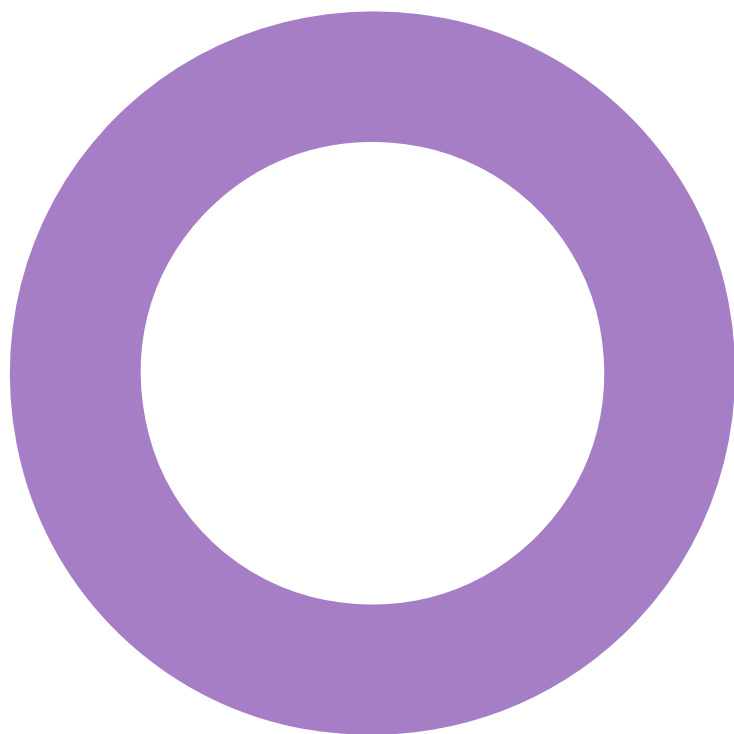


MIRA Technology Park- South Site. Nuneaton. ERI MTP Ltd.

SUSTAINABILITY
ENERGY STRATEGY

REVISION 03 – 04 AUGUST 2022



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
01	21/01/2021	First issue	IA	RKP	JRF
02	24/02/2022	Comments included	IA	RKP	JRF
03	04/08/2022	Comments included	IA	RKP	JRF

This document has been prepared for ERI MTP 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: 23/24410
Document reference: REP-2324410-5A-IA-20220804-Energy Strategy-Rev03.docx

Contents.

Audit sheet.	2
1. Executive summary	4
1.1 Planning Policy	4
1.2 Energy strategy overview	4
1.3 Policy LP35	4
1.4 Policy E4	4
2. Introduction	5
3. Policy and Drivers	6
3.1 Building Regulations Part L (2013)	6
3.2 National Planning Policy Framework	6
Part L 2021 Transitional arrangements	6
3.3 Local Planning Policy	6
4. Energy Strategy	7
4.1 Methodology	7
4.2 Energy Hierarchy	7
4.3 Be Lean.	7
4.4 Be Clean	8
4.5 Be Green	9
5. Conclusion	11
5.1 Energy – Condition LP35	11
6. Appendix A – Proposed Performance Parameters	12
6.1 Part L2A compliance	12
6.2 Architectural drawings	12
6.3 Modelling disclaimer	12
6.4 Fabric details	12
6.5 System parameters	13
7. Appendix B: Grid Decarbonisation.	14

1. Executive summary

Hoare Lea has been appointed to produce an energy strategy, in order to support outline planning application for the extension of the MIRA Technology Park South Site to provide advanced manufacturing (Class B2); associated office and service uses (Class E); and storage (Class B8); new spine road; car parking; landscaping; and enabling works, known as the Southern Manufacturing Sector.

This report has been prepared to describe the proposed approach to the Energy Strategy for the MIRA Technology Park South Site. The report outlines the approach made for the energy strategy in order to demonstrate compliance with North Warwickshire Local Planning policy.

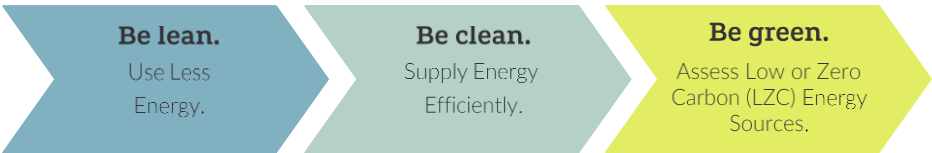
1.1 Planning Policy

The North Warwickshire Local Plan 2021 – Local Plan (Policy LP35& E4) states that all developments will be required, where viable, to:

- a. Produce at least 10% of a development’s operational energy from onsite renewables; and
- b. Provide a means to maximise onsite solar generation within the masterplan.

1.2 Energy strategy overview

The energy strategy details the regulated and unregulated carbon performance regarding the sustainable approach to delivering a low carbon and energy efficient development. This has been led by the energy hierarchy; be lean, be clean and be green, approach.



As the development is expected to need to comply with the future building regulations Part L2a 2021, SAP 10.1 carbon factors have been used to best represent future calculations in the absence of associated Part L 2021 software being available.

As demonstrated in the Figure 1, an estimated 44.2% CO₂ saving has been achieved at the Be Lean stage which increases to 65.2% saving at the Be Green stage through the incorporation of solar PV to meet 10% of the operational energy (regulated and unregulated) requirements as per Policy LP35 of North Warwickshire Local Plan 2021.

