Int. Journal for Housing Science, Vol.39, No.3 pp. 123-134, 2015
Published in the United States

LONDON FARM TOWER 2050: NEW WAY OF LIVING BETWEEN INNOVATIONS AND TRASFORMATIONS

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ABSTRACT

The research aims are the investigation of the living phenomenon in relation to the population growth, the gradual urbanization of the world population and the need for new technologies for food production in urban consolidated centers. To outline the problem you need to analyze some figures: in 2050 the world population will count up to 9.9 billion people, of which 71% will live in urban areas. It will also be necessary to cultivate 1,000,000,000 acres to meet the need for food. All this inevitably has an impact on metropolitan areas development: city becomes widespread and productive places diminish. City consumes but does not produces. This "forces" us to reflect on the regeneration of urban spaces that can be defined "empty" and on the development of new models able to cope with the problems listed above. The purpose of the research, considering the above data, is to study a new housing model that can squeeze a city portion and make it live on his own relationships, human and economic, in continuous connection with the outside world: the city, like a software can be updated through plugins. The experimentation takes place at the Tower of London in London, an area affected by recent urban expansion projects, which can be defined as "urban emptiness". The social housing becomes common thread between the parties: an "urban emptiness" to densify through an "open" system, ready to

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reconnect to other empty spaces and leaving permeable contact with the surrounding urban web. The creation of a social network made up of houses, space between the houses and productive places is seen and developed as a urban "component" required to respond to the problems listed above. Housing becomes the instrument through which "rethink" residential housing system by introducing temporal and social set of variables so far unknown as a unique opportunity to define a "new habitat" not only able to provide a service but to ensure human and social relationships,. For this "new urban model" an intensive production of housing would not be enough if it wasn't based on a complex urban public space. Considering all this I can state that this research wants to be an opportunity to define a methodology of intervention in the established urban centers responding to the rapid urbanization arising problems, and to initiate a radical debate on the listed issues.

Key words: new model, typology, density, urban growth, food production, energy saving

Introduction

Speaking today about social housing means to rethink and reflect on the public city in physical, planning, and social terms; in Italy the issue has been addressed in the 22/04/2008 inter-ministerial decree with a partial definition of the phenomenon in order to respond to the housing problems affecting contemporary cities. Social fragmentation, increase of sales prices and rents, lack of public loans and new needs, have undermined the established thinking on public residential. Consider the city as a "living" organism, which changes responding to a given system of external forces influencing its economy, markets, politics, and means considering changeable also its users: city users, immigrants and students are the basic categories of users to refer to, along with the 'weak' categories already known. It's very clear that the speech, especially outside the national borders, cannot find fulfilment in a definitionof the genre: it is, in fact, an understatement make it all about the economic and financial front when we have the chance to "rethink" the residential housing system by introducing a set of temporal and social variables previously unknown. A unique opportunity to define a "new habitat" able to ensure human and social relationships, and not just to provide a service [1]. From users of a service to the people part of a community. Designing residences, then, means acting on urban, typological, financial, and first of all, on social aspects: housing can be an opportunity through which redevelop a city portion, regenerate worn out urban contests, it can ensure that living spaces are flexible and adaptable to subsidized rents and, likewise, stimulate and increase the social and human relationships. The building is conceived and perceived as a social condenser which, through momentary and multi-purpose spaces, is able to expand the residence also in relationship spaces. On one hand the possibility of going

forward with the typological and technological research of the buildings on the other hand the need to use social housing as a tool for urban and social regeneration. The elements of the collective housing project that are able to create added value, from housing to the urban scale, in relation to the problems of urbanization and land use and lack of resources are the main fields of investigation to interpret future scenarios. Considering housing problems and the constant population growth, the approach also takes into account the social aspects that accompany discomfort dwelling. Living implies a dialectical relationship between built space and group installed, which evolves, changes and adapts: the space becomes a place because it's associated with an image shared by the inhabitants and the group becomes a community because it's organized in the space through a network of interpersonal relationships [2].

Population Growth, Urbanization and Soil Consumption: The Resources Problem

Available data on the population growth and urbanization confront us to a complex and articulated future which makes us in the position to start reflecting in order to find solutions to these severe problems. Nowadays, the world population is up to 6.6 billion people, 50% of which is settled in urban areas, compared with 2.2 billion people in 1950, it will quickly pass to 9.2 billion people in 2050, settled for 75% in urban and semi-urban areas. Analyzing the data it's evident that the world population urbanization curve is in sharp rise compared to the world population ruralisation and already in 2030 will be obvious the effects of this phenomenon: 60% of the world population will live in urban centers with consequent growth of sprawnl and high density suburbs phenomenon [3].

