

The agenda of the Modern Movement is commonly seen as intrinsically unsustainable – it promoted mass production and consumption, the motor car, rapid obsolescence, and the use of high-energy-content materials such as glass, steel and concrete. Especially in some of its wackier late manifestations such as Archigram it arguably did mostly that. But while the desire to embrace industrial methods of production, and the mass markets that that implied, was undoubtedly an important component of Modern Movement ideology, this was married – as Pevsner for one was insistent in pointing out – to an inheritance from the Arts and Crafts movement and its later planning manifestation, the Garden City movement. From this direction came a preference for simplicity and sparseness (embodied in William Morris' famous dictum that you should have nothing in your house that you do not know to be useful or believe to be beautiful), which implied a restraint of consumption, and an aspiration for the 'green city' (or 'City Verdant' – to use Gropius's term in *The New Architecture and the Bauhaus* translated by Morton Shand), the city permeated by nature.

The 'green city' ideal is evident in the work of many architects of the Modern Movement, such as the projected apartments by the Wannsee by Gropius of 1932 (and the emphasis he had laid on craftwork at the Bauhaus is also well known, extending to the New Bauhaus in Chicago), or Mies van der Rohe's Lafayette Park in Detroit of 1955-56, but no one expressed the polarities of industrialism and 'greenery' more forcefully than Le Corbusier. The Arts and Crafts heritage, absorbed from his teacher L'Eplattenier who, from travels in England and friendship with the Englishman Clement Heaton, carried the torch of nature and the hand-made from Ruskin, was strongest in him. It would be fair to say that Le Corbusier saw industrialisation as the means by which man could again make contact with nature, and be freed for the pursuit of the hand-made (the work of art being for him the product of individual sensibility, and therefore hand-made).

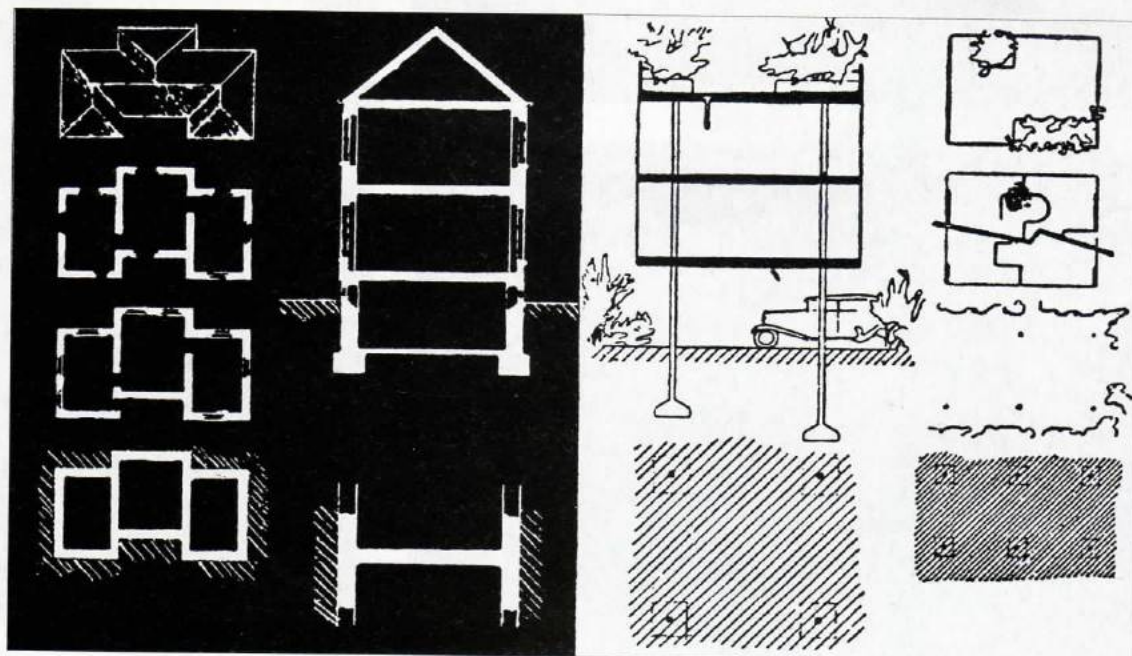
The specific threat that carbon emissions from industrial processes would lead to global warming and a destructive rise in sea levels, which is of such concern now, had not been identified at that time. But the risk to the health of man from the pollution and lack of sunlight common in the dense industrial city were central concerns, and the need to husband the resources of nature, to avoid the waste both of time and materials, was fundamental to his thought. In the Radiant City, his model of green city, 'the link *nature-man* is re-established'. It is notable also how many of the specific technical components of current 'green' or sustainable construction theory, such as the 'green roof' and rammed earth walling, were being proposed by him from the 1920s onwards. He was himself devoted to the simple open-air life that he practised every summer in his timber cabin – the Petit Cabanon – next to the Mediterranean at Roquebrune.

