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Sustainability: Zero-carbon London

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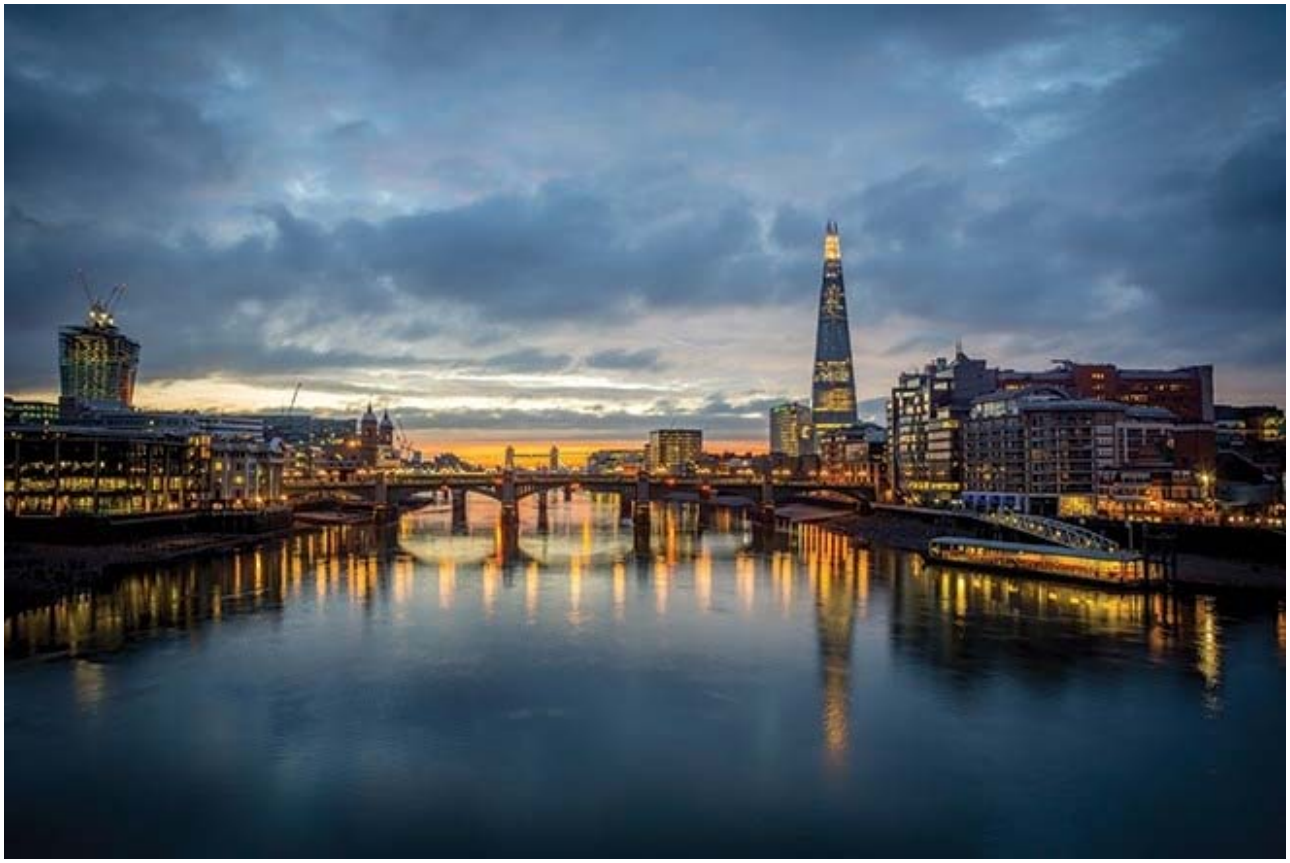
The London Plan has specific sustainability targets which affect development in the city. Here, Adam Mactavish of Currie & Brown considers the implications of the zero-carbon policy for major developments in the UK's capital



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01 / Introduction

London has very specific sustainability targets, which, in turn, affect development in the city.

The London Plan requires major developments to achieve a minimum of a 35% improvement on the carbon performance required by Building Regulations Part L1A 2013. From October 2016, it also requires that the residual regulated carbon emissions – from heating, hot water, ventilation and lighting, and so on – from each home be offset through a cash in-lieu payment to the relevant borough.

The payments are ring-fenced to be spent to achieve carbon savings elsewhere, and the level of the offset payment can be decided independently by each borough.

This article considers the implications of the zero-carbon policy for major developments in London and considers whether and how the new measures might change the form of new residential development.