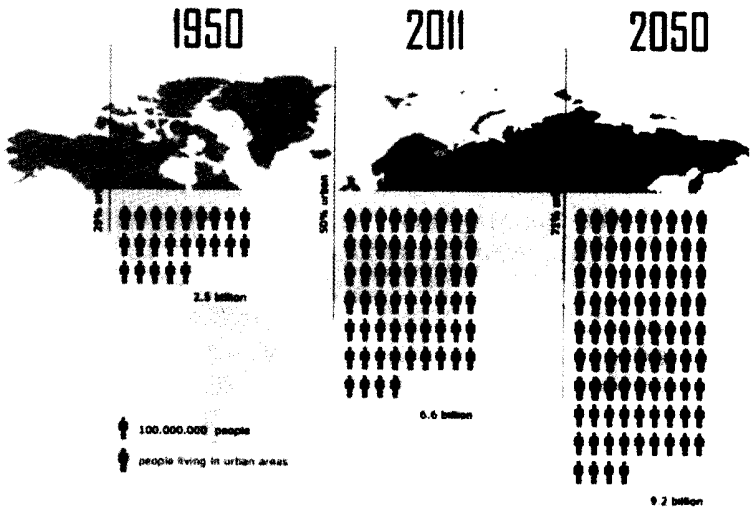

Figure 1 : Population growth and rate of urbanization.

European Environment Agency data shows that urban sprawl is much greater than the population growth alone. Over the past 50 years, the average per capita land available is doubled, while in the past 20 years, thanks to an increase of 6% of the population, the extent of built-up areas has grown up to 20% [3]. It's clear that this growth, expected until 2150, will exponentially cover less developed countries contributing, in fact, to accentuate the phenomenon of urban slum with strong socio-economic problems.

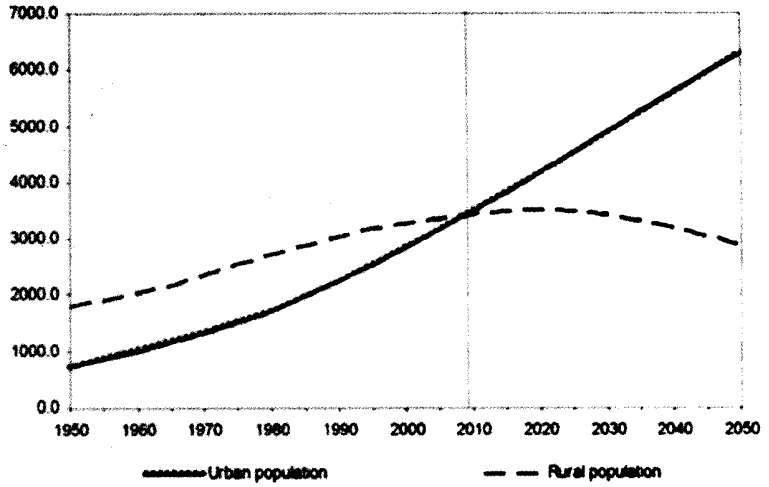

Figure 2 : The red curve shows that urbanization is on the rise between now and 2036; UN Population division.

All this, aside from accentuating the land consumption phenomenon, produces obvious problems with energy and food resources. Already about 842 million person do not have enough food and almost two billion suffer from lack of important nutrients in their diet. The fact that the greatest increase in population is expected mostly in the poorest regions of the world makes immediately clear how critical the situation is. City becomes more and more widespread: settlements fragments follow one another with a different frequency, with no continuity, they are the result of discontinuities and diachronic processes of urbanization, dis-urbanization and re-urbanization. The pace at which the city grows, becoming megacities, is impressive: in the city of Logos every hour 58 people move from the countryside to the city causing obvious problems of population density and urban sprawl. The city becomes widespread due to the loss of space while urbanization and the consequent soil consumption cause the reduction of available resources. All this increases exponentially the ecological trace compared to Earth's surface while the same should be less. We are facing a historic challenge: interpret the density and ensure enough food for a world population which continues to grow, not to mention the social and environmental aspects related to them. A complex problem that needs a radical approach. The approaches are varied but each one is designed to solve the main

problem: the city seen as a machine that consumes and does not produce interconnected to supply systems capable of ensuring energy and food is not a model that can interpret such a change that needs a new way of living, between innovation and transformation, encompassing new systems of food and energy production.

