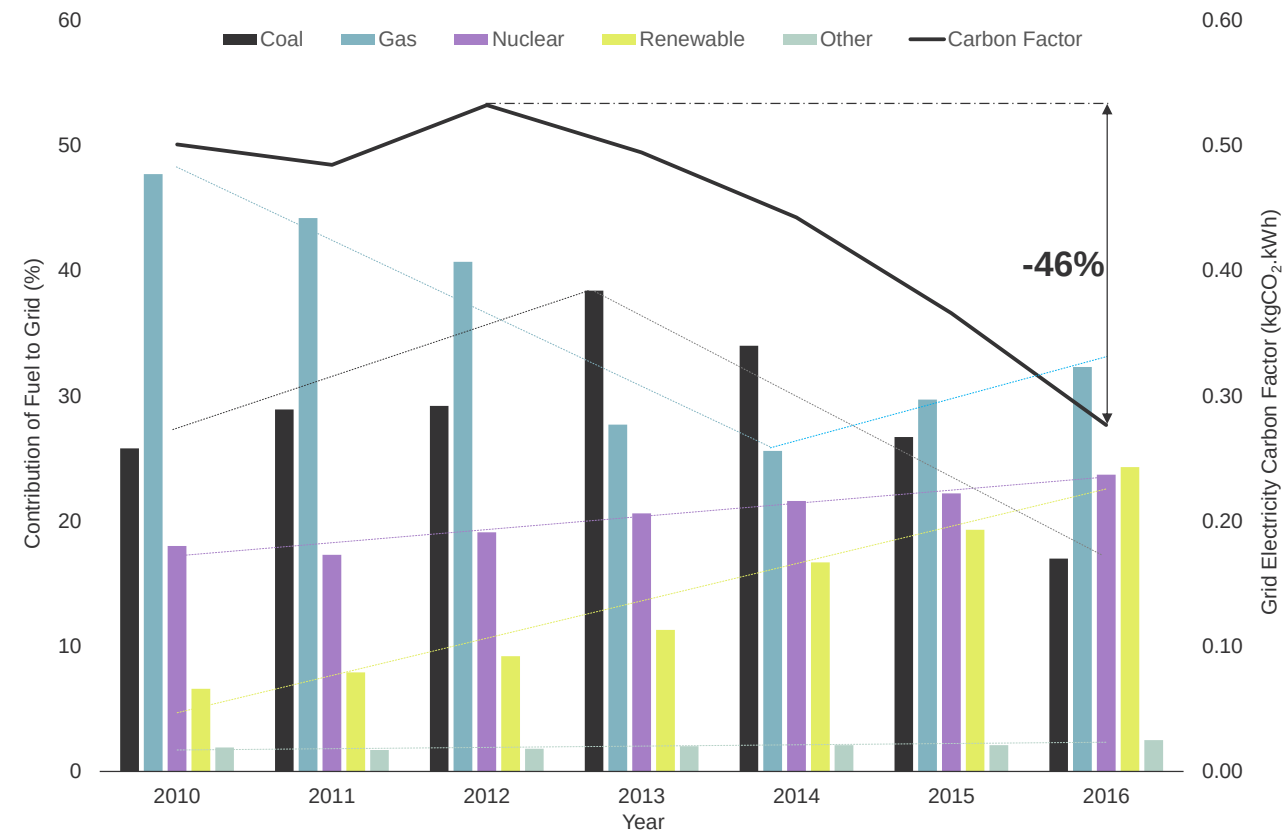


Figure 2 Historic mix of generation methods and associated carbon factor for the National Grid. 8% transmission and distribution losses are included. Sources: *electricityinfo.org* (generation mix); *BEIS Green Book* (historic carbon factors).

Under the draft Standard Assessment Procedure (SAP) 10.0, the proposed changes to Building Regulations Part L suggest a revised carbon emission factor for electricity of 0.233 kgCO₂/kWh for domestic buildings. The latest guidance on SAP 10.1 indicates a potential further reduction to 0.136 kgCO₂/kWh.

