An initiative by

elementa

Member of Integral Group

GETTING TO ZERO

LONDON ENERGY TRANSFORMATION INITIATIVE:

PROPOSALS FOR ENERGY POLICY

Participants

Aaron Gillich, LSBU

Adam Mactavish, Currie & Brown

Amanda Stevenson, Capco

Barny Evans, WSP group

Ben Galuza, Elementa Consulting

Chris Botten, Better Buildings Partnership

Chris Twinn, Twinn Sustainability Innovation

Ciaran Garrick, Allies & Morrison

Clara Bagenal George, Elementa Consulting

Clare Murray, Levitt Bernstein

Debbie Hobbs, Legal & General

Ed Garrod, Elementa Consulting

Fraser Tooth, KiWi Power Ltd.

Helena Bradford, Tuffin Ferraby Taylor

Hero Bennett, Max Fordham

Jack Morris, Carbon Smart

Jennifer Juritz, David Morley Architects

Joe Baker, Haringey Council

Joe Jack Williams, Feilden Clegg Bradley

Jon Gregg, BuroHappold Engineering

Julie Godefroy, Julie Godefroy Sustainability

Lara Rushby, BY Development

Lindsey Malcolm, XCO_2

Lucy Townsend, BDP

Malcolm Hanna, National Energy Foundation

Marie-Louise Schembri, Hilson Moran

Michael Severn, Linkcity

Nick Kennedy, Elementa Consulting

Nuno Correia, XCO_2

Olivier Boennec, Elementa Consulting

Phil Draper, Broadgate Estates

Philip Gray, BDP

Richard Twinn, UKGBC

Robert Cohen, Verco

Ronan Leyden, Bioregional

Ronan Pigott, Elementa Consulting

Sabbir Sidat, WSP

Shaun Kelly, Peabody

Simon Ebbatson, Elementa Consulting

Stephen Gallacher, WSP

Stephen Kent, CBRE

Sun Min-Hong, UCL

Susie Diamond, Inkling

Syed Ahmed, Energy for London

Thomas Lefevre, Etude

Tessa Hurstwyn, The Buildings Hub

Tim Pryce, C40

Tom Dollard, Pollard Thomas Edwards

Tom Kordell, XCO_2

Tom Randall, Verco

Zack Gill, Fortem

A special thanks to the below, without their support this initiative would not have been able to be so successful.

Barny Evans, WSP group

Ben Galuza, Elementa Consulting

Chris Twinn, Independent

Colette Connolly, Elementa Consulting

David Barker, Elementa Consulting

Ed Garrod, Elementa Consulting

Joe-Jack Williams, Feilden Clegg Bradley Studios

Julie Godefroy, Independent

Kevin Hydes, Elementa Consulting

Michael Severn, Linkcity

Nathan Millar, Elementa Consulting

Nick Kennedy, Elementa Consulting

Philip Draper, Broadgate Estates

Richard Twinn, UKGBC

Ronan Leyden, Bioregional

Shaun Kelly, Peabody

Syed Ahmed, Energy for London

Tim Pryce, C40

Acknowledgements

Elementa Consulting have initiated and coordinated the London Energy Transformation Initiative and edited this summary report.

Report Authors

Clara Bagenal George - Elementa Consulting - Environmental Design Engineer
MEng Low Carbon Consultant

Clara initiated the process of collaboratively developing energy policy recommendations which began with publishing an article in the CIBSE Journal. She then coordinated the 'Fixing London's Broken Energy Policy' workshop and edited the summary report of the workshop - **Getting to Zero- developing policy recommendations for a zero emissions capital.** Since then she has coordinated the London Energy Transformation Initiative. She was recognised as the UKGBC Rising Star of 2017 partly in recognition of her work on energy policy and low energy building design, and is a Mayor's Design Advocate for Good Growth.

Adam Mactavish - Currie & Brown - Operations Director
MSc, BSc

Adam leads Currie & Brown Sustainability Services team. He specialises in helping policy makers, clients and occupiers to make the business case for sustainable buildings. Adam has led teams in the review of national, local and corporate building standards and also in providing practical support to a wide range of development projects.

Thomas Lefevre - Etude - Director
CEng MEI MSc CSH SAP HQM Assessor BREEAM AP Certified Passivhaus Designer

Thomas is a Sustainability Engineer and works on projects at all stages: design, construction and operation. He has also collaborated with the London Boroughs of Tower Hamlets and Islington on their carbon policy. Thomas is an environmental sustainability advisor to the University of Manchester, a member of the Islington Design Panel and a Built Environment Expert for the Design Council.

Amanda Stevenson - Capital & Counties Properties Plc - Head of Sustainability
MIEMA, MSc, BA (hons), BREEAM Assessor, FRSA

Amanda is Head of Sustainability for Capco, a London property company with two key assets focused on Earls Court and Covent Garden. Amanda is responsible for implementing the company's sustainability strategy, of which a key focus area is driving for improved energy efficiency in both existing buildings and in new developments.

Stephen Kent - CBRE - Sustainability Consultant
BA (Hons), BREEAM AP, Low Carbon Consultant

Stephen is a Sustainability Consultant with experience of a wide portfolio of projects at all stages of the building lifecycle. He specialises in working collaboratively with all elements of the industry to deliver commercially viable sustainable / low carbon solutions for today's environmental challenges.

CONTENTS

Participants 2

Acknowledgements 3

Foreword 6

Executive Summary 8

Introduction 10

Proposal 1 - Revise London Plan Energy Strategy Targets 12

Proposal 2 - District Energy Networks 14

Proposal 3 - Offset Payment 18

Proposal 4 - Energy Usage Disclosure 20

Other Strategic Objectives 22

Bringing It All Together 23

References 24

Appendix 25

- Working Group 1 Report
- Working Group 2 Report
- Working Group 3 Report
- Working Group 4 Report

Foreword

You are a participant in the biggest competition that humanity has ever faced, and it has a timer. In order to win this competition, leading global cities have embraced measured performance-based targets to benchmark carbon emissions of their existing infrastructure and have already begun phased implementation plans to continuously reduce emissions over time – all the way to zero emissions.[1] These cities are leading their communities and nations. It is imperative that London join their ranks to remain competitive. This requires that we move away from theoretical baselines towards actual in-use performance for the baseline and proposed case.

London is special in the UK, in that it has the authority to write its own energy policy, Chapter 5 in the London Plan. In essence it has the ability to be a shining light and lead not only the UK but the world. With the right policy measures in place, coupled with London's innovative mix of local councils, active communities, businesses, universities and research institutes, we have an opportunity like no other to find and rapidly test simple and creative solutions.

We must ask ourselves the question, 'what does an international, leading energy policy look like?' Fundamentally, policy can be a tide that raises all ships if it is: evidence based and outcome driven, it improves access and opportunity for all constituents, it increases choices and avenues for success, and discourages avenues that unequally serve the few to the disadvantage of the many.

Now, more than ever, this requires envisioning a future without regrets. A future when we can collectively tell our children and our grandchildren, 'we stood up to cynicism, perfectionism and procrastination – and together we took a courageous step toward a healthy, equitable and regenerative future for all Londoners.'

You have shown, as Londoners, through participating in the Getting to Zero Workshop in May (over 100 industry stakeholders in attendance) and this Summer's London Energy Transformation Initiative - LETI (targeted working groups based on the Workshop outcomes, comprising over 50 industry experts) that you are ready for this step change. The policy measures and recommendations in these reports are simple and actionable – and will lead to real, measured reductions in carbon emissions. Rewriting policies that are no longer delivering real measured energy and greenhouse gas emissions savings will require a lot of work.

It is now clear that climate change is upon us, not something that future generations will solve but something we must solve now. There is undeniable evidence, rooted in peer reviewed science, that humanity's overuse of natural resources and carbon based fuels will soon lead to irreversible climate change. The window of time to take actionable steps is steadily closing right now.

I have had the great fortune to work on leading projects, in North America and now the UK that have achieved and aim to achieve such accolades as the International Living Future Institute's Net Zero Energy Certification, which we are now able to deliver using off-the-shelf technology. And it is my personal belief, that we must throw our support behind these renewable and energy efficient solutions that are already at scale today. These technologies have the following key attributes: existing global supply chains, locally available to installers, low maintenance, and most importantly production is increasing and prices are falling. These technologies include: Solar photovoltaics, Large scale wind energy (on and off shore), Energy storage and batteries, Heat pumps (for heating and cooling).

Other exciting and interesting technologies are currently in development but we cannot wait for these to reach scale. We cannot base our decisions on a future promise, it must be based on present data. Remember, time is constantly working against us. Research funding through government agencies and philanthropic institutes will have a role to play for pilot projects to make the next big step change using advanced technologies that are not yet at scale. In regards to today's policies pertaining to the built environment, in the developed world, we must make a bold move toward all electric systems, with zero combustion.

Having read and reviewed the 4 proposals developed by the LETI Task Force and delivered to the Greater London Authority it is clear that these proposals will allow London to be a leading international city. These recommendations follow in this report. I strongly add my support and believe that these recommendations will open new pathways for low cost, low carbon solutions to be delivered with immediate effect by project delivery teams.

Following a successful meeting with the Greater London Authority on 15 September, 2017 at London City Hall, it is time to amplify our voices.

We are asking you to do 3 things to amplify your voice:

1. Add your personal signature

Click here to sign up to support the LETI proposals

2. Convince 10 Londoners (friends and family) to add their signature
3. Create a task force in your place of work and convince an individual in your company to sign up – and then request that your company throw its brand behind these recommendations

When the severe impacts of climate change are weighed in the balance, we will all still be alive and we'll be able to look back at this moment and say, 'I stood up to be counted, I called my friends, family and colleagues to join together so we would be heard.'

I, for one, strive to live a life without regrets. I want to keep moving forward learn from my mistakes and my peers and then let go of the past. When it comes to improving the lives of all people everywhere, it is my hope that we are never satisfied and that we always remember the power of collective, positive action.

I personally want to thank Clara Bagenal George for her leadership, collaborative approach and inspiration – without your positive attitude and diligence, none of these achievements and collective thinking from the industry would have been realised.

To a future without regrets,

Benjamin J. Galuza, PE, LEED AP, LBC Amb, Fitwel Amb,
BSc Mech Engineering, MSc Sustainable Design
Principal, of Elementa Consulting, Member of Integral Group


FAIL

Executive summary

Climate change prevention, adaptation and resilience are reputation defining issues for world class international cities. Leading cities have already begun tackling this challenge by revamping their energy and environmental policies[2345] to conserve resources whilst improving the quality of urban living.

The leading policies from around the world utilise measured real performance to track progress against targets[6]. To avoid the most devastating effects of climate change, all new buildings must operate at net zero carbon by 2030 and existing buildings by 2050[7]. This is in line with the Mayor's ambition for London to be a Net Zero Carbon city by 2050. As a global city, London has a responsibility to help lead the transition to a low carbon future.

Chapter 5 of London's spatial strategy, the London Plan, along with the Greater London Authority (GLA) guidance on preparing energy assessments identifies the purpose, content, and output of an energy strategy as part of the planning application for a new development. Only through the evolution and realignment of these two documents will London see a purposeful carbon reduction programme. Last year the Mayor set out in his document 'A City for all Londoners' that he will be looking to publish a revised London Plan for consultation in 2017. The London Energy Transformation Initiative (LETI) was established in order to input fresh thinking, based on practitioners' experience, to how a new London Plan's energy and climate policies could evolve.

LETI believes that current policy relating to carbon emissions in buildings in London will not deliver Net Zero Carbon for new buildings by 2030 and therefore recommends the following proposals be implemented in policy to get us on the right trajectory. We believe these proposals will help in the delivery of buildings that are more energy efficient, lower carbon and less expensive to occupy.

This report mainly covers new build domestic and non-domestic developments. It also covers data disclosure of existing non-domestic buildings and community and district heat systems.

It is important to acknowledge that large scale energy refurbishment works will need to be carried out to the majority of existing buildings, as well as ensuring that all new buildings are Net Zero Carbon to ensure that we limit global warming to 1.5°C.[8]

1. Revise London Plan Energy Strategy targets

- Update carbon factors and ensure that they are updated regularly in the future
- Introduce a kWh/m² energy use target
- Introduce a fabric energy efficiency target
- Introduce a demand response and peak demand reduction statement in planning applications
- Introduce an onsite renewable energy generation target
- Continue to declare predicted carbon emissions at planning stage

2. Heat Networks

- Require all networks to provide a strategic district energy local plan that includes a Zero Carbon transition plan
- Require all new developments to adopt the 'delivering low carbon heat' hierarchy

3. Offset Payments

- GLA to provide guidance on the implementation of the carbon offset policy
- Require annual reporting to GLA relating to offset funds by London boroughs
- Update offset payment calculation methodology to include total building energy use, regulated and unregulated
- Introduce staged payments
- Update the cost of offset

4. Energy use disclosure

- Require all new buildings to disclose in-use energy data
- The introduction of a 'Be Seen' step to the energy hierarchy
- Require data disclosure for all non-domestic buildings
- Require block level central systems efficiency, carbon intensity and energy cost disclosure for domestic buildings
- Require detailed building performance data
- Incentivise the energy efficient operation of buildings

Introduction

The London Energy Transformation Initiative (LETI) is a cross sector group of professionals who have come together to develop strategies around London's built environment, building consensus on acceptable recommendations needed to make London a Zero Carbon Emissions capital.

