

1 March 2018

Dear Mr Kahn

## Arup Building Engineering London Response to draft London Plan

This response represents the views of a number of engineers in Arup's Building Engineering team in London, so focuses specifically on building related policies where we have expertise and a strength of feeling. Therefore, this response does not address every section of the plan.

Policy	Policy specific comment
Policy D1 London's form and characteristics	We support the importance placed on mitigating the impacts of noise and poor air quality. However, these are only two of many important aspects contributing to the overall microclimate quality in town centres. It would be beneficial to explicitly reference daylight/sunlight and environmental wind conditions.
Policy D2 Delivering good design	<p>We support the approach to review designs by discipline experts early in the planning process to avoid locking in poor design approaches. This policy offers the opportunity to robustly control the technical execution of other policies such as the impact of tall buildings on the urban environment and the inclusion of truly sustainable infrastructure described in chapter 9's policies.</p> <p>It is important that planning departments are able to access the skills necessary to review at a technical level, particularly where projects will have a significant long-term impact.</p> <p>It is recommended that Policy D2 should require consideration of adaptability to changes of use through a building's lifecycle, as well as a building's deconstruction at end of life. These could be required as part of a design access statement, to ensure that elements 3.1.9 - 3.1.12 are applied to building design.</p>

<p>Policy D4 Housing quality and standards</p>	<p>We support an overall approach to housing quality, and agree that amenities can be qualitative as well as quantitative.</p> <p>It will be important to provide supporting guidance on quality. For example, on what 'sufficient daylight and sunlight' is. The plan ought to prevent over stretching the concept that a central location is equivalent to having good daylight and enabling poorly designed housing stock as a result. The issues are complex and inter-related, but planning departments will need to be able to have guidelines against which to judge a scheme in order to defend design quality.</p> <p>We support the promotion of dual aspect dwellings and again suggest specific guidance is given on assessing the quality of single aspect dwellings.</p> <p><b>Public Education</b></p> <p>We don't see this covered in the plan, but note that there is a need for widespread education about the design, operation and maintenance of new housing types – particularly new and refurbished buildings where building fabric standards are better and the operation of ventilation systems is critical to delivering appropriate fresh air. Very simply, there is a problem with people not opening their windows enough or understanding how to use their homes that is causing problems which could very easily be avoided by public education. Refer to work done by MEARU <a href="http://www.gsa.ac.uk/research/research-centres/mearu/">http://www.gsa.ac.uk/research/research-centres/mearu/</a> ; <a href="https://www.architectsjournal.co.uk/news/public-health-at-risk-from-poorly-ventilated-homes-warn-gsa-experts/10005896.article">https://www.architectsjournal.co.uk/news/public-health-at-risk-from-poorly-ventilated-homes-warn-gsa-experts/10005896.article</a></p> <p>This is distinct from problems due to poor design and installation which require changes to physical infrastructure, and could be solved in quite a different manner.</p>
<p>Policy D7 Public realm</p>	<p>We support that the Plan acknowledges the importance of the local microclimate but this statement would benefit from a clearer, stronger definition of microclimate and what topics it includes. Buildings should not adversely affect the local microclimate to the extent that conditions become unsuitable for the current or intended activities of the public realm. Microclimate should include, for example, wind, air quality, sunlight, daylight and noise. 'Microclimate' should be added to the list of definitions at the end of the Plan.</p> <p>Wind is explicitly referenced in Policy D8 but adverse wind conditions are not only caused by tall buildings. The impact on levels of windiness can be affected by the geometry of the building, interaction with surrounding buildings and sensitivity of the public realm activities. Limiting reference to wind to the tall buildings policy could be interpreted as there not being potential adverse effects from buildings that are not considered to be tall.</p>
<p>Policy D8 Tall buildings</p>	<p>Tall buildings have a large impact on their surroundings for their lifetime. Their lifetime should be long to lengthen the return on their embodied energy. An integrated technical approach to environmental design and amenity is required. The technical report on the impact of tall buildings should be reviewed by technical experts.</p>