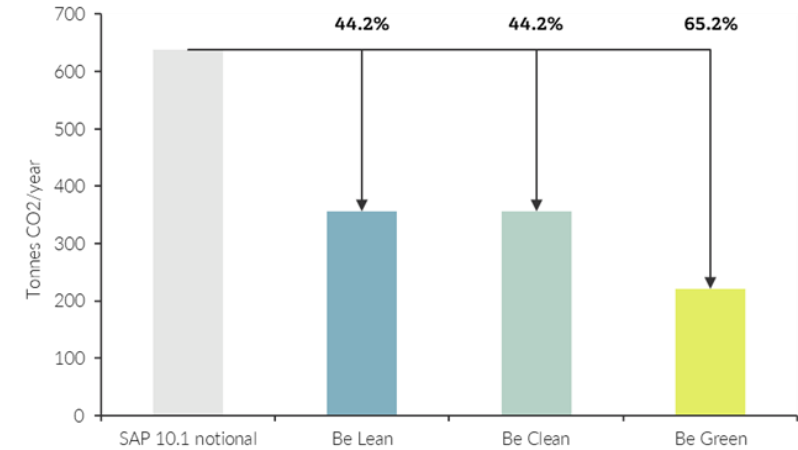


Figure 1 The CO₂ performance through application of the energy hierarchy using SAP 10.1 figures

1.3 Policy LP35

Following a feasibility review of different LZC technologies, it has been shown that the development can meet its obligation to deliver a minimum of 10% of development’s predicted operational energy needs from onsite renewables through the specification of roof-mounted PV panels alone.

Due to the early-stage nature of the project, specific information is not known so the operational energy has been estimated based on a typical B2-7 type building using Part L 2013 NCM regulated and unregulated energy. Although actual energy use can vary considerably with buildings of this type, this is a reasonable estimate at this stage. This shows that an estimated annual yield of 982,279 kWh would be required to be generated by solar PV to comply with policy LP35 to be spread across all 7 units as shown in Table 1.

Table 1: Operational Energy (Regulated & Unregulated) and Renewable Energy Contribution

Unit No	Unregulated and Regulated Energy (kWh/annum)	Renewable Energy (kWh/annum)	Renewable % contribution
1	800,675	80,068	10.00%
10	847,779	84,778	10.00%
20	1,205,760	120,576	10.00%
21	1,742,663	174,266	10.00%
22	1,483,637	148,364	10.00%
30	2,868,780	286,878	10.00%
31	873,498	87,350	10.00%
Total	9,822,793	982,279	10.00%

1.4 Policy E4

Planning policy E4 for this particular site requires the masterplan to incorporate a means to maximise onsite solar generation. At this stage, provision should be made for the roof structure and the new electrical connection to the grid to ensure it has the capacity to be able to maximise solar generation from the roof space.

It should be noted again that actual operational energy can be considerably different to those given by Part L 2013 NCM regulated and unregulated energy. That being said the total approximate roof area available is circa 200,000 m² so even if less than half of this space were deemed suitable at detailed design, all the regulated and unregulated requirements could be met by solar PV alone so there is considerable potential for a significant amount of the operational energy requirements to be met by onsite renewables in the form of solar PV.

2. Introduction

Hoare Lea has been appointed to produce an energy strategy, in order to support outline planning application for the extension of the MIRA Technology Park to provide advanced manufacturing (Class B2); associated office and service uses (Class E); and storage (Class B8); new spine road; car parking; landscaping; and enabling works, known as the MIRA Technology Park South Site.

This report has been prepared to describe the proposed approach to the Energy Strategy for the MIRA Technology Park South Site. The report outlines the approach made for the energy strategy in order to demonstrate compliance with North Warwickshire Local Planning policy.

The development is located on A5 (Watling Street), with A444 (Weddington Lane) adjacent to the south of the plot. The proposal for this plot is a masterplan development of a high-quality manufacturing campus which encompasses buildings of several scales. These buildings will mainly host research, manufacturing, and development functions as well as an ancillary office space.



Figure 2: Proposed Development – Masterplan

3. Policy and Drivers

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

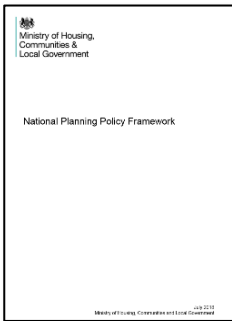
3.1 Building Regulations Part L (2013)



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.

3.2 National Planning Policy Framework



The National Planning Policy Framework (NPPF) was published in July 2021 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 proposed; 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:

“Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures⁵³. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure “

To help increase the use and supply of renewable and low carbon energy and heat, plans should, paragraph 155 sets out that:

“Provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts); b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and 53 In line with the objectives and provisions of the Climate Change Act 2008. 46 c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers “

Part L 2021 Transitional arrangements

The Amendment Regulations and accompanying Approved Documents L: Volumes 2 come into force on 15 June 2022. However, the changes will not apply in relation to building work where a building notice or an initial notice has been given to, or full plans deposited with, a local authority before 15 June 2022 provided that the building work is started before 15 June 2023.

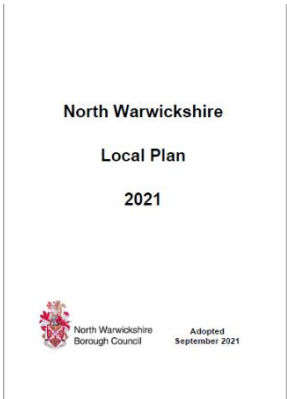
Please note that “building notice”, “initial notice” and “full plans” have the meanings given in Regulation 2 of the Building Regulations 2010.

It is understood that due to the project timeframes that Part L 2021 will most likely apply to this development. At the time of this report (January 2022), no Part L 2021 building regulations software has been published. The project will be assessed using Part L 2013 software and adjusting the assessment to use SAP 10.1 carbon factors applicable to developments required to comply with Part L2A 2021.

3.3 Local Planning Policy

The policies of North Warwickshire Local Plan 2021 relevant to this development are located below;

Policy LP35 65: Renewable Energy and Energy Efficiency and



New developments will be expected to be energy efficient in terms of their fabric and use including where viable.