The Greater London Authority (GLA) are following this trend and as such energy strategies submitted for planning from January 2019 onwards are encouraged to use the proposed carbon factor of 0.233 kgCO₂/kWh. Any strategy which is submitted using the 'historic' carbon factors will have to provide written justification of this decision.

Applying this approach to the Broad Street Development changes the energy strategy results considerably. Assessing against the SAP 10.1 carbon factor of 0.136 kgCO₂/kWh has been presented for further information.

Energy Strategy – Proposed Carbon Emission Factors (SAP 10.0)

Taking the results of the energy strategy and using the proposed carbon emission factor of 0.233kgCO₂/kWh as per SAP 10.0 guidance:

Be lean.

Domestic	Non-Domestic	Site-wide
56.2% Reduction over Part L1A baseline	0% Reduction over Part L2A baseline	54.1% Reduction over Part L baseline

Table 5 Be lean results summary.

Carbon dioxide emissions after each stage of the energy hierarchy.
The following table sets out the annual CO₂ emissions for the development.

	Domestic		Non-Domestic	
	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year
Part L Baseline	588,491	409,616	22,610	9,856
Be Lean.	257,902	179,511	22,610	9,856

Table 6 Carbon emissions after each stage of energy hierarchy.

Regulated carbon dioxide savings from each stage of the energy hierarchy.

	Domestic		Non-Domestic	
	Tonnes CO ₂ /year	Percentage	Tonnes CO ₂ /year	Percentage
Savings from Be Lean.	588	56.2%	0	0%
Total Reduction:	331	56.2%	0	0
Target Reduction:	588	100%	8	35%
Annual Shortfall*	-258	43.8%	-8	35%
Carbon Offset Payment Rate (£/tCO2)	£1,800		£1,800	
Offset Payment	£464,224		£14,245	
Total Offset Payment	£478,469			

Table 7 Regulated carbon emissions savings from each stage of the energy hierarchy.

Using the proposed carbon factor of 0.233kgCO₂/kWh shows that the dwellings achieve a 54.1% improvement over the Part L target – reducing the deficit to carbon zero by 51.9%.

Energy Strategy – Proposed Carbon Emission Factors (SAP 10.1)

Taking the results of the energy strategy and using the proposed carbon emission factor of 0.136kgCO₂/kWh as per the draft SAP 10.1 guidance:

Be lean.

Domestic	Non-Domestic	Site-wide
74.4% Reduction over Part L1A baseline	0% Reduction over Part L2A baseline	72.7% Reduction over Part L baseline

Table 8 Be lean results summary.

Carbon dioxide emissions after each stage of the energy hierarchy.

The following table sets out the annual CO₂ emissions for the development.

	Domestic		Non-Domestic	
	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year	Regulated kgCO ₂ /year	Unregulated kgCO ₂ /year
Part L Baseline	588,491	409,616	13,998	5,753
Be Lean.	150,535	104,779	13,998	5,753

Table 9 Carbon emissions after each stage of energy hierarchy.

Regulated carbon dioxide savings from each stage of the energy hierarchy.

	Domestic		Non-Domestic	
	Tonnes CO ₂ /year	Percentage	Tonnes CO ₂ /year	Percentage
Savings from Be Lean.	588	74.4%	0	0%
Total Reduction:	438	74.4%	0	0
Target Reduction:	588	100%	5	35%
Annual Shortfall*	-151	25.6%	-5	35%
Carbon Offset Payment Rate (£/tCO2)	£1,800		£1,800	
Offset Payment	£270,963		£8,819	
Total Offset Payment	£279,782			

Table 10 Regulated carbon emissions savings from each stage of the energy hierarchy.

Using the proposed carbon factor of 0.136kgCO₂/kWh shows that the dwellings achieve a 74.4% improvement over the Part L target – reducing the deficit to carbon zero by 72.0%.

The projected grid decarbonisation statistics only show a downward progression – therefore the CO₂ emissions will decrease at a commensurate rate.

1. Introduction

This strategy has been prepared on behalf of Inception (Reading) Sarl (c/o Moorgarth Group Ltd), in support of the proposed Broad Street Mall Master Plan development located in Reading. This strategy summarises the relevant regulatory and planning policies applicable to the proposed development and sets out how the proposed development will address and achieve the relevant policy targets.



