APEX AIRSPACE

CARBON REDUCTION IN AIRSPACE PROJECTS

Airspace development is the creation of new homes in the 'air-rights' on top of existing buildings, by usually one or two additional storeys. By utilizing existing rooftops, a huge number of new homes can be built with minimal disruption to existing communities and the skyline. This is an exciting prospect in a city like London, where the supply of land and homes is limited, and protecting green belts and open spaces is priority.

> As the construction sector experiences resurgence in growth to meet the housing crisis, it is bound to have a detrimental impact on the environment. The construction sector contributes to 23% of air pollution, 50% of the climatic change, 40% of drinking water pollution, and 50% of landfill wastes[1]. This puts pressure to Build Green to reduce carbon footprint and improve the environmental impact of construction.

Buildings in the UK account for over 40% of all energy use and CO2 emissions, so there is an increasing need for building regulations to become more demanding in terms of energy performance targets. Sustainability has been placed at the heart of National, Regional and Local Policy setting performance targets for best practice in design, construction and operation.

The UK aims to achieve an 80% reduction in greenhouse gas emissions by 2050 (against a 1990 baseline) in order to meet the world's first legally binding climate change target established in the 2008 Climate Change Act.

The London Plan Energy Hierarchy guides developers towards compliance with carbon emission targets; it urges developers in Being Lean i.e., providing reductions in energy use through the adoption of sustainable design and construction measures, Being Clean i.e., supplying energy efficiently for example through using decentralized energy networks, and Being Green i.e., using renewable energy in new developments.

How Does Construction Impact the Environment? | GoContractor[1]

AIRSPACE DEVELOPMENT-A SUSTAINABLE CONSTRUCTION TECHNIQUE

Airspace development adopts sustainable design and construction methods. It utilizes Modern Methods of Construction (MMC) which largely comprise off-site techniques that cause minimum disruption at site; use sustainable materials and cause less demolition and waste, while preserving existing buildings, communities and the environment.

Offsite modular construction reduces carbon emissions through the reduction of waste on-site. Mass production of these modular homes in factories helps achieve economies of scale through precise cutting and minimal waste. The excess materials are then recycled, such as excess steel and concrete. By reducing the amount of waste generated, the environmental impact of construction is minimized.

Another factor in the reduction of carbon emissions is by reducing transportation. Since the modules are prefabricated offsite, transportation to the construction site is minimized This implies less fuel needed for transportation. Reduced construction time implies reduced use of construction equipment on-site which results in reducing pollution and improving the air quality.

Offsite modular construction can also incorporate sustainable features and raw materials, such as energy-efficient windows, insulation, and HVAC (heating ventilation & cooling) systems, which help

reduce energy consumption and greenhouse gas emissions. Mostly using sustainable materials, such as recycled steel, bamboo, and reclaimed wood, the environmental impact of construction is reduced.

AIRSPACE HOMES- A SUSTAINABLE HOUSING SOLUTION

Following the London Plan 'Lean-Clean-Green' Energy Hierarchy, airspace homes can be designed to achieve reduction in CO2 emissions, improve energy performance through the use of high fabric efficiency, good air tightness levels, efficient building services and renewable energy generation.

Deploying decentralized energy systems to generate heat and power, and evaluating feasibility of Combined Heat and Power (CHP) systems in airspace development, can significantly reduce energy consumption, not only for the new development but also for existing one. Designing new homes to minimize internal heat generation, and amount of heat entering through fenestration, orientation, insulation, green roof and walls, and utilizing effective ventilation techniques in airspace projects can significantly contribute towards improving energy efficiency of new and existing homes.

APEX AIRSPACE-LEADING THE WAY IN SUSTAINABLE HOUSING

Apex Airspace has built number of projects, using sustainable construction techniques. Each project is designed for energy efficiency, keeping in view carbon reduction targets for the development. Many times, energy optimization is offered not only to the new development but also to the existing accommodation in the building. Few of airspace projects and their contribution to reduction in carbon footprint and improving environmental sustainability are discussed below.

