July 2013

Energy Planning

Monitoring the implementation of London Plan energy policies in 2012

Greater London Authority
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Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA

www.london.gov.uk
enquiries 020 7983 4100
minicom 020 7983 4458

Copies of this report are available from www.london.gov.uk

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Executive Summary

London planning authorities must consult the Mayor on all planning applications that are of strategic importance to London[a]. For each planning application referable to the Mayor, an energy assessment is required setting out how the development will meet the London Plan energy policies. Following the order of the Mayor's energy hierarchy, each energy assessment is required to set out how the development will:

- Use less energy
- Supply energy efficiently
- Use renewable energy

This approach facilitates the achievement of the carbon dioxide (CO_2) emission reduction targets in Policy 5.2 of the London Plan. It also helps to supply efficient, secure and affordable energy to building occupants. Each energy assessment is evaluated by specialists to ensure that the energy policies are met.

This report reviews the commitments secured through implementation of the London Plan energy policies in 2012. It will be of interest to developers and energy consultants, as well as others involved in the planning process e.g. case officers, policy officers, etc.

171 applications which were granted provisional permission by the local planning authority were considered by the Mayor in 2012 at stage II. This was higher than 2011 when 118 stage II applications were received. As with all planning applications, whether or not these developments are built out or get superseded will depend on many factors e.g. demand within the economy.

An analysis of the 2012 applications shows that significant energy related commitments continued to be secured through implementation of the London Plan energy policies, including:

- High levels of energy demand reduction with developments exceeding the requirements of Building Regulations through energy efficiency alone. The associated investment of circa £32 million will help to reduce consumers' energy bills.

- Substantial amounts of new district heating infrastructure and associated energy supply plant including:

    - circa £20 million of investment in new, high efficiency combined heat and power (CHP) plant able to produce 29MW of electricity and a similar amount of heat. 74MW of cumulative CHP electrical capacity has been secured through the planning process since 2010 to the end of 2012, broadly equivalent to the capacity required to supply 150,000 homes.

    - Circa £133 million of investment in heat network infrastructure for approximately 53,000 communally heated dwellings

    - Commitment to ten very large[b] mixed use developments implementing site heat networks, with each one key to the development of an area wide network. These include the extension of the Westfield Shopping Centre development in West London.

[a] Definitions of strategic applications are set out in the Mayor of London Order 2008
[b] Including more than 1000 dwellings

- An estimated 55 permanent jobs created in operating and maintaining the heat network infrastructure and associated energy supply plant. Additional jobs will also be created in the supply chain for heat network infrastructure, although these are often outside of the UK.

- Continued investment in on-site renewable energy systems, including approximately £16 million to provide circa 87,000m^2 of photovoltaic solar panels. Circa £1.3million per annum of combined feed-in-tariff (FiT) revenue and electricity savings is envisaged to result from this investment.

As well as reducing energy costs for the occupiers of the new buildings and providing increased security of supply, the energy outcomes highlighted above will result in reduced fossil fuel use leading to:

- Regulated[c] CO_2 emission reductions of 36 per cent more than 2010 Building Regulations requirements for developments. This percentage improvement is greater than the 25 per cent target for new developments set out in Policy 5.2 of the London Plan for the period 2010 to 2013.

- Approximately 60,000 tonnes per annum of regulated CO_2 emission reductions, over and above those reductions required to comply with 2010 Building Regulations – equivalent to retrofitting loft insulation in circa 150,000 existing homes.

Approaching a third of developments for which an energy assessment was provided did not meet the Policy 5.2 carbon dioxide reduction target on-site – approximately half of these did not incorporate CHP. This is in-part results from constraints associated with incorporating particular technologies e.g. CHP and renewables, due to the scale and type of development. This is discussed in more detail in section 3 of the report.

Where a development falls short of meeting the target, the London Plan requires the developer to make a cash-in-lieu contribution to account for the shortfall in CO_2 emission reductions as set out in Policy 5.2E[d]. In 2012, this shortfall equated to an approximate value of £5 million (enough to the fund the retrofitting of loft insulation to circa 22,000 existing dwellings). It should be noted however, collection of such a payment relies on the borough having in place procedures and a mechanism for gathering the payments. London boroughs are currently at various stages in developing procedures to collect cash in lieu payments.

Figure A below shows the regulated CO_2 emissions after each stage of the energy hierarchy. It can be seen how the emissions are first reduced below Building Regulations requirements through energy efficiency (EE) measures, before dropping further by obtaining energy from CHP and using renewable energy (RE) systems. Of the three elements of the energy hierarchy, two thirds of the overall carbon dioxide emission reduction beyond 2010 Building Regulations was attributed to CHP.

[c] In line with the London Plan, these figures exclude the impact of unregulated emissions e.g. catering, small power, etc.
[d] The GLA will be releasing high level guidance during 2013, on policy 5.2E under Supplementary Planning Guidance on Sustainable Design and Construction.

