

Energy Statement

Enplanner ID: 174

Demo Domestic Project

Leamington Spa

Location: 52.289952, -1.529937 (52.29, -1.53)

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Summary

Description of development:

This is proposed development for a block of 13 flats in the centre of Leamington Spa.

This energy statement analyses the energy and ${\rm CO_2}$ savings that can be achieved by installing renewable or low-carbon technologies at the proposed development. It also looks at energy efficiency measures that could be implemented at the development to make energy and ${\rm CO_2}$ savings beyond current building regulations.

The energy consumption figures for the development are based on benchmark figures for each building type from CIBSE for non-domestic buildings or based on SAP 2009 for domestic buildings.

The development consists of the following buildings:

Туре	Floor area (m ²)	No. of units	Specification	Primary heating	Secondary heating
C3 General residential (Ground floor flat)	254	1	Building regs	gas (100%)	N/A
C3 General residential (Mid-floor flat)	298	1	Building regs	gas (100%)	N/A
C4 Houses in multiple occupancy (Top floor flat)	300	1	Building regs	gas (100%)	N/A

This project comes under the **Warwick** planning authority where the low carbon policy objective is as follows:

Policy summary

In appropriate residential and non residential developments, including conversions, the Council will require 10% of the predicted energy requirements to be produced on site or in the locality from renewable energy resources.

Note: this is a summary of the local policy provided for indicative purposes only. You should always check directly with the planning authority concerned if you require a formal statement of planning policy.

The following energy efficiency measures will be implemented to reduce the overall energy consumption and CO_2 emissions of the development before renewable or low carbon technologies are installed:

- Lighting
- Windows and doors

The most suitable low carbon or renewable technology system that has been chosen to achieve the energy savings is as follows:

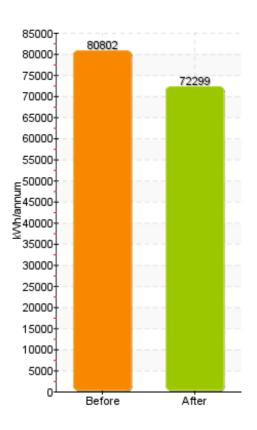
Solar Photovoltaics

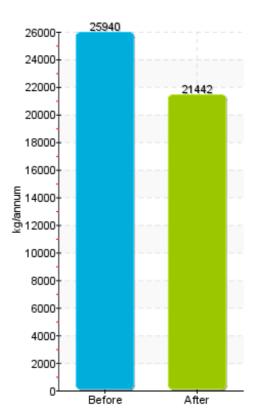




The predicted savings achieved by selected low carbon or renewable technology system after energy efficiency measures are implemented are a 10.5% saving in energy and a 17.3% saving in CO₂ emissions as shown in the graphs below.

Predicted annual energy consumption for development before and after installing renewable or low carbon technologies Predicted annual ${\rm CO}_2$ consumption for development before and after installing renewable or low carbon technologies





Based on the information entered in this tool, this development **would meet** the calculable part of this policy.

The following sections go into more detail about selected energy efficiency measures, and low carbon or renewable technology system.





Energy efficiency measures

This development will benefit from energy efficiency measures to reduce the energy consumption and ${\rm CO}_2$ emissions over and above those required to comply with Building Regulations Part L.

The following have been selected as additional energy efficiency measures for this development. The efficiency measures are explained in more detail in the boxes below

Lighting

Lighting will be improved above and beyond current Building Regulations Part L that is likely to result in a total energy saving of 2.50% for the whole development.

Low energy lighting fitted in all apartments. Motion sensors fitted in communal areas.

Windows and doors

Windows and doors will be improved above and beyond current Building Regulations Part L that is likely to result in a total energy saving of 2.00% for the whole development.

Triple glazing fitted throughout.

Adding these measures in Enplanner has reduced the predicted energy consumption over Building Regulations Part L by **4.50**% and the CO_2 emissions by **5.31**%. This brings the predicted energy consumption down to **80802 kWh/annum** and CO_2 emissions down to **25940 kg CO_2/annum**. These figures have been used to calculate the energy and CO_2 savings from renewable and low carbon technologies in the remainder of the report.







Proposed technologies

Solar Photovoltaics

A solar photovoltaic (PV) cell consists of two or more thin layers of semi-conducting material, most commonly silicon. When silicon is exposed to light, electrical charges are generated, which are conducted away by metal contacts in the form of direct current (DC). The electrical output from a single cell is small, so multiple cells are connected together and encapsulated to form a photovoltaic module, often referred to as a "PV panel". These are often mounted to a roof and electricity can be used in the building and/or exported to the national grid.