One of the lessons Le Corbusier sought to draw in *Towards a New Architecture* (1923) from the comparison between buildings and transport vehicles of various kinds was that of miniaturisation: that the door into a room, for example, could be a much narrower, lighter, less bulky affair than was customary. The development of aeroplanes in particular had forced the reduction in size and weight of every component, and hence in the consumption of materials. Furniture – the 'equipment of the home' – could similarly be reduced from the customary massive pieces to their functional minimum, with potential gain in elegance as well as reduction in consumption. In architecture a reduction in scale in many areas was also possible and could, he felt, allow an expansion elsewhere where it would 'tell' – for example a reduced ceiling height of 2200mm could be doubled in the living area to 4500mm. He frequently drew attention to the very slender walls (and consequent saving in use of materials) made possible by steel or concrete frame construction, compared to the immense thicknesses of load-bearing walls, citing building regulations in Prague which demanded external

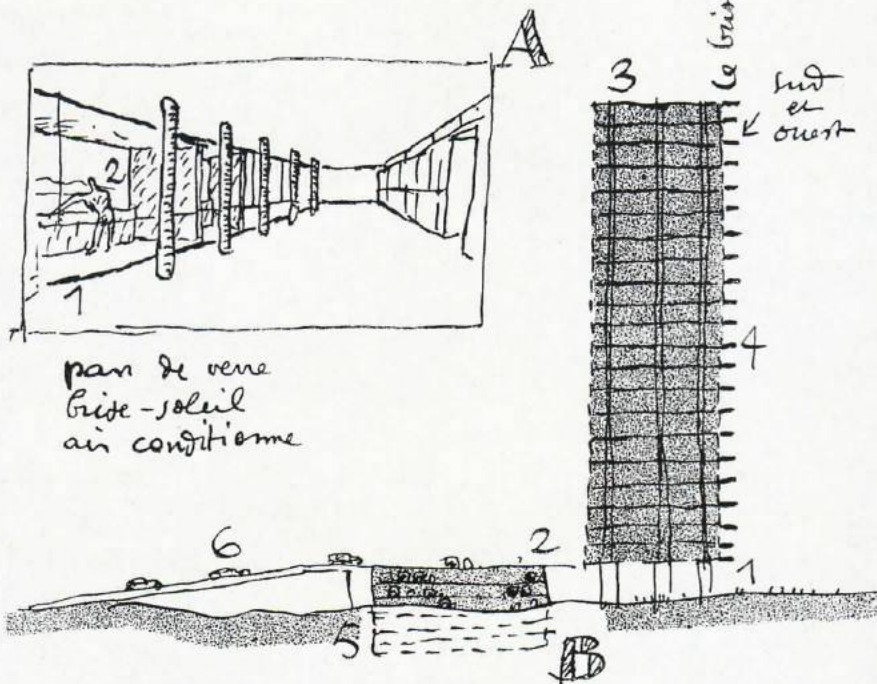
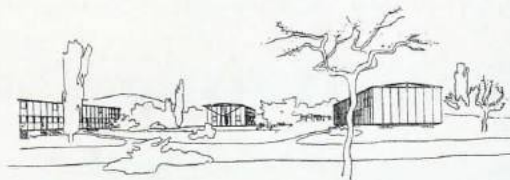
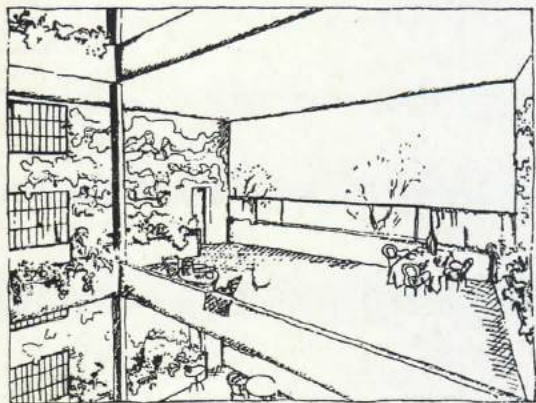
L'HOMME VERT