The voluntary group is made up of developers, engineers, housing association representatives, architects, planners, academics, sustainability professionals, contractors, and facilities managers, with support and input provided by the GLA and London boroughs. LETI was initiated and co-ordinated by Elementa Consulting. Clara Bagenal George and Ben Galuza led the initiative.

Click here for the first "Getting to Zero" report that summarises the outcomes of the initial workshop undertaken in May 2017

This report summarises the second phase of the LETI programme. Four working groups were set up to tackle key priorities from the workshop, each looking at a topic in greater detail and providing robust recommendations for implementation.

Working Groups

Working Group 1 - Data Disclosure led by Adam Mactavish (Currie&Brown)

Disclosure of energy consumption emerged as a priority from the workshop. To close the performance gap we need to create a positive feedback loop; monitoring the actual energy use of buildings, and using this data to inform design decisions for future projects in London.

Working Group 2 - Better Performance Metrics led by Thomas Lefevre (Etude)

The current London Plan specifies a minimum 35% operational carbon reduction, based on the Part L building regulations framework. There is concern that this metric cannot be checked once the building is in operation and that this approach can encourage the implementation of building and district scale strategies that will not deliver the actual required emissions reductions.

Working Group 3 - Decarbonising Energy and Heating led by Amanda Stevenson (Capco)

The operational greenhouse gas impact of buildings depends on their demand for energy and the carbon intensity of the energy supplied. The carbon intensity of the UK electricity grid continues to fall, and the greenhouse gas impact of electricity use will fall proportionally. Solutions to decarbonise heat supply need to be developed.

Working Group 4 - Delivery Mechanisms led by Steven Kent (CBRE)

The only way in which the potential energy and consequential carbon savings identified will be realised, is through the application of robust delivery mechanisms to drive the industry.

Full reports and names of all participants from each of the working groups are appended to this document.

The LETI Taskforce met twice monthly throughout the summer, to review and coordinate the development of the working groups and agree the LETI proposals. The aim of this document is to draw together the recommendations from the working groups and produce a set of recommendations for the GLA that industry can sign up to ahead of the Mayor's forthcoming consultation on the London Plan. The views in this document cannot be taken to represent the views of all members of LETI, however they do represent a high level consensus of members. We will endeavour to amass signatures by the broader London community to support these recommendations and illustrate their viability.

Click here to sign up to support the LETI proposals

London Environment strategy

This report also forms a response to the consultation of Chapter 6 - Climate change mitigation and energy of the Mayor's Draft London Environment strategy[9] that was published for consultation in August 2017.

1. Do you agree that the policies and proposals outlined will meet the Mayor's ambition to make London a zero carbon city by 2050? Is the proposed approach and pace realistic and achievable?

The Mayor outlines ambitions for London to be a zero carbon city by 2050. The strategy states that all new buildings will be zero carbon from 2019, and therefore no further milestones need to be set in place. However, the current definition of zero carbon, as set out in the current London Plan (at least 35% carbon emission reductions from a notional building to be achieved onsite, with an offset paid for the remaining regulated carbon emissions) remains far away from a position where buildings emit no carbon emissions. In order to have actual impact in the fight to slow and reverse climate change, it is recommended that the proposals set out in this document are implemented.

Proposals 1-3 of this report set out recommendations that address the following policies/proposals of the draft London Environment Strategy:

- Objective 6.1 Reducing carbon emissions of London's homes and workplaces while protecting the most vulnerable by tackling fuel poverty
- Policy 6.1.4 Ensure that new developments are zero carbon
- Proposal 6.1.4a Through the London Plan the Mayor will consider policies to support the delivery of zero carbon development
- Proposal 6.1.3b Supporting reducing emissions and energy within the commercial sector including through improved building management, energy efficiency and reporting
- Proposal 6.1.4b Support the design of effective methods to ensure the energy and carbon performance of new developments meet their agreed design standards

Proposal 4 of this report details methods that are recommended to achieve the policy's/proposals of the draft London environment strategy show below

- Objective 6.2 Develop clean and smart, integrated energy systems utilising local and renewable energy resources
- Policy 6.2.1 Delivering more decentralised energy in London
- Proposal 6.2.1a Help implement large scale decentralised and low carbon energy projects, including stimulating demand from the GLA group
- Policy 6.2.2 Planning for London's new smart energy infrastructure
- Proposal 6.2.2a Encourage the identification and planning of decentralised energy in priority areas
- Proposal 6.2.2c Investigate the potential for further smart, flexible energy system demonstrators and pilots where Londoners can help manage demand

Collaboration with the London Environmental Coordinators Forum (LECF)

The London Environmental Coordinators Forum (LECF) has conducted two surveys on the implementation of the London Plan's Carbon Reduction Standard (policy 5.2). LECF has been involved in the LETI working groups and members of LETI have taken part in the LECF study.

The LECF study 'A Review on Delivering London's Carbon Reduction Standards' puts forward recommendations to the GLA, many of which are aligned to the LETI proposals outlined in this report including: the introduction of the kWh/m^2 energy use metric and a fabric performance metric, energy use disclosure and ensuring that all developments and district heating schemes have a plan in place to deliver heat without the use of fossil fuels.

https://www.leti.london/

LETI Taskforce members and advisers

Michael Severn - Linkcity
Amanda Stevenson - Capco
Adam Mactavish - Currie & Brown
Chris Twinn - Twinn Sustainability Innovation
Thomas Lefevre - Etude
Syed Ahmed - Energy for London
Clara Bagenal George - Elementa Consulting
Stephen Kent – CBRE
Barny Evans - WSP group
Philip Draper - Broadgate Estates
Joe-Jack Williams – FCBS
Ronan Leyden - Bioregional
Ben Galuza - Elementa Consulting
Richard Twinn - UKGBC
Julie Godefroy - Julie Godefroy Sustainability
Tim Pryce - C40

LETI Proposal 1 - Revise London Plan Energy Strategy Targets

The current planning targets based on using Building Regulations Part L[10] compliance tools and percentage carbon emissions improvements over a notional building encourage a culture of false reporting and thus do not lead to best practice design and performance. Furthermore the planning stage carbon emission metrics cannot currently be measured once a building is in operation, which makes it impossible to quantify the impact of the planning policy, at a building scale or London-wide.[11]

1.1 Immediate Actions

Carbon Factor to be immediately updated in current policy

Currently the estimated CO_2 reductions of a development, reported in the planning submission energy strategy, is calculated using the carbon factors stated in building regulations (519 gCO_2/kWh for grid electricity[12]). This significantly overestimates the carbon emissions related to electricity in the development. This is due to the fact that the carbon intensity of the electricity grid is much lower than stated in building regulations, as the carbon intensity of the grid has reduced over the last 10 years. In 2016 the average UK electricity grid carbon factor was 254 gCO_2/kWh[13]- less than 50% of the value used in Part L of the Building Regulations.

In order to provide a robust CO_2 reduction estimation the use of the appropriate carbon factors is vital. The use of overestimated carbon factors for electricity has had significant knock-on consequences for the current business as usual approach in London. This has resulted in natural gas-fired Combined Heat and Power (CHP) still being installed as it is theoretically shown to reduce carbon emissions of the development in the energy strategy. The reality is that natural gas CHP is no longer always a net carbon reducer – thus not the solution to realise a zero carbon development or building.

It is proposed that the GLA lobby the government to make sure appropriate carbon factors are used for Building Regulations and updated regularly.

The GLA should publish guidance of what carbon factors are to be used, using current carbon factors and/or future carbon factors, and update this guidance regularly. The guidance should also include how these carbon factors should be used to compare a development's carbon emissions with those of the notional building. Delays in update of the carbon factors in Building Regulations should not jeopardise London's carbon pathway.

1.2 London Plan and London Environment Strategy proposals

It is proposed that the following be included in an energy strategy that is produced at the planning approval stage.

A. Predicted energy use

B. Fabric energy efficiency target

C. Demand response and peak demand reduction measures

D. Onsite renewable generation targets

E. Predicted carbon emissions

A. Predicted Energy Use

Putting in place a metric that is clear, simple to understand and readily comparable between buildings is fundamental. In line with building performance standards used internationally, a total energy consumption kWh/m^2 (energy use) metric is proposed. This includes both regulated and unregulated energy and will replace the current CO_2 emission compliance methodology.

A kWh/m^2 energy use metric is used in Toronto's zero emissions buildings framework[3], Vancouver's Zero Emissions Building Strategy[1], the Canadian Green Building Council's Zero carbon building standard[4] and the Passivhaus standard[14].

The kWh/m^2 metric provides a consistent indicator to be measured at each stage of the design process and ultimately and most importantly, during operation allowing identification of the most successful approaches.

Implementation will require realignment of the energy modelling approaches currently used, allowing for a single standardised approach being followed, with inbuilt flexibility to allow designers to follow different design approaches to demonstrate compliance.

Minimum energy use targets will be set for different building types based on published performance data, to be reviewed regularly. It is recommended that the energy use targets become tighter every few years, for continual site energy reductions to 2030, as we move towards a net zero carbon buildings and a zero carbon capital.

This means that the development will still have to show compliance with building regulations once it has been built, but will not have to meet a certain percentage carbon emission reduction compared to the notional building at planning stage.

B. Fabric Energy Efficiency Target

An efficient building fabric drastically reduces energy consumption, makes the building more resilient to weather extremes and decreases capital and maintenance expenditures on active building services. The risk of 'locked-in' inefficiency in the building fabric is more acute than that of building services – getting it right the first time is much less challenging than a 'fix it later' approach.

It is proposed to include a fabric energy efficiency target, which takes into consideration both heating and cooling. Examples include the Thermal Energy Demand Intensity[15] used in Toronto's zero emissions buildings framework, Vancouver's Zero Emissions Building Plan and the Canadian Green building council's Zero carbon building standard. Other examples include the Fabric Energy Efficiency Standard (FEES)[16] from the Zero Carbon Hub and the Overall Thermal Transfer Value (OTTV)[17] used in Hong Kong.

C. Demand response and peak demand reduction measures

As the electricity grid decarbonises, using electricity to generate heating and domestic hot water, (typically through heat pumps[18]) becomes a cost effective, energy efficient and low carbon solution, and it appears likely that more heating and domestic hot water will be delivered by electricity over time.

However, electric solutions (for heating and cooling) will put continued and growing pressure on the electricity grid, exacerbated further by the additional expansion requirements to meet the demand from the increase in electric vehicles.

This will drive the need to reduce peak requirements of electricity likely to be at its most acute during winter evenings when heating and vehicle charging is required (and output from solar renewable energy is low.) Without careful management of the electricity grid, there could be concerns over power blackouts.

Policy should look at ways to dis-incentivise consumption during peak periods or provide complementary systems onsite to meet potential peak demands – whether through battery storage, thermal storage and other smart demand management systems. The Energy Strategy for the development should clearly demonstrate how peaks will be reduced and what peak reducing measures will be incorporated as part of the building operation; this builds on paragraph 5.22a of the current London Plan. Appropriate guidance should be made available to designers to ensure desired outcomes.

This information should be used by the GLA to understand what peak reductions can be achieved for different types of development and mandatory peak reduction targets could be introduced in the future.

Where smart meters are installed time-of-use electricity tariffs that disincentives using electricity at peak times are available in the UK for both residential[19] and commercial developments[20] and are likely to become more widespread. The California energy code compliance methodology includes specific disincentives for energy used during peak grid demand periods through the use of Time Dependent Valuation (TDV) of Energy.[21]

D. Onsite renewable generation target

Currently, onsite energy renewable generation is encouraged through the *Be Green* section of the energy hierarchy that contributes to the carbon emission reductions compared to the notional building.

The kWh/m^2 energy usage target, proposed in this report, accounts for technologies that increase the efficiency of the systems (e.g. heat pumps), but does not include renewables that generate energy, for example solar photovoltaics (PV) that generate electricity or solar thermal panels that produce heat.

It is important that onsite generation is still encouraged. To ensure the solar potential of the roof is fully realised, it could be mandated to install solar renewable technologies on a certain percentage of roof area. This percentage area could be recommended by the GLA and set by boroughs, depending on whether the boroughs would like to focus on green roofs or solar energy generation (although the two are not mutually exclusive and indeed can have beneficial synergies, but requiring both may be seen as overly onerous in some cases).

E. Predicted Carbon Emissions

The merits of providing a simple, clear, and comparable energy performance metric have been demonstrated in the previous sections. However, meeting London's zero carbon target requires a reduction in emissions, therefore predicted carbon emission reductions still need to be reported, as has been the case for a number of years.

Therefore, it is proposed that while a kWh/m^2 become the main compliance metric for technical reasons, carbon emissions should still be reported in the Energy Strategy to allow progress to be tracked against climate change targets.

LETI Proposal 2 – District Energy Networks

Decarbonising heating and hot water in London is essential to meet the Mayor's carbon reduction goals, but it is not without its challenges. There are various schools of thought of what the future of heating will be: heat pumps, fuel cells or CHP fuelled by biogas, hydrogen or low carbon electricity and whether it will be delivered locally or using district systems.

