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Energy Planning

Monitoring the Impact of London Plan Energy policies in 2010

Greater London Authority
October 2011

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1 Executive Summary

The Mayor has committed to an overall target of reducing London's carbon dioxide (CO_2) emissions by 60 per cent of 1990 levels by 2025 and at least 80 per cent by 2050. This is set out in the Mayor's Climate Change Mitigation and Energy Strategy and the London Plan (the Mayor's spatial development strategy). The London Plan sets out a comprehensive range of policies that underpins London's spatial response to climate change and energy e.g. Policies 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 and 5.7.

Through the planning system, new developments provide an ideal opportunity to demonstrate new techniques and adopt best practice. Decentralised energy systems serving new developments can also be designed to expand and serve the existing building stock.

Strategic planning applications referable to the Mayor are required to include an energy assessment setting out how they meet the above London Plan energy policies. Applicants are required to set out how the CO_2 emissions of the proposed development have been minimised through the application of the energy hierarchy i.e.:

1) Be lean: use less energy
2) Be clean: supply energy efficiently
3) Be green: use renewable energy

Each assessment is evaluated by a specialist team to ensure that the key strategic issues are adequately addressed and that the CO_2 reductions have been maximised.

An analysis of the energy assessment evaluations relating to all Stage 2 planning applications determined from 1 January to 31 December 2010 was undertaken to establish the projected CO_2 savings and infrastructure commitments that have been secured.

The analysis demonstrated that substantial projected CO_2 savings were secured through implementation of London Plan energy policies in 2010. Specifically, the following were achieved:

- average CO_2 savings of 33 per cent per development over and above a baseline of a 2006 Building Regulations Part L compliant development including unregulated energy,
- a reduction of approximately 50 per cent in **regulated** CO_2 emissions beyond the minimum requirements of 2006 Building Regulations (excluding unregulated energy)[1].

[1] Assuming 2/3 of the baseline carbon emissions are due to regulated energy

- Overall, in 2010 projected annual CO_2 savings of 71,813 tonnes of CO_2 were secured. This is equivalent to retrofitting cavity wall insulation in approximately 111,000 existing semi detached homes.[2]
- The largest CO_2 reductions were due to energy efficiency (EE) and combined heat and power (CHP), with a smaller saving due to renewable energy (See Figure 1 below).

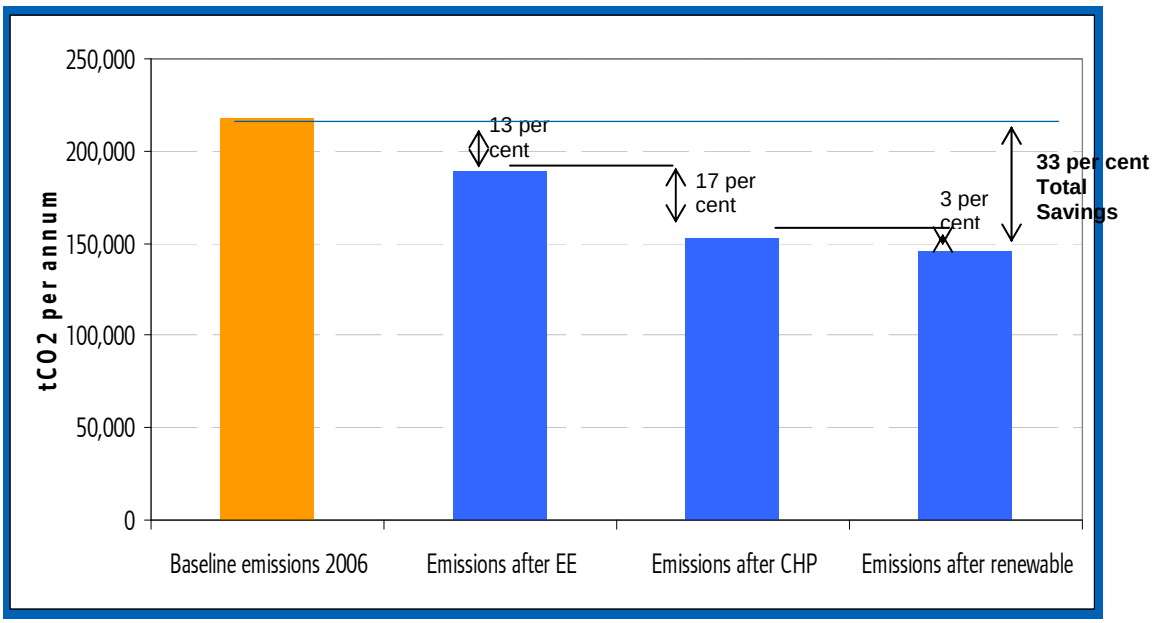

Figure 1: Summary of overall CO_2 emission reductions due to implementation of London Plan Policies in 2010.