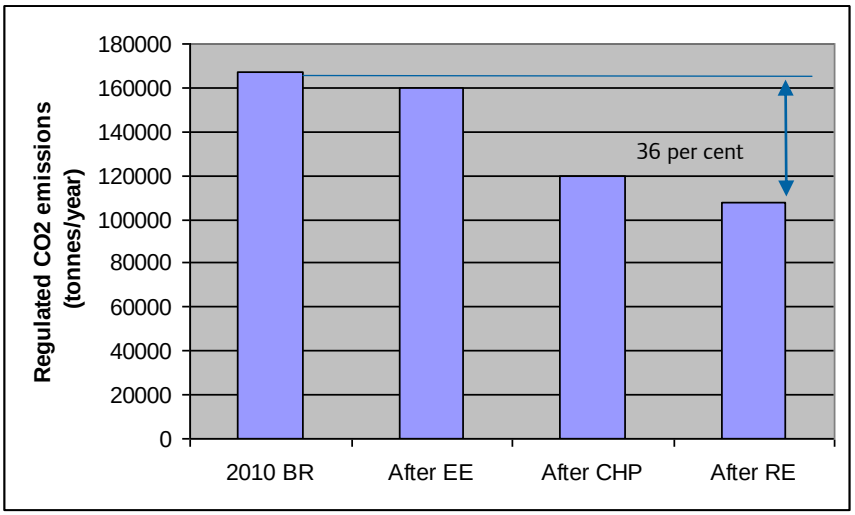

Figure A: Regulated CO_2 emissions after each stage of the energy hierarchy in 2012

Table A below compares the figures for 2012, 2011 and 2010. 2012 saw a substantial rise in the number of applications that were considered by the Mayor subsequent to being given provisional permission by the local planning authority. This was in part due to a surge in applications prior to the introduction of the Mayor's Community Infrastructure Levy (CIL) and developers obtaining permission in anticipation of an uplift in the economy.

As a consequence of the increase, there was a significant rise in the absolute carbon dioxide savings and associated energy generation capacity. However, this was also accompanied by an increase in the percentage CO_2 emission reductions, indicating increased success in implementation of the energy policies.

Table A: Comparison of 2010, 2011 and 2012 figures

	2010	2011	2012
Stage II applications	112	118	171
Number of dwellings in developments	28,181	32,051	55,879
Non-domestic floor area (million m^2)	2.2	1.5	2.3
Regulated CO_2 emission reductions compared to 2010 Building Regulations (per cent)	33	33	36
Regulated CO_2 emissions reductions compared to 2010 Building Regulations (tonnes per annum)	35,598	41,136	59,817
Dwellings connected to heat networks	27,000	31,000	53,000
Proposed CHP electrical capacity (MW)	28	17	29
PV Panels (m^2)	22,500	49,000	87,000

Note: The CHP capacity figure for 2010 was relatively high compared to 2011 and 2012 due to the inclusion of a small number of large CHP units sized to supply existing buildings.

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1. Introduction

The London Plan sets out an integrated economic, social, environmental and transport framework for the development of London over the next 20-25 years. It estimates that London will grow by 700,000 households by 2031. 750,000 additional jobs are anticipated during this same period. To meet this demand there will be significant growth in new build developments in London.

The Plan seeks to ensure new developments are designed to enable the more efficient use of energy and support the development of sustainable energy infrastructure to produce energy more efficiently. It sets out a range of energy policies which apply to new developments. They are underpinned by the energy hierarchy:

- use less energy: see *Policy 5.3 Sustainable Design and Construction*
- supply energy efficiently: see *Policy 5.6 Decentralised Energy in Development Proposals*
- use renewable energy: see *Policy 5.7 Renewable Energy*

These policies are designed to facilitate achievement of the CO_2 emission reduction targets in Policy 5.2, while facilitating other long term benefits including security of supply and affordable energy. They also stimulate increased investment in energy efficiency measures, infrastructure and low and zero carbon technologies. Additionally, jobs are created through the construction and maintenance of the installed equipment, as well as indirect associated jobs.

A detailed energy assessment, based on Greater London Authority (GLA) guidance[e], is required for each major development proposal. These are required to demonstrate how the targets for CO_2 emission reduction over and above 2010 Building Regulations will be met using the Mayor's energy hierarchy.

At the planning application stage, evaluations of the energy assessments are undertaken to ensure that each development is designed to minimise the energy demand and residual energy requirements are supplied efficiently. The GLA evaluation is designed to complement that untaken by local borough officers and places a particular emphasis on strategic energy issues relating to particular developments; for example, links to area wide district heating networks.

Applications determined from the 1 January 2012 to 31 December 2012 have been analysed to establish the regulated CO_2 emission reductions and infrastructure commitments secured through the planning process. The purpose of this report is to present the results of the analysis. As with all planning applications, whether or not these developments are built out or get superseded will depend on many factors e.g. demand within the economy.