Apex utilizes unconventional construction techniques with reduced environmental impact in comparison to traditional methods. Volumetric offsite construction has been used in most of Apex projects, which offers substantial reduction in waste and on-site disturbance, and uses recycled materials.

Wimot Place, a project whereby Apex built an additional storey for single two-bed units, was developed using volumetric modular offsite construction.

The flat roof design of the development allowed for the installation of solar panels to provide renewable energy. A green roof was built, to add thermal insulation to the building and reduce cooling load by up t0 90%. The green roof also serves to improve the air quality by filtering pollutants from the air, reducing disease levels like asthma.

Abbey Road, whereby a penthouse was built on top of existing four storeys, was also developed using volumetric offsite modular construction. Both internal and external walls were built with thermal insulation, brick cladding was done and existing windows at all elevations were replaced with double-glazed aluminum framed windows, improving energy efficiency in the building.

For one of Apex projects, Marion Court, a different approach to construction was deployed. Volumetric offsite construction had to be discontinued due to existence of chimneys on roof which called for high accuracy in determining the chimney position in design; this required use of a portable on-site facility to build and assemble lightweight steel frames, to hold the new structure.

This approach, like volumetric modular, is highly sustainable; 85% of the steel used is recyclable, reducing waste up to 70%, and is up to 50% faster to install. The development has achieved a minimum of a 19% reduction in CO2 emissions below the maximum threshold set in Building Regulations Part L 2013.

ANTONY AND RODERICK HOUSE- A GREEN APPROACH TO CONSTRUCTION

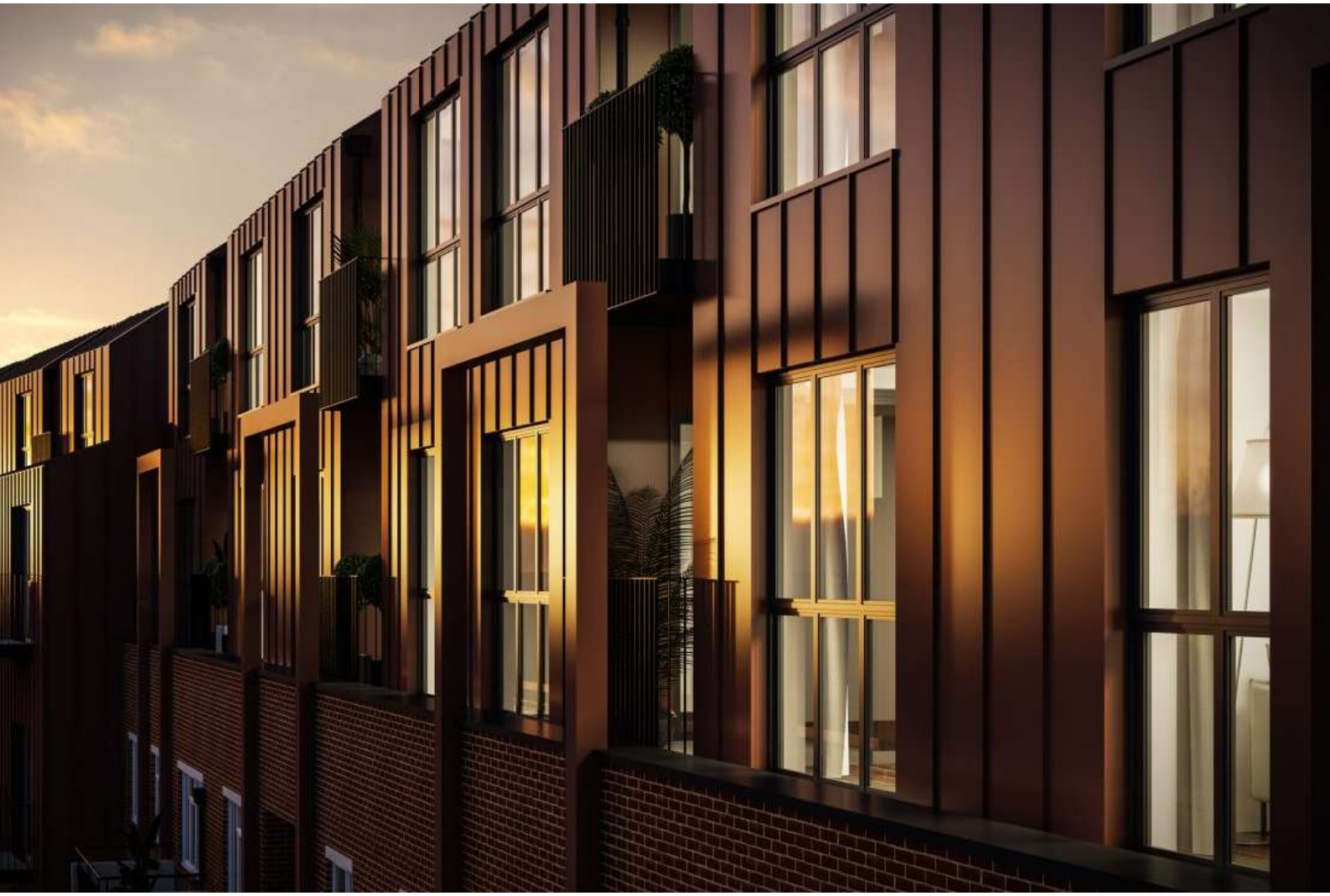
The new development proposed to incorporate a range of energy efficiency measures including high levels of insulation exceeding current Building Regulations requirements, the installation of high-performance glazing, energy efficient lighting and mechanical ventilations with heat recovery systems in all habitable spaces.