Implementation of the policies in 2010 also secured the following key commitments in relation to decentralised energy:

- Installation of onsite heat networks to supply circa 27,000 new apartments (96 per cent of the total dwellings approved through planning). This will allow connection to future external district heating network.
- Six very large[3] mixed use developments establishing site wide heat networks of a scale that are capable of expanding to serve the wider area;

[2] Figures derived from modelling conducted for the RE:NEW programme
[3] e.g. more than 900 dwellings

- Provision for a 6,000m^2 energy centre at Battersea Power Station which can accommodate plant able to export heat to the Vauxhall Nine Elms Opportunity Area;
- Installation of circa 28MW of CHP electrical capacity, equivalent to the energy capacity required to supply 56,000 homes. The total CHP electrical capacity in London is circa 198MW[4].

[4] Combined heat and power in Scotland, Wales, Northern Ireland and the Regions of England in 2009. Energy Trends 2010

2 Introduction

The London Plan estimates that the number of households in London will grow by 790,000 new households by 2031 (30 per cent of the total in 2031). An additional 750,000 jobs are anticipated during this same period. This represents significant growth in new build developments in London and is an ideal opportunity to lead by example, drive innovation and secure CO_2 savings through a range of energy measures from the outset.

A major challenge is to ensure that new developments are built to a high standard to minimise the 'retrofit hangover' of tomorrow. Through the planning process, the Mayor has succeeded in securing tangible and measurable CO_2 reductions in new developments, as well as encouraging site wide heat networks which can act as anchor heat loads in developing larger, multi-site heat networks which serve the existing stock in the future..

The Mayor's Climate Change Mitigation and Energy Strategy sets a target to achieve an overall reduction in London's CO_2 emissions of 60 per cent below 1990 levels by 2025. The mitigation and energy policies seek to reduce the emissions of CO_2 primarily by reducing emissions and ensuring the more efficient use of energy in new developments and supporting development of sustainable energy infrastructure to produce energy more efficiently.

The London Plan sets out a comprehensive range of policies that underpin London's spatial response to climate change. Major development proposals are required to include a detailed energy assessment, based on GLA guidance[5], demonstrating how CO_2 emissions reductions will be achieved within the framework of the energy hierarchy:

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy

Energy assessments are evaluated at the planning stage to ensure that each development makes the fullest contribution to minimising CO_2 emissions.

An analysis of the energy assessment evaluations relating to Stage II planning applications determined from 1 January to 31 December 2010 has been undertaken to establish the projected CO_2 savings and infrastructure commitments that have been secured. This short report summarises the results of the analysis.

[5] GLA Energy Team Guidance on Planning energy Assessments October 2010
http://www.london.gov.uk/sites/default/files/guidance-energy-assessments-28-sep-10.pdf

This report follows on from previous studies undertaken by London South Bank University which monitored the impact of London Plan Energy Policies between 2006-2009 [6].

[6] Monitoring the London Plan Energy Policies – Phase 3: London South Bank University December 2009

3 The 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[7]. 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.

Once the Local Planning Authority (LPA) has resolved to grant or refuse permission for a referable application it must send the application back to the Mayor with a copy of the draft decisions 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 call in and act as the LPA 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.

A total of 258 planning applications were referred to the Mayor during 2010[8], with the largest number of applications received from Newham (30). Each year a significant number of applications proceed through **stage I** but are withdrawn to be revised prior to being determined by the LPA. 112 Stage II applications were considered in 2010.

Table 1 provides a breakdown by development type of the number of stage II applications considered by the Mayor in 2010. Planning permission for 28,181 dwellings were approved in 2010. Of the 55 developments with a residential element, the average number of dwellings was 512. The development with the single largest number of dwellings was Brent Cross with 7,550 dwellings. It is worth noting that the average dwelling density across the developments is high at circa 148 dwellings per hectare[3].

[7] Definitions of potentially strategic applications are set out in the Mayor of London Order 2008
[8] London Plan Annual Monitoring Report (February 2011)

Type of development	Number of Developments	Number of dwellings	Non-domestic floor area (Mm2)
Mixed use[9]	45	26,531	1,309
Domestic	10	1,650	-
Non-domestic	57	-	856
Total	**112**	**28,181**	**2,165**

Table 1: A breakdown by category of application considered at stage II by the Mayor in 2010

This report is based solely on applications proceeding through stage II during 2010, as these represent the applications actually proceeding through the planning system. Where developments achieve planning permission build out timescales can be long, sometimes over a number of decades, and in some cases new applications supersede consented applications.