Following two earlier pieces of work conducted by London South Bank University, beginning in 2010[f], the Mayor initiated an annual review of the outcomes secured through implementation of the London Plan energy policies. As well as quantifying the benefits achieved, this was also intended to help inform future London Plan policy development. The report reviewing the impact of the policies in 2011 is published on the GLA website at the following link:

http://www.london.gov.uk/priorities/environment/climate-change/energy-efficiency/new-build

[e] Energy planning: GLA Guidance on preparing energy assessments September 2011
http://www.london.gov.uk/sites/default/files/guidance-energy-assessments-2011.pdf
[f] Energy planning: Monitoring the impact of London Plan energy policies in 2010 (GLA)

2. Strategic scale planning applications determined in 2012

Once the Local Planning Authority (LPA) has resolved to grant or refuse permission for a referable[g] application it must send the application to the Mayor with a copy of the draft decision notice and other documentation. Following receipt the Mayor has 14 days to decide to either:

- direct the LPA to refuse the application;
- direct that he is to act as the LPA and determine the application himself; or
- take no further action.

The Mayor's decisions, commonly known as **stage II**, take the form of an officer's report to the Mayor and a letter from the Mayor to the LPA. For further information on the Mayor's role in strategic planning applications including stage I see Appendix 1.

171 applications, which had been granted provisional permission by the local planning authority, were considered by the Mayor at 'stage II' in 2012[h]. This is significantly more than in 2011 when only 118 were considered. The increase was in part due to a surge in applications prior to the introduction of the Mayor's Community Infrastructure Levy (CIL) and developers seeking permission in anticipation of an uplift in the economy. However, some of these applications related to developments where a full energy assessment was not considered necessary e.g. temporary structures, structures requiring insignificant amounts of regulated energy, very small developments, etc.

Table 1 provides a breakdown by development type of the number of stage II applications considered by the Mayor in 2012. Planning permission for approximately 56,000 dwellings was approved in 2012. To provide additional context for this figure, there were 17,977 conventional housing completions in London in the financial year 2010/11[i].

Type of development	Number of Developments	Number of dwellings	Non-domestic floor area (Millions m^2)
Mixed use[j] and domestic	113	55,879	1.5
Non-domestic	58	0	0.8
Total	**171**	**55,879[k]**	**2.3**

Table 1: Breakdown by category of applications at stage II in 2012

This report is based solely on applications proceeding through stage II during 2012, as these represent the applications actually receiving planning permission.

Development Plan Documents

The GLA energy planning team also provide comments on energy planning policies in London Borough development plan documents (DPDs) received by the Mayor at the pre-submission and submission stages. Various documents were reviewed including, for example, core strategies, development management plans, waste development plan documents to ensure that London borough policies are in line with the London Plan energy policies.

[g] Definitions of strategic applications are set out in the Mayor of London Order 2008
[h] 7 other applications were also seen at stage II having been refused by the local planning authority
[i] London Plan Annual Monitoring Report 8, 2010-11 published March 2012
[j] All these developments have a residential and commercial component
[k] An additional 492 residential units were contained in developments for which no energy assessment was provided

Opportunity Area Planning Frameworks

Support was also provided in considering the energy implications within Opportunity Area Planning Frameworks (OAPF). For example, the GLA Decentralised Energy Project Delivery Unit (DEPDU) provided support to the borough in configuring the plans for the Croydon Opportunity Area district heating scheme so that it would be commercially attractive to the energy services market[l].

DEPDU also contributed towards four energy master plans (EMP) in 2012: Wembley, Kingston, Westminster and Havering. Based on the heat demand potential identified from the London Heat Map, these four EMPs are expected to identify the extent of a market competitive area-wide district heating network and where the early phases of the networks would be started.

[l] Croydon Opportunity Area Planning Framework: Consultation Draft: July 2012

3. Regulated CO_2 Emission Reductions

Policy 5.2 of the London Plan sets targets for regulated CO_2 emissions reductions over and above those required by 2010 Building Regulations. In 2012, developers were expected to achieve a 25 per cent regulated CO_2 emissions reduction compared to a 2010 Building Regulations compliant development. Appendix 2 contains further information on Building Regulations.

As shown in Table 2 below, the implementation of the London Plan energy policies in new developments referred to the GLA in 2012 resulted in cumulative regulated CO_2 emissions reductions of 59,817 tonnes per annum relative to 2010 Building Regulations Target Emissions Rate (TER). This is equivalent to retrofitting loft insulation in circa 150,000 existing homes[m].

The percentage savings in regulated CO_2 emissions were approximately 36 per cent beyond the requirements of Part L of the Building Regulations 2010. Therefore, the reductions were well above the 25 per cent target in Policy 5.2.

Of the three elements of the energy hierarchy, the greatest carbon dioxide emission reduction was attributed to efficient supply using CHP. This equates to 39,447 tonnes of regulated carbon dioxide emissions per annum, approaching two thirds of the overall reduction. The associated energy capacity helps with progress towards the Mayor's target of supplying 25 per cent of London's energy from decentralised sources by 2025.