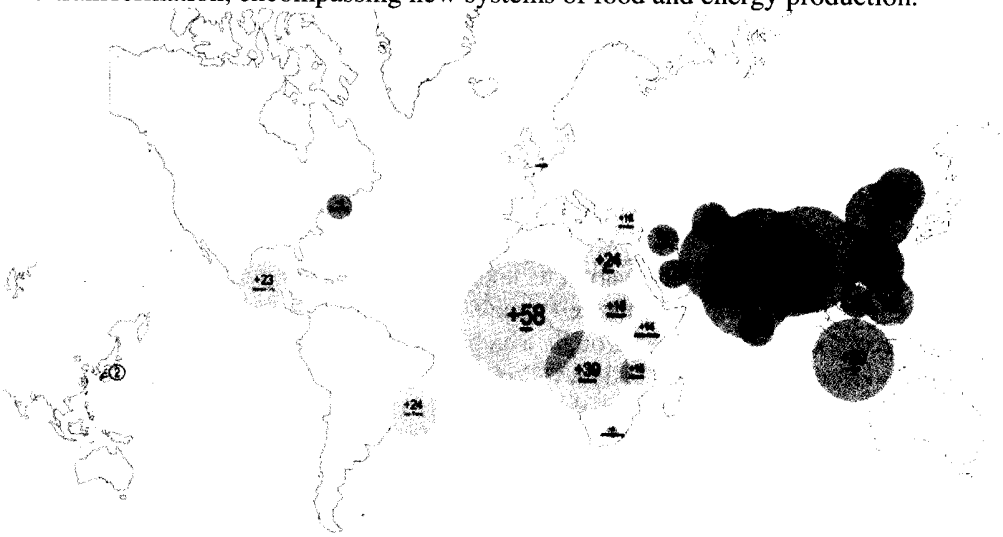

Figure 3 : Speed of urban growth: number of people each hour pass from the countryside to the city; www.xinst.org.

New Ways of Living and New Technologies of Food Production

One approach aimed at addressing and finding solutions to these problems focuses on the study of the Vertical Farms looking at the basis of Dickson Despommier research, a ColumbiaUniversity professor and looks at experiments conducted by MIT CITY FARM. This approach aims to investigate technological, environmental, social and economic systems able to produce accessible and high quality food in the cities of the future. The potential of this system is significant and worthy of further investigation: zero distance between production and consumption places, the possibility of using waste derived from production to produce energy, reduction of the use of armful chemicals pesticides, reduction of emissions and zero fuel consumption through the use of renewable sources are the main potential of this approach [4]. In addition, the use of techniques of indoor growing allows a continuous food production cycle and creates new professional profiles. Among the most investigated techniques for indoor growings we can mention: hydroponic, aeroponic and aquaponic technique. Hydroponic is a technique "soilless" in which instead of agrarian ground is used a nutrient solution and an inert substrate. With this technique you can get a higher yield per unit area under cultivation; also it can be used as an alternative method in any place in which, for reasons of poor soil fertility, it is not possible to use traditional agriculture methods.

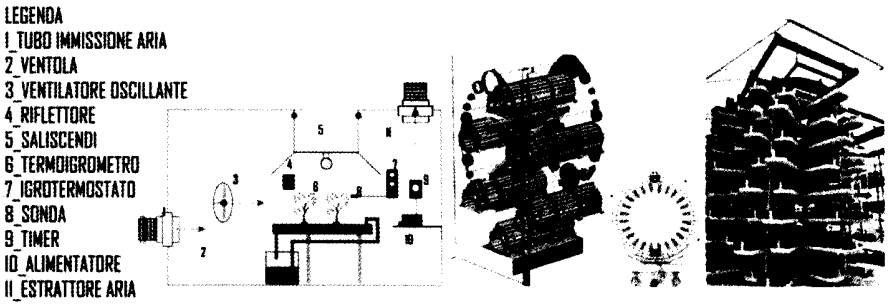

Figure 4 : Indoor growing: Hydroponic System.

Aeroponics is an advanced cultivation technique, with high manufacturing yields. The plants are placed on special perforated panels intended only to support the plant. The growth occurs in plastic tubes through which pass the nutrient solution: the roots of the plants are exposed to air and have no type of contact with natural or artificial substrates. The time of growth of the plant, independently from the seasons, is the same as traditional crops in the ground, but without interruption. Contrary to what happens for hydroponics, aeroponics cultivation allows to use the entire volume of the greenhouse and to modify the parameters of the nutrient solution in order to obtain the best cultivation results.