3.1 Development Plan Documents

In addition to planning applications, the GLA also provided comments on London Borough related climate change and energy planning policies for 35 of the 78 development plan documents (DPD's) received by the Mayor's office at the pre-submission or submission stages. These include, for example, Core Strategies, Development Management Plans, Waste development plan documents etc. Energy planning input ensures that local authority policies are in line with the London Plan energy policies. This includes ensuring that the CO_2 reductions targets in Policy 5.2 of the London Plan are adopted in local plans.

[9] All these developments have a residential component

4 Application of the Energy Hierarchy in referable applications

The subsections below describe the application of policy at each tier of the energy hierarchy as set out in section 1; detail the commitments that have been secured through the planning process and makes observations that are relevant to the implementation of policy going forward.

4.1 Be lean: use less energy

Policy 5.3 of the London Plan states that development proposals should demonstrate that sustainable standards are integral to the proposal and ensure that they are considered at the beginning of the design process. Standards include measures to minimise CO_2 emissions across the site, including the building and services.

Day to day application of policy

In order to maximise the CO_2 savings from the first part of the energy hierarchy, new build developments have for several years been encouraged to significantly exceed the 2006 Building Regulations through energy efficient design alone.

As well as optimising the design of the buildings through passive design, developers are asked to demonstrate that the potential for improvements through measures such as improved insulation, reduced air permeability, energy efficient lighting and enhanced controls are maximised.

Outcomes

In 2010 the following outcomes in relation to energy efficiency were secured:

- Average savings of 13 per cent per development, over and above a baseline of 2006 Building Regulations Part L compliant development (including unregulated energy)[10].
- Projected annual CO_2 savings of 28,098 tonnes of CO_2. This is equivalent to retrofitting cavity wall insulation in approximately 43,500 existing semi detached homes.[11]
- Improved fabric insulation and air permeability standards, well beyond the minimum backstop values required by building regulations, have become standard practice in new build residential developments in London; thus minimises the energy required for

[10] Assuming 2/3 of the baseline carbon emissions are due to regulated energy, this is equivalent to a 19 per cent reduction in regulated carbon emissions beyond 2006 Building Regulations.
[11] Figures derived from modelling conducted for the RE:NEW programme

space heating. Mechanical ventilation with heat recovery (MVHR) is proposed where air permeability is very low.

- High performance facades have become a standard approach to reduce the energy requirement of highly glazed buildings in London (e.g. offices), as they allow cooling loads to be controlled and at the same time maximise access to daylight.

Observations

The application of this Policy has led to substantial improvements in the energy efficiency of proposed developments. Developments have significantly exceeded 2006 Building Regulations compliance levels through energy efficiency measures alone. Overall, the level of savings from energy efficiency seen in 2010 is broadly equivalent to the 14 per cent observed in the London South Bank University (LSBU) study[12] which covered November 2006 to June 2009. This reflects the GLA's continued approach to maximising CO2 savings in line with the energy hierarchy over the past 5 or more years.

With the introduction of the new 2010 Building Regulations in October 2010, new build developments are being requested to measure the CO_2 savings from energy efficiency relative to a 2010 Building Regulations compliant development.

The level of savings secured from energy efficiency alone has been enough to significantly exceed the 2006 Building Regulations compliance Target Emissions Rate. However, this level of savings from energy efficiency is only likely to enable developments proceeding through planning in 2011 and beyond to approach the 2010 Building Regulations compliance[13] Target Emissions Rate. 2010 regulations require a further 25 per cent reduction in CO_2 emissions compared to 2006 levels.

4.2 Be clean: supply energy efficiently

Policy 5.6 of the London Plan requires that development proposals should evaluate the feasibility of combined heat and power (CHP). Major development proposals should 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.

In high density areas, heat networks, often utilising CHP, offer the potential for significant CO_2 and cost savings. As most of London and many new developments occurring here are high density, it offers particular opportunities for the establishment of heat networks.

[12] Monitoring the London Plan Energy Policies – Phase 3: Part 1 report Final. December 2009, http://legacy.london.gov.uk/mayor/priorities/docs/lon-plan-energy-policies-monitoring-1.pdf

[13] Just considering regulated emissions

Sometimes, usually in parts of the outer boroughs, densities can be lower and there is less potential for heat networks.

a) Connecting to existing and establishing new heat networks

Day to day application of policy

There are a number of existing large, multi-site heat networks in London. Examples include Pimlico, Barkantine and the new Olympic Park network. There are also plans for large new networks such as the Vauxhall Nine Elms, Euston Road and White City networks. There is only scheme with a major cooling network (Citigen) and opportunities for further networks are constrained by a lack of low carbon cooling sources.