Note: Appendix 3 contains a simple cost benefit analysis examining the cost to the GLA of achieving the CO_2 emissions reductions highlighted above.

	Regulated CO_2 emissions	**Cumulative regulated CO_2 emissions reductions relative to 2010 Building Regulations i.e. excluding unregulated**	
	(tCO_2/year)	**(tCO_2/year)**	**(per cent)**
Baseline	167,185		
After energy efficiency	159,533	7,652	5
After energy efficiency & CHP	120,086	47,099	28
After energy efficiency, CHP & Renewables	107,369	59,817	36

Table 2: CO_2 emission reductions from application of the energy hierarchy

3.1 Proportion of developments meeting the target in policy 5.2

As shown in Figure 1, nearly 70 per cent of developments for which an energy assessment was provided met or exceeded the 25 per cent target in Policy 5.2 of the London Plan. Out of these nearly a third achieved savings greater than or equal to 40 per cent; the London Plan target for 2013 to 2016. Just under a third of all developments failed to achieve the target through on-site carbon reduction measures. A quarter of these were smaller developments where CHP was not appropriate (see further comments in section 3.2). Developments falling into this category are also discussed further in section 3.3 below.

[m] Assumes average saving per dwelling of 0.4 tonnes of CO_2 per annum from OFGEM CERT spreadsheet

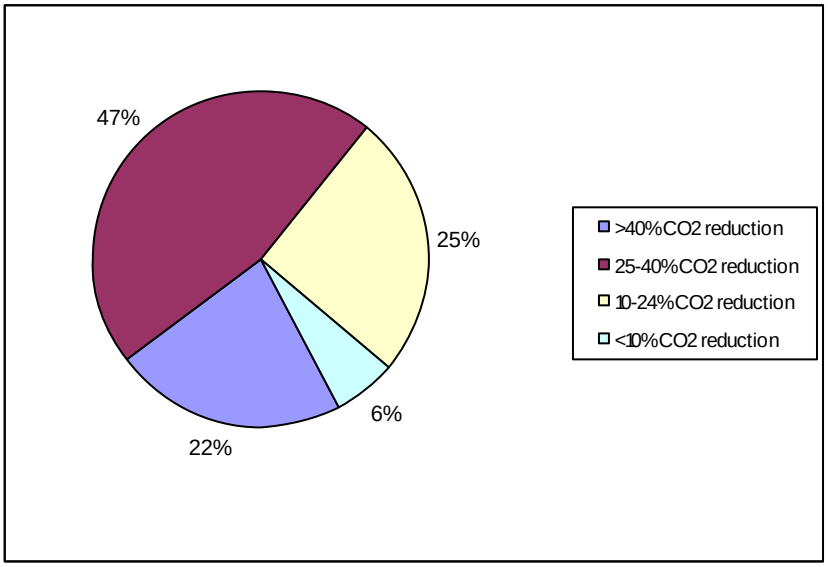

Figure 1: Proportion of developments achieving particular ranges of percentage savings in 2012

3.2 The variation of savings with scale of development

The theoretical impact of scale in achieving CO_2 reductions was considered by examining the reductions achieved by developments above and below 10,000m^2 of floor area[n].

Note: the observations below are based on estimates of the carbon dioxide emission reductions made at the planning stage. The reductions achieved by different scale developments will vary in practice.

As can be seen in Table 3 below, the percentage savings from energy efficiency are broadly similar for both the large and small scale categories. However, the CO_2 emission reductions after CHP are significantly greater for the larger category of development. These figures in part reflect the greater applicability of CHP to large scale residential led, mixed use developments (CHP is usually not suitable for small residential only developments where the complexities involved in managing electricity sales are difficult for the developer to manage). The additional improvement after taking into account renewable energy systems was slightly greater for larger scale developments.

	Developments less than 10,000m^2 Cumulative CO2 savings (per cent)	Developments greater than 10,000m^2 Cumulative CO2 savings (per cent)
After energy efficiency	4	5
After energy efficiency and CHP	20	29
After energy efficiency, CHP and renewables	25	37

Table 3: Cumulative CO_2 emission reductions for developments of different scale

[n] Where the residential floor area was not known, the number of residential units was multiplied by 70m^2 to give the approximate domestic floor area. This was then added to the non-domestic floor area to give the total area.

3.3 Offsetting the shortfall in the required carbon dioxide reductions

Individual developments can not always meet the target in Policy 5.2 of the London Plan through on-site measures. Where this is the case, developers may make cash-in-lieu contributions to the local borough to account for the shortfall in CO_2 emission reductions. For example, the Guys Hospital, Great Maze Pond development planned to provide £38,840 towards off site projects in Southwark[o].