Though environmental awareness is a recent phenomenon, it has deeper and perhaps surprising roots in the Modern Movement, especially in the work of Le Corbusier.

Opposite page:
Le Corbusier at the
opening of the
Unité d'Habitation in
Marseilles, 1952.
Photograph:
Lucien Hervé.
Right: the famous
'five points' of the
new architecture from
1926 – pilotis, roof
gardens, free plan,
horizontal windows
and a free facade.







Clockwise from top left: sketch of a garden terrace, early 1920s; the polarities of nature encapsulated; unbuilt project for a prefabricated school for refugees, designed in collaboration with Jean Prouvé, 1940; principles of brises-soleil, now widely integrated in buildings everywhere; the health-giving properties of a typical Unité d'Habitation.

wall thicknesses of 450mm minimum at the top, increasing by 150mm stages for every storey below. This process of reduction in structure and mass, which was central to the Modern Movement agenda, was thus 'sustainable' in its economy in the use of materials.

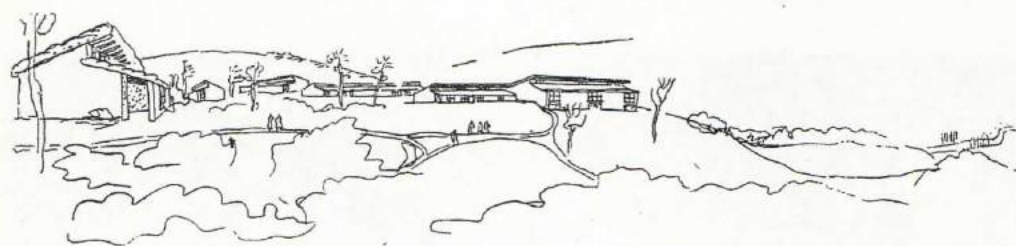
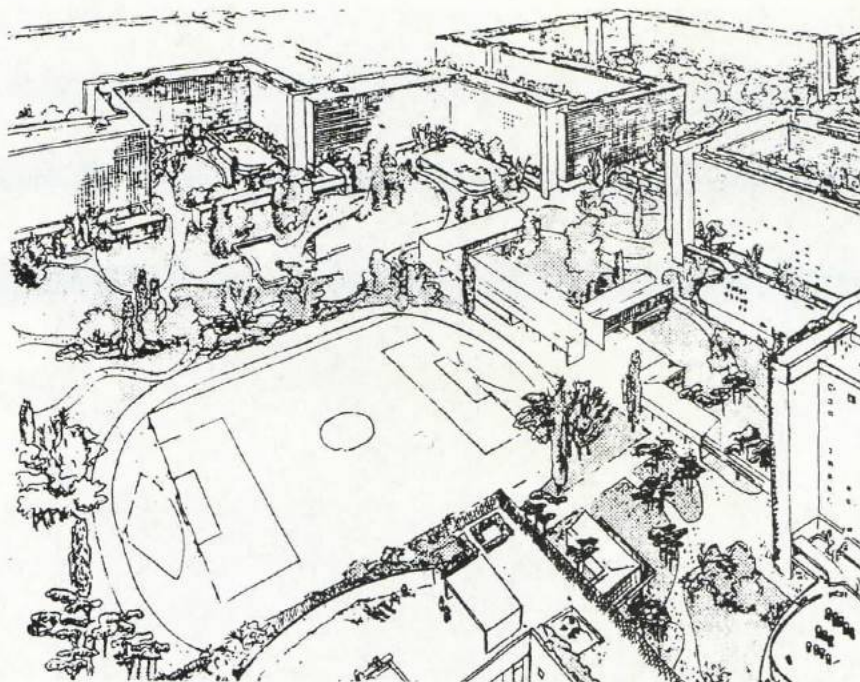
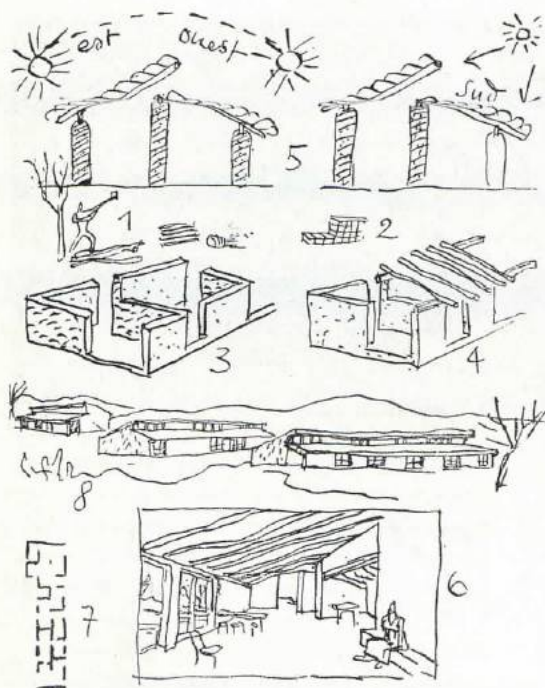
One of the 'Five Points of the New Architecture' proposed by Le Corbusier and Pierre Jeanneret in the first volume of their *Oeuvre Complète* (1929) was the roof garden. The flat roof, long used as a vital living space in the Arab world, as additional playgrounds for London Board schools in the late nineteenth century, and by Auguste Perret in his Rue Franklin apartment building in Paris of 1903 (where he was perhaps the first to plant them), was for Le Corbusier the prime locale for what might be seen as the defining intellectual activity of the world he sought to create – communion between man and nature. From there, raised