The priority must therefore be to ensure that policy drives decision-making that delivers long term carbon emission reductions in a way that gives the designers flexibility to incorporate engineering strategies that are appropriate to the building use. Resilience should be encouraged with systems that are technology neutral that can adapt to future technologies and building uses.

District heating is often mentioned alongside combined heat and power (CHP). This is because many communal and district heating schemes used natural gas CHP, as it is an economical way of generating heat, once the benefits of generating electricity are taken into account; 10 years ago it was also a very low carbon method of generating heat and electricity. The carbon emissions savings potential of natural gas CHP has reduced over the last 10 years as the carbon emissions of the electricity grid have reduced. It is therefore important to be clear about the distinct concepts: district heating describes a situation where heat is generated at single, or multiple, locations and then distributed to multiple buildings, CHP is just one technology used to generate heat.

District heating itself can be beneficial because an energy centre, typically employed in such schemes, can be easily maintained and adapted to use lower carbon technologies as they become available (i.e. switching gas fired boilers or CHP to large scale heat pumps or fuel cells, utilising waste heat, switching the fuel from natural to biogas, and so on). Large scale thermal stores can also be incorporated in the energy centre, reducing peak heating demand. Furthermore, when district heating connects buildings with different demand patterns, peak heating demand is levelled out, increasing the efficiency of the system.

The ability to switch to more efficient or lower carbon fuel sources is key for heat networks to be part of the solution to delivering low carbon heat. This must be thought through from the beginning, with considerations including appropriate flow and return temperatures for the network. The temperature of a heat network matters because the systems in a building are designed according to the temperatures of the heat network. Therefore changing temperatures of the heat network will affect the output of heat emitters and other terminal devices, which may then need to be replaced.

Currently, developments are typically obliged to utilise a district (communal) heating solution on site – and/or connect to a district heating system where one is available (and has sufficient capacity to connect to), regardless of either the efficiency of the district heating system or whether or not connecting into the system will actually achieve a reduction in carbon emissions, compared with alternative on-site solutions. This is acting as a positive dis-incentive for project innovations focused on next-step reductions in thermal demand and developments that want to achieve zero combustion fossil fuel free heat on-site.

In practice some district and communal heating systems operate with low efficiencies[24] and at a high cost to the end user[25]. This is a problem as district heating networks are a natural monopoly.[26] The heat trust is a voluntary consumer protections scheme[27] that has been set up to address this. The London Heat Network Manual[28] and the CIBSE Heat Networks Code of Practice for the UK[29] give guidance on the design, construction, commissioning and operation of Heat Networks.

The appropriate selection of low carbon technologies for heat networks needs to also consider air quality implications and potential HFC fugitive emissions from heat pumps.

2.1 Options for Decarbonising Heating

Three options for delivering low carbon heat are described below:

A. Generating fossil fuel free heat onsite

Communal heating or heating of individual units for both residential and commercial blocks, for example through the use of local heat pumps or waste/secondary heat sources.

B. Connecting to an extra-low grade heat network

An extra low grade heat network delivers heat at a temperature of around 50 degrees (sometimes known as 4th generation district heating[30]). This means the hot water for the heat network can be generated by heat pumps (now or as a switch to heat pumps in the future), and the delivery losses are reduced compared to a network where heat is distributed at higher temperatures.

C. Connecting to an energy sharing network

When providing cooling to a building, heat is rejected by cooling and refrigeration plant, normally into atmosphere. Within central London this contributes to the London urban heat island (UHI) effect and is wasteful as this heat could potentially be used in buildings. In the medium term, this is expected to be classified as an environmental pollution discharge (as is already the case for discharges to rivers)[31]. Capturing and using waste heat to provide heating is referred to in this document as 'energy sharing', which is facilitated by an ambient loop. Heat is taken from, or rejected to, this loop depending on whether heat or coolth is needed, via connection heat pumps at either building or block level. The connection heat pumps can operate at a significantly higher Coefficient of Performance (CoP) connecting to the ambient loop rather than atmosphere. In this way energy is shared and the heating and cooling loads in the building are reduced. The building design emphasis then changes to smoothing out heat demands and surpluses so that they can be better managed by the network. This principle works towards 'Heat Autonomy' – where a development sources all of its thermal energy needs from waste on site.

Notes:

1. Where combustion occurs, mitigation measures must be put in place to prevent air quality degradation.

2. Heat pumps are categorised as fossil fuel free. The carbon emissions associated with electricity have significantly decreased over the last 10 years and will need to continue to decarbonise if we are to meet our climate change goals. When heating is provided through heat pumps it is seen as fossil fuel free as there are no fossil fuels combusted on-site and the technology has the potential to deliver fossil fuel free heating as the electricity grid moves towards a zero carbon future.

2.2 London Plan and London Environment Strategy Proposals

2.2.1 A District Energy Strategic Plan

This report proposes that all 'networks' and communal heating systems must have a local district energy strategic plan that addresses the following considerations:

Cost

- The commercial delivery of the plant must be detailed, including a platform for the transparent billing of customers
- The actual cost paid by the end user must not be more than the average household energy bill[32] for heating or an agreed pricing index for residential developments. Costs must include operation and maintenance of the heat network.

Interconnectivity

- The interconnectivity with other heat or energy sharing networks must be set out as part of area-wide energy and planning strategy of the heat network, to highlight the longer growth proposals for the network.
- Possible links should be explored to provide heat to existing buildings.

Zero Carbon Transition Plan

- A London Zero Carbon Transition Plan should be produced by the network, which shows how the heat networks will deliver fossil fuel free heat by 2030 with no negative impact on air quality. This transition plan must be updated and submitted to the GLA every 5 years and kept on a central database.
- All new heat networks must distribute low grade heat to facilitate use of fossil free fuel sources.
- Where a heat network already distributes heat at a higher temperature than 50^{0}C, it needs to be demonstrated how and when the network and buildings served will transition to a low grade heat approach (unless the heat produced is 100% waste heat).

Data Disclosure

- The energy network must publically report on annual efficiency, distribution losses, costs to users and actual carbon factors
- The Mayor should then use the information to publish online a London district heating report, outlining the prices typically paid by consumers and the efficiency of the district heating systems.

It is suggested that the district energy strategic plans be guided by local authority wide energy strategies that set out potential sources of waste heat, other heat networks, etc. These types of strategic plans have been used in Denmark[33]. The London Heat Map would be used as a basis and extended[34].

2.2.2 A 'Delivering Low Carbon Heat ' Hierarchy

This report proposes that the following 'delivering low carbon heat' hierarchy is adopted in the revised London Plan when designing the heating and cooling system for new buildings.

1. Reducing heating loads through implementation of:
    - Fabric energy efficiency, using the fabric energy efficiency target outlined in Proposal 1
    - Use of energy sharing loops where appropriate (see 2.1c)
2. Inclusion of energy storage for example batteries and thermal stores, thermal mass and demand response control measures for heat and electricity.
3. Connecting to an 'extra-low grade heat network' or 'energy sharing networks' in the area, which must adhere to the local district energy strategic plan described above. If the development achieves a low enough heating load and generates fossil fuel free heating, for example through the use of heat pumps, the development is not forced to connect to an energy network.
4. If there are no energy networks in the area, and the development is not fossil fuel free, a fossil fuel free plan must be proposed. This plan must be technology neutral so that the building can shift to 'fossil fuel free' without having to replace all of the services in the development.

Case Studies

District heating can utilise low carbon sources. A good example is the Drammen district heating scheme in Norway.[22] The heat was originally from a mixture of fossil fuel and biomass but a new system was designed to make a large heat pump the primary source. Currently 75% of the network heat is generated from ammonia heat pumps with 15% from biomass and 10% from gas/oil. This scheme is also a good example of the ability of a heat network to switch to low carbon heat sources; in this case 90% of the heat is fossil fuel free.

Another example of low carbon heat networks is district heating in the False Creek neighbourhood[23] in Vancouver with 70% of heat supplied by a sewage heat pump that recovers heat from untreated urban wastewater, with supplementary solar thermal.

LETI Proposal 3 - Offset Payment

Current London Plan policy specifies that all domestic new developments in London are to be 'zero carbon', with non domestic buildings following suit in 2019.

In the context of this policy zero carbon means a building must achieve a minimum carbon emission reduction of 35% improvement on national building regulation requirements on-site (using the compliance energy model methodology) and then the remaining regulated carbon emissions must be offset for 30 years. It is important to note that this policy does not deliver zero carbon buildings, which is why LETI is advocating for a change in energy policy, as per this report.

Each local planning authority is currently free to set their own carbon price (establishing an evidence base for the price applied); where they do not take this opportunity, a default price of £60/tonne of carbon for 30 years is applied.

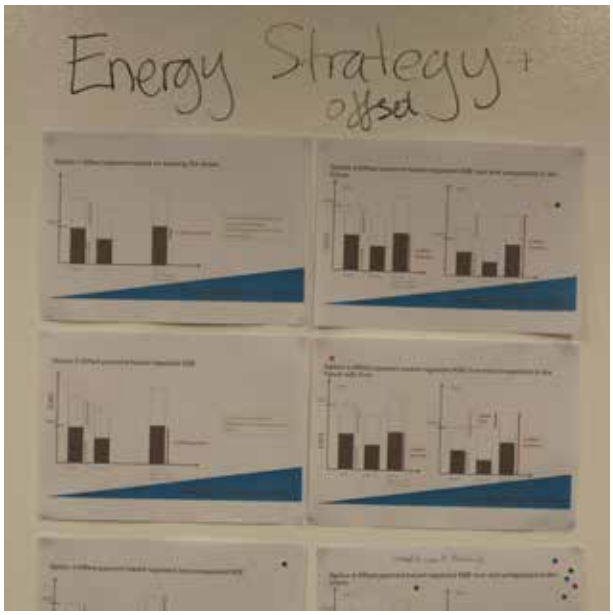
For example, if it is estimated that a development will produce 100 tonnes of carbon per year after all onsite carbon reduction solutions have been applied, then the developer must pay £180,000 to the local planning authority; this is called the 'carbon offset' and can be referred to as cash in lieu, as part of the section 106 agreement between the developer and planning authority. The local planning authority is required to ring fence any carbon offset payments, to fund the delivery of carbon reduction programmes in the borough.

A study undertaken by the London Environmental Coordinators Forum (LECF), 'A Review on Delivering London's Carbon Reduction Standards', has found that a third of London boroughs are not actively collecting carbon offset payments. Over £9m has been collected across 13 boroughs actively collecting carbon offset funds. Seven boroughs that actively enforce the policy and collect offsetting payments have spent the funds. The majority of the boroughs use the carbon price of £1,800 (i.e. £60 per ton over 30 years), however Haringey, Lewisham, Islington have the carbon costs of respectively £2,700, £3,466, and £900 (Islington includes regulated and unregulated emissions).[35]

The policy aims to incentivise developers to deliver high performance buildings, with onsite reduction through passive design, energy efficiency and generation via renewables. Unfortunately the policy is not delivering the improvements required; the reasons for this include:

- Compliance modelling methodology does not drive solutions that lead to realised (actual) carbon emissions savings
- Offset payment can be cheaper and easier than actually providing reductions as part of the development
- Local planning authorities are not necessarily spending the money generated through non-compliance payments on reducing carbon emissions
- Carbon emissions from unregulated energy are currently not included in the offset calculations (except in Islington); these form an increasingly large part of the carbon emissions from a development.

These items need to be addressed if we are to meet our climate change challenges.



3.1 Immediate Actions

3.1.1 Guidance provided by GLA on the implementation of the carbon offset policy

The GLA should provide guidance to the boroughs on the implementation of the carbon offset policy that specifies what the funding should be spent on and provides guidance on managing offset policy requirement in relation to development viability. Financial valuation has become an increasingly controversial component of the UK planning system. The research undertaken by the London Environmental Coordinators Forum states that the ability of developers to leverage pressure on councils to relax or remove planning obligations through valuation assessments can be so strong that it can force boroughs to abandon adopted policies[35]. Guidance is provided through the Homes for Londoners SPG[36] and the London Borough Development Viability Protocol[37] This guidance should be extended.

3.1.2 Carbon offset reporting by boroughs to GLA

Local planning authorities should publicly publish accessible annual reports to the GLA, outlining how funds generated from offset payments are used and how much energy and carbon has been saved as a result of this intervention. The local planning authority should spend the offset funds within 5 years, or the money would be transferred to the GLA for use on carbon reduction schemes or returned to the developer.

3.2 London Plan and London Environment Strategy Proposals

3.2.1 Offset payments based on regulated and unregulated energy consumption

The offset payment should be based on the new kWh/m^2 metric, as set out in Proposal 1; in line with the zero carbon emission ambition the offset payment should include regulated and unregulated energy consumption – providing a full representation of the future use of the development.

3.2.2 Staged payments

In providing a stage payment process for any required carbon offset it is proposed that 50% of the payment is to be paid at the time of the planning submission and 50% at the end of detailed design. This timing is to provide further incentive for design teams and contractor teams to make additional improvements leading to additional carbon reductions, reducing the detailed design payment.

