

The use of the planning system to encourage low carbon energy technologies in buildings

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ABSTRACT

This paper presents the key findings of a study conducted by London South Bank University for the Greater London Authority on the performance of the energy policies contained in the London Plan. These policies require developers to demonstrate how new developments within London will meet specific energy efficiency and renewable energy targets in order to gain planning permission. The study shows that 10% savings on CO₂ emissions using renewable energy technologies were routinely met a year after the introduction of the policy. The study also shows that the largest CO₂ savings are due to the use of combined heat and power.

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1. Introduction

There is a growing global commitment to the implementation of renewable energy technologies, with significant growth occurring in Europe, US, China and India [1]. Much of this growth is either in remote stand alone systems, or else with large scale grid-connected electricity systems. An area where there has been less uptake is integrated, embedded systems within large cities. Buildings account for 40–45% of energy consumption in Europe and China (and about 30–40% world-wide) [2], and encouraging low carbon solutions in urban locations can deliver large point-of-use savings. However, issues of cost, investment and ownership, and technical risk all provide disincentives to the uptake of embedded energy technologies. Governments have adopted a number of approaches to encourage these new and often expensive technologies, including energy price subsidies, capital grants and supply side obligations. A different regulatory approach has been adopted in the city of London, UK, where the planning system is being used to compel developers to include on-site and local energy generation. There is very little in the way of academic study into the use of regional or local government powers that support or encourage low carbon technologies in cities around the world. Columbia University in the USA is currently studying the variety of policies that leading cities are developing to reduce carbon emissions and dependence on imported fuel [3], but the findings are pending publication at the time of writing. This paper therefore provides

a unique snapshot of the performance of a particular regional government policy. Further follow-up studies will be necessary to compare the success of different policies, but it is also evident from the work of Columbia University that London is currently a leader in this field.

The UK encourages the use of the planning system to promote the use of renewables and sustainable principles, for example through documents such as Planning Policy Statement 1 [4] and Planning Policy Statement 22 [5]. These require local authorities to develop policies for mitigation of climate change, and give guidance to the implementation of low carbon technologies, but do not set mandatory targets.

Many local authorities have incorporated renewable energy targets through their planning policies, with the London Borough of Merton leading the way with a 10% target in 2003 [6]. In 2004 The Mayor of London used his powers to introduce a similar policy, with the inclusion of energy efficiency and combined heat and power, on all developments referred to him for planning permission, and which placed an expectation that all thirty-three London Boroughs would adopt the same practice. This paper examines the success of this policy, which has important implications for other regional and city energy strategies.

2. The London energy strategy and the London plan

The London Energy Strategy was introduced in February 2004 [7] as part of the Mayor's vision for sustainable development in London. The strategy aims to reduce carbon dioxide emissions, eradicate fuel poverty and boost the economy of London through a range of measures. There is a strong emphasis on energy

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efficiency and local energy generation from combined heat and power, renewable energy and hydrogen. In order to meet these objectives, the energy hierarchy was defined for the design and construction of all new developments (see Fig. 1). In particular a target was set for 10% reduction in total CO₂ emissions through on-site renewable energy generation. This 10% reduction target is calculated from the reduced emissions after energy efficiency and combined heat and power (CHP) have been considered.

This strategy is taken forward through the London Plan [8], a policy document that defines the Mayor's spatial development strategy and sets out the strategic planning framework for London. Through this the Mayor uses his planning powers to ensure that new and refurbished buildings are designed and constructed with energy efficiency as a high priority. Applicants seeking planning permission for developments above 1000 m² or 10 dwellings are required to submit an energy statement for their site. This must demonstrate how carbon savings are to be achieved in the proposed development through the various methods, and in particular how the renewable energy targets are to be met. Fig. 2 shows how these savings relate to the baseline emissions. This framework has been in operation in London since February 2004.

In May 2006, the London Plan Supplementary Guidance, Sustainable Design and Construction was published [9] to provide a clearer definition of the energy policies and identify relevant guides for implementation. It signposts the relevant standards and regulations by which the building energy and carbon baselines should be determined. This includes a reference to the 2004 Greater London Authority (GLA) London Renewables Toolkit [10], which has been the prescribed methodology for assessing the feasibility of renewables within a development (although this is due to be superseded by the Low Carbon Designer software in 2009).