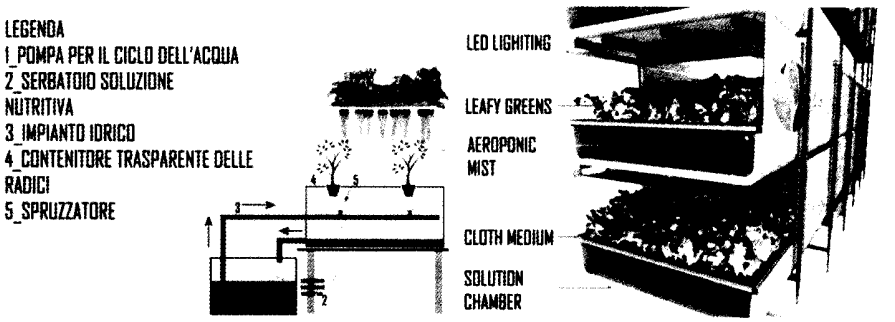

Figure 5 : Indoor growing: Aeroponic System.

Finally, aquaponics allows to raise fresh fish and vegetables for family consumption or even to generate income as own commercial business. Everything is characterized by the production of food using natural biological techniques. The waste is converted, dissolved in the farming or fish and shrimp water, thet are, so to say, "processed" in greens and vegetables. Schematically, the system uses in fact the discharge water of the tanks, where fish are raised, to irrigate the special beds for growth, with no soil and fertilizer, where are located the young plants to grow. It's necessary to tie these research experiments of new forms of living to avoid the complete alienation of human beings: architecture as hyper-functional machine, the secret dream of modern architecture should be being able to establish new relationships between home, place of work and production sites [4].

Study Cases

At the present there are many experiments conducted that can be analyzed as study case in order to identify the main brances of experiment on the issues addressed above. The first of these is "The Tour Vivante", a SOA French architects project: experimental indoor growing, vertical farm along with housing and offices create a hyper-complex system capable of meeting specific needs of the contemporary world. The design of a complex organism able to eat independently, thanks to the design of technological devices in order to achieve high standards of environmental sustainability is the main challenge of this proposal. A project made of layers: agricultural landscape, vertical farm, together with the urban residences and offices, are places of self-sustaining production and consumption able to transforming the city into a place of production and not only consumption.

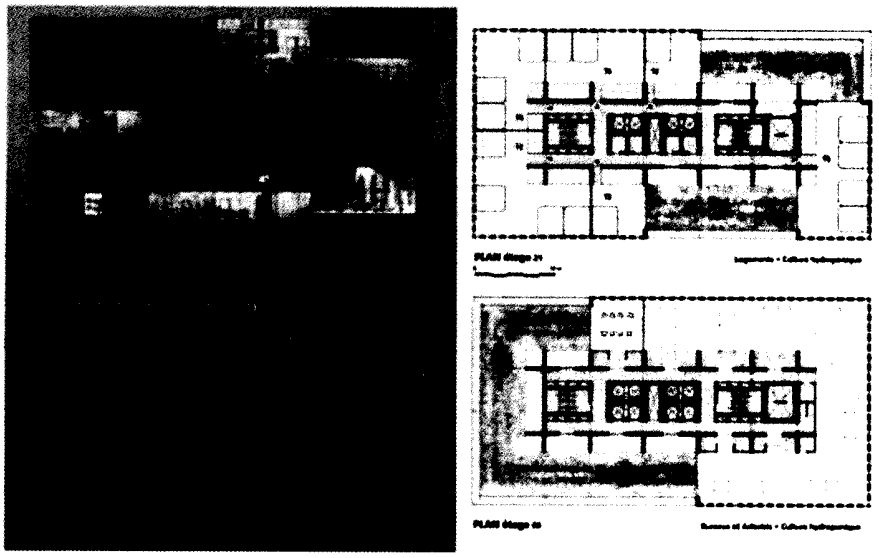

Figure 6 : Drawings of farm tower "Tour Vivant" proposed by Som architects.

The other project to be analyzed as a case study is Knafo Klimor Architects "Agro-Housing" : interestingly, the same concepts are applied to different types of buildings. While in the first case the reference type is the complex building with a development project mainly vertical, Knafo Klimor develops the typology of the building in line reducing, in fact, the alienation of man in relation to the new agriculture laboratory. The indoor growing are the setting for a careful planning of housing and new ways of living with a focus on the transition space in which to expand the residence itself.