3.2.3 Cost of offset

The cost of a tonne of carbon should be set at a level that incentivises on-site carbon emission reduction. This value should be reviewed to regularly ensure that this remains the case in the future, with the value of carbon reflecting changes in the price of technology. The research undertaken by the London Environmental Coordinators Forum recommends increasing the cost of offsetting to £3,600 per tonne (covering a 30 year period, compared to £1,800 currently)[38].

LETI Proposal 4 - Energy Usage Disclosure

Disclosure of building energy use is a central component underpinning progress in reducing carbon emissions and running costs. Disclosure brings many benefits, such as providing:

- Clear information on the real performance of buildings, thereby incentivising building providers (developers and landlords) to seek the best possible real performance rather than modelled compliance with regulations.
- Enhanced understanding of the way in which buildings use energy, enabling policy makers, designers and building managers to achieve better outcomes from their work.

In common with most of the UK, there is currently very little disclosure of property specific data on the operational energy consumption of buildings in London.

Although London Plan policies are in place to reduce carbon emissions (section 5.2 of the London Plan), there is currently no mechanism in place to record and make data available, allowing designers and owners to understand whether carbon emission reductions are realised. This needs both disclosure of energy data and a change in the metric of the energy strategy, so that there is a figure to be verified against.

The Better Buildings Partnership (BBP), has been promoting energy use disclosure for some time through the use of their Better Metering Toolkit[39] and their sustainability benchmarking toolkit. They have also set up The Real Estate Environmental Benchmark (REEB)[40] that can be used to compare the performance of buildings. BBP have also created a Green Lease toolkit to enable owners and occupiers to work together to reduce energy consumption.[41]

NABERS[42] is a national rating system in Australia based on measured energy performance of commercial buildings. It was introduced to create a design-for-performance culture. Since the introduction of NABERS in 2002, new office base buildings in Australia have reduced their energy consumption by 50%.[43]

4.1 London Plan and London Environment Strategy Proposals

4.1.1 New buildings

Energy usage for all new buildings should be disclosed annually in kWh/m^2, broken down by building type in the development, fuel type and by regulated and unregulated use. Energy consumption would be displayed transparently on an online platform along with the predicted energy performance in kWh/m^2 from the energy assessment. This platform can be used to show how developments and buildings are performing.

To make this process as easy as possible, it is recommended that a tool similar to the 'Portfolio Manager tool' used by the US Energy Star programme is used. This tool enables data to be shared by the utility thereby minimising the administrative burden or potential for data entry error.

A requirement for disclosure would be delivered through the Section 106 agreement to include an obligation for the developer and building owner to facilitate the collation of energy data for the first 5 years of occupancy – the length of a section 106 agreement. Once operational reporting is set up for each property, users would hopefully see merit in continuing to provide data and benchmark their performance after the 5-year section 106 period has expired.

A number of organisations have invested in the development of simple energy benchmarking tools including VolDEC[44] by the National Energy Foundation and others.

4.1.2 Existing buildings

- **Data disclosure for all non-domestic buildings**

The GLA currently has no powers to mandate building owners to display the operational energy use of their buildings (e.g. via a Display Energy Certificate, DEC). However, given the overarching importance of London's existing buildings in the achievement of our climate change goals it is recommended that the GLA urge Government to devolve the power to mandate the use of DECs. The data collected from the publication of DECs will provide a good evidence base for the performance of existing buildings, providing the industry with relevant performance data feedback, allowing new buildings to be designed with full feedback and knowledge of current operations. This level of transparency will provide better performance, strengthening the market for more energy efficient buildings.

Within the United States there are over 20 state or city authorities that mandate the use of the Energy Star reporting platform for buildings over a certain size threshold (typically 50-100,000 sqft or commercial space)[45].

To support the case for eventual mandating of energy use disclosure, it is recommended that the GLA develop the tool described in 4.1.1 (for new buildings) so that it can also accommodate information from existing buildings. This tool would demonstrate the practicality of disclosing this information, particularly if it can automatically capture utility data (once customer permission is granted).

In the absence of the ability to mandate disclosure, it is recommended that the GLA actively investigate how it could incentivise the use of a disclosure tool and thereby help to normalise the widespread disclosure of data.

There are many forms of possible incentives that might be considered ranging from acknowledgement (e.g. the right to use a specific branded logo) to other specific benefits or even financial incentives. Where the mechanism for disclosure is straightforward and there is growing availability of data in the market (including that for new buildings), it would be hoped that market forces would encourage disclosure and that the need for additional incentives would be relatively small.

Again, building on the availability of an energy benchmarking tool, the GLA could also investigate the development of an operational stock

model. This might, for example, combine data on buildings from the Valuation Office Agency (VOA) with energy data from utilities. The GLA would need to investigate the most effective way to secure utility data. One option might be providing a simplified approval mechanism whereby the GLA can streamline an approvals process through its existing relationships. A more radical approach might be for the GLA to request access to utility data to enable it to moderate business rates based on energy use intensity.

- **Block level central systems efficiency, carbon intensity and energy cost disclosure for domestic buildings**

Domestic buildings require a different approach. The priority for these developments relates to the performance of the centralised systems or district heating systems connecting the development. Block level data on central systems efficiency, carbon intensity, and energy cost to residents should be disclosed to the GLA and made available for the public.

The measures that are currently being implemented by industry – for example the rolling out of SMART meters – will support the provision of transparency and efficient energy use.

4.2 Detailed Building Performance Data

Incentives should be put in place to disclose enhanced monitoring data. This could be delivered through reduced carbon offset payments for new builds or a reduction in business rates/ council tax, or as a pre-requisite for access to retrofit funding. The detailed data could also be used by the GLA to track how developers are responding to its policies and the impacts on energy consumption and demand patterns.

Examples of detailed data disclosure are below

- Peak demand
- Detailed breakdown of energy use
- Ventilation rate
- Air quality
- Indoor temperature
- Air tightness measured over time

Where there are gaps in information, research should be supported into detailed building performance data. The completion of the agreed research studies should be facilitated through connections with sector experts and academia.

4.3 Incentivising the Energy Efficient Operation of Buildings

The amount of energy used by a building depends on the system that has been specified by the designers, how the systems have been installed and commissioned and maintained and how the occupiers use the building. We need to be rewarding building designers, developers, operators and occupants that reduce actual energy use in buildings.

Currently the GLA and the boroughs have influence over the energy performance of the building at the design stage, when planning permission is sought and can utilise section 106 agreements that can last up to 5 years from when the building is built.

The introduction of data disclosure will give all parties the opportunity and incentive to improve performance. This is through learning about the performance gaps, identifying which systems deliver the energy savings that were expected and through providing a greater trust in the reliability in estimating energy performance of buildings.

The current 'carbon offset' mechanism could be further developed to incentivise actual in-use energy performance reductions by linking the offset payments to verified in-use disclosed energy use; this has been explored by working group 1. The benefit of this approach is that it adapts a mechanism already in place and uses the current powers of the GLA. However, how much energy the building is using is not under direct control of the developer, it is influenced by the building operator and the building tenants. Further work is needed to establish how the responsibility for the energy use, and the offset fee, falls between the developer, building operator and tenants.

Another option is to envision that proposal 4.1.2 has been implemented and energy use data is disclosed for all buildings. Energy use data could then be compared to a benchmark kWh/m^2 that is related to the building type and age of construction. If developments that are designed using the site energy usage targets in proposal 1 end up exceeding the energy use targets that were set, retro-commissioning and / or financial penalties relating to business rates could be enforced.

In any case it is clear that rewards linked to low in-use energy consumption will need to be developed in the future, for both new and existing developments. It must be ensured that any penalties or requirements to improve the energy performance of buildings would need to be phased in appropriately to allow the industry time to learn.

Case Studies

Tokyo, Japaokyo

Large residential buildings must report their energy use under the city's mandatory Tenant Rating and Disclosure Program.[46]

Guangzhou, China

206 large public institutions are required to conduct energy audits and install efficiency upgrades to cut energy use by 20%. [47]

Vilnius, Lithuania

The city has created an interactive online energy map allowing residents to access energy performance data for 4,799 apartment blocks in the city. [48]

Boston, USA

In 2017 Boston's large and medium sized buildings were required to report their annual energy and water use.[49] A city energy map has been developed that tracks hourly energy use of 85,000 buildings. [50]

Other Strategic Objectives

GLA to Support Education Programs

It is proposed that the GLA should facilitate a programme to provide support to building owners and occupiers. Such a programme would provide information and methods of energy saving and energy consumption disclosure. Themes to include:

- Effective metering strategies and allocation of responsibility for energy use
- Energy management and identification of energy efficiency opportunities
- Lease and Memorandum of Understanding templates to assist landlords and occupiers collaborate effectively on energy and other aspects of building performance
- Tools for estimating and disclosing energy performance, leading to tools to support benchmarking and target setting

GLA to Lobby the Government

We advise the GLA to lobby the government on the following issues:

- Building regulations

The government should update the carbon emission factors in building regulations.

- Reducing the carbon emissions of existing buildings

The government should devolve greater powers to the Mayor around building energy efficiency, so that the GLA has the power to introduce mandatory energy audits and retro-commissioning for poorly performing existing buildings.

To address the need to provide incentives to retrofit existing buildings, working group 3 proposed that a minimum Energy Performance Certificate (EPC) rating of B shall be required by new lease agreements for existing buildings, in order to incentivise the improvement in energy performance of the existing building stock. See working group 3 report for more information. It was agreed by the LETI task force that this is an ambition to be worked towards in the future, progressing from F to B over an agreed period. This would require further powers to be devolved to the Mayor.

GLA to Support Retrofitting

A programme of retrofitting existing building stock is another key driver required as part of the route map to a Zero Carbon London. The GLA and Local Authorities should put in place a programme of retrofitting a set percentage of building stock every year to facilitate this. This would build on the existing RE: FIT programme.

The GLA needs to clarify its approach to major domestic and non-domestic refurbishments and whether major refurbishment projects should be designed to meet Part L new build requirements.

Bringing It All Together

Draft London Environment Strategy - Energy Hierarchy

The draft London Environment Strategy proposes to update the current wording of the energy hierarchy to the wording below.

1. Be Lean:

use less energy and manage demand during construction and operation

2. Be Clean:

exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly

3. Be Green:

generate, store and use renewable energy onsite

LETI - Energy Hierarchy

The LETI proposals outlined in this paper support this hierarchy, but it is proposed that it is delivered a different way. Rather than showing the percentage carbon emissions reductions compared to the notional building, it is proposed that developments show compliance using the metrics outlined in the report, as shown below. It is also proposed to include a 4th stage to the hierarchy; 'Be Seen'.

Be Lean

- Compliance with the fabric efficiency target

Be Clean

- Compliance with kWh/m^2 energy use target
- Follow the 'delivering low carbon heat' hierarchy
- Display peak reduction

Be Green

- Compliance with onsite renewable energy generation target

Be Seen

- New developments to publicly disclose their actual energy and carbon performance for 5 years

Become a LETI supporter

We are looking for organisations and individuals to sign up to become a LETI supporter to demonstrate to the GLA the level of industry support for the LETI proposals for energy policy