- Production of at least 10% of their operational energy needs from onsite renewables

Policy E4: Land to the south of Horiba MIRA Technology Park and Enterprise Zone:

The Master Plan, to be agreed, by the Borough Council, to include;

- Means to maximise on site solar energy generation

4. Energy Strategy

4.1 Methodology

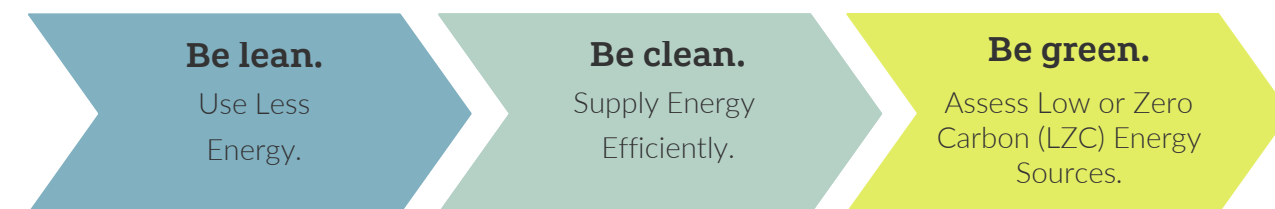
Due to the outline stage of the development, architectural details are not known. As such the energy strategy has been based on a Part L2013 assessment for a typical building of this type and using the regulated and unregulated energy (kWh/m²) to apply to the proposed masterplan production and office areas for 7 buildings (Unit no 1-31). As the development will likely need to comply with Part L 2021, with the absence of any approved government software for the new regulation that come into force in June 2022, Part L2A 2013 has been used with SAP 10.1 carbon factors applied. SAP 10.1 carbon factors are to be used with Part L2A 2021 assessments. The carbon factor used for SAP 10.1 for all electric buildings such as this is listed below.

- SAP 10.1 – 0.136 kgCO₂/kWh

4.2 Energy Hierarchy

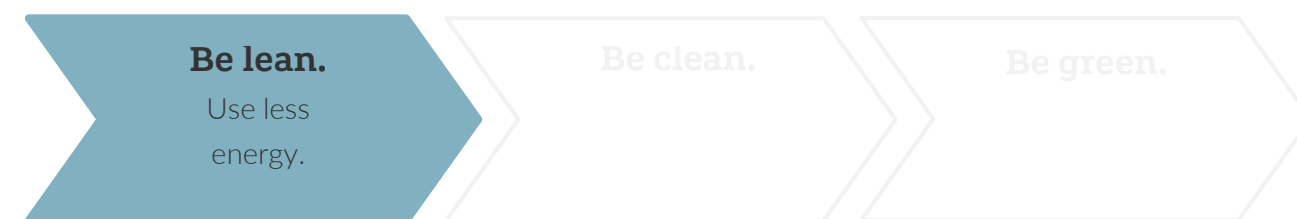
The energy strategy has been based on the energy hierarchy; Be Lean, Be Clean and Be Green.

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.



4.3 Be Lean.

Passive design and energy efficiency measures form the basis for the reduction in overall energy demand and carbon emissions for the proposed development. This energy strategy aims to reduce the energy demand initially by optimising the envelope and building services within the development.



The passive measures that have been incorporated into the energy strategy include:

- Insulated building fabric & low air infiltration.
- Glazing performance.
- Optimising the use of natural daylight and specifying efficient artificial lighting.
- Efficient building services systems.
- Heat recovery ventilation

The 'Be Lean' results show that the site-wide development achieves an approximate 44.2% betterment against the SAP 10.1 baseline. This demonstrates that energy demand and CO₂ emissions have been reduced prior to the consideration of Low and Zero Carbon options.

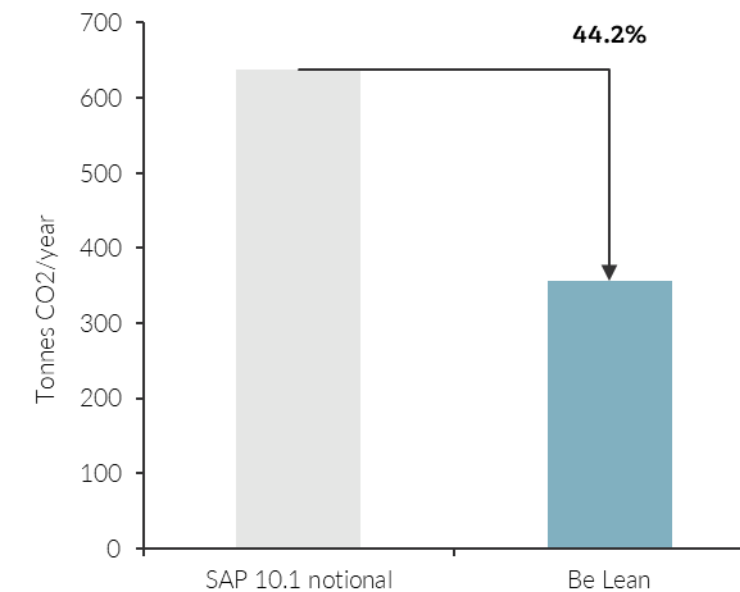


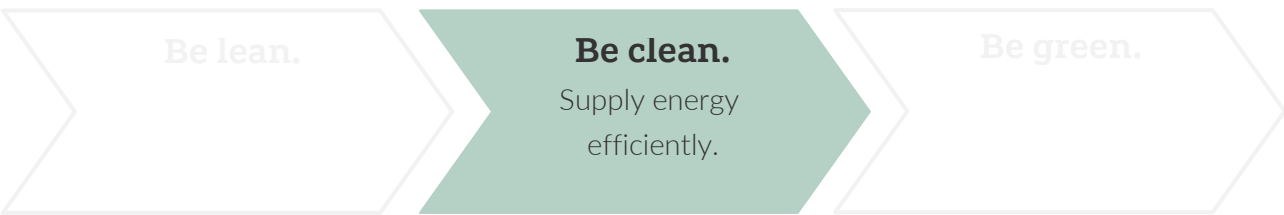
Figure 3: Be Lean stage results summary SAP 10.1

4.4 Be Clean

This stage of the energy hierarchy refers to the use of heat networks or on-site Combined Heat and Power (CHP) in order to provide energy and reduce consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site.

The ‘Be Clean’ stage explored the feasibility of a Combined Heat and Power (CHP) system. The energy demand shows there is no constant heating/hot water demand as the hot water is likely to be intermittent meaning the CHP engine would not be continually operated. Further, the carbon factors stated with the current Building Regulations are considerably outdated. The benefits of CHP are shown to rapidly diminish and become a negative impact of carbon emissions when actual, up to date carbon factors from the national grid are taken into account.