Figure 3 Proposed Development Location

The Broad Street development consists of a mixture of residential and retail development. The residential elements are split over four blocks; Block A, B, C and E.

1.1 Proposed Development Area Schedule

The proposed development consists of the following area schedule;

Space Type	Space Use	Floor Area (Gross)
Domestic	446 Apartments	31,404m ²
Non-domestic	Sites A, B, C and E (Basement to level 01)	1,580m ²
Total:		32,984m ²

Table 11 Area schedule

2. Policy and Drivers

The following section outlines the national and local policies and drivers.

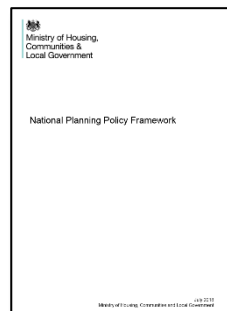
2.1.1 Building Regulations Part L (2013)



Part L of the Building Regulations is the mechanism by which government is driving reductions in the regulated CO₂ emissions from new buildings. The dwellings will be assessed against Building Regulations Part L1A 2013 and the commercial aspects will be assessed against Building Regulations Part L2A 2013.

All new buildings must meet the requirements of Part L1A or Part L2A of the 2013 Building Regulations.

2.1.2 National Planning Policy Framework



The National Planning Policy Framework (NPPF) was published in July 2018 and has superseded all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents, with the exception of PPS10 (Waste). The NPPF sets out the Government's strategy on the delivery of sustainable development.

The NPPF places responsibility for policy making with the Local Planning Authority, who shall communicate their policies through Local Plans and facilitate the creation of Neighbourhood Plans. The NPPF states that there is a presumption in favour of sustainable development.

The following is extracted from paragraph 11 of the NPPF:

For decision-taking this means:

- approving development proposals that accord with an up-to-date development plan without delay; or
- where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:
 - i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed⁶; or
 - ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole

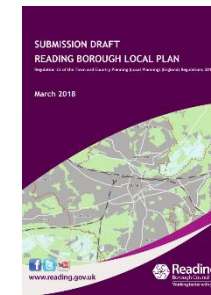
In respect of energy policy contained within the NPPF, paragraph 153 sets out that:

"In determining planning applications, local planning authorities should expect new development to:

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption."

2.1.3 Adopted Local Planning Policy

The Adopted Reading Borough Council Local Plan policy includes revised targets for new development; most noticeably the introduction of zero-carbon homes.



Emissions

Paragraph 4.4.43 within Reading's Climate Change Strategy (Reading Means Business on Climate Change 2013-2020) sets challenging targets for tackling the Borough's contribution to climate change and aims to reduce Reading's carbon footprint by 34% by 2020 in comparison to 2005 levels.

One of the Strategy's strategic principles is that buildings in Reading should be built to high standards of energy efficiency incorporating on-site renewable energy where possible. Given the scale of residential development in Reading up to 2036, achieving the aims of the Climate Change Strategy will not be possible without that development having a minimal impact on carbon emissions.

Paragraph 4.4.44 state that, the requirement "will be that major new housing is built to zero carbon homes standard". A revised Sustainable Design and Construction SPD will contain more detail on achieving this requirement, but in general, this will mean as a minimum a 35% improvement over the 2013 Building Regulations plus a contribution of £1,800 per tonne towards carbon offsetting within Reading (calculated as £60 per tonne over a 30-year period).

Where it is proposed to meet the zero carbon homes requirement in another way, clear evidence should be provided to demonstrate how it will be achieved at planning application stage. Zero carbon homes are an achievable standard that, until recently, was intended to be a national requirement in the Building Regulations.

All other housing should be built to a level equivalent to the emissions requirement of former Code for Sustainable Homes Level 4, which is a 19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations.

Where the 19% reduction in carbon dioxide emissions cannot be achieved on site, an offset may be possible through planning contributions.

Further guidance on such an off-set will follow the Local Plan.