In 2012 the total shortfall from developments not meeting the target equated to approximately 3,592 tonnes of regulated CO_2 emissions per annum. The value of this shortfall would have equated to approximately £5million if an indicative CO_2 price of £46 per tonne and a 30 year lifetime[p] is assumed. This was not enforced in many cases, as arrangements for collecting cash-in-lieu contributions have only been established in certain boroughs. However, if it had been, this level of funding would have been enough to fund the retrofitting of loft insulation to circa 22,000 existing dwellings.

If the shortfall was calculated against the 40 per cent target this would have amounted to 16,358 tonnes of regulated CO_2 emissions per annum. Again assuming a 30 year lifetime and £46 per tonne, this would have equated to a value of approximately £22.5million.

The GLA will be releasing high level guidance during 2013, on policy 5.2E under Supplementary Planning Guidance on Sustainable Design and Construction.

[o] See Stage II report for Guy's Hospital, Great Maze Pond dated 19 November 2012
[p] See 'Zero Carbon Homes Impact Assessment', Communities and Local Government, May 2011.

4. Application of the energy hierarchy in referable applications

The sub-sections below highlight the technologies that will be installed as a result of implementation of the energy hierarchy in 2012 and their resulting impact.

4.1 Be lean: use less energy

To meet the requirements of Policy 5.3 of the London Plan, development proposals need to demonstrate that sustainability standards are integral to the proposal and ensure that they are considered at the beginning of the design process. Standards include measures to maximise CO_2 emissions reductions across the site, including the building and services.

The reduction in regulated CO_2 emissions from energy efficiency alone compared to a 2010 Building Regulations compliant development increased to five per cent in 2012. This compares to a reduction from energy efficiency of just one per cent in 2011.

This indicates that developers, working in conjunction with their consultants, are gaining a greater understanding of what can be achieved through energy efficiency measures such as improved air tightness or mechanical ventilation with heat recovery (MVHR). As a result, in some cases they are prepared to commit to reducing regulated CO_2 emissions below those of a 2010 Building Regulations compliant development through energy efficiency alone. However, there is always a need to ensure that energy efficiency measures do not lead to overheating of buildings; this can be achieved through, for example, ensuring adequate ventilation is always provided.

Achieving a high level of energy efficiency results in significantly reduced demand for heat, meaning domestic customers pay substantially less for energy than people living in existing homes of the same type and size.

4.2 Be clean: supply energy efficiently

To comply with Policy 5.6 of the London Plan, development proposals need to evaluate the feasibility of combined heat and power (CHP). Major development proposals[q] are required to select energy systems in accordance with the following hierarchy:

1. Connection to existing heating and cooling networks;
2. Site wide CHP network;
3. Communal heating and cooling.

An estimated 53,000 dwellings that obtained planning permission in 2012 will be supplied by means of heating networks. These dwellings will be located in developments ranging from small residential-only developments containing less than 100 dwellings (where a number of blocks are connected) to very large mixed use developments with over 1000 dwellings and significant non-domestic space (with heat supplied by CHP). Appendix 4 contains a list of the very large, mixed use developments which obtained planning permission in 2012 and committed to installing site heat networks. Each of these developments has the potential to be a key element, and in some cases the catalyst, of a scheme serving the wider area.

Approximately three-quarters of strategic developments met part of their energy requirements through CHP. As a result, 29MW of CHP electrical capacity was part of submitted proposals in 2012. This compares to 17MW and 28MW in 2011 and 2010 respectively. As shown in Table 4 below, the

[q] See London Plan 2011 for a definition of Major Development proposals

majority of the capacity was found in installations between 100kW and 999kW in electrical capacity. The average installation size was 320kW$_e$. This is roughly equivalent to the size required to supply the average heat demand of a residential led, mixed use development incorporating circa 800 new apartments. The Mayor does not request consideration of CHP installations at the 'less than 100kW$_e$' scale for residential only developments, though developers often propose these for other reasons.

Aside from the existing and proposed CHP that will serve the buildings covered by the Olympics Legacy application, the largest proposed CHP installation was 2.6MW of electrical capacity for the mixed use extension to the Westfield shopping centre in west London. This installation will be sized to allow some export of heat into the district heating network planned for the wider White City area. Additionally, of the developments reaching the target in Policy 5.2 of the London Plan, over 80 per cent of them met part of their energy requirements from CHP. The 2012 capacity, when built out, will represent an increase of 23 per cent compared to the total 126MW of CHP already installed in London in 2011[r].

	Total electrical capacity (MW$_e$)[s]	**Average size of installation (MW$_e$)**
Less than 100kW$_e$	1.5	0.04
100kW$_e$ to 999kW$_e$	15.2	0.32
1MW$_e$ and above	12.5	1.56
Total	**29.2**	**-**

Table 4: Size distribution of CHP installations secured through planning in 2012

Additionally, a major waste-to-energy plant[t] was granted permission in 2012. This gasification plant development included a steam turbine producing approximately 25MW of electricity. It also included a heat off-take facility able to provide 38MW of thermal energy (at a pressure of 3 bar). This report does not include the CO_2 savings arising due to the electricity generated by this plant displacing grid supplied electricity, as the proposal to install this electricity generation plant results from the waste policies.