The use of CHP is considered unsuitable as it offers little benefit for the development in terms of a realistic carbon saving, and this benefit will continually diminish as the national grid continues to decarbonise. This, coupled with the fact that the development’s hot water demand is not sufficient means CHP is not considered a viable option.



4.4.1 Development demand

The graph below provides a breakdown of the thermal and non-thermal demand. The site-wide results show that the development is lighting-led with the greatest proportion of energy associated with the demand associated with lighting requirements. Hot water demand is quite high, but this is a known overestimate in Part L 2013 for buildings of this type especially for changing areas. It should also be noted that the sample building used for this report has showers and changing rooms so when the details are known for the development, it is likely the lighting energy demand will increase.

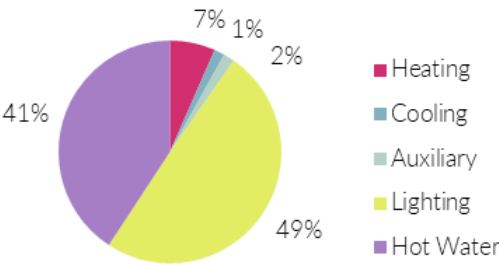


Figure 4: Sitewide thermal & electrical CO₂ emission summary based on NCM demand

Due of the limited benefit and potential negative impact with the consideration of realistic carbon factors, the creation of a CHP led heat network for the development is not recommended. As such there is no impact on the overall emission reduction at this stage of the energy hierarchy.

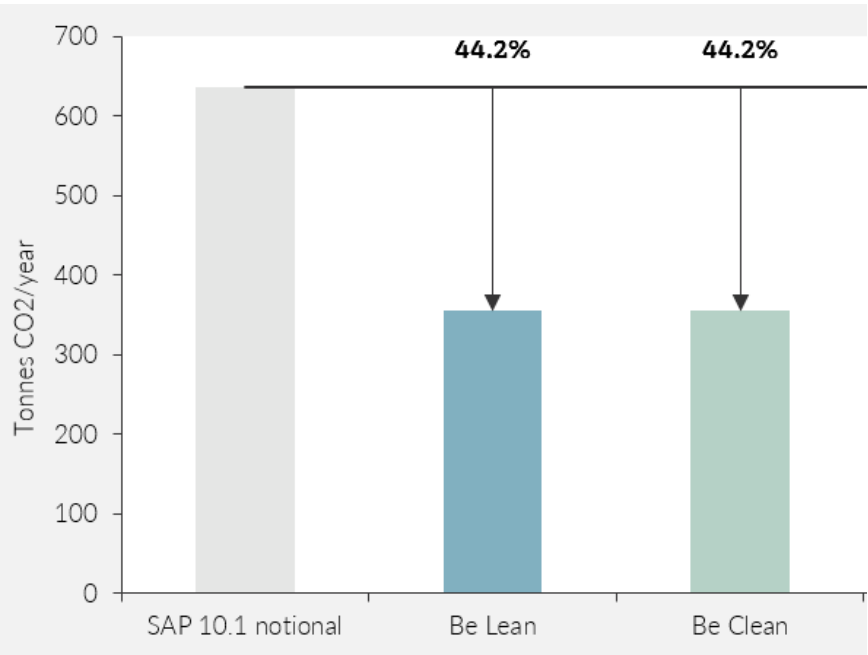


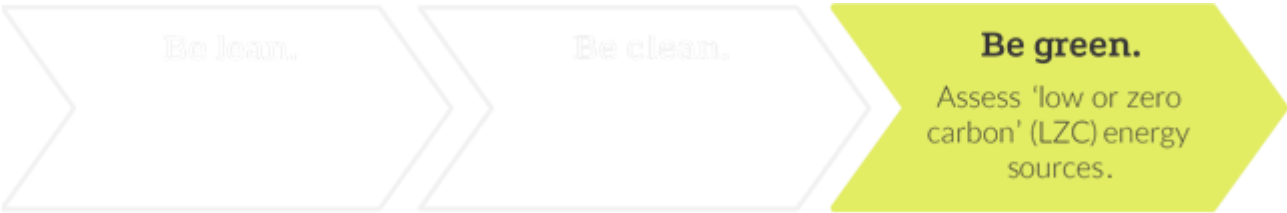
Figure 5: Be Clean Stage results summary SAP 10.1

Table 2: Be Clean Summary

	Combined heat and power (CHP) Due the proposed changes to the carbon emission factors in future revisions of Part L – the use of Combined Heat and Power (CHP) is likely to offer a ‘negative benefit’ within the next five years and therefore has not been explored as part of the energy strategy.
	District Heating Network The local plan notes that there is limited scope for district heating networks in the region and given the location is a likely to have relatively low heat demand it is unlikely that district heating will extend to area and there seems to be no plans to for this area.

4.5 Be Green

The 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 carbon emissions.



An LZC options appraisal has been undertaken for suitable technologies considered for the units on this development.

The 'Be Green' results show that the site-wide development, achieves a further betterment of 21% in CO₂ emissions over 'Be Lean' levels by introducing LZC technologies. This results in an overall betterment of 65.2% against the SAP 10.1 notional baseline. The proposed LZC would also deliver a minimum of 10% of the overall predicted operational energy (regulated and unregulated) needs of the development.

This demonstrates that the proposed energy strategy satisfies the requirement to deliver a minimum of 10% of the development's predicted energy needs from decentralised and renewable or low carbon energy as required by Condition LP35 of the Local Plan.