Where a development is within close proximity to an existing heat network with spare capacity, as part of the initial energy comments (stage I), evidence of correspondence with the network operator is requested. This provides assurance that the opportunities for connection have been fully explored, before the application is considered at stage 2.

In most situations, due to the relatively small number and limited size of existing networks in London, developments are often some distance from the nearest network and, hence, all that can reasonably be asked is that, where heat density is sufficient, the development is designed to allow future connection to an external network, as and when a system expands to cover their area. In developments with multiple buildings, future connection is also sometimes further facilitated through the installation of a site heat network.

Outcome

Implementation of policy in 2010 has secured the following outcomes in relation to heat networks:

- Commitments to circa 27,293 new apartments being supplied by heat networks.
  Note: This alone accounts for an increase of approximately 8 per cent of the homes supplied by heat networks in England, Wales and Northern Ireland.[14]
- Commitments to six very large[15] mixed use developments (see table 2 below) establishing site wide heat networks.
- Commitments to 45 mixed use, 10 domestic and 57 non domestic developments being ready to connect to area wide heating networks.

Observations

While it is possible to ensure that developers actively investigate the potential to connect to off-site heat networks at the planning stage, it is more challenging to obtain a

[14] Based on the English, Welsh and Northern Ireland House Condition Surveys
[15] more than 900 dwellings

guarantee that the development will connect. Where this is the case, Section 106 agreements, where appropriate, are proposed to ensure the applicant continues to prioritise connection to off site heat networks.

Despite the potential difficulties arising from the phasing of large mixed use developments, implementation of the London Plan policies in recent years has meant that developers have become accustomed to committing to establishing site wide heat networks. While negotiations occur regarding the timing by which a site heat network will be established, the principle of establishing a network is rarely disputed.

Figure 2 below shows the geographical distribution of these mixed use developments with site heat networks proceeding through planning in 2010. As can be seen these are predominantly located in the inner London Boroughs. Although they are not usually in a position to connect to existing off-site heat networks, they will be able to connect should networks expand to cover these areas in the future. They will also be able to act as anchor loads in the establishment of new larger networks in the future; in much the same way as some of the older social housing networks are being used today, for example recently in Leicester.

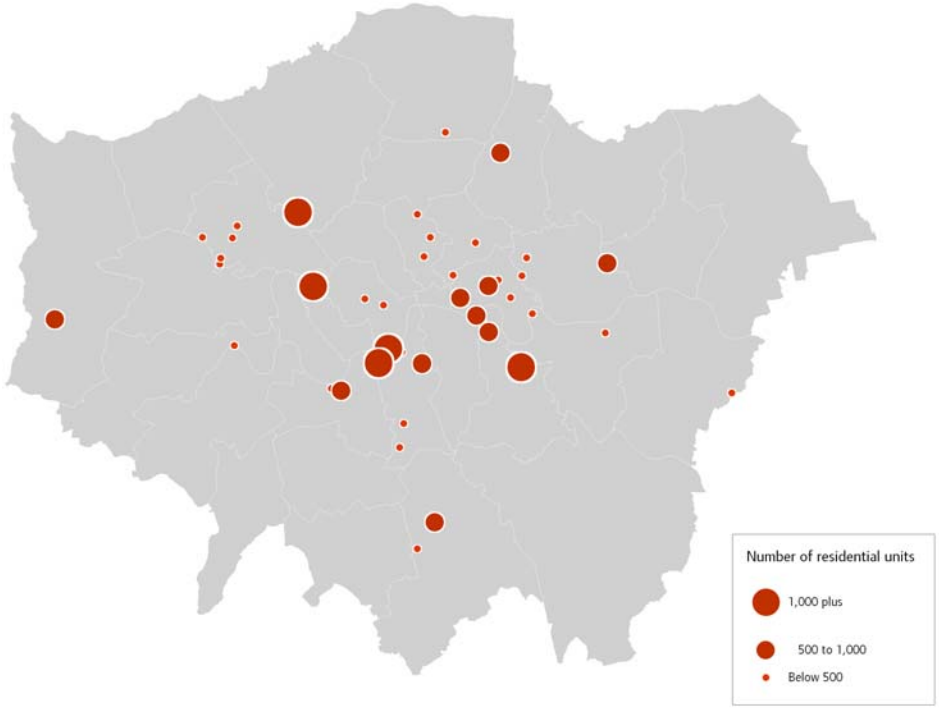

Figure 2: The locations of mixed use developments receiving planning in 2010

In the case of the very large developments, these have the potential to be the nucleus of area wide networks in their own right. As can be seen from Table 2 below, six very large mixed use developments proceeded through planning in 2010, the most significant being Battersea Power Station (See case study in Appendix 1) and Brent Cross Cricklewood. In the other cases, there may be potential for clustering together some of the medium size developments to form larger networks.