It also looks at the long-term suitability of the solutions being used and how they perform against broader policy goals such as minimising household bills.

02 / Low-carbon development in London

The London Plan has required more stringent energy standards for major development for many years with the GLA publishing an annual report on how developers have responded to its energy policies.

The most recent monitoring report estimates that annual CO2 savings of just under 50,000 tonnes will be achieved by developments approved in 2015.

Of the more than 52,000-plus dwellings covered in the analysis, together with 2.7 million m^2 of non-domestic space, nearly 47,000 homes (90%) will be connected to heat networks. The total installed CHP capacity is estimated at about 32MW with a further 10MW of photovoltaics.

Pre-existing policies have clearly had a big impact on residential development, so the key question is: how will the new zero-carbon policy change things?

03 / Implementing London's zero-carbon policy

In May 2016 the National Energy Foundation published a review of carbon offsetting approaches in London. Of the 35 bodies (32 London boroughs, two mayoral development corporations and the Corporation of London) surveyed, 22 were collecting offset payments with a further two boroughs planning to do so imminently. Of those not yet collecting payments, two were not doing so because of concerns over viability or the need to prioritise affordable housing.

Of those with a policy to collect offset payments, the price was typically £60 per tonne of CO2 emitted for 30 years (a one-off payment of £1,800 per tonne). This is consistent with the value used by the government in assessing the price cap for the now-abandoned Allowable Solutions mechanism that was to form part of the national zero-carbon homes regulations.

Some boroughs have chosen to set a higher price based on their own assessments of the cost of saving carbon in their borough, most notably Lewisham (a one-off payment of £3,210 per tonne) and Westminster (a one-off payment of £7,560 per tonne).

Islington is the only borough to include unregulated emissions (small power, cooking, and so on) in its carbon offset calculation. However, its offset price is lower than those in other boroughs – a one-off payment of £920 per tonne.

Source: Shutterstock / Gordon Bell

London's City Hall

04 / Impact on development

The introduction of the zero carbon policy does not change the expectations for on-site carbon reductions for major residential developments – in other words, they still need to achieve a 35% improvement over Part L1A 2013. The material question is therefore whether undertaking additional measures on site to avoid at least part of the offset is more effective than simply making the necessary payments.

With offset payments in the order of £1,300 to £1,600 for a two-bedroom flat, it is highly unlikely that developers will be able to offset all of a development's residual carbon at a lower cost. For comparison, the capital cost of carbon savings from installing photovoltaics (PV) would be around £3,500 to £4,000 per tonne, well above the offset payment in most locations.

Because the offset payment covers energy used for heating, hot water and lighting, only a proportion (about 45-55% depending on building type) of the carbon offset could be avoided through reduction in heat demand. It is therefore unlikely that significant further reductions in energy efficiency would be achieved on site directly as a result of the zero-carbon policy.

One short-term consequence of the policy might be to discourage investment in electric heating solutions (such as heat pumps) because, at present, these have higher carbon emissions per unit of heat output than gas CHP. As a result a heat pump based solution, although potentially well placed in the long term because of falling carbon emission factors for electricity, would incur a higher offset payment than a system using gas CHP. This issue may be addressed in future revisions to the emission factors used in SAP for different fuel sources.

In Westminster, where the carbon offset price is high, it might be expected that further on-site carbon reduction would be planned.

However, while installing PV might be very cost effective in comparison to a carbon price of £7,560 per tonne, the limited amount of available roof area, potential for shading and the other competing uses for prime space on a dense site might make this option less desirable than fabric or other performance improvements.

05 / Are we getting the most from london's energy policies?

GLA energy policies are certainly delivering energy and carbon savings beyond those required by Building Regulations. However, it is timely to consider the future of this policy area and whether it is adequately addressing the wide range policy goals affected by energy generation, supply and use.

Some key considerations include:

- **Household costs** Most solutions proposed for new developments prioritise supply of low-carbon energy over absolute energy efficiency or energy generation. Ongoing maintenance and fuel costs of energy supply systems mean household costs have not fallen as fast as CO2 emissions.

  A policy that prioritised reduction in household costs might result in very different technical solutions, including greater use of Passivhaus-style solutions. Significant demand reduction together with ongoing decarbonisation of the energy system might mean that new homes could achieve lower running costs and carbon emission targets.

- **Long-term performance** As the electricity grid continues to decarbonise and a larger proportion of the energy supply becomes intermittent (for instance, more solar and wind energy in the supply mix) then the solutions to optimise energy use and carbon will change. Energy storage and demand reduction might need to figure in the evaluation of future energy strategies if they are to help manage the demand from major developments on constrained supply infrastructure.