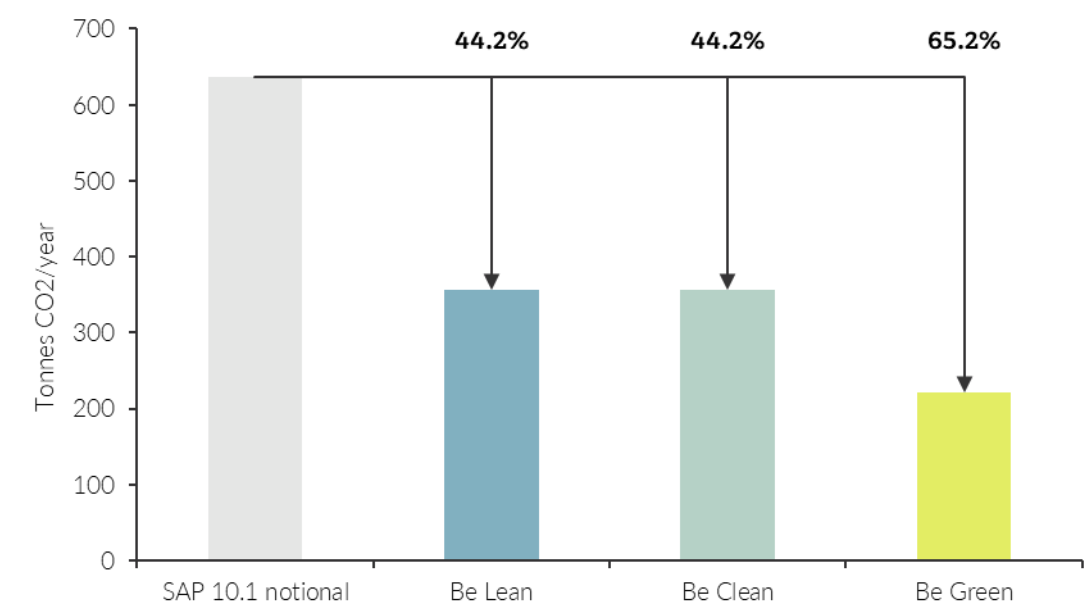


Figure 6: The CO₂ performance through application of the energy hierarchy against a SAP 10.1

4.5.1 LZC Assessment

The following is a summary of the potential Technological Alternatives reviewed for the proposed development:

Table 3: LZC appraisal

	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 150kWh/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. Across the site there is potentially 200,000 m² of roof space available. It is likely that some of this will face in a northerly direction which isn't ideal although typically the roof pitches tend to be <10 degrees meaning this opens up the potential for more roof space to be suitable for solar PV. Therefore, there is ample roof space to accommodate solar PV to meet 10% of the sites operational energy consumption as outlined in this section. In addition, if the site were to maximize its solar potential, early-stage calculations suggest the entire site's regulated, and unregulated, energy consumption could be met from solar PV. Depending on the energy use profile of the units, in terms of energy used outside of daylight hours and peak solar generation, battery storage would be potentially suitable. Commercial batteries can take up considerable space externally and are expensive and so the benefits associated with energy/carbon savings would need to be reviewed further.
	Solar Thermal There is a minimum demand for hot water on developments of this type and therefore solar thermal panels are unlikely to offer a meaningful benefit for reducing carbon emissions and would be unsuitable with the proposed hot water strategy with standalone electric water heaters. Suitability to proposed development: Similarly, to solar PVs, solar thermal panels would be roof-mounted and dependant on space and structural requirements. However, given the anticipated energy demands of the units of this kind, it is unlikely to provide meaningful benefit for reducing carbon emissions. It has therefore been discounted
	Biomass Boiler Biomass boilers use fuel in the form of pellets 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 of the fuel. Suitability to proposed development:

	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. The development is electrical lighting led and therefore biomass would offer little to no benefit in reducing carbon emissions Biomass systems also require regular maintenance which can become an issue for the on-site facilities managers. They also require regular access for deliveries of further biomass. Notwithstanding the small demand for hot water within these units, a biomass boiler is deemed unfeasible also due to a limitation of sufficient accommodation for such a system, the consideration of regular biomass deliveries onsite and the associated storage space required.
	Air source heat pump Air source heat pumps use the air temperature to reject to and extract heat from the air to provide energy within the building. The ability of the heat pump to transfer heat from the outside air to the building depends on the outdoor temperature. As this temperature drops the ability of the heat pump to absorb heat also drops. Suitability to proposed development: Given the efficiencies afforded by ASHP when connected to the proposed VRF systems and carbon factors for electricity, it is considered an excellent low carbon, energy efficient option for the proposed units in order to deliver the necessary space heating requirements in the office spaces providing heating. Depending on the hot water demand when full plans are available heat pumps could be suitable alternative to an all-electric system that has currently been taken to be the hot water heating source.
	Ground Source Heat Pump Ground Source Heat Pumps (GSHP) operate much like Air Source Heat Pumps, however the energy source is ground temperature rather than air. GSHPs can either use a ground loop system or a borehole system. The ground loop system can take large areas of land and the borehole system requires careful structural integration and co-ordination. Suitability to proposed development: Due to potential viability issues in terms of the surrounding ground for loops or boreholes, and the associated costs with such a system offering a small benefit in carbon emission reduction, this technology has been discounted from the energy strategy. Ground Source Heat Pumps are typically double the cost of air source heat pumps at delivering similar carbon savings.
	Water source heat pump Water source heat pumps use a local water source temperature to reject to and extract heat from bodies of water to provide energy within the building. Suitability to proposed development: There is potential for this technology to use the planned water sources on the site, however, it is currently unknown whether this would be suitable for use with WSHPs as an alternative to other more common heat pump technologies.
	Wind Turbines

	Wind turbines generate electricity from the kinetic energy generated when wind spins turbine blades. As such, the potential for energy generation is subject to local climatic conditions, wind flow patterns, speeds and direction. Suitability to proposed development: 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. The reliance on reliable wind and weather conditions in addition to aspects of noted, wind turbine technology is not suitable for this development and has therefore been discounted. In addition, the average wind speed for this area at 10 m is between 4.6 -4.9 m/s which makes wind unviable where typically winds speed of 6 m/s+ are required.¹
--	---

Due of the limited benefit and/or consideration to cost, structural implications and spatial co-ordination notwithstanding any amenity considerations, the majority of LZC technologies are considered to be unfeasible for the development. However, Photovoltaic panels (PV) and Air Source Heat Pumps (ASHP) are considered feasible and beneficial to the development and therefore have been incorporated into the early-stage design.