Click here to sign up to support the LETI proposals

References

1. http://www.c40.org/programmes/the-global-protocol-for-community-scale-greenhouse-gas-emission-inventories-gpc
2. Vancouver Zero Emission Building Strategy http://council.vancouver.ca/20160712/documents/rr2.pdf
3. British Columbia Step Code http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/reports/step_code_sciwg_report_final.pdf
4. Toronto's zero emissions buildings framework https://www1.toronto.ca/City%20Of%20Toronto/City%20Planning/Developing%20Toronto/Files/pdf/TGS/Zero%20Emissions%20Buildings%20Framework%20Report.pdf
5. CaGBC Zero Carbon Buildings Framework https://www.cagbc.org/cagbcdocs/zerocarbon/CaGBC_Zero_Carbon_Building_Standard_EN.pdf
6. National Australian Built Environment Rating System(NABERS) - https://nabers.gov.au/public/webpages/home.aspx
7. http://www.worldgbc.org/advancing-net-zero
8. http://www.c40.org/researches/deadline-2020
9. https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/draft-london-environment-strategy-have-your-say
10. Conservation of fuel and power: Approved Document L, 13 April 2016, DCLG
11. GLA non-domestic carbon dioxide emissions target: feasibility and viability study, Hoare Lea, DLA, G&T (2015)
12. Conservation of fuel and power: Approved Document L, DCLG, 2013 (with amendments 2016)
13. Digest of UK Energy Statistics, DUKES BEIS (2017)
14. http://www.passivhaus.org.uk/standard.jsp?id=122
15. City of Vancouver: Energy Modelling Guidelines. http://vancouver.ca/files/cov/energy-modelling-guidelines-v1.0.pdf
16. http://www.zerocarbonhub.org/zero-carbon-policy/fabric-energy-efficiency-standard
17. minisite.proj.hkedcity.net/hkiakit/getResources.html?id=4063
18. Examples include the Siemens Crystal building https://www.thecrystal.org/about/architecture-and-technology/ and One New Change https://www.cityoflondon.gov.uk/services/environment-and-planning/planning/design/sustainable-design/sustainable-design-case-studies/Pages/one-new-change.aspx
19. http://www.telegraph.co.uk/bills-and-utilities/gas-electric/new-electricity-tariff-offers-80pc-discount-night-time-usage/
20. https://britishbusinessenergy.co.uk/electricity/
21. www.ethree.com/wp-content/uploads/2017/01/TN212524_20160801T120224_2019_TDV_Methodology_Report_7222016.pdf
22. http://www.ehpa.org/technology/best-practices/large-heat-pumps/drammen-district-heating-norway/ - https://www.islington.gov.uk//~/media/sharepoint-lists/public-records/energyservices/information/adviceandinformation/20152016/20160107faqbunhillheatandpowerphaseiifinal
23. http://vancouver.ca/docs/planning/renewable-energy-neighbourhood-utility-factsheet.pdf
24. https://www.bre.co.uk/filelibrary/SAP/2016/CONSP-04---Distribution-loss-factors-for-heat-networks---V1_0.pdf
25. http://www.bbc.co.uk/news/business-39736010
26. http://www.staticwhich.co.uk/documents/pdf/turning-up-the-heat-getting-a-fair-deal-for-district-heating-users---which-report-399546.pdf
27. http://www.heattrust.org/index.php
28. https://www.london.gov.uk/sites/default/files/london_heat_map_manual_2014.pdf
29. http://www.cibse.org/knowledge/knowledge-items/detail?id=a0q200000090MYHAA2
30. https://www.london.gov.uk/decisions/dd1454-fourth-generation-district-heating-networks
31. www.gov.uk/government/uploads/system/uploads/attachment_data/file/296932/LIT_8383_dc522f.pdf
32. https://www.gov.uk/government/statistical-data-sets/annual-domestic-energy-price-statistics
33. http://www.ea-energianalyse.dk/papers/1414_strategic_energy_planning_denmark.pdf
34. https://www.london.gov.uk/what-we-do/environment/energy/london-heat-map/view-london-heat-map
35. A Review on Delivering London's Carbon Reduction Standards (2017)
36. https://www.london.gov.uk/sites/default/files/ah_viability_spg_201708152.pdf
37. https://www.towerhamlets.gov.uk/Documents/Economic-development/London_Borough_Viability_Protocol_November_2016.pdf
38. A Review on Delivering London's Carbon Reduction Standards (2017)
39. http://www.betterbuildingspartnership.co.uk/better-metering-toolkit
40. http://www.betterbuildingspartnership.co.uk/our-priorities/measuring-reporting/real-estate-environmental-benchmark
41. http://www.betterbuildingspartnership.co.uk/green-lease-toolkit
42. https://nabers.gov.au/public/webpages/home.aspx
43. http://www.betterbuildingspartnership.co.uk/node/360
44. https://voldec.com/
45. Energy Star, 2017 Benchmarking Programs and Policies Leveraging Energy Star®
46. http://solutions.sustainia.me/solutions/owners-and-renters-collaborate-to-reduce-energy-use/
47. http://solutions.sustainia.me/solutions/energy-audits-and-retrofits-mandated-for-large-public-buildings/
48. http://solutions.sustainia.me/solutions/online-tool-tracks-apartment-energy-use/
49. https://www.boston.gov/environment-and-energy/building-energy-reporting-and-disclosure-ordinance
50. http://solutions.sustainia.me/solutions/mapping-energy-use-to-boost-resilience/

Appendix

Working Group 1:

Data Disclosure

Working Group Leader - Adam Mactavish

1.0 Scope of the working group

Disclosure of information on a building's energy use is a central component underpinning progress in reducing its carbon emissions and running costs. Disclosure brings many benefits, including:

- **Clear information on the real performance of buildings, thereby incentivising building providers (developers and landlords) to seek the best possible real performance rather than modelled compliance with regulations.**
- **Enhanced understanding on the way in which buildings use energy enabling policy makers, designers and building managers to achieve better outcomes from their work.**

In common with most of the UK, there is currently very little disclosure of property specific data on the energy consumption of buildings in London.

The working group sought to identify practical and effective means by which the GLA could work to increase the disclosure of energy data to refocus attention on actual performance and on the actions that reduce energy use in practice. Currently the Mayor does not have the power to mandate the disclosure of energy data for an existing building, but there are still opportunities to encourage disclosure through effective design of policies for new buildings and by creatively utilising the Mayor's power to incentivise and recognise good practice. The group comprised architects, engineers, energy consultants, energy managers, investors and academics. It met once to identify priority recommendations, with further correspondence via email.

Working group members

Joe Jack Williams - Fielden Clegg Bradley
Debbie Hobbs - LGIM
Robert Cohen - Verco
Malcolm Hanna - National Energy Foundation
Phil Draper- Broadgate Estates
Sun Min-Hong - UCL
Ciaran Garrick - Allies & Morrison
Jack Morris - Carbon Smart
Chris Botton - Better Buildings Partnership (correspondence)
Ronan Pigott - Elementa Consulting (correspondence)
Tom Kordell - XCO_2 (correspondence)
Nuno Correia - XCO_2 (correspondence)

2.0 Key Challenges

In the UK, we spend ~£5Bn each year on new construction yet have very little good data on how building regulations impact actual energy performance. This information gap also applies to energy policies in the London Plan. In 2015, the London Plan's energy policies were projected to save 49,000 tonnes of CO_2e per year from c.£150M invested in low carbon infrastructure and technology[1]. However, we have no information on the actual energy or carbon saving achieved and so cannot say whether the £150M has been well spent.

Major landlords are already actively measuring and reporting the energy consumption of their portfolios through, for example, the Better Buildings Partnership or the Global Real Estate Sustainability Benchmark. However, information on individual buildings is not widely disclosed.

Studies of the actual performance of new buildings highlight a significant gap between the energy modelled during design and that measured in use, averaging 2.8 times higher in homes[2] and 3.8 times higher in non-domestic buildings[3]. Part of this discrepancy is a result of the omission of 'unregulated' energy in most energy modelling. However, a large part of the gap is the result of buildings being designed to achieve better theoretical performance, not better actual performance, and frequently in the failure to effectively commission and operate a building to its potential. The problem is particularly acute for air-conditioned buildings because the compliance regime does not require scrutiny of how HVAC systems and their controls will perform in operation. A well-maintained evidence base on buildings' actual energy use could ensure focus and investment is directed to where it can deliver most benefit.

Beyond a lack of knowledge to inform policy development and the resulting design decisions and expenditure, failure to disclose energy data risks limiting the market for energy efficient buildings. This is because an absence of reliable and comparable information on actual performance limits the ability of occupiers or investors to take energy performance into account when making decisions.

If developers and building owners knew that the energy performance of their buildings would be transparently available they would have a strong incentive to take steps to improve its efficiency. For example, by refocusing design, specification and management decisions around the actions needed to achieve energy efficiency in practice. This new focus on actual building performance would give building professionals the licence to invest in and use tools more accurately to predict actual energy performance, while also ensuring that sufficient emphasis is placed on building quality, commissioning and handover and in supporting its users and managers.

The London property market is complicated, not least in the roles and responsibilities of landlords and occupiers, both of whom have substantial responsibility over different elements of a buildings energy use. Currently, it is often the case that these different parties fail to communicate and collaborate effectively to improve building performance (including energy). The progressive introduction of data disclosure would give each party an incentive to improve their combined performance and would encourage the introduction of new arrangements to their joint advantage.

Where energy data disclosure programmes have been implemented internationally there is a strong correlation with improved building performance[4]. For example, in New York between 2010 and 2013, buildings participating in a benchmarking programme achieved energy savings of c.6% resulting in annual energy savings worth over $260M. Across the US, analysis of 35,000 benchmarked buildings showed energy savings of 7% over three years. Perhaps the best-known building rating initiative is the Australian NABERS scheme which has been shown to drive progressive improvements in both energy performance with reduced operating costs and higher returns to the building owners.

Put simply, energy data disclosure could trigger a change in mindset from compliance to excellence, rewarding those able to provide energy efficient space, while increasing the availability of high quality well managed buildings for London's businesses.

Recommendations

A. Mandate annual public disclosure of actual energy use by new developments over 1,000 m^2 GIA during their first five years of operation.
B. Commission an online platform which can support energy performance disclosure by new developments.
C. Seek additional powers to mandate disclosure of energy data for existing commercial buildings over 1,000 m^2 GIA.
D. Examine creatively how it can encourage or incentivise existing buildings to disclose their energy performance through the online platform.
E. Explore options to capitalise on existing data on building floor area, sectoral activities and actual energy use to automate energy performance disclosure and benchmarking.
F. Require that carbon offset payments for new buildings calculated at the design stage are adjusted according to the verified in use energy consumption in operation.

3.0 Policy Input Recommendations

Two outcomes are desired from data disclosure, each requires a different approach:

1. Greater **transparency** of overall building performance for all buildings - to encourage better performance and strengthen the market for efficient buildings.
2. Better **understanding** of the detailed performance of different building types - to enable and encourage operators, designers and policy makers to make better decisions (partially in response to the greater transparency of performance).

In return for the above disclosure, the GLA should offer support to landlords to assist them in improving performance, this could prove to be one of the best value uses of carbon offset payments.

Transparency

1 | Energy usage for all new buildings to be disclosed annually in kWh/m^2, broken down by building type in the development, fuel type, and by regulated and unregulated use

Energy consumption would be displayed transparently on an online platform along with the predicted energy performance in kWh/m^2 by fuel type from the energy assessment. This platform can then be used to show how developments and buildings are performing. A requirement for disclosure would be delivered through the Section 106 agreement which would include an obligation for the developer and building owner to facilitate the collation of energy data for the first 5 years of occupancy – the length of a section 106 agreement. Once operational reporting is set up for each property it would be hoped that users would see merit in continuing to provide data and benchmark their performance after the 5-year S106 period has expired.

To make this process as easy as possible, it is recommended that the section 106 agreement places an obligation on all new development owners to require their energy suppliers to upload at least monthly data (as measured by the development's utility meters) to the online platform. A comparable process is in place in several US States, such as California, which take advantage of the US Energy Star 'Portfolio Manager' online platform.

2 | The Mayor should seek powers to mandate the disclosure of energy performance for existing buildings

The GLA currently has no powers to mandate building owners to display the operational energy use of their buildings (eg via a Display Energy Certificate). However, given the overarching importance of London's existing buildings in the achievement of our climate change goals it is recommended that the GLA urge Government to devolve the power to mandate the use of DECs. The data collected from the publication of DECs will provide a good evidence base for the performance of existing buildings, providing the industry with relevant performance data, and allowing new buildings to be designed with full feedback and knowledge of current operations.

This level of transparency will strengthen the market for more energy efficient buildings. Within the United States there are very many (over 20) state or city authorities that mandate the use of the Energy Star reporting platform for buildings over a certain size threshold (typically 50-100,000 sqft of commercial space)[5].

3 | To support the case for eventual mandating of energy use disclosure, the GLA should develop the tool described for new buildings so that it can also accommodate information from existing buildings

This platform, particularly if it can automatically capture utility data (once customer permission is granted), would demonstrate the practicality of disclosing this information and reduce barriers to disclosure. Further, once new buildings have begun the process of reporting their energy use (see recommendation 1) then it would be hoped that they would not opt out of ongoing reporting and the growing number of reporting buildings might encourage their peers to participate in the system.

4 | In the absence of the ability to mandate disclosure, the GLA should actively investigate how it could incentivise the use of a reporting tool and thereby help to normalise the widespread disclosure of data

There are many forms of possible encouragement or incentives that might be considered or creatively developed, ranging from acknowledgement (e.g. the right to use a specific branded logo) through to other specific benefits or even financial incentives. Where the mechanism for disclosure is straightforward and there is growing availability of data in the market (including that for new buildings), it would be hoped that market forces would encourage disclosure and that the need for additional incentives would be relatively small.

5 | Consider the development of an automatic operational energy use model

An automated energy benchmarking tool might, for example, combine floor area and activity data on buildings from the VOA with energy data from utilities. The GLA would need to investigate creatively the most effective way to secure utility data. One option might be providing a simplified approval mechanism whereby the GLA can streamline an approvals process through its existing relationships. The GLA might also look at how access to energy supply data could underpin its potential role in supporting London's businesses to have secure energy supplies and in supporting London's buildings to take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which they are connected. Another approach might be for the GLA to request access to utility data, for example, to enable it to moderate business rates based on energy use intensity. Building on the availability of an automated energy benchmarking tool, the GLA could also investigate the development of an operational energy stock model for the whole of London.

6 | Block level data on plant efficiency, carbon intensity and cost should be disclosed for multi-family apartment blocks and heat networks

For existing domestic buildings, the priority would be the performance of developments with district heating or other centralised systems. For these buildings, it is recommended that block level data on central plant efficiency, its carbon intensity and cost is disclosed to GLA and made available to residents.

Other existing homes in London are less of a priority in relation to this strategy as it is hoped that SMART meter roll-out and associated commercial services would help to provide visibility of energy consumption to help encourage efficient energy use.

7 | Carbon offset payments for new buildings should be based on their verified in use energy consumption

For new buildings, a further incentive for better operational performance is recommended. One option is for GLA to join up their new policies for London with the BREEAM New Construction Verification Stage proposed for 2018[6], and alternative approaches are also developing. This approach would have multiple benefits including:

- Requiring disclosure of performance data against which design stage estimates can be assessed, this will help all parties to make more informed and better decisions.
- Encouraging developers to consider eventual performance rather than just compliance with design standards may change their approaches and increase levels of quality assurance.
- Incentivising the effective commissioning and operation of the building from the outset.