The capacity described above will contribute to meeting the Mayor's target of supplying 25 per cent of London's energy from decentralised sources by 2025. The London Decentralised Energy Capacity study sets out the opportunity and the pathway to delivering the target. It can be found at:

http://www.london.gov.uk/priorities/environment/climate-change/decentralised-energy

4.3 Be green: use renewable energy

Following the order of the energy hierarchy, Policy 5.7 of the London Plan requires that major development proposals should provide CO_2 emissions reductions through the use of onsite renewable energy generation, where feasible.

In 2012 the number of developments exceeding the targets in Policy 5.2 of the London Plan through the first two elements of the energy hierarchy and not proposing renewable energy systems increased compared to 2011. In total fourteen developments exceeded the targets in Policy 5.2 of the London

[r] Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2011, Energy Trends article September 2012
[s] 14 developments incorporating CHP did not provide an estimate of the electrical capacity. These developments are estimated to incorporate an additional 2MW of electrical capacity.
[t] 1335d biossence

Plan through the first two elements of the energy hierarchy and did not propose on-site renewable energy systems.

Table 5 below shows the number of each different type of renewable energy installation proposed. Over 80 per cent of developments proposed the use of renewable energy systems. Of these developments, over three quarters planned to install photovoltaic (PV) panel arrays. Developers committed to the installation of approximately 87,000m^2 of PV panels, equivalent to circa 8MW electrical capacity. A wider range of renewable technologies were employed when CHP was not applicable. These included solar thermal panels, ground source heat pumps, biomass boilers and air source heat pumps.

	2011	**2012**
PV	60	107
Biomass boilers	14	7
Heat pumps	19	21
Solar thermal	10	6

Table 5: Number of installations of different types of renewable energy systems

5 Other benefits

Implementation of the London Plan energy policies results in other longer term benefits. The subsections below discuss some of these benefits.

5.1 Helping to enhance regeneration areas

Energy infrastructure such as heat networks has the potential to contribute to the regeneration of the areas they supply, as well as providing affordable energy. Not only can they supply new developments but the largest networks have the potential to be expanded to supply existing buildings and housing estates.

The London Plan identifies areas of focus for regeneration, with a particular emphasis in East London. It sets out that the Mayor will work with partners to develop and implement a viable and sustainable legacy for the Olympic and Paralympic Games to deliver fundamental economic, social and environmental change within east London, and to close the deprivation gap between the Olympic host boroughs and the rest of London. The Plan states that this will be London's single most important regeneration project for the next 25 years. It will sustain existing stable communities and promote local economic investment to create job opportunities, driven by community engagement.

The state-of-the-art Kings Yard energy centre in the Olympic Park was unveiled in October 2010. It, together with the accompanying Stratford City energy centre and 16km of heat network, was designed, financed and built by an energy services company, as part of a 40 year agreement. This represented an investment of £113 million[u]. The energy centre provided an efficient low-carbon heating and cooling system across the site for the Games and will continue to provide this for the new buildings and communities that will develop on and around the site in the years to come. Substantial space has been set aside within the Kings Yard energy centre to accommodate additional CHP plants to supply many buildings and homes beyond those served by the initial scheme.

Developers proposing building in the vicinity of the Olympic Park are required to communicate with the energy services company operating the heat network to examine the potential for connection to the network. The connection of new developments is expected to help the network grow significantly beyond the Olympic Park itself.

Additionally, King's Cross now functions as a European passenger gateway and has the highest public transport accessibility in London. Planning permissions have been granted in both LBs Camden and Islington for high-density commercial development, office, retail, leisure and housing. The King's Cross Central development is Europe's largest city centre regeneration scheme and one of the UK's most significant and high profile developments. The £2 billion, 67-acre scheme will be served by a pioneering community energy system[v] which will supply heat and power to the development's eight million square foot of offices, shops, homes and a university and significantly contribute to the development's carbon emission reduction target. Although the development passed through planning well before 2012, the benefits secured through the planning process will be experienced for many years to come.

5.2 Investment due to London Plan energy policies

The infrastructure and technologies required to meet the commitments secured through implementation of London Plan energy polices will result in substantial inward investment.

[u] http://www.power-technology.com/projects/olympic-park-energy-centre
[v] http://www.vitalenergi.co.uk/news_kingscrossEC.php

Reducing emissions 5 per cent below a 2010 Building Regulations compliant development through energy efficiency alone is estimated to require investment of £28million[w] in the domestic sector and £4million[x] in the non-domestic building sector.

The 29MW of CHP electrical capacity proposed in 2012 is estimated to require investment of circa £20 million, assuming an installed capital cost of £700 per kilowatt.

In addition, substantial additional investment will be required to provide the site heat network infrastructure into which CHP will supply heat energy. The heat network infrastructure for the 53,000 dwellings with communal heating is estimated to require investment of circa £133 million[y]. Additional investment will be required in the heat network infrastructure required to supply the non-domestic buildings.