3. Energy Strategy

3.1 Energy Hierarchy

The energy strategy has been based on the energy hierarchy; Be Lean, Be Clean and Be Green. The strategic approach to the design of the Proposed Development has been to reduce demand for energy prior to the consideration of integrating Low or Zero Carbon (LZC) technologies, since controlling the demand is the most effective way of reducing energy requirements and CO₂ emissions.

3.2 Be Lean; Passive Design and Efficiency Measures

Fabric performance.

As part of the updates to Part L1A 2013 a fabric energy efficiency target was introduced. This target considers factors such as glazing proportion, solar energy, air leakage, fabric performance and thermal bridging. The energy strategy targets improved insulation levels beyond the Part L minimum targets to meet the fabric efficiency target and reduce heat losses and in turn drive down energy consumption.

Space heating.

Each dwelling is served via electric panel heating.

Ventilation.

The use of Mechanical Ventilation Heat Recovery (MVHR) in each dwelling helps to reduce energy consumption by utilising the internal air to pre-heat the incoming fresh air.

Lighting.

Efficient lighting is utilised throughout the development.

Domestic hot water.

Each dwelling uses electric immersion heating.

3.3 Be lean results.

Using the passive design measures the following results were generated.

Domestic carbon performance.

The table below provides the results of the sample dwelling Part L1A assessments.

Dwelling Reference	Dwelling Emission Rate (DER) kg.CO ₂ /year	Target Emission Rate (TER) kg.CO ₂ /year	Percentage Variance	Dwelling Fabric Energy Efficiency (DFEE) kWh/year	Target Fabric Energy Efficiency (TFEE) kWh/year	Percentage Variance
A 009	25.99	26.18	-0.75%	45.04	37.77	16.13%
A 010	27.01	24.65	8.75%	32.60	27.62	15.26%
A 012	22.88	23.49	-2.65%	34.73	32.14	7.46%
C 009	26.65	27.13	-1.78%	44.87	38.58	14.03%
C 012	24.03	22.88	4.80%	33.72	29.00	13.98%
C 015	32.36	29.76	8.04%	40.08	33.31	16.89%
E 016	31.91	29.97	6.08%	40.88	34.79	14.89%

Dwelling Reference	Dwelling Emission Rate (DER) kg.CO ₂ /year	Target Emission Rate (TER) kg.CO ₂ /year	Percentage Variance	Dwelling Fabric Energy Efficiency (DFEE) kWh/year	Target Fabric Energy Efficiency (TFEE) kWh/year	Percentage Variance
E 019	27.46	25.45	7.32%	34.91	29.60	15.22%
E 021	22.06	21.63	1.96%	36.03	31.10	13.68%
E 023	23.74	22.54	5.04%	34.60	29.26	15.42%
E 026	27.07	27.50	-1.59%	47.31	39.75	15.97%
Area-weighted Average:	25.62	25.01	2.39%	38.01	32.80	13.71%

Table 12 Domestic carbon performance and fabric energy efficiency results

Non-domestic performance

As stated previously the retail areas have been assessed as shell only and therefore do not show any improvement over the Part L 2013 target.

3.1 Be lean summary

The figure below shows the reduction in annual regulated CO₂ emission for the development.

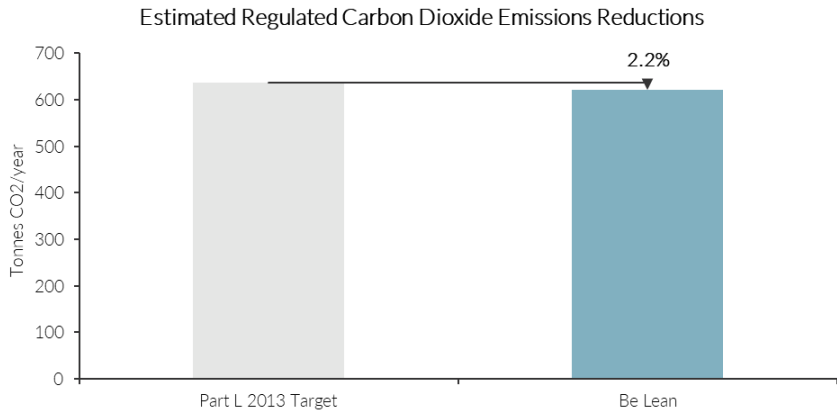


Figure 4 Be lean results summary

4. Be clean stage.

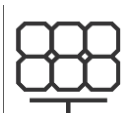
As discussed previously the use of Combined Heat and Power (CHP) is not part of the energy strategy.

