www.xco2.com
mail@xco2.com
+44 (0)20 7700 1000

56 Kingsway Place, Sans Walk
London, EC1R 0LU

TIM MILES
Montagu Evans LLP
5 Bolton Street
London
W1J 8BA

27 July 2020

Dear Tim,

RE: 30 GREAT JAMES STREET – COOLING HIERARCHY

XCO2 have been appointed to review the drawings and scheme at 30 Great James Street and investigate which measures from the Cooling Hierarchy could be incorporated into the project in order to reduce the risk of overheating.

Based on Camden's Energy Efficiency and Adaptation document, Chapter 10 Sustainable Design and Construction Measures, some of the key messages are:

> *"Active cooling (air conditioning) will only be permitted where its need is demonstrated and the steps in the cooling hierarchy are followed (Local Plan policy CC2)"*

> *"Development is expected to reduce overheating risk through following the steps in the cooling hierarchy. All new development should submit a statement demonstrating how the cooling hierarchy has been followed (Local Plan policy CC2)."*

This technical letter presents the review and discusses each step of the hierarchy.

MINIMISE INTERNAL HEAT GENERATION THROUGH ENERGY EFFICIENT DESIGN:

For this step of the Hierarchy, key considerations (bullet points) and associated responses related to the scheme at 30 Great James Street are below:

- Layout and uses: locate any spaces that need to be kept cool or that generate heat on cooler sides of developments.

There are no changes proposed to the layouts as this is an existing building. Therefore, it is not deemed feasible for 30 Great James Street to locate certain spaces on cooler sides of the building.

- Reducing heat gains e.g. including low energy lighting.

Low energy lighting is being proposed throughout the development to reduce internal heat gains.

- Seal/ insulate heat generating processes.

All pipework will be insulated in accordance with industry guidelines in order to reduce potential heat gains into the occupied spaces.

- Reduce the distance heat needs to travel and insulate pipework.

This design will be done as far as practicably possible within the limitations of the existing building and layout which cannot be modified. All pipework will be insulated in accordance with industry guidelines to reduce potential heat gains.

- Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.

There are no changes proposed to the layouts as this is an existing building. Therefore, it is not deemed feasible for 30 Great James Street to be redesigned in such a way that can further promote natural ventilation. Some key habitable spaces are already dual aspect which can promote cross-ventilation and there are opportunities for further cross and stack ventilation by opening internal doors. Nevertheless, it is not possible to change the layout to fully promote natural ventilation based on the latest industry guidelines and practices as 30 Great James Street is an existing listed building.

- Consider evaporation cooling which cools air through the evaporation of water.

Evaporative cooling is a cooling method that tends to be more effective in hot dry climates, offering less benefits for a project like 30 Great James Street in London. This approach could only be adopted via larger mechanical ventilation and air conditioning system which is unlikely to fit within the existing building at 30 Great James Street.

- Consider 'free cooling' or 'night cooling', which uses the cooling capacity of ambient air to directly cool the space.

Night cooling could not be securely implemented due to the type of windows installed which cannot stay securely open. There is no scope to change the windows due to the listed status of the building.

REDUCE THE AMOUNT OF HEAT ENTERING A BUILDING IN SUMMER

For this step of the Hierarchy, key considerations (bullet points) and associated responses related to the scheme at 30 Great James Street are below:

- Consider the angle of the sun and optimum daylight and solar gain balance.
- Orientate and recess windows and openings to avoid excessive solar gain.
- Consider low g-values and the proportion, size and location of windows.
- Make use of shadowing from other buildings.
- Include adequate insulation.
- Design in shading: e.g. include internal courtyards, large shade-providing trees and vegetation, balconies, louvers, internal or external blinds, and shutters.

The design considerations above are not feasible either due to the existing nature of the building, where significant redesign cannot take place to address the considerations above, or due to the listed status of the building which precludes retrofitting some of these measures such as external shading, new windows, or insulation.

- Make use of the albedo effect (use light coloured or reflective materials to reflect the sun's rays).

