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Agro-Housing

Agro-Housing project - Wuhan, China
 Knafo Klimor Architects



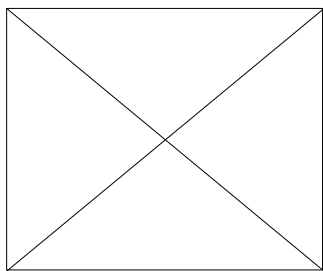
Agro-Housing the winning design for sustainable housing construction in China, blends urban and rural living by creating vertical greenhouse space within high-rise apartments. The competition was launched by "Living steel" a program of the International Iron and Steel Institute (IISI) with the support of UIA (Union of International Architects). The Agro-Housing concept presents a new type of home where tenants grow their own food indoors, greatly reducing environmental impact while elevating garden spaces and fostering greener neighbourhoods.



This concept was developed with regard to predictions that 50% of China's population will be living in cities by 2020, a trend mirrored in many developing countries in the world. The architects observe how massive urbanisation displaces communities, dissipating existing traditions and heritage, as well as placing a strain on energy resources and infrastructure. Agro-Housing, a new urban and social vision, reacts to the imminent changes by creating a new order in the city and, more specifically, in the housing environment. The idea behind Agro-Housing is for city-dwelling families to use indoor greenhouses to sustain them according to their own abilities in order to promote independent living and potentially, additional income. These greenhouse spaces also form a natural gathering place for community members to interact. Agro-Housing, a place for living is in essence, a model for a new urbanity, contributing to the preservation of traditions and community values and diminishing the trials of rural migration.

Layout

The Agro-Housing concept is based on two components: Apartment building and a vertical greenhouse embracing an atrium that function as a thermal chimney. The greenhouse, facing south, is the building's



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Agro-Housing's prominent feature - a multi-floor garden for cultivation of crops such as vegetables, fruits or spices, growing on soilless substrate that is environmentally friendly and equipped with drip irrigation enable re-uses of grey water. The greenhouse climate is controlled by natural ventilation by means of the vertical chimney. The rooftop terrace provides additional garden space and grass lawns for social activities. A kindergarten on the ground floor keeps children close to home and family. The entire ground floor plan ensures a minimal footprint by adding ground surfaces for gardening and rainwater harvesting.

Construction & Materials

The 12-storey structure is made of steel columns and beams on a 10 by 9 meter grid. The structure is prefabricated and delivered to the site ready-made for installation. The exterior panels are prefabricated, forming modular shades of structural insulated wall panels, glass and sliding shades. All materials are chosen with attention to their thermal qualities, durability and recyclability. All interior partitions, made of recyclable light plaster panels, are arranged by the tenants, allowing ultimate flexibility according to changing personal needs.

Natural Ventilation through a Thermal Chimney

Agro-Housing's inner vertical chimney functions as a natural air-conditioner, ventilating the apartments or circulating heat as necessary. The vertical greenhouses buffer heat and cold. In summertime, the rooftop windows will be opened to allow natural cross-ventilation and the balconies and shades reduce heat absorption. South facing apartments have shaded balconies to block the summer sun. Greenhouse foliage screens the inner part of the building. In wintertime, the rooftop windows are closed, and the greenhouse walls trap warm air that circulates through the thermal chimney. Low-angle winter sun heats up thermal masses that warm the apartments at night.

Energy and water

The solar heating system delivers heat from the roof panels to each apartment using a forced circulation system. Geothermic system utilizes the high water table at the site.

Rainwater from roofs and balconies will be harvested for irrigation of greenhouse and garden water preservation. Irrigation will be supplied by recycling grey water from the apartments. Drip Irrigation will reduce water consumption by delivering irrigation directly to the plants and by collecting water through evaporation. Using advanced technology for production of crops enables the recycling of drainage water and reusing it.

Agro-Housing benefit to the environment

- Agro- Housing will save a considerable amount of energy by growing vegetables indoors, reducing the use of resources needed for traditional agriculture, transportation into cities and commercial spaces.
- Agro-Housing will allow the production of organic vegetables free of diseases and fertilizers according to the choice of the tenants.
- Agro-Housing will strengthen the social ties within the members of the family and community, and will offer a new space for gathering and social activities.

- Agro - Housing will create extra incomes and new jobs for the tenants of the building.
- Agro - Housing will reduce the need for extra development of urban infrastructures, as part of the food production will take place within the neighborhood.
- By reducing the area of agriculture fields, Agro Housing will contribute to forestation and reducing the damage to the ozone layer in the atmosphere.

Agro-Housing suggests a new way of living by creating spaces for dwelling and agriculture in the same environment. Agro-Housing is a highly feasible concept that will change the perception of home as we experience it today, introduce a new social and urban order and promote the idea of sustainability to a higher level of awareness.

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