The London Decentralised Energy capacity study suggests that it is feasible to meet the target to supply 25 per cent of London's energy from decentralised sources by 2025. It estimates that investment of £23.9 billion would be required in order to meet 27 per cent of London's energy demand in 2031 from:

- non-renewable energy linked to heat networks;
- renewable energy linked to heat networks; and
- renewable energy (technologies not linked to heat networks),

£8.3 billion of this investment is related to heat networks and associated energy generation plant which will supply for over four fifths of the energy demand. A further £15.6 billion is related to other renewable energy e.g. photovoltaics, heat pumps.

The combined £153 million highlighted in the paragraphs above represents just below 2 per cent of the investment in heat networks and associated energy supply plant or 0.6 per cent of the overall investment. Repeated year on year this level of investment in new build will make an important cumulative contribution to the overall target. The remaining investment to achieve the target will occur in systems established to supply existing buildings.

Aside from the employment stimulated in manufacturing and installing the energy infrastructure, people will also be employed in operating and maintaining the heat network infrastructure and associated energy supply plant serving new developments. The commitments secured in 2012 are estimated to result in circa 55 permanent jobs[z], most of which would be located in energy services companies (ESCOs).

Additionally, investment in renewable energy systems will be required. To provide circa 8MW of photovoltaic electrical capacity will require investment of approximately £16 million, assuming an installed capital cost of £2,000 per kilowatt. This investment is envisaged to result in combined feed-in-tariff (FiT) revenue and electricity savings of circa £1.3million per annum. Additional investment will occur in heat pumps, solar thermal panels and biomass boilers.

[w] Assumes a cost of £497 per dwelling, interpolated from Table 3 of CLG 2012 consultation on changes to the building regulations

[x] Assumes a cost of £1.84/m^2, interpolated from Tables 6 and 7 of 'Investigating improved CO_2 emission and energy targets for new non-domestic buildings compared to 2010 standards', March 2012

[y] Assumes a heat distribution cost of £2500 per flat for district heating, taken from Table 51 of Code for Sustainable Homes: A cost review (CLG March 2010)

[z] Assumes 0.5 jobs per mixed use/residential development for maintaining a site network

6 Conclusions

For developments obtaining planning permission in 2012 from the Mayor, the continued implementation of the energy policies in the London Plan has been successful in securing:

- Regulated CO_2 emission reductions of 36 per cent against a baseline in which developments complied with 2010 Building Regulations. This is above the requirements on developers set out in Policy 5.2 of the London Plan.

- Commitments to substantial investment in district heating infrastructure including 29MW_e CHP, estimated at more than £150 million, in order to achieve 39,447 tonnes of CO_2 emission reductions.

- Significant investment in renewable energy technologies, including circa £16 million in photovoltaic panels.

- Circa 55 permanent jobs in operating and maintaining heat network infrastructure and associated energy supply plant.

In terms of the carbon dioxide emission reductions from the different elements of the energy hierarchy, two thirds of the overall emission reduction was attributed to CHP.

Glossary

Building Emissions Rate (BER) or **Dwelling Emission Rate (DER)** is the actual building/dwelling CO_2 emission rate. In order to comply with Part L of the Building Regulations, the BER/DER must be less than the TER (see below).

Combined Heat and Power (CHP) is defined as the simultaneous generation of heat and power in a single process. The power output is usually electricity, but may include mechanical power. Heat outputs include hot water for space heating or domestic hot water production.

CHP Electrical Capacity – is the maximum power generation capacity of CHP.

kilowatt (kW) – One thousand watts. A watt is a measure of power.

Megawatt (MW) – One million watts. A watt is a measure of power.

Part L of the Building Regulations – Approved documents L1A and L2A of the Building Regulations relate to the conservation of fuel and power in new dwellings and new buildings other than dwellings respectively.

Regulated CO_2 emissions – The CO_2 emissions arising from energy used by fixed building services, as defined in Approved Document Part L of the Building Regulations. These include fixed systems for lighting, heating, hot water, air conditioning and mechanical ventilation.

Simplified Building Energy Model (SBEM) is a computer program that provides an analysis of a building's energy consumption. The purpose of the software is to produce consistent and reliable evaluations of energy use in non-domestic buildings for Building Regulations Compliance.

Standard Assessment Procedure (SAP) is a methodology for assessing and comparing the energy and environmental performance of dwellings. Its purpose is to provide accurate and reliable assessments of dwelling energy performances that are needed to underpin building regulations and other policy initiatives.

Target CO_2 Emission Rate (TER) is the minimum energy performance requirement for a new dwelling/building. It is expressed in terms of the mass of CO_2 emitted per year per square metre of the total useful floor area of the building ($kg/m^2/year$).