10% of the development’s predicted operational energy needs from decentralised and renewable or low carbon energy has therefore been met by PV alone. This meets the requirements of Condition LP35.

Calculations have been undertaken to determine the size of the PV array required to deliver 10% of each unit’s predicted energy needs. In total, it has been established that an array able to generate 982,279 kWh/annum is required. This has been calculated on the basis that the PV arrays will achieve:

- Annual PV performance of 130 kWh/m²/annum;
- Annual PV performance of 780 kWh/kWp/annum;
- Panel spatial efficiency of 6 m²/kWp;
- Peak power rating of 1,266 kWp.

Accordingly, across all units, the total panel area has been estimated to be 7,594 m². This meets the requirements of Condition L35 for delivering a minimum of 10% of development’s predicted operational energy needs from renewable technologies.

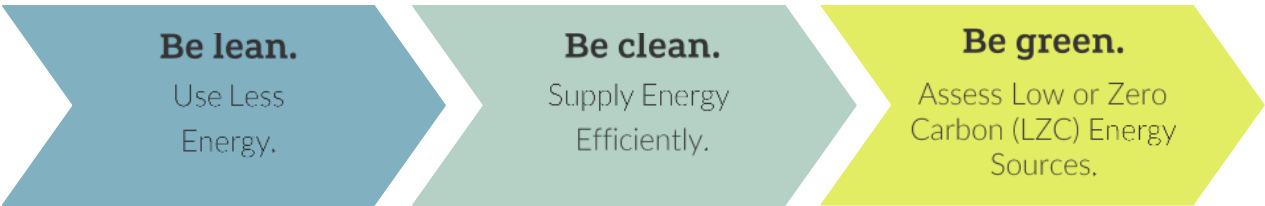
¹ <https://www.rensmart.com/Maps>

5. Conclusion

This Energy Statement has been prepared on behalf of ERI MTP Ltd in support of the proposed new development on the land. It summarises the relevant regulatory and planning policies applicable to the proposed development and sets out how the proposed development will address and achieve these.

5.1 Energy – Condition LP35

The energy strategy proposed seeks to deliver a low carbon and energy efficient development through application of the energy hierarchy:



The energy assessment has been developed with a ‘fabric first’ approach. This is founded on optimising passive design measures to enhance the building envelope and incorporate highly efficient building services to reduce the energy demand of the proposed development. The production of on-site energy generation is also explored to determine the impact of low and zero carbon (LZC) technologies.

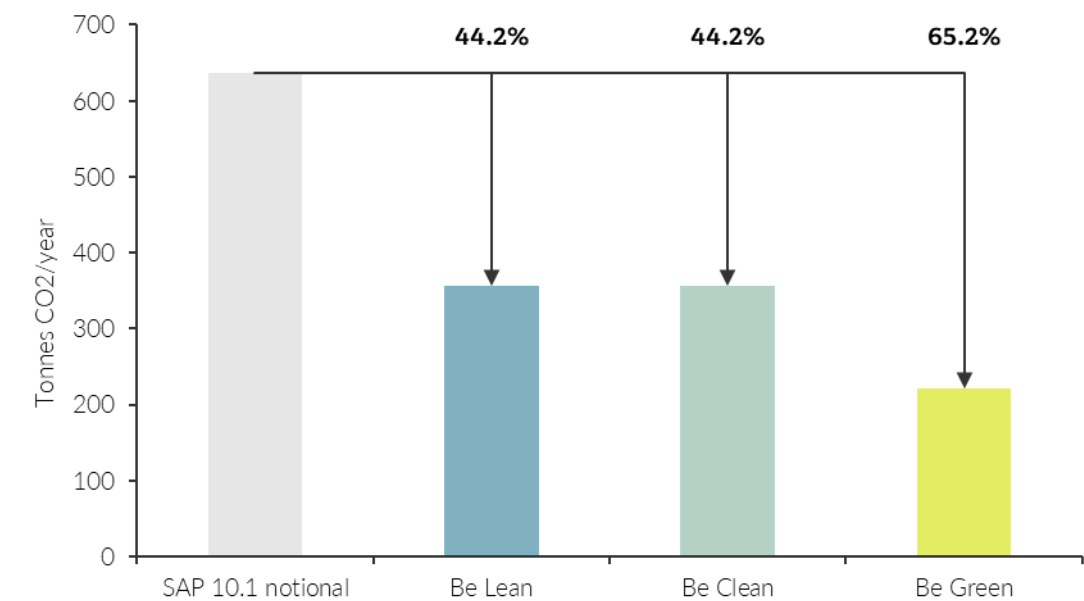


Figure 7: The CO₂ performance through application of the energy hierarchy against a SAP 10.1

Whilst not a condition for this development, it can be demonstrated the current design is on average delivering a 44.2% betterment against the SAP 10.1 notional baseline showing a carbon saving before renewables are considered.

Table 4: Operational Energy (Regulated & Unregulated) and Renewable Energy Contribution

Unit No	Unregulated and Regulated Energy (kWh/annum)	Renewable Energy (kWh/annum)	Renewable % contribution
1	800,675	80,068	10.00%
10	847,779	84,778	10.00%
20	1,205,760	120,576	10.00%
21	1,742,663	174,266	10.00%
22	1,483,637	148,364	10.00%
30	2,868,780	286,878	10.00%
31	873,498	87,350	10.00%
Total	9,822,793	982,279	10.00%

Furthermore, following a feasibility review of different LZC technologies, it has been shown that the development can meet its obligation to deliver a minimum of 10% of development’s predicted operational energy needs from renewable energy (Policy L35) through the specification of roof-mounted PV panels alone.

Planning policy E4 for this particular site requires the masterplan to incorporate a means to maximise onsite solar generation. At this stage, provision should be made for the roof structure and the new electrical connection to the grid to ensure it has the capacity to be able to maximise solar generation from the roof space.

It should be noted again that actual operational energy can be considerably different to those given by Part L 2013 NCM regulated and unregulated energy. That being said the total approximate roof area available is circa 200,000 m² so even if less than half of this space were deemed suitable at detailed design, all the regulated and unregulated could be met by solar PV alone so there is considerable potential for a significant amount of the operational energy requirements to be met by onsite renewables in the form of solar PV.