above the tumult of the world below, bathed in light, with distance and an uninterrupted view of the sky all around, man could soliloquise and contemplate his situation within nature and the cosmos. Beginning with the Villas La Roche and Jeanneret of 1923 and continuing throughout his career, the roof gardens (including 'green roofs' not intended for regular access) provide some of the most lyrical moments in his oeuvre. Roof-top soil and greenery, presented initially as a technical counter-measure to the high thermal coefficient of expansion of concrete and to limit excess rainwater run-off, was practically to overwhelm the building itself in projects such as his Petit Maison de Weekend of 1935.

Perhaps the 'greenest' project Le Corbusier ever designed was the Murondin emergency housing project of 1940 intended for refugees from the first stage of the war in Belgium. He had increasingly begun to use

'natural' materials for construction from 1930 onwards, with the rubble stone walls of the Villa de Mandrot and the Errazuris house project, but the Murondin project exploited an even more basic material – rammed earth (*pisé*) for the walls, with logs (*rondins*) supporting luxuriant pitched 'green roofs', generously overhanging the walls to shelter them, and all to be built entirely of materials found on the spot. This was a response to the wartime lack of transport and other materials, but it clearly aroused a sensuous response in him. Characteristically he proposed in parallel a lightweight solution for emergency schools – published on the adjacent pages of the *Oeuvre Complète* – using a sheet metal system developed with Jean Prouvé, at a time steel was still available. They were to be carried forward by the army to make good the damage they had caused.