5. Be green stage.

The ‘Be Green’ final step of the energy hierarchy explores the feasibility of Low and Zero Carbon (LZC) technologies to allow for the production of renewable energy onsite to offer a further reduction in CO₂ emissions.

The preferred building services strategy is to utilise an all-electric heating and hot water solution therefore technologies which generate electricity would be beneficial for the development i.e. Photovoltaics.

There is limited space for Photovoltaics across the site and therefore are not included in the energy strategy.

	Photovoltaics Photovoltaics (PV) generate electricity using energy from the sun. PVs are ideally located in a southern orientation with an inclination angle of 30 - 35° and can generate up to 130kWh/m² (per panel) each year. PVs offer a truly renewable energy source as they require no input power in order to generate energy. Suitability to proposed development: The integration of a PV system would require a roof top space allocation. Much of the limited available space on the roof of each block is dedicated to building services plant. PV's have therefore been deemed unfeasible to incorporate at this stage as a small array size would offer very little benefit in reducing carbon emissions, and a more beneficially sized array would require a large, unshaded space allocation on the roof which is currently limited. As the design progresses, if the potential for more roof space is realised, the incorporation of PVs shall be reassessed.
	Solar Thermal A primary consumer of energy within the Proposed Development is associated with the hot water demand. Solar thermal panels would therefore typically offer a benefit in reducing carbon emissions as they provide a hot water from a renewable energy source i.e. the sun that would cater to the space heating and hot water provision. Suitability to proposed development: The proposed strategy is to utilise an all-electric strategy to provide the greatest carbon benefits, negating the need for a hot water loop for which solar thermal would supplement part of the demand. Similarly to PV's, it is considered unfeasible to incorporate this technology and there is not sufficient roof space to accommodate a beneficially sized solar thermal array to reduce energy demand. For these reasons, solar thermal is not conducive to the all-electric scheme and even with a wet system were incorporated, a small array size would offer little benefit in reducing carbon emissions and therefore, at this stage, the technology has been discounted.

	Biomass Boiler Biomass boilers use a fuel in the form of pellet or chips to provide heat from a renewable and sustainable source. The technology is considered carbon neutral as the carbon dioxide emitted during burning of the biomass fuel, is the same quantity of carbon absorbed in the life span of the growing the fuel. The development is thermal led and therefore biomass would offer a beneficial solution in reducing carbon emissions as shown in the graph opposite. Suitability to proposed development: The proposed strategy is to utilise an all-electric strategy to provide the greatest carbon benefits, negating the need for a hot water loop for which biomass would supplement part of the demand, typically with gas-boiler back-up. Even if a wet system was incorporated, a constant supply of biomass fuel would be required to keep the boiler in operation to satisfy the thermal demand, meaning that the system will need to continually combust. which in turn would negatively impact air quality within the local vicinity. Biomass systems also require regular maintenance which can become an issue for the on-site facilities managers. Accessibility to the site and location of the system is also required to be carefully considered for the constant transporting of biomass product onsite, refuelling of the system, large on-site storage facility and flue requirements. A biomass boiler has therefore been discounted as it is not conducive to the all-electric scheme. Even if a wet system were incorporated there would be a limitation of sufficient accommodation for such a system, the consideration of regular biomass deliveries onsite and the associated storage space required, in addition to the poorer air quality when compared to the proposed all-electric strategy.
	Wind Turbines Wind turbines pose a number of possible issues such as acoustic discomfort, distracting light flicker, acceptability from an aesthetic point of view, and vibration issues which in turn could result in potential planning difficulty. It is therefore considered that wind turbine technology is not suitable for this development and has therefore been discounted.