Another unconventional approach was deployed at Antony and Roderick House, which comprised of a pitched roof. For this site, volumetric offsite was combined with building an onsite steel frame exoskeleton.

A&R House has been designed to achieve a reduction in CO2 of at least 35% over the target emission rate defined in Building Regulations 2013 Part L1A. Improvement in energy performance is achieved through the use of high fabric efficiency, good air tightness levels, efficient building services and renewable energy generation, following the London Plan 'Lean-Clean-Green' energy hierarchy. The development has been designed to improve the air permeability rate to at least 5 m3/m2 at 50 Pa. All elements of the building fabric including roof, windows, external walls, and doors are designed to provide at least 30% improvement in insulation, in comparison to the Building Regulations.

The installation of approximately 252 m2 PV panels (active area) with a total peak power of 55.20 kW is expected to reduce regulated CO2 emissions by 49.25%. The estimated energy generated by the photovoltaic panels is 41,933.57 kWh/year.

All domestic units are also provided with adequate, accessible and protected-from-bad-weather bin storage for waste and recycling. Passive measures have been incorporated in line with the London Plan Policy 5.9 and Southwark Policy 61 (Environmental Standards) using the Cooling Hierarchy approach, to prevent summer overheating and keep the dwellings moderately warm. In all areas of the building, windows are openable to achieve passive cooling in summer. Ventilation systems are designed to provide 78% heat exchange efficiency. The design team has utilized window configurations which allow effective single-sided or cross ventilation to occur. The development has been designed to maximize daylight to reduce the need for artificial lighting whilst delivering pleasant spaces for occupants, and incorporating low energy lighting fittings throughout the buildings.



CONCLUSION

Despite conflicting goals and complex challenges, construction industry is gradually moving towards sustainability. Airspace development, brings with it a plethora of environmental benefits as it utilizes Modern Methods of Construction (MMC), that use offsite construction techniques, reducing waste production, promoting use of recycled materials, and reducing construction time, to design energy-efficient homes. These measures contribute to reduce carbon footprint, substantially reducing the environmental impact of traditional construction practices. Mass adoption of airspace development can be a game-changer, as the industry expands rapidly to address the increasing housing crisis, while preserving communities and the natural environment.