It is not possible to design the external shell of the building with reflective materials as it would alter its appearance which is not deemed suitable due to the listed status. The primary benefit of this strategy would only be limited to very few rooms, those with the exposed roof but the roof is grey slates which cannot be modified as it would alter the appearance of this listed building.

- Include green infrastructure e.g. green wall, green/blue roofs and landscaping, to regulate temperatures.

This would not be feasible due to the listed status and existing nature of the building.

- Reduce the amount of heat entering a building in summer.

Measures such as external shading, resizing of windows, or installing windows with low g-value would alter the appearance of the building and are not feasible due to the listed status.

MANAGE THE HEAT WITHIN THE BUILDING THROUGH EXPOSED INTERNAL THERMAL MASS AND HIGH CEILINGS

It is not feasible to increase the ceiling heights any further as 30 Great James Street is an existing building and the heights are fixed. Thermal mass is also not feasible to increase for the same reason. Given the age of the building, some thermal mass may be present which would help with overheating mitigation but this element of the building alone is unlikely to suffice for maintaining a desirable internal environment. Thermal mass also requires night ventilation which would not be possible due to the type of windows the building has.

PASSIVE VENTILATION

For this step of the Hierarchy, key considerations (bullet points) and associated responses related to the scheme at 30 Great James Street are below:

- Natural ventilation, openable windows, the 'stack effect' system

Windows can be opened during warm days for passive temperature regulation. However, on hot days the window opening are not considered adequate to fully reduce internal temperatures to acceptable levels.

- Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.

The building is listed and no redesign of layouts can take place.

- Consider evaporation cooling which cools air through the evaporation of water.

As previous responses, evaporative cooling is a cooling method that tends to be more effective in hot dry climates, offering less benefits for a project like 30 Great James Street in London. This approach could only be adopted via larger mechanical ventilation and air conditioning system which is unlikely to fit within the existing building at 30 Great James Street.

- Consider 'free cooling' or 'night cooling', which uses the cooling capacity of ambient air to directly cool the space.

As per previous responses, night cooling could not be securely implemented due to the type of windows installed which cannot stay securely open and the inability to change the windows due to the listed status of the building.

MECHANICAL VENTILATION

For this step of the Hierarchy, key considerations (bullet points) and associated responses related to the scheme at 30 Great James Street are below:

- Ensuring the most efficient system possible.
- Consider mechanical ventilation with heat recovery

It is not possible to install full mechanical ventilation system (including recovery) on this existing building. The fact that the building is existing entails significant spatial constraints (large service risers and service distribution zones would be required which would change the proportions of the rooms and associated layouts) to install ductwork for mechanical ventilation. Façade penetrations would also not be feasible as they would alter the appearance of the listed building.

ACTIVE COOLING

For this step of the Hierarchy, key considerations (bullet points) and associated responses related to the scheme at 30 Great James Street are below:

- Ensuring they are the lowest carbon options.

The most efficient system will be specified and use of green energy supply will also be considered.

- Ground Source Heat Pumps and Air Source Heat Pumps can be used in reverse to provide cooling to buildings.

The system proposed is effectively an Air Source Heat Pump that can operate in reverse to provide cooling. This is the most suitable technology to be installed, there is not space for Ground Source Heat Pump installation given the existing nature of the building.

- Water based cooling systems also reduce the need for air conditioning by running cold water through pipes in the floor and/or ceiling to cool the air

It is not feasible to install pipes within the floor of the existing building. The proposed system is the most efficient solution that can feasibly be installed for the existing, listed property at 30 Great James Street.

CONCLUSION

Having followed the Cooling Hierarchy, it can be concluded that the installation of a cooling system would be necessary to maintain a desirable internal environment at 30 Great James Street.

I hope the above provides sufficient clarification on which measures are reasonably feasible to incorporate to the project but if you have any comments or questions, please do not hesitate to contact us.

Kind regards,

KOSTAS MASTRONIKOLAOU
ASSOCIATE