Name of development	Borough	Number of dwellings	Non-domestic floor area (m^2)
Battersea Power Station	Wandsworth	3,400	293,511
Fresh Wharf Estate	Barking & Dagenham	950	4,540
Myatts Field, North, Brixton	Lambeth	980	1,500
Brent Cross Cricklewood	Barnet	7,550	707,934
Heathside & Leathbridge Estates	Lewisham	1,201	1,280
Wornington & Greenham Estate	Kensington & Chelsea	1,000	4,987

Table 2: Large site wide heat networks capable of expanding to serve a wider area

In order to further facilitate the future connection of new build developments to large off-site heat networks and, in the case of the larger mixed use developments, utilise large, efficient on-site CHP plant, success has been achieved in persuading developers to minimise the number of energy centres.

For a few of the larger developments, single energy centres with enough space to install plant to supply heat beyond the boundary of the specific development have been secured through the planning application process.

When the decentralised energy vision for London is realised in the years ahead these networks will help to facilitate the shifting of whole communities to low carbon and renewable heat provision, e.g. waste heat from power stations, heat generation with large biomass plants, residual heat from industrial processes, etc.

b) Combined Heat and Power (CHP)

Day to day application of policy

Where a development cannot immediately connect to an existing heat network but it contains sufficient scale and a suitable mix of building types/uses, developers are encouraged to install on site CHP as the lead heat source for the site heat network, and consider the potential for expansion of the system beyond its boundaries.

Ideal applications for CHP include very large mixed use developments where the load diversity smoothes the heat profile enabling CHP to provide a larger proportion of the heat demand. Suitable CHP applications for individual buildings include hotels, student accommodation and hospitals as they have large and constant demand for hot water throughout the year. In these types of developments, the use of CHP is encouraged where a connection to an off-site heat network is not available.

Sometimes surplus heat is available from a CHP installation i.e. heat that is not required for hot water or space heating. This can be used to drive an absorption chiller to provide cooling. The level of CO_2 savings achievable is influenced by a range of factors including the assumed coefficient of performance of the absorption chiller and the displaced electric chiller, the efficiencies of the CHP unit and the carbon intensity of the fuels consumed and displaced.

Outcomes

Implementation of policy in 2010 has secured the following outcomes in relation to CHP:

- A further 17 per cent CO_2 reduction over and above the baseline of a 2006 Building Regulations Part L compliant development (including unregulated energy),
- Projected annual CO_2 savings of 36,392 tonnes of CO_2. This is equivalent to retrofitting cavity wall insulation in approximately 56,500 existing semi detached homes.[16]
- Commitment to the installation of circa 28MW of CHP electrical capacity. This is equivalent to the energy capacity required to supply electricity to 56,000 homes. Bearing in mind the total CHP electrical capacity, including industry, in London is circa 198MW[17] this is a significant achievement.

[16] Figures derived from modelling conducted for the RE:NEW programme
[17] Combined heat and power in Scotland, Wales, Northern Ireland and the Regions of England in 2009. Energy Trends 2010

Observations

An increase in CHP capacity of 28MW$_e$ in one year is substantial (about 14 per cent of London's total existing capacity). It is an increase of 8 per cent relative to the 348MW$_e$ of CHP capacity currently installed in buildings in the UK[18].

Over 80 per cent of the proposed CHP capacity is planned for mixed use developments. Although mixed use developments only account for 40 per cent of the total number of developments, they account for a significantly higher proportion of the overall CHP capacity, thus demonstrating their suitability for CHP. Just under two thirds of this capacity is proposed for a small number of large mixed use developments, each containing over 900 dwellings.

While purely residential developments account for 9 per cent of applications, less than 1 per cent of capacity is proposed for these usually relatively small developments. In purely non-domestic developments, cumulatively hotels, student residences and healthcare buildings account for over half of the proposed CHP capacity.

While the total CHP electrical capacity is heavily influenced by a relatively small number of large schemes, Figure 3 below shows how most applications have electrical capacities between 100 and 500 kilowatts.

Often driven by requirements to reach Code for Sustainable Homes Level 4, a sizeable number of sub 100kW$_e$ CHP installations have been proposed for small residential led developments. Due to the complexities involved in successfully managing the operation of CHP, for example making the arrangements for selling exported electricity where it cannot be used on site, CHP applications for these small residential led developments are often not practical and, hence, are not pushed as part of the planning policy implementation process.