6. Appendix A – Proposed Performance Parameters

The proposed development have been assessed using The National Calculation Methodology for demonstrating compliance with Approved Document Part L.

6.1 Part L2A compliance

A dynamic simulation model was created to assess the design of each unit of the development.

Integrated Environmental Solutions Virtual Environment (IESve) is a Dynamic Simulations Modelling (DSM) software package which has the capabilities of enabling the user to create a virtual representation of a building. The results presented in this report were calculated using the approved compliance software IESve 2019 (v2019.3.2.0).

6.2 Architectural drawings

The geometry used for this assessment was based on a sample warehouse building so no drawings have been used for this development.

6.3 Modelling disclaimer

The calculations produced by Hoare Lea have been carried out with the information provided by the appointed architects and building services engineers in order to determine whether the proposed development can achieve compliance with Approved Document Part L2A of the Building Regulations.

It should be noted that the data generated by this work is obtained using computer simulations. These simulations are the best means of predicting the performance of the building at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual energy usage for the building once occupied may vary from the calculated values submitted to Building Control. These differences will occur due to a number of variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, how the plant is used and the design criteria with regards to how the rooms are environmentally controlled.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Hoare Lea can take no responsibility for differences between the computer simulations and the actual performance of the completed building due to the inherent complexity and variability of the physics in a building and its environment.

The below fabric and system parameters were used in the typical warehouse project for the purposes of energy modelling in Part L 2013. Although there are no current details of the layouts of the buildings, other than expected production and office floor areas the below could be expected to be a typical achievable specification to achieve compliance with Criterion 2 (Fabric and buildings service limits) of Part L 2021.

6.4 Fabric details

Table A.1 Fabric Parameters of the sample building

Parameter	Value
Air Permeability	2.5 m³/h/m²
External Wall U-value (W/m²K)	0.26
Flat Roof U-value (W/m²K)	0.18
Pitched Roof U-value (W/m²K)	0.16
Warehouse Ground Floor U-value* (W/m²K)	0.05
Office Ground U-value (W/m²K)	0.18
Pedestrian Door	1.6
Vehicle Access Door	1.3
Glazing U-value (average including the frame, W/m²K)	1.6 (g value: 40% / Visible Light Transmittance 70% /Frame factor: 10%)
Roof Light Glazing U-value (average including the frame, W/m²K)	1.3 (+0.3 adjustment) (g value: 55% / Visible Light Transmittance – 60%, Frame factor: 15%) Rooflight to be provided to 15% of each warehouse’s floor area.

*Based on a p/a ratio uninsulated floor slab. As the warehouse areas are currently expected to be unheated, this low U-value doesn’t impact the heating consumption of the sample building

6.5 System parameters

Table A.2 Systems parameters- Sample Building

Office Areas	
Space Heating & Cooling	Heat source: Air Source Heat Pump Fuel source: Electricity SCOP: 4.0. SEER: 5.0. EER: 3.5
Ventilation	Mechanical ventilation with heat recovery Heat recovery efficiency: 80% System specific fan power: 1.6 W/(l/s)
Lighting*	Min. luminaire efficacy 95 lm/W Lighting Controls: Auto on/off using presence detection sensors. With daylight dimming**
Warehouse / process area	
Space Heating & Cooling	None
Ventilation	None
Lighting*	Installed Power Density: 1.2 W/m ² /100lux Lighting Controls: Auto on / off using presence detection sensors. With daylight dimming**

Circulation (stairs, lobby, & WCs)	
Space Heating	Electric panel heaters. Heat source: Electric heater Fuel source: Electricity Efficiency: 100%
Ventilation	Naturally ventilation (lobby and stairs): Mechanical extract ventilation System specific fan power: 0.5 W/(l/s)
Lighting*	Min. luminaire efficacy 95 lm/W Lighting Controls: Auto on/off using presence detection sensors.
Domestic Hot Water (DHW) system	
Generator	Standalone water heater (electric point-of-use) DHW seasonal efficiency: 100%
Storage	Storage volume: 10 litres per toilet/ Disabled WC Storage losses: 0.04 kWh/(l/day)

Power Factor Correction
Power Factor Correction has been included to correct to >0.95

Building Management Systems
A BMS system with provision for out-of-range alarms for energy consumption for all lighting and HVAC systems has been included.

- *Lighting Controls are defined as follows:
- **Auto On – Auto Off:**
Specifies presence detection sensors within the space which automatically switches lighting on when occupants are detected and switches lighting off when the space is detected to be unoccupied.
- **Areas with ‘Daylight Dimming’ have been specified with photoelectric sensors which dim artificial lights in response to the amount of natural light present in the zone achieving the designed lux level for the space.

7. Appendix B: Grid Decarbonisation.

The national grid is continually decarbonising which makes the use of gas systems less preferential over electrically fuelled systems. The chart below illustrates the carbon intensity of the national grid from 2005 up to 2050.