Various options are possible for payment of an offset based on the measured performance of regulated energy uses, including:

- Making a higher offset payment for 30 years use at the design stage based on an assumed performance gap, and then a single rebate / further payment after year 1 of >80% occupation if the actual impact is higher or lower.
- Making a payment for design stage regulated impact for 30 years use (as currently) with additional payments in each year of subsequent operation based on the actual (measured) impacts of the regulated loads above this predicted base (thereby incentivising improved energy management over time).

A stronger step would be to relate the current carbon offset payment to total operational energy use rather than the Part L calculation of regulated energy use under standard conditions. This would have the significant advantage of not requiring any extra measurements beyond the DEC or equivalent that a larger new building would require once it was in operation (recommendation 1). The group also considered that if it was right for new buildings to be asked to pay a carbon offset, in effect a license fee to add a new source of carbon emissions to London's baseline, then it was logical for such a fee to be based on the building's total emissions not some harder-to-meter sub-set related to the efficiency of the building's fabric and plant, which excludes the emissions arising from the activities of occupiers. With this approach, the options for payment of the offset include:

- Making a higher offset payment for 30 years use at the design stage based on an assumed performance gap PLUS unregulated energy use, and then a single rebate / further payment after year 1 of >80% occupation if the actual impact is higher or lower.
- Making a payment for design stage regulated impact for 30 years use (as currently) with additional payments in each year of subsequent operation based on total actual impacts above this base (thereby incentivising improved energy management over time).

Increasing the scope of the offset payment and / or the period over which it is paid would necessitate landlords and their occupiers working together to determine how they can minimise energy use and allocate costs effectively.

Established models are in operation to enable allocation of energy use between occupiers and landlords. These could be more widely applied in new buildings, providing a further return on the investment in their sub-metering and an incentive to ensure that the metering is correctly commissioned.

Although this option delivers significant benefits over an offset payment based on modelled regulated energy only, it is recognised that it would be a disruptive policy impacting the nature of relationships between developers, building owners and occupiers. Further, there could be practical challenges in recovering offset monies after the building is complete and, perhaps, has been sold. Nonetheless, the current situation whereby buildings are not achieving their potential is such that the GLA should aim to move to position where there is a closer link between the real emissions associated with a new project and the associated offset payment.

Understanding

It is also important to gather more detailed data on energy use in different buildings, to understand the breakdown of energy use by load and actual in use performance factors for different services, etc.

8 | Incentives should be offered for disclosure of detailed energy data, for example through reduced carbon offset payments and/or as a prerequisite for access to energy support

It is expected that any discount in offset payment would not need to be significant to prompt detailed data disclosure, but would encourage the relatively rapid accumulation of much more detailed data on in use energy for new buildings. The detailed data could also be used by GLA to track how developers are responding to their policies and the impacts on energy consumption and demand patterns. Such data could be valuable in helping to better predict the impact of future development on the London energy system.

9 | A limited portion of carbon offset revenues should be used each year for the analysis of detailed building performance data targeting key gaps in existing data

The detailed format of energy / carbon data to be provided was not discussed. Although models exist from Innovate UK's Building Performance Evaluation Programme (2010-2014).

Support

Many energy efficiency measures are among the most cost effective and rapid means of reducing carbon emissions and could therefore be suitable for expenditure of revenue from carbon offset payments.

10 | A programme of targeted support should be available to help building owners and occupiers to disclose and save energy

Support may also be needed to help the market respond to the impacts of increased disclosure. The GLA / boroughs could usefully provide targeted support mechanisms for market actors to assist the real estate sector in:

- Effective metering and allocation of responsibilities for energy use
- Energy management and identification of energy efficiency opportunities
- Lease / MoU templates that might be used to help landlords and occupiers collaborate effectively on energy and other aspects of building performance.
- Tools for efficiently estimating and / or disclosing energy performance together with training on their use

The Better Buildings Partnership and others have produced a wealth of guidance resources that could be used for these purposes. CIBSE Low Carbon Consultants are an example of skills and expertise human resources available to the property industry which might need to be broadened and deepened.

References

1.GLA, 2016. Energy Planning: Monitoring the implementation of London Plan energy policies in 2015. 2.Innovate UK, 2016. Building Performance Evaluation Programme: Findings from domestic projects. 3.Innovate UK, 2016. Building Performance Evaluation Programme: Findings from non-domestic projects. 4. For a good summary of current research see the Better Building Partnership blog on the topic. 5.Energy Star, 2017 Benchmarking Programs and Policies Leveraging Energy Star® 6.BREEAM Verification tackles the notorious performance gap between design stage predictions and operational energy use, but for regulated energy uses only (whole building HVAC, domestic hot water and general lighting)

Working Group 2:

New Performance Metrics For Better Outcomes

Working Group Leader - Thomas Lefevre

1.0 Scope of the working group

The scope of working group 2 was to discuss whether the current compliance metrics in the London Plan were fit for purpose or whether they are hindering the design and delivery of better performing buildings with lower CO_2 emissions. Members of the working group are architects, contractors, academics, engineers and energy specialists. We had two workshops to share our opinions and experiences and structure our recommendations.

The aim of this paper is to communicate to the Greater London Authority these key recommendations. Further work is required to refine them but they reflect the opinion of the working group as a whole. They should be read in conjunction with the recommendations of the working groups on data disclosure and decarbonised heat & energy.

Working group members

Nuno Correia- XCO_2
Susie Diamond - Inkling
Tom Dollard - Pollard Thomas Edwards
Simon Ebbatson - Elementa Consulting
Stephen Gallacher- WSP
Zack Gill - Fortem
Aaron Gillich - LSBU
Julie Godefroy - Julie Godefroy Sustainability
Philip Gray - BDP
Tessa Hurstwyn -The Buildings Hub
Jennifer Juritz - David Morley Architects
Ronan Leyden - Bioregional
Clare Murray - Levitt Bernstein
Tom Randall - Verco
Lucy Townsend - BDP

2.0 Key Challenges

London needs to reduce its CO_2 emissions by at least 80% by 2050 compared to 1990 levels[1]. This means reducing CO_2 emissions associated with buildings (new and existing) to nearly zero[2]. The challenge is significant but it is not too late. It also seems more achievable when it is broken down into the three areas of action recommended by the Committee on Climate Change: **Reducing energy demand**, decarbonising heat and decarbonising electricity.

The latest C40 cities publication 'Deadline 2020'[3] reports the efforts made to date by the largest cities in the world to curb their carbon emissions and most importantly those required in the (immediate) future. The name of the report and its main objective are to highlight that emissions should be set on the right tracks by 2020 in order to achieve the 2050 objectives. Unfortunately, London is not on the right track[4]. The current performance metrics are part of the problem, as already identified by industry consultation in a 2015 report commissioned by the GLA[5]. Among other issues:

- Planning and design carbon metrics cannot be measured once a building is in operation, which makes it impossible to quantify the impact of planning policy, at a building scale or London-wide.
- The current planning targets based on using Part L compliance tools encourage a culture of false reporting and do not lead to best practice design and performance.
- The performance gap is an issue across all stages of design, construction and operation.

This working group has developed recommendations to tackle these. We acknowledge that in order to design and build better buildings which are truly energy efficient and low/zero carbon a step change is required. Although the planning system cannot solve all problems, we believe that a significant number of decisions are made and directions set pre-planning. Therefore, there is a lot which can be done through the London Plan to accelerate the delivery of low/zero carbon buildings. We now need to focus on outcomes which are clear, transparent and can accompany a building from concept design to construction through to operation.

Better buildings are possible. First and foremost, these buildings will be fit for purpose, comfortable, healthy, resilient and affordable to run. They will have a reduced energy demand through much improved fabric energy efficiency, reduced energy wastage[6], access to a low carbon heating system, the ability to generate zero carbon electricity, and they will manage/store energy better. In addition to reducing the energy use and carbon emissions of the buildings themselves, this comprehensive set of measures will also support further decarbonisation of the electricity grid.

Recommendations

1. London needs better performance metrics
2. A kWh/m^2 target for a better outcome
3. Fabric energy efficiency is a priority
4. CO_2 matters
5. Beyond energy and carbon: better buildings for Londoners

3.0 Policy Input Recommendations

Recommendation 1 | London needs better performance metrics

We are in favour of metrics based on actual performance in operation to help us deliver better buildings. Focusing on a metric which can be adopted from day one, checked throughout design/construction and then verified during operation would help us to go much further on the journey towards a better understanding and delivery of energy efficient buildings. It would help avoid the limitations associated with a single Part L metric which does not correlate to any operational targets, tends to be relevant mainly during the design phase and cannot be used to report against actual carbon reduction targets at a borough level. Tying up design, construction and operation is a significant advantage of this approach, along with the ability to require a specific level of energy performance. The zero carbon target often hides a variety of approaches and levels of ambitions. **Our recommendation is therefore for the GLA to stop using Part L based targets and adopt a better performance metric.**

The most successful and efficient energy standards are all based on clear, transparent and absolute performance metrics[7]: Passivhaus, AECB Silver, NABERS[8], DEC A rating performance contracts, Better Buildings Partnership Landlord Energy Rating[9]. These standards lead to energy use which can be up to 3 times lower. They could be rewarded, if not mandated. A number of London boroughs are already putting a particular focus on performance[10].

Recommendation 2 | A kWh/m^2 target for a better outcome

Keeping things simple and transparent is very important. A 'kWh/m^2 (energy use) metric' has the advantage of being a very basic metric which can easily be compared against post occupancy surveys of comparable buildings[11] during the briefing stage, be evaluated during the design, be checked during operation and be translated into both carbon and financial costs and savings throughout the process[12]. In the context of the current and future decarbonisation of the grid, it also helps to make it independent from this effect and therefore simplify the monitoring and comparison during the lifetime of a building and its design/construction.

The whole working group was unanimous in agreeing that Part L assessments are not sufficient to design and deliver low carbon buildings. The current Part L process can sometimes act against best practice design and lead to worse outcomes. **We recommend focusing on energy performance and using 'kWh/m^2' as the metric.** This would require evolving the current energy modelling approach towards better energy assessment / performance modelling. However, methodologies and tools are available (e.g. CIBSE TM54, PHPP) and better energy modelling is essential to ensure that design and construction choices are well informed.

A more challenging question is how ambitious these energy targets ought to be for various building types as a similar approach to the 'one size fits all' 35% improvement over Part L 2013' target could not apply. The GLA should set specific and ambitious levels of performance based on published performance data[13] for new buildings and major refurbishments and update them annually[14]. This would help to gradually educate the project teams about 'actual energy performance' and build over time a culture of energy performance and disclosure/transparency in the industry, and develop the associated skills, jobs and products. Finally, a 'kWh/m^2' indicator measured consistently at each stage and during operation (associated with a mandatory disclosure of data – refer to recommendations from Working Group 1) would be very helpful at identifying the most successful approaches and eradicate over time the most damaging.

Recommendation 3 | Fabric energy efficiency is a priority

There is a growing consensus that the building fabric represents a significant and essential opportunity to save energy and carbon for the lifetime of a building and improve its resilience. The risk of 'locking in' inefficiency/high emissions is also much higher with the building fabric than its services and 'getting it right' is much less challenging than 'fixing it' later. LPAs also have more control over this aspect than heat and electricity decarbonisation.

A growing number of projects currently adopt a 'fabric first approach' following the same principles and quality assurance methodology as Passivhaus, without necessarily achieving the Passivhaus level of performance. Additional guidance on what 'fabric first' actually means and which level of quality assurance would be necessary to ensure that it is delivered could also be beneficial.

We would recommend introducing a 'Fabric energy efficiency metric' and its associated target(s) to push the 'be lean' step of the energy hierarchy as much as possible and gradually shift projects from business as usual to good and best practice without leading to unintended consequences (e.g. overheating). The GLA should review and analyse the merits of several examples of fabric energy efficiency metrics, including:

- The 'Fabric Energy Efficiency Standard' metric calculated by SAP with enhanced and absolute levels of performance as per the Zero Carbon Hub's definition of 'Zero Carbon'[15]: It was introduced to ensure that zero carbon homes have an energy efficient building fabric. 'Full' and 'interim' performance levels have already been adopted in key areas in London[16].
- The space heating/cooling demand assessed by PHPP (15kWh/m^2 for Passivhaus, 40kWh/m^2 for AECB Silver) is also a very effective fabric energy efficiency metric.
- A resilience target with the building having to maintain certain temperature conditions for a period of time with no electricity or heat input, both in summer and winter. This is by proxy an energy efficiency target. The ability of the fabric to reduce peak demand (heat/electricity) is also likely to become more important in the future.

Recommendation 4 | CO_2 matters

Climate change mitigation requires carbon emission reductions and therefore carbon needs to be reported. For this reason, a carbon budget is being set at a national level and we are likely to see carbon budgets and predictions being set at a more local level in the near future[17]. A carbon metric would make it easier to correlate the strategic efforts and the performance achieved by a particular building. **We recommend that carbon emissions are reported accurately but we do not think that carbon should be the key performance driver.**

There is also an issue with the way CO_2 emissions are currently calculated in the context of rapid electricity grid decarbonisation. The latest official estimate of carbon intensity of the UK electricity grid (254 gCO_2/kWh[18]) is more than half the value used within Part L (519 gCO_2/kWh). This could be addressed by the GLA publishing guidance on carbon factors on a regular basis (at least every 2-3 years) based on published data[19]. There is also an argument for the

use of a variable electricity carbon factor[20]. A consistent calculation methodology is critical.