	<p><i>" 3) Environmental impact</i></p> <p><i>a) Wind, daylight, sunlight penetration and temperature conditions around the building(s) and neighbourhood must be carefully considered and not compromise comfort and the enjoyment of open spaces, including water spaces, around the building</i></p> <p><i>b) Air movement affected by the building(s) should support the effective dispersion of pollutants, but not adversely affect street-level Conditions"</i></p> <p>This should be stronger. Tall buildings should be designed taking an integrated view of the impact on the ground level environmental conditions/ microclimates. Ideally, windiness should be reduced through the form of the building and the manner in which it comes to ground. Where this is not possible, the windiness should be controlled through mitigation integrated into the streetscape without compromising the public realm.</p>
Policy D13 Noise	<p>Support the control of noise for quality of life and in particular because of its impact on mental health. Suggest referring to specific guidance from Association of Noise Consultants. Also refer to UKGBC Healthy Homes report.</p> <p>Note also the link here to how ventilation and overheating is assessed with respect to noise.</p>
Policy E1 Offices	<p>As identified within the plan, the office market is a huge potential growth area between 2016 and 2041. The plan references research stating that:</p> <p>This (increased office employment) could translate into demand for between 4.7 and 6.1 million sqm of office floorspace over the period 2016 to 2041.</p> <p>We agree with the proposal that boroughs support should new office provision, refurbishment and mixed use development to support this projected growth. We would support further policy or guidance that specifically encourages the refurbishment of existing office buildings as the following benefits, some of which complement other London Plan policy goals, can be realised:</p> <ul style="list-style-type: none"> <li>• Higher proportion of existing buildings compared to new buildings, therefore greater scope for improving energy performance of overall office building stock if existing building performance is improved through fabric upgrades, energy efficiency, use of LZC technologies</li> <li>• Reduced material and embodied energy where significant elements of buildings are reused</li> <li>• Where significant structural elements can be retained this leads to reduced heavy goods vehicle traffic into the CAZ and other densely populated areas where air quality is also a big issue</li> </ul> <p>Are there policies which could further specifically support refurbishment? An example may be to more formally recognise the benefits reduced embodied energy from refurbishment. A stronger</p>

	<p>statement on the benefits of improving energy performance of existing office buildings (due to their far greater number compared with new office buildings) would be welcomed.</p> <p>We would support the implementation of policies which also required monitoring of improvements to existing office buildings as set out in SI2.</p> <p>The plan refers to trends in different types of offices within the market. A recent British Council for Offices research report (Office Occupancy Density and Utilisation- Feb 2018) also acknowledges this but suggests that there is a general trend of convergence of densities and utilisation of office space where once there were more evident differences between sectors, building types and geographical locations. There may therefore be limited difference between the floor space required in different parts of London based on projected numbers of jobs. Table 6.1 suggests a difference in occupancy density which may not exist.</p> <p>We would welcome more details on the proposal to support space suitability for SMEs.</p>
Policy SII Improving air quality	<p>We strongly support improvements to external air quality and note that with respect to buildings this obviously has the potential to improve the internal environment and ability to naturally ventilate. We refer to CIBSE's comments on the specifics of the quantitative targets.</p> <p>We would like to see an emphasis also on internal air quality, particularly as we spend 90% of our time indoors. We would welcome leadership from London on the question of internally generated pollutants which are currently unregulated by the national government. We would also welcome leadership on domestic ventilation rates, for which the regulations are incredibly outdated.</p> <p>Approved Document F of the building regulations for homes requires ventilation rates below those outlined as good practice by other industry standards. There is very little consideration of controlling sources of pollutants from construction materials and design rates are often not achieved in practice as a result of incorrect installation, commissioning and maintenance.</p> <p>Productivity can be improved by 8-11% as a result of better indoor air quality[1] (IAQ). The health effects most strongly linked to emissions from construction materials and furniture are allergic and asthma symptoms and odour and irritation[2]. Controlling emissions from such materials is key to reducing exposure, thereby improving occupant health, wellbeing and productivity. The approach to emissions from building fabric and content in Approved Document F is that if the ventilation rates are adequate, then emissions from materials and occupant activities will not build up to harmful levels [ADF 4.7, 4.9, 4.10]. However, it has been demonstrated[3] that ventilation is often far from adequate. Consequently, levels of volatile organic compounds (VOCs) and formaldehyde can easily build up to harmful levels. Controlling such emissions at source reduces the risk of irritating levels of such compounds.</p>

	<p>For example, there is no building regulation limit on formaldehyde emissions, despite the fact that there is a suggested limit by WHO of 100microgram/m<sup>3</sup>, above which it may cause nose and throat irritation. This limit is mentioned in the Building Bulletin 101 – Ventilation of School Buildings, but not under the general Building Regulations. There are however, formaldehyde emissions limits, for certain product types, such as timber based products in European product standards. Typically the requirement is for products to meet the E1 classification to EN771-1. The only limits mentioned in Building Regulations under Approved Document F – Means of Ventilation are for NO<sub>2</sub>, CO, Ozone (which are not related to emissions from construction products) and Total VOCs, which is 300microgram/m<sup>3</sup>. ADF states that “at the present time it is not practical to make an allowance for the use of these [low emission] products in the ventilation requirements” (para 4.30).</p> <p>[1] <a href="http://healthyhomesbuildings.org.uk/wp-content/uploads/2017/08/APPG_HHB_paper-Reply-by-30-Sept-2017.pdf">http://healthyhomesbuildings.org.uk/wp-content/uploads/2017/08/APPG_HHB_paper-Reply-by-30-Sept-2017.pdf</a></p> <p>[2] EnVIE. Co-ordination Action on Indoor Air Quality and Health Effects. 2009.</p> <p>[3] <a href="https://www.citb.co.uk/documents/news%20and%20events/ventilation-in-new-homes.pdf">https://www.citb.co.uk/documents/news%20and%20events/ventilation-in-new-homes.pdf</a></p>
<p>Policy SI2 Minimising greenhouse gas emissions</p>	<p>We support a trajectory towards zero carbon and believe that the policy should be 'solution neutral' allowing designers to solve the problem with the most appropriate technology to their site. We also support a fabric first approach to passive design.</p> <p>We refer to our response to the London Environment Strategy on Zero Carbon, in particular:</p> <p>“All developments should be required through planning policy to demonstrate that the energy network a development connects to is the option associated with the lowest carbon emissions over the lifetime of the building (whether it be a centralised or decentralised network), based on current and projected future energy supply methods.”</p> <p>“More emphasis needs to be placed on making sure that new housing to be constructed to help combat London’s housing crisis is built with quality to ensure robustness and resilience, and has low lifecycle energy demands (embodied plus operational energy).”</p> <p>“All building owners should be required to report on annual operational energy use against industry benchmarks using a consistent methodology, e.g. TM54, providing data post-completion which could be used to inform truly energy efficient building design.”</p> <p><b><i>"A Major development should be net zero-carbon. This means reducing carbon dioxide emissions from construction and operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:"</i></b></p>