6. Energy strategy conclusion.

This energy strategy has been prepared on behalf of Inception (Reading) Sarl (c/o Moorgarth Group Ltd), in support of the proposed Broad Street Mall Master Plan development located in Reading.

Following discussions with DP9 Planning Consultants, it is understood that the Proposed Development must achieve the policies within the Adopted Reading Local Plan; specifically, the zero-carbon target.

This strategy summarises the current policies within the Reading Local Plan documentation applicable to the Proposed Development and sets out how the Proposed Development will address and achieve the relevant policy targets.

6.1 Drivers.

The Adopted Reading Local Plan requires new / major residential development to achieve zero carbon and non-domestic development to achieve a minimum of 35% reduction in CO₂.

6.2 Proposed energy strategy.

Through the use of passive design and energy efficient measures the proposed development achieves the following;

Be Lean	2.20% Betterment achieved over Part L2 2013 target. Good practice building fabric and building services to reduce carbon emissions and energy demand through passive measures.
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Table 13 Energy strategy summary

	Domestic	Non-Domestic	Site-wide
Be Lean.	2.40% reduction	0% reduction	2.20% reduction

Table 14 Carbon reduction breakdown

Evaluating against the adopted policy, the development fall short by ~98% and is therefore likely to incur a large carbon offset payment.

The proposed changes to Building Regulations Part L suggest a revised carbon emission factor for electricity of 0.233 kgCO₂/kWh for domestic buildings, with draft guidance indicating that this has the potential to be reduced further to 0.136 kgCO₂/kWh.

The Greater London Authority (GLA) are following this trend and as such energy strategies submitted for planning from January 2019 onwards are encouraged to use the proposed carbon factor of 0.233kgCO₂/kWh. Any strategy which is submitted using the 'historic' carbon factors will have to provide written justification of this decision.

Applying this approach to the Broad Street Development changes the energy strategy results considerably.

	Domestic	Non-Domestic	Site-wide
Be Lean.	56.2% Reduction	0% Reduction	54.1% Reduction

Table 15 Carbon reduction breakdown using proposed Carbon Factors of SAP 10.0 (i.e. 0.233 kgCO₂/kWh)

When applying the SAP 10.1 carbon factor of 0.136 kgCO₂/kWh the carbon emissions are further reduced.

	Domestic	Non-Domestic	Site-wide
Be Lean.	74.4% Reduction	0% Reduction	72.7% Reduction

Table 16 Carbon reduction breakdown using proposed Carbon Factors of SAP 10.1 (i.e. 0.136 kgCO₂/kWh)

7. Appendix A: Part L Analysis and Calculation Parameters

7.1 Part L1A Building Regulations Analysis

An iterative process was undertaken to establish the building fabric performance required, using the current proposed architecture provided by Corstorphine + Wright, to meet the FEE requirements.

Table 14 below sets out the building fabric performance targets and in addition includes the Part L ‘notional building’ for reference;

Element	Notional Building	Proposed Target
Exposed Floor (W/m²K)	0.13	0.12
External Wall (W/m²K)	0.18	0.15
Roof (W/m²K)	0.13	0.12
Party Wall (W/m²K)	0.00	0.00 (Fully filled cavity with edge sealing)
External Glazing (W/m²K)	1.40	1.20 (g-value 0.45)
Entrance Doors (W/m²K)	-	1.00
Thermal Bridges	SAP Appendix R	‘Approved Details’
Air Permeability (m³/hr.m²)	5.00	3.00

Table 17 Proposed Development Target Building Fabric Performance

Using the targets identified in Table 14 and based on the current architectural proposals, the Proposed Development achieves an approximate 14% improvement over the Part L Target Fabric Energy Efficiency (TFEE).