Appendix 1: Mayor's role in strategic planning applications

London planning authorities must consult the Mayor on all planning applications that are of strategic importance to London[aa]. The Mayor is required to provide a statement setting out whether he considers that the referred application complies with the London Plan. The Mayor must give this statement, commonly known as **stage I**, within six weeks of receiving the application.

Each year a significant number of applications proceed through the first phase **stage I** but are withdrawn to be revised prior to being determined by the local planning authority (LPA).

[aa] Definitions of strategic applications are set out in the Mayor of London Order 2008

Appendix 2: Building Regulations

Building regulations set minimum compliance criteria that all new developments in the UK have to meet in order for development to occur.

As part of the compliance criteria, Part L of the Building Regulations sets a target CO_2 emissions rate (TER). A new development's building/dwelling emissions rate (BER/DER) must be reduced below the TER in order to achieve compliance. This process is implemented through the Standard Assessment Procedure (SAP) methodology in dwellings and the Simplified Building Energy Model[bb] (SBEM) methodology for non-domestic buildings.

The latest Part L Building Regulations came into effect on 1st of October 2010 and introduced tougher compliance criteria. The target CO_2 emissions rate for buildings to comply with the 2010 Building Regulations is approximately 25 per cent lower than the target CO_2 emissions under the 2006 Building Regulations.

Since the 1 October 2010 developers have been asked to state the regulated CO_2 emissions reductions relative to the CO_2 emissions of a development of the same size and type which complies with the 2010 Building Regulations.

In line with Government's stated pathway to achieving zero carbon new buildings, a further tightening of building regulations is expected to occur in 2013. At this point, it will be necessary to assess the CO_2 savings from developments against 2013 Building Regulations.

[bb] Other certified software packages also implement the methodology for non-domestic buildings.

Appendix 3: Cost benefit analysis

The CO_2 savings described in this 2012 monitoring report are secured as a result of a team evaluating the energy assessments produced by developers to ensure they meet the energy policies in the London Plan and, where they do not, requesting changes to the proposals to bring them into compliance. In effect, the team act as a gate keeper ensuring that only those proposals meeting the policy requirements pass through the planning system.

The team involves an Authority energy officer and external specialist consultants (as well as the planning case officers assigned to individual applications). The annual combined costs of the core team are approximately £200,000.

Assuming the annual CO_2 savings secured through planning continue for a period of 30 years reflecting the lifetime of the building services, cumulative CO_2 savings of 1,794,510 tonnes will be achieved as a result of the implementation of the London Plan energy policies in 2012.

Considering purely the officer and consultancy costs to the GLA, this represents a cost per tonne of CO_2 saved of £0.11. In practice, the cost per tonne of CO_2 saved will be higher as some of the savings will not materialise, for example, where the development does not get built out or is superseded by a new planning application in a later year. Nevertheless, even if the majority of the developments did not proceed, the cost to the GLA is still significantly less than £1 per tonne of CO_2 saved.

Knock on effects of not performing functions
Without each energy assessment being evaluated by the GLA team, there would be no way of ensuring that developers meet the requirements of the London Plan energy policies. This could lead to:

- Diminished progress towards meeting the target in Policy 5.1 of the London Plan to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. This would undermine one aspect of the Mayor's Climate Change Mitigation and Energy Strategy.

- Reduced progress in meeting the target in Policy 5.5 of the London Plan for 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. This would make the task of the GLA Decentralised Energy Team more difficult.

Appendix 4: Large mixed use developments gaining permission in 2012

Very large mixed use developments have the potential to be the nucleus of area wide networks supplied by CHP. As seen in Table A4 below, ten of these very large mixed use developments proceeded through to obtaining planning permission in 2012.

Most of these developments form key elements of the wider plans for decentralised energy in the areas in which they are located. For example, the Land south of Nine Elms Lane, South London Mail Centre and New Covent Garden Market developments all represent important heat loads for the planned Vauxhall Nine Elms Battersea (VNEB) heat network. Similarly, Areas 7 and 1C, Cannington Town will eventually form part of the scheme serving the wider area as set out in Newham's Local Development Order for a district heating network, the route of which runs predominantly along public highway from Beckton to Royal Docks, Canning Town and Custom House, West Ham and Stratford.

Name of development	Borough	Number of dwellings	Non-domestic floor area (m^2)
Kidbrooke Phase 4/4a	Greenwich	1,634	0
Westfield Shopping Centre	Hammersmith & Fulham	1,646	61,306
Land south of Nine Elms Lane	Wandsworth	1,994	63,823
South London Mail Centre, Nine Elms	Wandsworth	1,870	25,000
Minoco Site, Silvertown	LTGDC	4,196	37,876
New Covent Garden Market	Wandsworth	2,443	28,679
Olympics Legacy Application	ODA	6,800	130,441
Sugar House Lane	Newham	1,200	42,920
Part of South Acton Estate, Acton Gardens	Ealing	2,350	3,398
Areas 7 and 1C, Canning Town	LTGDC	1,100	76,200

Table A4: Large developments with site heat networks capable of expanding to serve a wider area