In summary, we are in favour of requiring applicants to predict the estimated operational CO_2 emissions of the building with the energy target as the key performance metric. Reporting of actual total carbon emissions (pre- and post-planning as well as during operation) should also be mandated to make it easier for local authorities to track progress against their climate change targets.

Recommendation 5 | Beyond energy and carbon: better buildings for Londoners

Recommendations 1-4 focus on energy performance and carbon reduction. However, we all acknowledge that these necessary ambitions should not come at the expense of people: health, comfort[21], quality, maintenance are all very important dimensions[22]. **The Greater London Authority, together with the building industry, needs to continue to develop performance metrics and require designers, developers and contractors to start reporting against these parameters to build a database of performance against which future targets could be set.**

As far as fuel poverty and/or more generally the affordability of heat and energy are concerned, we would recommend that the GLA undertakes research on how future energy bills can be quantified[23] [24]at an early stage to ensure that lower carbon solutions do not lead to unaffordable energy bills and therefore colder homes.

Indoor air quality and its link to ventilation and airtightness should also be better monitored. There is much evidence that low-carbon and very low energy buildings can deliver similar, and even better indoor air quality and comfort[25], but this relies on good design and implementation.

And also…

This working group could have decided to cover other metrics (e.g. embodied carbon[26], energy storage, peak shaving, etc.) but agreed that the areas covered by our five recommendations are the most critical and hence should be focused on as a priority.

More work for everyone, but no effect on viability

We acknowledge that implementing these recommendations will require more work from the applicants, the GLA and the LPAs. However, applicants often highlight the risks and costs associated with inconsistent approaches and an unfair and uncertain playing field, which do not reward the best energy and carbon reduction strategies. We think a clear trajectory and transparent targets would be welcome. We therefore do not believe that our recommendations would affect viability and, most importantly, we think that it is the right approach to set London on the right tracks to achieve its carbon reduction targets. We cannot effect change without effort.

References

1. Delivering London's Energy Future, Greater London Authority (2011)
2. Progress Reports to Parliament, Committee on Climate Change (2017), Draft London Environment Strategy (2017)
3. Deadline 2020 – How cities will meet the Paris Agreement, C40 Cities (2016)
4. Cutting carbon in London - 2015 update, GLA Environment Committee (2015). For example, 2013 figures show a carbon reduction for homes of 7%, against 15% that had been expected by then.
5. GLA non-domestic carbon dioxide emissions target: feasibility and viability study, Hoare Lea, DLA, G&T (2015)
6. E.g. simultaneous heating and cooling, out of hours use
7. Zero emissions building framework, the City of Toronto (2017)
8. NABERS - www.nabers.gov.au
9.www.betterbuildingspartnership.co.uk/our-priorities/measuring-reporting/landlord-energy-rating
10. Green Performance Plan required by the London Borough of Islington
11.Building Performance Evaluation, Innovate UK – an improvement of published performance should be sought
12. Setting a 'kWh/m2' as a single 'primary energy' figure is possible and has its merits. However, the conversions required (and the associated conversion factors) could introduce a level of unhelpful complexity, and ultimately be subject to the same compromises and limitations as carbon factors.
13. Building Data Exchange, Carbon Buzz, DECs, etc.
14. The GLA provided a comparable level of guidance in 2004 with the Renewable Energy Toolkit. POE data published each year and design targets submitted for planning could help inform the annual updates.
15. Zero carbon homes and nearly zero energy buildings, Zero Carbon Hub (2014)
16. For example 39 kWh/m2/yr for apartment blocks on the Queen Elizabeth Olympic Park, LLDC
17. Planning for Climate Change? TCPA (2016)
18. DUKES (2017)
19. Drax website (http://electricinsights.co.uk/#/dashboard?_k=tzhiwt) and National Grid Future Energy Scenarios (2017)
20. An investigation into the use of temporal factors for CO2 emissions accounting in buildings, WSP (2017)
21. E.g. access to daylight, mitigated overheating risk
22. Post Occupancy Evaluations (POEs) should be encouraged to ensure quality buildings and continuous improvement
23. Funded by Innovate UK, the LENDERS project set out to create a stronger link between energy costs, affordability and mortgage borrowing. A 'Fuel Bill Cost Calculator' is available on the project website.
24. Affordable temperature metric approach adopted by Fortem
25.Promoting healthy and energy efficient buildings in the European Union, JRC, European Commission (2016)
26. Please refer to Decarbonising construction, including embodied carbon in the London Plan, UKGBC (2017)

Working Group 3:

Decarbonising Energy & Heat
Working Group Leader - Amanda Stevenson

1.0 Scope of the Working Group

Significant progress has been made to decarbonise the electricity grid. However, the gas grid has not been as quick to adopt low carbon sources. Current planning policy and building regulations are not reflective of these changes in nationwide infrastructure and are not supporting the need for differing approaches to adopting appropriate technologies and innovation.

Existing homes and workplaces account for 78% of carbon dioxide emissions in London and, with 80% of these buildings expected to be in operation in 2050, it is vital that steps are taken to adapt existing buildings using fossil fuels to building using low and ultimately zero carbon technologies, in order to achieve the long-term goal of significantly reducing carbon emissions. [1]

Current planning policy is considered as restrictive, for example the prevalent, sometimes enforced, application of CHP, is potentially tying buildings into relatively poor long-term carbon performance from the outset of operation and is stifling the opportunity for incorporating engineering strategies that are appropriate to the building use, the scale of a project and future developments.

Working group members

Barny Evans - WSP
Nick Kennedy - Elementa Consulting
Sabbir Sidat - WSP
Lindsey Malcolm - XCO_2
Helena Bradford - Tuffin Ferraby Taylor
Marie-Louise Schembri - Hilson Moran
Ciaran Garrick - Allies and Morrison
Jon Gregg - BuroHappold Engineering
Fraser Tooth - KiWi Power Ltd
Lara Rushby - BY Development

2.0 Key Challenges

- Current prescriptive methods of demonstrating policy compliance lead to a design vs. operation performance gap (e.g. legacy carbon factors, rigidity of modelling software, tick-box exercise for heat networks).
- It is expected that as London continues to grow and energy demand increases, there will be a greater need for decentralised energy storage capacity (both electric and thermal) and demand response including 'peak shaving measures', however this isn't currently explicit in policy or incentivised.
- Current approach to offsetting carbon emissions is not robust or clear enough and is ring-fencing emission reduction projects to within London. It is argued that this lack of clarity suppresses meaningful implementation.
- Current energy policy doesn't incentivise building operators to share operational energy performance to support continual improvement in design.
- Building regulations represent minimum standards; by linking policy to building regulations can lead a performance gap and does not incentivise higher performing buildings.
- End-user costs associated with district heating provisions are unregulated and the benefits associated with the decentralised approach are not frequently shared.
- District heating standards currently often restrict end-users from using solar hot water or energy efficiency measures to reduce their demand and bills through high standing charges or clauses. Often users are also not allowed to disconnect from the network irrespective of DHN heating costs.
- Strategies to capture waste heat are not being fully considered within design. Greater policy direction is needed to drive identification of capturing waste heat including life cycle cost.
- Current policy guidance (e.g. GLA Energy Planning) recommends ways to provide robust evidence for demonstrating technical and financial feasibility. However, high-quality evidence is disregarded if the conclusion does not align with policy priorities to deliver an arguably superseded strategic agenda.
- There is a growing demand for cooling, particularly in homes in London and how this will be provided should be considered.
- Air pollution is not adequately considered in assessments for decarbonising heat.
- The capital cost of energy efficiency and renewable generation measures are commonly paid by a different group to the end user of the energy, so that capital cost is not linked to the consequent savings in running costs (e.g. housing agency and tenants). This does not incentivise capital spending or ensuring that actual performance matches predictions. A linkage method could also enable external investment energy retrofits, unlocking capital from major investors like banks.
- A greater emphasis on energy-efficient design is leading to buildings with lower energy and heating demands. This shift in demand should be considered more holistically alongside issues such as overheating.

Recommendations

1. All new developments to be Net Zero Energy
2. A minimum EPC of B for existing buildings where new leases are agreed
3. Heat Network Development
4. Use of fossil fuels
5. Impact on infrastructure
6. Carbon factor

2.0 Priorities

- Set aspirational stretch performance targets and let industry respond.
- Encourage innovation and be technology and distribution neutral.
- Create a transparent, credible and realistic approach to demonstrate meeting of performance targets (for example TM54 for analysing operational energy use, recognised techno-economic optimisation software, BCIS Standardised Method of Life Cycle Costing, etc.).
- Give equal importance to technical, economic and commercial models for short and long term feasibility of energy solutions.

- Policy to reward:
  - » In-use performance and link end users with design to enhance financial viability of zero carbon buildings
  - » Reduction of impact on infrastructure to reduce need for extra network capacity
  - » Use of positive demand management to increase resilience and support wider uptake of renewables
  - » Sharing of performance data

- Greater clarity of heat network provisions that considers;
  - » Removal of requirement for new developments to connect to or create a heat network
  - » An end to any gas-fired CHP-led networks
  - » Long-term investment intentions
  - » Design quality
  - » Decarbonisation potential (over a building's lifecycle)
  - » Sharing of waste heat
  - » End users should be better informed of implications of supply from heat network and if possible, freedom for end user to switch systems

- Greater clarity of electrical network provisions, specifically:
  - » Local infrastructural pinch points
  - » Local high demand users / opportunities for sharing
  - » Grid capacity (to limit rise in grid voltage)
  - » Local battery storage capacity

3.0 Policy Input Recommendations

Recommendation 1 | All new developments to be Net Zero Energy

- Base assumption that all new buildings are net zero energy (NZE). (We recognise that NZE in London may not be initially feasible, therefore the offsetting of any deficit by developing renewable sources of energy outside London may become a widely adopted approach.) Where possible, heating should not be provided from fossil fuels (either through boilers or CHP).

Recommendation 2 | A route map for existing buildings to achieve a minimum EPC rating of B where new leases are agreed

- In order to incentivise the improvement of the energy performance of existing building stock a route map should be established that sets a trajectory for requiring a minimum EPC B rating for existing buildings where new leases are agreed. Recognising the importance of London's listed buildings, where it is not possible to improve the energy performance of listed buildings to the minimum EPC standard, it will be possible to offset the differential between the target and the actual EPC with off-site renewable sources.

Recommendation 3 | Heat Network Development

- Where a heat network is proposed, it must be demonstrated that the cost to the end user is no more than national pricing or an agreed pricing index. Performance efficiency and actual carbon factors must be reported annually and costs must include operation and maintenance of the heat network.

- Where a heat network is proposed that will distribute high-grade heat (greater than 50^{0}C), it shall be required to demonstrate how the network and buildings served will transition to a low-grade heat approach.

- The use of heat rejection equipment to be de-incentivised and only permissible where it can be shown that there are no users within a 10-year period. It follows that the use of heat pumps to provide heat and coolth while coupled with low-grade heat networks should be incentivised.

Recommendation 4 | Fossil Fuel Free

- In order to improve air quality and reduce dependence on fossil fuels all new developments should be combustion free, with no negative impact on local air quality.
- Where combustion is required for a specific use, e.g. high hot water demand, the developer shall be required to demonstrate how the building will transition to a combustion-free approach, for example demonstrating that heating can be met by low-grade heat sources.
- It may be viable to restrict gas usage for domestic hot water usage only.
- Tighten air quality targets.

Recommendation 5 | Incentivise Smart Demand-Response Measures

Incentives to incorporate smart demand-response measures (and on-site storage where feasible) and to lessen the extent of infrastructure required to encourage longer-term thinking on the draws upon national infrastructure.

Recommendation 6 | Support Innovation

- In order to promote innovation, technological approaches to achieve compliance are to be agnostic with industry producing more rigorous and adaptable compliance and analysis tools, e.g. CIBSE, BRE, BCIS etc. These tools should allow flexibility for designers to demonstrate compliance and economic feasibility for a wide range of technologies that can be appropriately assessed by the relevant authority, while also supporting design vs. operational analysis.
- Policy to incentivise the actual performance of a building meeting that predicted at planning stages. (DEC vs design EPC – financial penalties)

Recommendation 7 | Evaluate Carbon Factors

- Provide agreed carbon factors that are regularly reviewed (e.g. every 2 years) to recognise decarbonisation and for a fair benchmark to promote design innovation in buildings and new neighbourhoods. It is recognised that Part L does not encourage innovative design due to emission factors that are out of date, therefore the policy of having regularly reviewed updated carbon factors will address this shortcoming.
- Provide agreed future carbon factors that are regularly reviewed to recognise decarbonisation at a later stage in the building life cycle and promote design innovation in buildings and new neighbourhoods.