[18] Table 6C of the Digest of UK Energy Statistics 2010

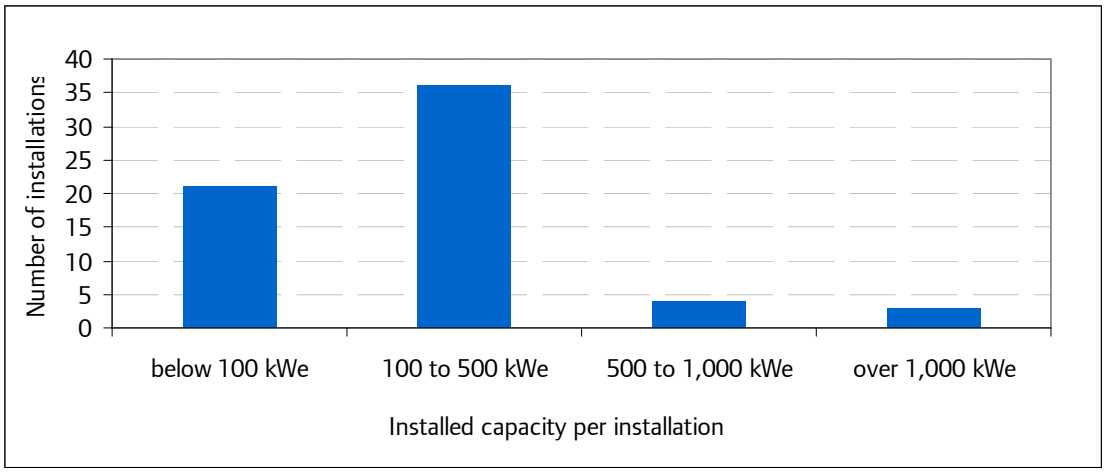

Figure 3: Breakdown of number of CHP installations by capacity

4.3 Be green: use renewables energy

Within the framework of the energy hierarchy, Policy 5.7 of the London Plan states that major development proposals should provide a reduction in CO_2 emissions through the use of onsite renewable energy generation, where feasible.

Day to day application of policy

As the lowest tier of the energy hierarchy, renewables should be investigated after energy efficiency and CHP (where applicable) have been considered. Generally, where developments are being supplied with heat from CHP, the potential for on-site renewable energy is often constrained. This is particularly the case in relation to renewable heat technologies which, if installed, would compete with CHP for the base heat load. In terms of renewable electricity technologies, small wind turbines in urban locations have been found not to perform as well as originally envisaged, so the renewable technology usually pursued in these cases is photovoltaic (PV) panels.

Where CHP is not proposed, a wider range of renewable technologies are employed including solar thermal panels, ground source heat pumps, biomass and air source heat pumps. The extent to which particular technologies are prioritised depends on the characteristics of the proposed development.

Outcomes

Implementation of policy in 2010 has secured the following outcomes in relation to renewables:

- A further 3 per cent CO_2 reduction over and above the baseline of a 2006 Building Regulations Part L compliant development (including unregulated energy).
- Projected annual CO_2 savings of 7,423 tonnes of CO_2.
- Commitments to the installation of approximately 22,570m^2 of photovoltaic panels equivalent to circa 2MW electrical capacity (e.g. comparable to the peak demand for a large hospital)

Observations

Table 3 below shows a breakdown of renewable and CHP technologies within 2010. This highlights the shift in the mix of technologies proposed from the previous LSBU report. This shift can be attributed to a range of reasons some of which are alluded to below.

Over 60 per cent of new developments proposed to use energy supplied by CHP. Of these developments, two thirds also planned to install PV panel arrays. This reflects the complementary nature of the two technologies. However, the use of roofs for other purposes, for example accommodating ventilation and cooling plant, often constrains the space available for installing PV panels, with subsequent small percentage CO_2 savings.

A small number of large schemes have proposed the possible use of biomass as the fuel for CHP in the future. The additional savings from using renewable fuels as opposed to natural gas have not been included in the above figures.

A few developments (e.g. Tesco developments) have proposed bio-fuel CHP engine installations. In these cases, evidence has been provided regarding the sustainable sourcing of the fuel, delivery/storage arrangements and the capability of the engine technology to use the fuel while maintaining successful long term operation. Information on the implications for local air quality was also provided.

In the order of 15 developments planned to include biomass boilers. The proportion of developments proposing biomass appears to have dropped compared to previous years, with air quality considerations often cited as a reason for not pursuing this renewable energy technology.