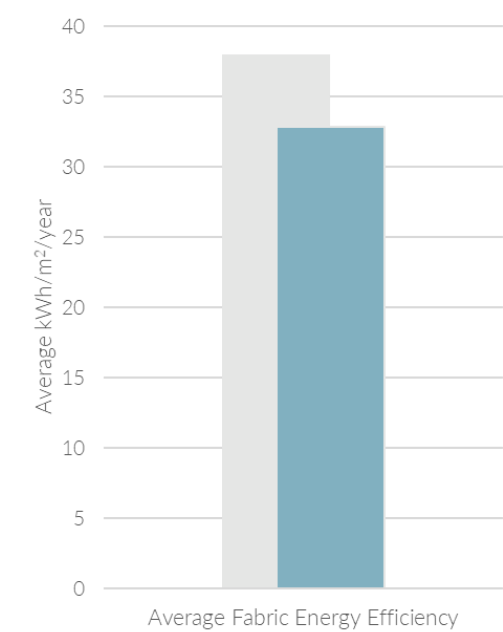


Figure 5 Proposed Development Fabric Energy Efficiency

7.2 Criterion 1a: Achieving the Carbon Emissions Target

Using the sample dwellings identified in Section 4.2, and similarly to the Fabric Energy Efficiency (FEE), an iterative process was undertaken to identify the building services strategy and associated plant efficiencies to meet the requirements of Part L1A 2013 of the Building Regulations.

As part of this process the use of Mechanical Extract Ventilation (MEV) was evaluated. However, the use of MEV in lieu of Mechanical Ventilation Heat Recovery (MVHR) would result in an increase on the annual regulated CO₂ emissions and would therefore require reduction in glazing proportions, increase in thermal insulation and / or the integration of Low and Zero Carbon Technology (LZCT).

Table 15 provides the target building services strategy and performance for the dwellings evaluated.

System	All Electric
Heat Source Efficiency	100%
Heating System Controls	Programmer & Room Thermostats
Water Heating	Immersion; 150l Storage, 0.85kWh/day losses
Mechanical Ventilation	0.43W/l/s & 94% Heat Exchange Efficiency
Ductwork	Insulated, Rigid
Lighting	100% low energy

Table 18 Proposed Development Target Building Services Performance

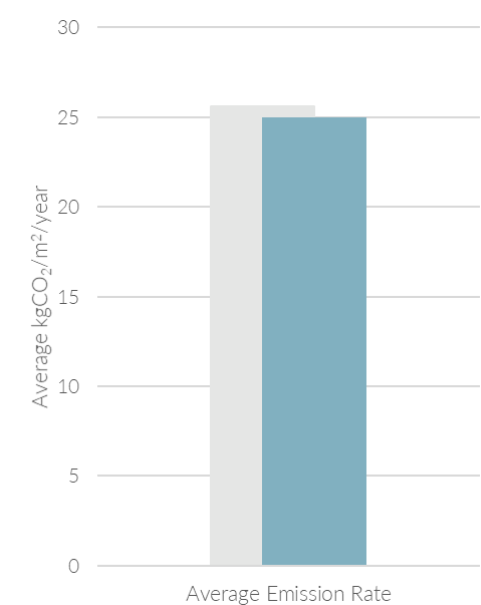


Figure 6 Regulated Carbon Emissions Reduction Using an All-Electric Strategy Part L Compliance

Using passive design measures and energy efficiency using an all-electric heating and hot water strategy, the Proposed Development shows a 2.60% reduction in annual regulated carbon emissions compared to the Part L 2013 benchmark.

7.3 Criterion 2: Limits on Design Flexibility

Criterion 2 sets minimum efficiency targets for building fabric and building services efficiencies. Generally, achieving the Fabric Energy Efficiency (FEE) results in the building fabric performance going beyond the minimum targets defined in Part L.

The fixed building services identified in Table 5 meet the minimum values prescribed in Part L1A and therefore the sample dwellings achieve compliance with Criterion 2 of the Building Regulations part L1A.

7.4 Criterion 3; Limiting the Effects of Heat Gain in Summer

The Standard Assessment Procedure (SAP) calculations undertakes a simple assessment of summertime temperatures – using averaged data over the summer months. Criterion 3 of the Building Regulations is not to be taken as a summertime overheating risk assessment.

The SAP calculations undertaken as part of this energy strategy indicates that all of the evaluated dwellings meet the targets defined within this criterion and therefore the dwellings comply with Criterion 3 of the Building Regulations Part L1A.



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