In June 2007 the GLA published its intentions to strengthen the requirements of the London Plan [11], in particular this signalled an intention to move formally to a 20% renewable energy requirement. This was formally adopted as policy in October 2007 following a process of public scrutiny that examined evidence of the success of the 10% policy [12].

3. Meeting the requirements

In order to obtain planning permission the application must include a detailed energy statement of how CO₂ savings are to be achieved. This must state the intended technologies to be employed, the magnitude of the expected savings, and explain the methodology by which these have been calculated. This is assessed, in conjunction with the other requirements under the London Plan, by the Planning Development Unit (PDU) at the GLA. If the proposed scheme falls short of target requirements, or if it does not appear to maximise the potential for savings, there will be a round of negotiations to explore whether further savings can be made. There is some room for manoeuvre on both sides at this point, but there is a strong expectation on the part of the PDU that the

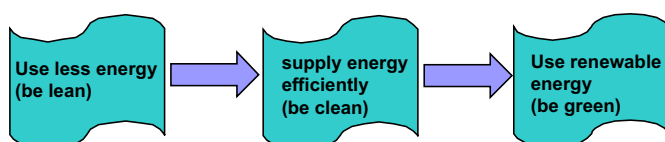


Fig. 1. The energy hierarchy. The original hierarchy placed renewable energy before efficient supply, but this has been reversed in the revisions to the London Plan.

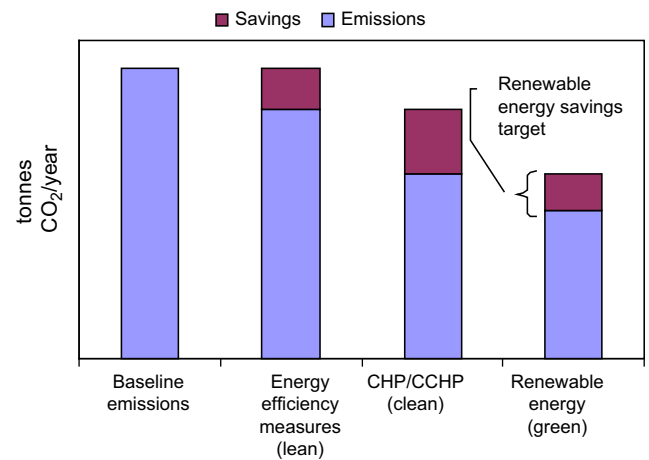


Fig. 2. CO₂ savings from different measures against the business as usual baseline. (Adapted from the London Plan, February 2008 [8]).

percentage renewable energy target should be met. The energy statement should address the components of the energy hierarchy, discussed below.

3.1. Use less energy

Energy efficiency gains are best achieved by considering the opportunities at the earliest stage in the design process. Designing in energy efficiency at the outset is more cost effective and yields higher savings than changing the design at a later stage. The Building Regulations (England and Wales) 2006 [13] set the national standards that must be met for new and refurbished buildings in terms of heating, cooling and lighting. This does not include energy used in appliances and processes within the building. The London Plan requires the baseline to be based on total energy, i.e. to include all expected energy use in a building. Therefore, under the London Plan savings must be demonstrated through energy efficiency measures that are additional to Building Regulations, but that will also impact on the small power and process loads. Typical energy efficiency measures that may be adopted include:

- ◆ Automatic controls
- ◆ Condensing boilers – although these are now mandatory in domestic applications.
- ◆ A-rated appliances – for example refrigerators, clothes washers and dryers, dishwashers and IT equipment are the greatest energy use appliances.
- ◆ Airtight building design.
- ◆ Energy efficient lighting and controls.
- ◆ Building Energy Management Systems (BEMS)
- ◆ Enhanced insulation
- ◆ High performance glazing
- ◆ Passive solar design
- ◆ Water efficient fittings
- ◆ Variable speed pumps and fans
- ◆ District/Community heating schemes
- ◆ Mechanical ventilation with heat recovery
- ◆ Solar shading
- ◆ Chilled ceilings (where cooling cannot be avoided)
- ◆ Variable Refrigerant Flow systems (where cooling cannot be avoided).

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