Since the use of air source heat pumps (ASHP) was allowed in 2009, a small number of residential developments, usually in lower density areas where heat networks would not be applicable, have proposed individual ASHPs for each dwelling.

	Biomass boilers	Heat pumps [1]	Photo-voltaics	Solar thermal	Wind	CHP [2]
Number of installations	9	20	66	11	0	68

Table 3: Breakdown of renewable and CHP technologies

[1] Includes air source and ground source heat pumps.

[2] Of the total number of CHP installation, the vast majority are based on natural gas fired CHP. A small number of large schemes have proposed the possible use of biomass as the fuel for CHP in the future.

5 Total CO_2 Savings

The main objective of the Climate Change Mitigation and Energy Polices in the London Plan is to reduce overall CO_2 emissions. Policy 5.2 of the London Plan sets targets for overall CO_2 emission reductions relative to building regulations.

Note: the targets in Policy 5.2 relate solely to reductions in regulated emissions, whereas the current London Plan relates savings to whole energy use i.e. including unregulated and regulated emissions.

Outcomes

Implementation of policy in 2010 has secured the following outcomes in relation to CO_2 savings:

- Average savings per development of 33 per cent over and above a baseline of a 2006 Building Regulations compliant development including unregulated energy,
- Approximate 50 per cent reduction in **regulated** CO_2 emissions beyond the minimum requirements of 2006 building regulations (i.e. excluding unregulated energy)[19],
- Overall projected annual savings of 71,813 tonnes of CO_2 (see table 3 below).
- Average projected savings per development of 641 tonnes of CO_2 per year.

Observations

Implementation of the London Plan energy policies in new developments referred to the GLA in 2010 resulted in substantial reductions in CO_2 emissions relative to the minimum regulatory requirements in force at that time i.e. the 2006 Building Regulations.

The average percentage savings secured per development in 2010 is about the same as that in the LSBU report between 2006 and 2009 i.e. a saving of 33 per cent per development including unregulated and regulated energy.

As can be seen from Table 3 below, CHP produces the biggest CO_2 savings of each of the elements of the energy hierarchy. It accounted for 50 per cent of all the projected CO_2 savings secured over the course of the year. Well over a third of the projected savings were due to energy efficiency. Renewables accounted for 10 per cent of the overall savings.

[19] Assuming 2/3 of the baseline carbon emissions are due to regulated energy

	Total Residual CO_2 emissions	Savings relative to 2006 Building Regulations (including unregulated)	
	(tCO_2/year)	**(tCO_2/year)**	**(per cent)**
Baseline	217,291		
Energy Efficiency	189,193	28,098	13 per cent
CHP	152,801	36,392	17 per cent
Renewables	145,378	7,423	3 per cent
Total	-	71,813	33 per cent

Table 3: CO_2 savings after each element of the energy hierarchy

The CO_2 savings from developments where CHP is unsuitable are substantially less than those with CHP. As such, developments able to obtain energy from CHP are more likely to exceed the CO_2 reduction targets in the London Plan.

Since the end of 2010 planning applications referred to the GLA are being assessed against the new 2010 Building Regulations. The 2010 regulations require a 25 per cent reduction in CO_2 emissions relative to 2006 regulations. The total CO_2 savings in 2010 over and above a baseline of a 2010 Building Regulations compliant development are approximately 33 per cent (excluding unregulated energy).

6 Conclusions

The following conclusions can be drawn from the analysis:

- For developments obtaining planning permission in 2010, continued implementation of the energy policies in the London Plan has been successful in significantly reducing their CO_2 emissions beyond the minimum regulatory requirements i.e. an average reduction of 33 per cent.
- Maximising energy efficiency measures remains the crucial first step in applying the energy hierarchy to ensure development's make the fullest contribution to minimising CO_2 emissions.
- Success in future proofing new developments to allow connection to off-site, area wide heat networks and, in larger, high density developments, establishing site wide heat networks utilising CHP, continues to support delivery of the Mayor's wider decentralised energy vision.
- CO_2 savings from on-site renewable energy accounts for a smaller proportion of the overall savings and often tends to be less significant in delivering overall savings targets than the first two elements of the energy hierarchy.

Appendix 1 – Battersea Power Station Case Study

- Redevelopment of site including refurbishment of Battersea Power Station for new mixed use development including approx 3,400 residential units, office/commercial space, retail, hotel and leisure and cultural uses.
- The Battersea Power Station development is the largest development within the Vauxhall Nine Elms Battersea Opportunity Area.
- A Planning Framework for the wider OA has been developed that included an energy masterplan. The key element of the OAPF energy proposals is the development of an area wide low carbon heat network (see figure 4 below).