Advantages:

- Very low maintenance costs, only to make sure that the panels are free from debris such as fallen leaves.
- Often has a good payback period for smaller systems in Great Britain (i.e. up to 10kW) due to the feed-in tariff and the export tariff (for any excess electricity the system generates) and falling installation costs.
- PV panels have a lifetime in excess of 25 years.
- Short installation time of 1 to 3 days for small to medium roof mounted systems

Disadvantages:

- Ideally the roof should be unshaded roof space that is oriented between west and east in a southerly direction (south facing is best).
- Although payback is good, up-front installation costs can be high

The following solar PV system is suggested to achieve energy and CO₂ savings at this development

Specification

- Power: 10.3kW
- Building use: Domestic
- Area: 75m²
- Orientation: South-West
- Pitch: 30°
- Overshading: None/very little (< 21%)
- Build type: A new building
- Onsite usage: 70%

Financial specification

- Annual savings: £2101
- Annual maintenance costs: £232
- Installation cost: £30595
- Payback period: 16.4 years
- Internal Rate of Return: 6.3%
- Net Present Value: £995

This system is predicted to save 8503 kWh/annum and 4498 kgCO₂/annum for the development.

Solar PV is the most appropriate technology for this development because:





Solar PV is financially viable and there is sufficient south westerly facing roof space for the installation.





Other technologies

Solar Thermal

Solar water heaters generate hot water directly from sunlight, and work even when it is cloudy. The "collector" heats water or another fluid pumped gently through a panel on the roof. The fluid then circulates through a secondary coil inside a hot water tank. This works to heat water in exactly the same way as the coil from a regular boiler. The end result is a reduction in demand for hot water from the existing heating system. A modern, well-insulated hot water tank will keep this water warm for at least twenty-four hours, until it is needed.

Solar water heating systems are generally specified in square metres (m2), which is the collector area, and determines how much sunlight the system can catch. The heating power of a system will also depend on where in the country it is sited and the direction it



faces. A common size of solar collector for domestic use is about 3-4m2 (flat plate). This will deliver around 1,500 kWh per year, which will heat just over half the annual hot water demand of a typical house with 3-4 persons. Most of this will occur during the summer months. For this reason, systems are usually sized to meet all of the summer hot water needs or half of the annual needs for a building: making the system bigger will not help in summer and make a marginal difference in winter.

Advantages:

- Low maintenance costs, only to make sure that the panels are free from debris such as fallen leaves
- Short installation time of 1 to 3 days for small to medium roof mounted systems.

Disadvantages:

- Ideally the roof should be an unshaded roof space that is oriented between southeast and southwest (south facing is best).
- Payback can be longer than the lifetime of the system, especially for smaller systems.

Solar thermal is not appropriate for this development because:

Solar thermal requires a constant hot water demand all year around and a large water storage area. The flats do not have sufficient room for water tanks The water demand is not high enough in the summer to make good use of a solar thermal system.





Wind Turbine

Wind turbines use the power of the wind to generate electricity. They usually have a life in excess of 20 years before requiring a major overhaul. Some larger turbines require an annual inspection survey where the turbine will need to be lowered to the ground.

They can be installed on buildings or on masts. It must be noted that surrounding features such as tall trees and buildings and even the building that the wind turbine is mounted on, can disrupt wind flow to such an extent that the amount of electricity generated is significantly reduced. Wind turbines have a cut-off wind speed of around 3 m/s (this varies depending on the model), below which it will not generate any electricity.



Advantages:

- In the right location, an exposed, windy site, the payback periods can be very good.
- It is a well established renewable technology.

Disadvantages:

- They have planning restrictions where noise, shadow flicker and environmental impact (both visual and physical) must be considered.
- Wind is an inconsistent renewable resource so proper wind speed measurements should be made over a long period (at least 6 months) before a wind turbine is considered.

Wind turbines are not appropriate for this development because:

There is not sufficient wind speed to make a wind turbine financially viable.





Hydroelectricity

Hydroelectric turbines come in many shapes and sizes, but they all have the same fundamental concept. They rotate with the force of water flowing past them and the rotation is used to power a generator that electricity. Micro hydro electric systems are classified as less than 100kW in capacity; they are not very common in the UK due to the difficulties of finding a suitable site and funding the installation.

Advantages:

- The generation of electricity will be relatively consistent if the water source has a year round flow.
- The systems utilise establish technologies which can be easily operated and maintained.



Disadvantages:

- Finding a suitable site to install a hydro electric turbine can be very difficult. The development must be close to a river and the flow must be sufficiently high.
- Unless there are existing civil works onsite (e.g. old milling sites), there may be considerable and costly ground works to install hydroelectric turbines.
- An abstraction license is required from the Environmental Agency to divert a flow of a watercourse. Provisions must also be made for wildlife and fish swimming upstream.
- Installation costs can be prohibitive.

Hydroelectric turbines are not appropriate for this development because:

The development is not near any watercourses.





Disclaimer

The energy and CO_2 figures for the development have been calculated using either benchmarks for typical building types or figures from SAP or SBEM calculations as entered by the applicant, therefore no responsibility is taken for the accuracy of the figures in the energy statement. Renewable and low-carbon technology specifications and energy efficiency measures are indicative only and should not be used for design or construction purposes without seeking additional professional advice. All text in bordered boxes has been written by the applicant therefore no responsibility is taken for their content.