Immediately after the war, scarcity continued, and Le Corbusier again proposed rammed earth housing, in a different form – the Unité d'Habitation Transitoire. Finally in 1948 the same material was proposed – now seen as permanent construction – for the housing attached to the proposed pilgrimage centre of La Sainte-Baume near Marseilles. 'Life in these *pisé* buildings can have great dignity and regain for man in the machine age a sense of the fundamental resources of humanity and of nature', he wrote. With its vaulted roofing and thick walls, it referred to the vernacular traditions of the eastern Mediterranean, and like them would have provided the comfort of high thermal mass.

In the case of more conventional housing, post-war steel shortages were at the same time moving him from steel frame to heavier reinforced-concrete construction with higher thermal mass, and thus effecting a complete revolution in his architecture. The Unité d'Habitation at Marseilles was a notable example, where he was particularly proud of



Clockwise from top left: construction sequence for the Murondin emergency housing project of 1940, using logs and rammed earth from the immediate locale; apartment buildings surround schools and parks in the Radiant City, 1935; sketch showing the development of the picture window; Murondin housing on site.

the thermal efficiency of the design due to the very small amount of external wall in relation to the floorspace of each apartment.

But it is in Le Corbusier's persistent efforts to resolve the Great Waste (*'le grand gaspillage'*) of the modern city that his broadest claim to have addressed the question of sustainability lies. The waste he referred to was the waste caused by the unnecessary travel involved in urban and suburban life – 'Trains, Pullmans, metros, cars, roads, and the administration of it all, the personnel required to run it, maintain it, repair it and police it – that is the stupid waste of modern times'. At first he felt the solution lay simply in building cities that were both more compact and greener, and it is worth noting that the Radiant City model of 1933, housing about 1.5 million people, on paper occupies a land area not very different from that of Cambridge with a population of about 100 000. In 1935 he wrote 'the new city is compact and occupies less space. It has no suburbs. The transport problem solves itself. We learn to walk again. With buildings 50 metres high we can accommodate 1000 persons to the hectare – a super-density. Only 12% of the ground space is occupied by buildings, the remaining 88% being parks and sports grounds ... The motor car, is the sickness, the cancer ... it will be used for making the short journey into the country at weekends, or even during the week'. The prevalence of greenery throughout the city would make it unnecessary, as Le Corbusier saw it, to live in low density suburbs (which he persisted in calling 'garden cities') to satisfy the craving for nature, with the long distance commuting that that demanded. The same benefits, without the travel, could be obtained from his vertical garden city (*'cité-jardin vertical'*). Later, during the war, he came to believe that a plan form allowing an even closer relationship

between work, home, and nature – the linear industrial city – was the answer. Manufacturing industry would no longer be regarded as an urban activity but would be strung out along the routes of road, canal, and railway between compact nodal 'cities of exchange'. Housing would be stretched out along these routes in parallel with the industry, making it possible for the working population to live very close to their employment indeed (though he did not make the error of supposing that in a free society they would necessarily do so), as well as to nature. Such an arrangement was well-adapted to be served by public transport or indeed for walking.

Le Corbusier assumed that with the higher productivity of 'the machine', and after the waste of time, effort, and material spent in needless travel and in the production of superfluous consumer goods had been eliminated, the working day could be reduced to four hours. The free time left would then become 'the real working day of the machine age. Work disinterested and without monetary reward, a giving of oneself; keeping fit to ensure good physique, good morale, and ethical development ...' His aim by the elimination of waste was the positive one of freeing man from unnecessary labour and thereby enabling him to get closer to himself and to nature, rather than simply the negative one of avoiding carbon emissions. But the solutions he proposed often prefigured the 'sustainable' policies of today – which might indeed be better received if more often informed by a similar moral and creative agenda; and it is to be hoped that the restraint in consumption now called for in the interests of sustainability will be as productive in design as wartime scarcities were for Le Corbusier.

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