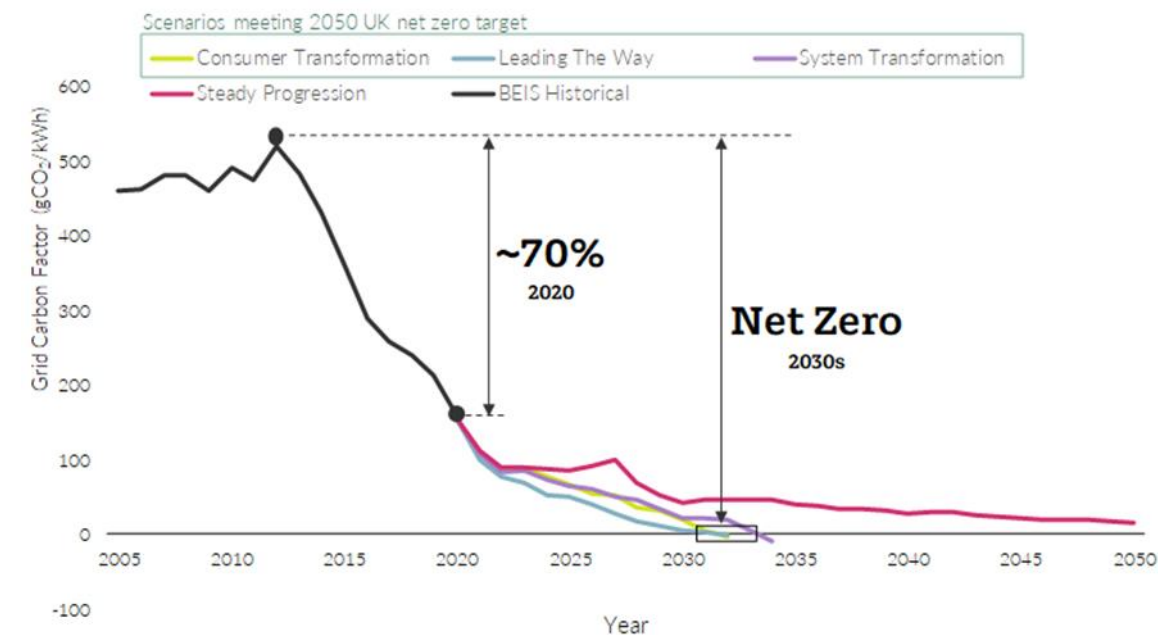


Figure C1 National Grid Decarbonisation

Current Building Regulations (2013) uses a carbon factor of 0.519kgCO₂/kWh for electricity whereas the reality is that the carbon factor is around 0.15 – 0.2kgCO₂/kWh in 2020, therefore the carbon content could be as low as 0.05kgCO₂/kWh at this point in time – using the BEIS projections.

What this means is that current Building Regulations could potentially steer design in a particular direction of travel i.e., fossil fuel lead strategies, rather than considering the impacts of grid decarbonisation. This energy strategy evaluates the Proposed Development against current Building Regulations and against the future carbon emission scenarios.

Grid Decarbonisation

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 C2 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 in 2013.

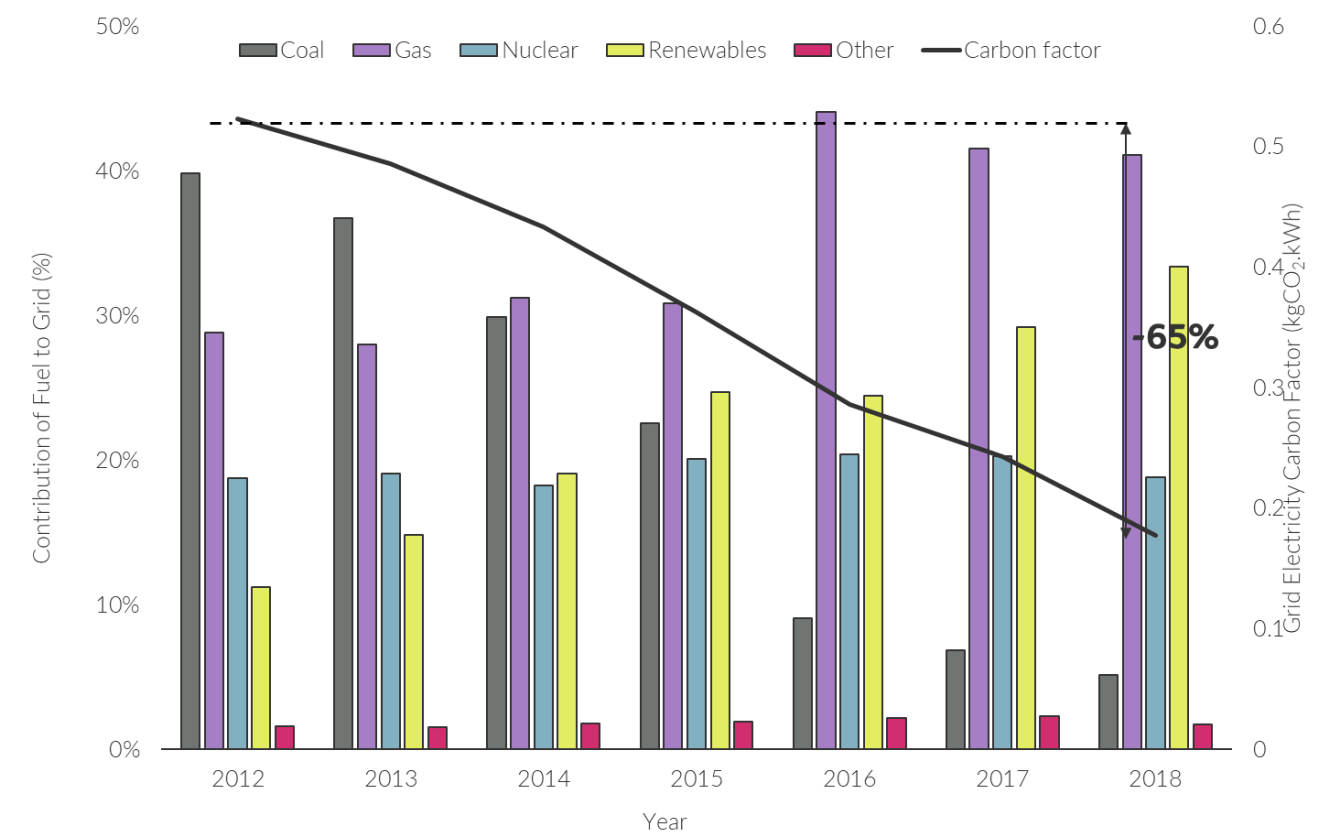


Figure C2 Historic mix of generation methods and associated carbon factor for the National Grid.

8% transmission and distribution losses are included. Sources: electricityinfo.org (generation mix); BEIS Green Book (historic carbon factors).



IAN ANDREWS

SENIOR SUSTAINABILITY CONSULTANT

+44 113 380 1922

ianandrews@hoarelealea.com

HOARELEA.COM

6th Floor
Town Centre House
Merrion Centre
Leeds
LS2 8LY
England