References

1.https://www.london.gov.uk/what-we-do/environment/energy/energy-buildings

Working Group 4:

Delivery Mechanisms
Working Group Leader - Stephen Kent

1.0 Scope of the working group

In the draft London Environment Strategy[1], the Mayor has reaffirmed London's position as being a lead in tackling climate change, setting a zero-carbon target for London by 2050. The Mayor has stated that London will require economy-wide decarbonisation with energy infrastructure that is diverse low carbon and local, a grid that is smarter able to balance energy demand with homes and workplaces that are highly insulated and energy efficient.

The purpose of working group 4 is to produce evidence based recommendations for delivering energy policy that strives towards a zero-carbon future for London but remains technology neutral and flexible enough to drive innovation.

This working group is a cross sector effort made up of architects, engineers, developers, energy specialists and local authority policy makers. The recommendations proposed in this section have been developed from 3 workshops and correspondence with the GLA. Further investigation is needed to refine them but the intent and the potential benefits are there, indicating how London can become the zero-carbon capital it intends to be.

Working group members

Debbie Hobbs – Legal & General
Hero Bennett – Max Fordham
Joe Baker – Haringey Council
Chris Twinn – Twinn Sustainability Innovation
Michael Severn – Linkcity
Olivier Boennec – Elementa Consulting
Richard Twinn – UKGBC
Syed Ahmed – Energy for London

2.0 Key Challenges

London's current approach to energy policy is prescriptive, focusing unduly on the 'Be Clean' aspect of the Energy Strategy. Developers and their design teams are encouraged to focus upon the methods for achieving policy compliance rather than seeking to deliver tangible reduced energy demands. Furthermore, under the current system, there is no responsibility on anyone to save energy, instead only to demonstrate a compliance method. Using this current compliance method that does not relate to final measured energy use has encouraged the Performance Gap. If London is to reduce its GHG emissions from 38 megatons to zero carbon by 2050 this must change. As outlined previously by Working Group 2 and the Committee on Climate Change, London energy policy needs a greater level of flexibility aimed at supporting innovation to first and foremost reduce energy demand for both new and existing buildings as then on decarbonising the supply of heat and electricity.

London's energy policy does not consider the carbon emissions associated with unregulated energy and only focuses upon the regulated emissions. If this was to continue London would not be net zero carbon by 2050. Similarly, it allows climate resilience to become a future additional energy liability. These worsen the performance gap and lead to greater insecurity and instability for London's future energy infrastructure. The carbon offsetting fund in its current format is also a barrier to London's Zero Carbon aspirations. A report by the GLA in 2016 found that of the 22 LPAs who collect carbon offsetting funds only 7 have used the funds citing S106 complications and a lack of identified projects to make use of the offset funding[2].

In summary, the issues are:

- Prescriptive energy policy stifling building demand reduction innovation.
- The performance gap is not being addressed with unregulated emissions being neglected.
- The carbon offsetting fund is not being utilised to its full potential. A lack of transparency exists and funds are not being used.

This working group has drawn on a considerable experience base to develop recommendations to address these issues. Further investigations are anticipated to quantify both the metrics and the implementation timing of the step change required.

A net zero carbon London is possible. To deliver this, the policy mechanisms need to be fit for purpose, encouraging demand reduction innovation, reducing the performance gap and leading to tangible benefits. London's buildings will have a reduced energy demand, greater energy efficiency and thermal performance. London's grid will be low carbon, diverse and smarter.

Recommendations

1. A more informed energy strategy - a kWh/m^2/yr metric alongside climate resilience adaptability
2. A supportive long term vision for district energy networks
3. A carbon offsetting fund that transparently saves carbon
4. Work towards measured whole building based policies

3.0 Policy Input Recommendations

Recommendation 1 | A more informed energy strategy

Proposal: A kWh/m²/yr target that accounts for regulated and unregulated energy should be adopted. Alongside a climate resilience target and an on-site site-area related generation target. The facility to automatically monitor and transmit actual energy use shall be provided. There should be a defined timetable for all these to be introduced during the next London Plan.

Implementation: The submitted project energy strategy will detail the design specifications and procurement measures adopted to deliver:

1. The kWh/m²/yr target.
2. Comfortable temperatures (whilst all HVAC systems are turned off for a period of 4 hours during peak winter and summer with today's climate.
3. Comfortable temperatures using 2050 climate data using installed and retrofitted measures that do not add energy consumption.
4. Automatic monitoring and transmission of actual energy use
5. The onsite generation target related to site area.

Justification: Adopting the kWh/m²/yr target keeps things simple and transparent, allowing for a comparison between the design and operational performance of a building. This allows pressure on designers' predictions to use realistic expectations of energy use, and on building operators to reconcile operating regime against intended. To be simple it is anticipated that all building types will be clustered under no more than half a dozen different kWh/m²/yr targets (due to the prediction errors being greater the difference between types). Building uses and not HVAC solutions shall define different targets – hence avoiding the current ideocracies brought about by an air conditioned office allowed as much as double that of a natural ventilated office.

The climate resilience targets ensure that buildings will be fit for purpose during their lifetime and are ready for the anticipated climate when London will be net zero carbon, addressing the overheating risk for the building's occupants and the problem of coolth poverty. It also anticipates the electrical grid peak demand management issues already being seen in warmer countries worldwide. This same policy objective provides a none proscriptive means to incentivise improved building fabric performance and less dependence on HVAC energy consuming measures.

The onsite generation target will assist with the diversification of the energy mix and the decarbonisation of the grid. This policy should be a kWh/m²/yr target related to the site area, not on the building energy use. Hence, large roof area shed buildings fully use their roof area potential to become major exporters, offsetting the limited roof area on high rise sites.

Outcome: These measures represent the first steps leading to net zero carbon buildings by 2050 that are comfortable to live / work in with reduced heating and cooling demands and high performing building fabric, with a diverse energy mix for London.

Stretch targets: All the targets shall have improvement timescales built into the London Plan period to provide transparency on future direction. This is to allow industry innovators to become pathfinders prior to wider implementation. The targets could be expanded to include the following measures implemented with the introduction of the five-year London carbon budget[1].

a. Requiring all buildings to be fossil fuel free or with a fossil fuel free plan by 2030. By: 1st Budget Period (2018-22)

b. Heat emission to atmosphere to be defined as a pollutant, hence promoting energy sharing loops to reduce heat rejection, encourage heat networks and reduce the heat island effect. By: 1st Budget Period (2018-22)

c. Demand response measures and peak shaving to reduce electrical power consumption during periods of maximum demand. By 2nd Budget Period (2023-27)

Recommendation 2 | A supportive district energy network

Proposal: District energy networks will be supported where there is a Local District Energy Strategic Plan in place. District energy should not be supported where there is no plan in place and alternative solutions demonstrate better than policy energy consumption.

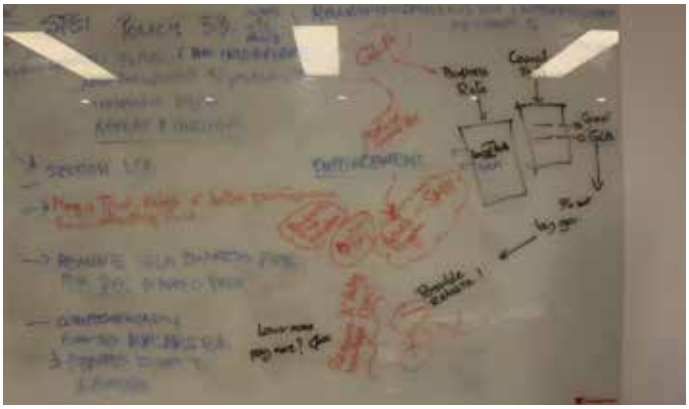
Implementation: To establish the Local District Energy Strategic Plan, a GLA District Energy Delivery Board should be established. The aim of the board would be to create strategy plans that address:

1. The commercial delivery of the plant including the platform for the transparent billing of customers
2. The interconnectivity around and across sites to grow the area network
3. Transparent appraisal and commercial plan
4. Going beyond the 'red line boundary' of new developments and link into existing buildings, complete with the associated transparent commercial plan
5. Have a fossil fuel free by 2030 plan

Where there is no plan in place alternative solutions for delivering low demand buildings that exceed the kWh/m² target and achieve compliance with the climate resilience and onsite generation targets should be given approval.

Justification: Current London Plan policy is prescriptive enforcing the application of CHP, tying buildings into relatively poor carbon performance and stifling the opportunity for innovation to deliver low carbon energy efficient buildings. Without a plan to decarbonise the district energy networks It is also potentially locking customers into increased energy bills. Furthermore, the current London Heat Map is disjointed and doesn't outline the full potential for unlocking existing buildings. The longer-term vision for heat networks is required. This is expected to encompass:

- Zero combustion and zero fossil fuels
- Heat emitted to atmosphere defined and penalized as a pollutant (creating UHI, adverse local micro-climates, increased cooling energy needs, etc.). Hence all AC rejects its heat via heat pump into the heat network
- Heat network migrating to a low temperature heat sharing network and a source for all thermal energy needs via building connection heat pumps
- All building heat / cooling demands to be smoothed using on-



site thermal-storage / thermal-mass / etc. across 24-hours to better balance heat / cooling demands on the network

- System / HVAC electrical demands to be 24hr site smoothed using time-of-day tariffs to reduce heat-pump peak loads on the electrical grid
- Incentivise new-build to achieve site 'Heat-Autonomy' i.e.: using building heat sources (e.g. people and processes) to avoid any heat import or export

Outcome: There would be a zero-emissions transition plan in place. Customers would not be faced with increasing energy bills as the future carbon intensity of gas is considered. There would be a transparent comparison between the differences in the prices customers are paying for the supply of heat. The strategic plans would also help to maximise the full potential of the network. LPAs would understand the heat loads around new developments, allowing for connections into the wider community, ensuring that benefits are not just realised for new developments.

Recommendation 3 | A carbon offsetting fund that transparently saves carbon

Proposal: A carbon offsetting fund that is based on offsetting regulated and unregulated emissions to achieve net zero energy. Including unregulated energy puts an incentive on reducing oversized and inappropriate occupier HVAC. The carbon offsetting fund is based upon design data at the planning stage, with yearly reports issued by LPAs to confirm how the money has been spent and the resulting carbon emissions that have been offset from the investments. LPAs will have 5 years to spend the funds or the money is passed onto the GLA or returned to the developer. A performance metric will also be added to the carbon offsetting fund so that the offset price changes depending upon how much energy has been reduced on site.

Implementation: This will be implemented through the same S106 obligations as the current carbon offsetting fund.

Justification: The standard GLA carbon offsetting fund is based on regulated energy only, which needs to be amended if London is to achieve a net zero carbon target by 2050. LPAs are currently facing barriers to spend the money, with lawsuits in place for developers trying to recoup the funds. NABERS experience indicated that unregulated energy can be included given time for the industry to understand implications and evolve accordingly with the right incentives in place.

Outcomes: The carbon offsetting fund will offset both regulated and unregulated energy as standard moving London towards being net zero carbon by 2050. As LPAs will be required to publish annual Carbon Offsetting reports and spend the money within 5 years, the benefits from the carbon offsetting fund will be transparent and tangible, improving confidence in energy policy.

Stretch target: The carbon offsetting price could be doubled every time a new London Carbon Budget is introduced to increase the focus on the delivery of onsite measures to reduce energy demand.

Recommendation 4 | Work Towards Occupancy Based Policy

Proposal: S106 obligations to include an obligation for the developer and building owner to facilitate the collation and transmission of energy data for the first 5 years of occupancy.

Implementation: This will be implemented through the S106 Agreement.

Justification: There is a lack of data on the performance of existing buildings, with a gap between the expected design performance and the actual operational performance of a building.

Outcome: By collating this data, design methodologies can start to incorporate the data and improve the accuracy of modelling to reflect real time performance. It can also highlight potential barriers as to why the expected building performance and the actual operational performance differ. The naming and shaming of the worst performers may encourage building users to take energy conservation more seriously.

Stretch target: Implement an occupational performance rating scheme that rates the environmental performance of existing buildings. This could be stretched further to mandate that existing buildings must achieve a rating. To deliver such a scheme the Australian NABERS scheme could be adopted with the DEC rating of a building being used to confirm the building's performance.

Alternatively, BREEAM In Use could be mandated for all relevant building types.

References

1. Mayor of London, (2017), London Environment Strategy, URL: https://www.london.gov.uk/sites/default/files/les_full_version.pdf
2. NEF Research Report commissioned by the GLA, (2016), Review of Carbon Offsetting Approaches in London, URL: https://www.london.gov.uk/sites/default/files/gla_cof_approaches_study_final_report_july_2016.pdf

Elementa

80 Cheapside
London
EC2V 6EE
T +44(0)203 697 9300

Unit 1, Library Avenue
Harwell
Oxfordshire
OX11 0SG
T +44(0)1235 820300

Clara Bagenal George
clara.bg@elementaconsulting.com

London, UK
Oxford, UK
San Francisco, CA
Oakland, CA
San Jose, CA
Los Angeles, CA
Seattle, WA
Washington, DC
Richmond, VA
Austin, TX
Atlanta, GA
Vancouver, BC
Calgary, AB
Toronto, ON
Kelowna, BC
Sydney, AU

www.elementaconsulting.com

@elementa_uk

elementa
Member of Integral Group