	<p>This does not make sense. Net zero-carbon is not the same as reducing.</p> <p>Propose to separate energy use from infrastructure by requiring reporting on kWh and on carbon related to infrastructure, as well as trajectory to zero carbon.</p> <p>We support the inclusion of embodied carbon as something to be reduced in the path to zero carbon. However, we believe it is important to separate this from operational in reporting as they have very different calculation methodologies. More clarity is needed around the assessment of embodied carbon for developments.</p> <p><b><i>"B Major development should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy and will be expected to monitor and report on energy performance."</i></b></p> <p>Support the intent fully. The requirement for reporting of energy consumption presents an opportunity to drive a transformative change in the market, by establishing a universal publicly available benchmark for energy efficiency. We would strongly recommend that the reporting requirement utilise a consistent and comparable methodology, and that the data be made publicly available.</p> <p>We propose that the monitoring and reporting is an enforceable requirement.</p>
Policy SI3 Energy infrastructure	<p>There does need to be a strategic approach to energy networks, but it should be wary of investment in infrastructure that locks in carbon emitting solutions for the future.</p> <p>We support for "low temperature thermal networks" because this allows for many future pathways and is therefore 'technology agnostic' which is appropriate for a long-term plan.</p> <p>We are wary of lock-in with high temperature networks especially where the energy centres cannot be retrofitted with heat pumps. We note the relationship between this policy and SI2, in particular the energy strategy requirement for a route map to zero carbon. This transition reporting must be taken seriously and assessed technically in order to deliver on carbon reduction commitments.</p> <p>We would welcome support and encouragement for the sharing of heat/ energy where there is no commercial advantage to developers, but there is a clear carbon reduction benefit.</p>
Policy SI4 Managing heat risk	<p>We are generally very supportive of this policy, and refer also to CIBSE's response. We would suggest stronger wording generally. WE would place the cooling hierarchy with point (2) below above (1) and make the following changes to the wording.</p> <p><i>A - Development proposals <del>should</del> <b>must</b> minimise internal heat gain and the impacts of the urban heat island through design, layout, orientation and materials.</i></p> <p><i>B Major development proposals <del>should</del> <b>must</b> demonstrate through an energy strategy how they will reduce the potential for overheating and</i></p>

	<p><i>reliance on air conditioning systems in accordance with the following cooling hierarchy:</i></p> <ol style="list-style-type: none"> <li><i>1) minimise internal heat generation through <del>energy efficient</del> (not sure energy efficient the right word here) design, <b>in particular reduction of avoidable heat losses from equipment, distribution pipework etc.</b></i></li> <li><i>2) reduce the amount of heat entering a building through orientation, shading, albedo, fenestration, insulation and the provision of green roofs and walls</i></li> <li><i>3) manage the heat within the building through exposed internal thermal mass and high ceilings</i></li> <li><i>4) provide passive ventilation</i></li> <li><i>5) provide mechanical ventilation</i></li> <li><i>6) provide active cooling systems.</i></li> </ol> <p>It is important not to give the impression air tightness is a problem as is not (by itself), so we suggest the following amendment:  <i>9.4.3 Many aspects of building design can lead to increases in overheating risk, including high proportions of glazing and an increase in the air tightness of buildings - <b>if windows are not opened.</b> There are a number of low-energy-intensive measures that can mitigate overheating risk. These include solar shading, building orientation and solar-controlled glazing.</i></p> <p>Note link with acoustics and opening windows - can refer to AVO Guide from the ANC (acoustics &amp; noise consultants)</p>
<p>SI7 Reducing waste and supporting the circular economy</p>	<p>The circular economy offers the opportunity to maximise the lifetime value of projects. We would recommend that to enable this, all referable projects are required to submit a lifecycle costing plan. Publicly procured projects should be based on whole life cost of ownership. This approach is being implemented in other countries such as Denmark.</p>

If you would like to discuss any of these points further, please get in touch.

Yours sincerely



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