As part of the negotiations for the BPS scheme, an energy centre of no less than 6,000m^2 was secured. The BPS heat requirements will be supplied using combined heat and power installed in this energy centre. As sufficient space has been secured, future plant could be installed to supply the heat requirement not only of the BPS but of other developments in the OA.

As part of the planning process, the applicant was also requested to safeguard the connection route to the Pimlico District Heating Undertaking to the north of the river and to detail how connection between both schemes could be achieved. The use of a site wide heat network powered with gas fired CHP would on its own achieve overall CO_2 savings of 20 per cent. Proposals exist for the use of bio fuel CHP. If this option is finally implemented, savings of 50 per cent may be achieved.

Independently, of the final technology chosen, the key strategic achievement has been to secure an energy centre with enough space to supply the wider area in the future. Fossil fuel based plant installed in the short term could be replaced by large renewable energy sourced plant allowing whole communities to benefit from zero carbon heat in the future.

Connection to the Pimlico DH scheme could result in a wider DH network which could eventually connect other buildings in the Victoria area up to the point of the existing Whitehall DH network which serves central Government buildings.

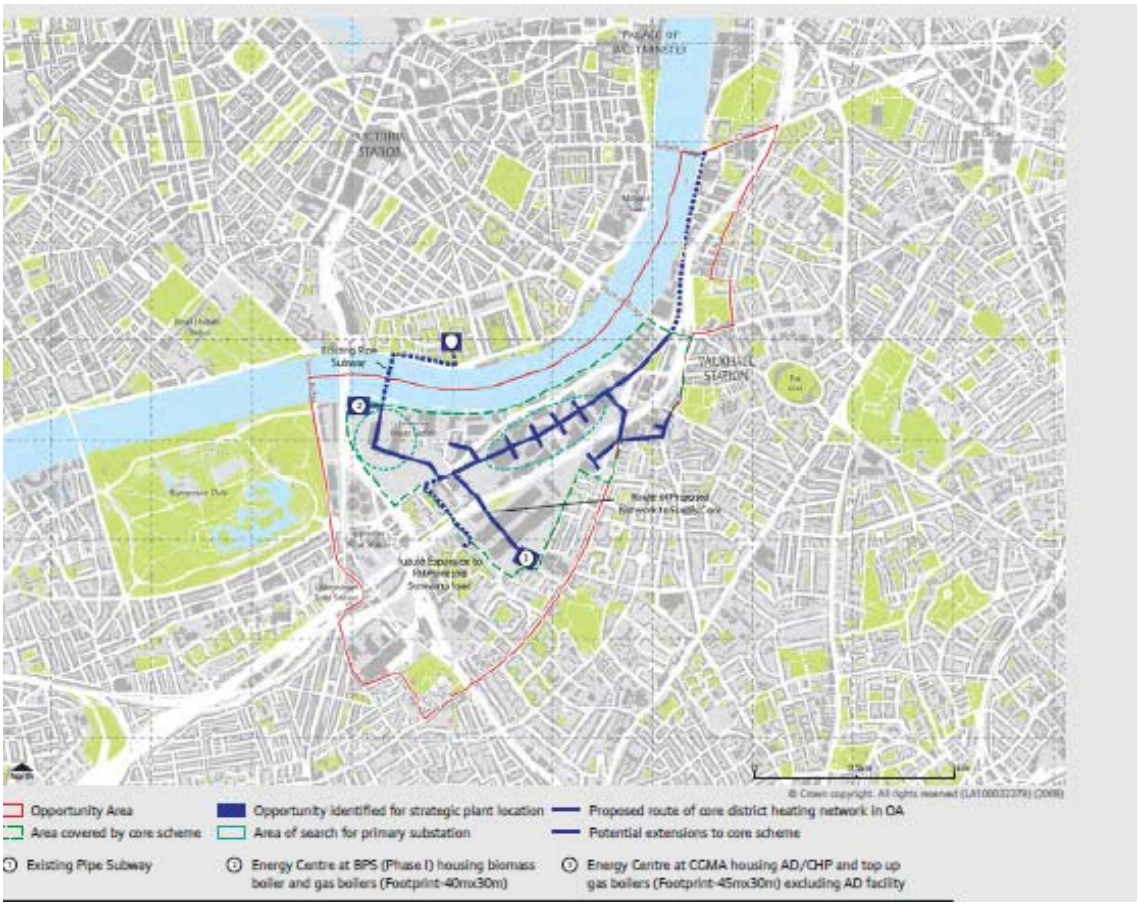

Figure 4: Conceptual map showing proposed heat network and energy centre locations for core OAPF