  It is likely that the net carbon savings from gas CHP over grid electricity will have disappeared within the next 10 years. There is a risk that the lack of any regulatory imperative means that existing systems continue to run even when they are actually higher in carbon than even using direct electric heating. A further important consideration will be whether new homes can operate with the lower flow temperatures associated with heat pumps. New developments should be able to demonstrate clear plans to transition to using alternate sources of heat supply such as heat pumps or waste heat.

- **Performance in use** The gap between the designed energy performance and that achieved in practice has been shown in many new housing developments, with public body Innovate UK calculating that on average a new home emits 2.6 times more carbon on average than that shown on its design stage SAP assessment (admittedly this does include a sizeable amount of unregulated carbon – including small power use and cooking). With new homes becoming more energy efficient during design, some of the most effective improvements in performance are likely to arise from ensuring they perform to their potential by building them in line with the design and even by working with homeowners to help them use their homes as efficiently as possible. One option might be to offer reduced carbon offset payments where there is a commitment to working with or even incentivising (such as in the case of private rented homes) residents to help them reduce energy use in practice. Such an approach could also help reduce the amount of unregulated energy use, currently unaddressed.

06 / Future developments

Although the addition of carbon offset payments to London Plan Policy 5.2 may not of itself transform the delivery of major developments, there are signs that some new development areas are exploring different solutions.

The two case studies below summarise some of the different approaches being developed, showing that there is still plenty of innovation to be found, particularly where there is a strong focus on reducing absolute energy demand, using available resources and on consumer costs.

Old Oak and Park Royal Development Corporation

Proposal for Grand Union Park centred around the Grand Union canal

It is estimated that the 25,500 homes planned on the Old Oak and Park Royal Development Corporation site in west London will generate a peak heat demand of nearly 100MW. This is a long-term project being delivered in phases over at least the next 30 years. Following energy efficiency measures, the corporation is reviewing options to meet this demand through a range of low carbon sources including heat from surface water, aquifers and even the sewage system. It is also looking at making use of waste heat from energy from waste facilities.

These energy sources together with heat pumps, will provide low-carbon energy that will become lower carbon as the grid decarbonises. To make best use of these technologies, homes will need to be very energy efficient and capable of working with low temperature heating networks that are more efficiently delivered through heat pumps.

Agar Grove, Camden

Source: Hawkins\Brown

Agar Grove development

This development of nearly 500 homes designed by Hawkins\Brown for Camden council (with Max Fordham as services engineer) will include 345 Passivhaus standard dwellings, including an 18-storey tower. It is currently under construction. The development's design intent explicitly included the goals to address fuel poverty, provide comfortable summer and winter environments, be quiet, draft free and have good indoor air quality.

It is estimated that the running costs of the new homes will be about 90% less than that for a typical existing home, and previous experience (for instance, Innovate UK's building performance evaluation studies) has shown that the performance gap for Passivhaus schemes is typically much smaller than for non-Passivhaus developments.

Interestingly, the demands of Passivhaus will actually necessitate a move away from a heating network towards separate systems within each development block. This is because the energy losses within the network would have increased energy consumption. Further reduction in losses will be achieved by redesigning the distribution of the heat network within each block. The benefits of this approach are that the smaller boilers can be more easily maintained by existing council staff and can be run at lower temperatures, further reducing energy loss.

07 / Conclusion

Recent years have seen a transformation in the energy and carbon performance of new homes in London. The UK energy system, however, is evolving and this brings new opportunities and challenges that must be taken into account if we are to get the most from the considerable investment made to meet carbon targets.

Giving due consideration to occupant costs and to how a development will perform in a decarbonised, but capacity-constrained energy environment, with higher energy prices may well change perspectives.

There is clearly a tension between promoting scaled solutions that can expand to serve a range of building types, but which are complex to initiate and subsequently run, and building-level solutions that don't provide a kernel for linking up existing buildings but which are easier to deliver and run. There is room for a range of solutions, but it is important that they perform both now and in the longer term for households and the environment.

Acknowledgments

With thanks to Dan Epstein of Useful Simple Trust and Duncan Price of Buro Happold. Information on the response to London Plan energy policies is available at: www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/2015-energy-planning-monitoring-report

Information on the approaches to carbon offsetting being applied across London is available at: www.nef.org.uk/about-us/insights/carbon-offsetting-opportunities-for-local-authorities-to-finance-energy-eff

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