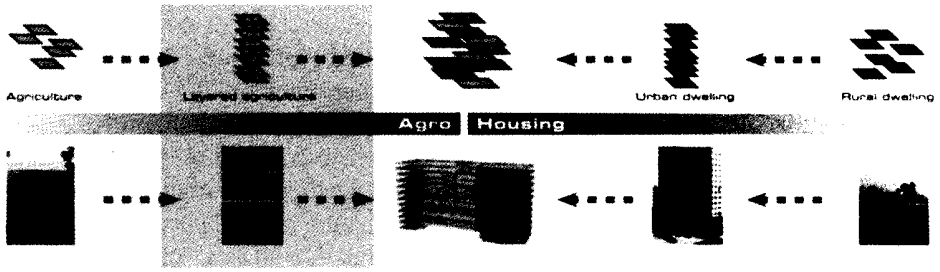

Figure 7 : Agro – Housing: conceptual diagram.

A Design Solution: Loft 2050, London Farm Tower

"LOFT 2050: LONDON FARM TOWER" objective is the investigation of the phenomenon of living in relation to population growth, the gradual urbanization of the world population, the need for new technologies for the production of food in established urban centers established. The choice of the timing of the project, in 2050, it's not random but refers to research on population growth and future development of urban areas. To outline the problem you need to analyze some figures: in 2050 the world population will consist of 9.9 billion people of which 71% will live in urban areas. They will also need 1,000,000,000 acres to meet the need for food. All this inevitably has an impact on metropolitan areas development: the city becomes widespread through the exponential growth of urban sprawl, and the places of production decrease. The town consumes but does not produce. This will "oblige" to make a reflection on the regeneration of urban spaces that can be called "empty" and new development models that are able to cope with the problems listed above. The design intention is to compress a part of the city and make it live of their own relationship and systems, in continuous connection with the outside, but capable of self-sustaining. The research application, which is inspired by a design competition, is in the heart of the city of London in an area affected by recent urban expansion projects such as the Shard by Renzo Piano and Norman Foster's London City Hall and can be defined as "urban void" waiting for a Metamorphosis.

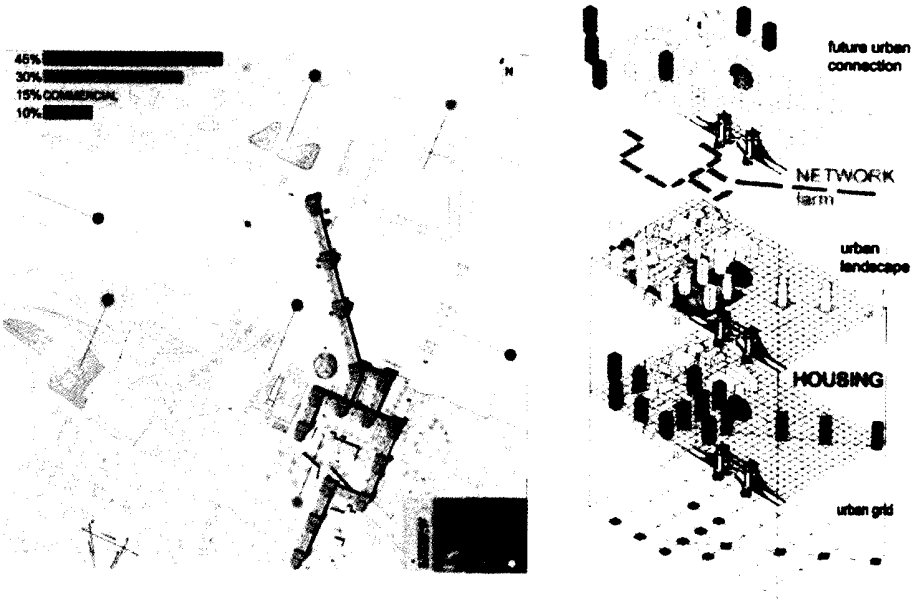

Figure 8 : Conceptual diagram of urban network

The regeneration of urban spaces is the central theme of the research has as its objective in the development of a growth model that is able to consume and produce at the same time. The project uses social housing as a conduit between parties: an "urban void" to densify and re use through an "open" system, ready to connect to other urban spaces, leaving permeable and public spaces in contact with the surrounding urban contest. The creation of a social network made up of houses, the space between the houses and places of productive work is seen and developed as an urban "component" necessary to respond to the issues listed above. Housing becomes the tool through which "rethink" the residential housing system by introducing a set of variables, temporal and social, otherwise unknown, as a unique opportunity to define a "new environment" to ensure human and social relations, not only to provide a service to avoid the alienation of human beings.

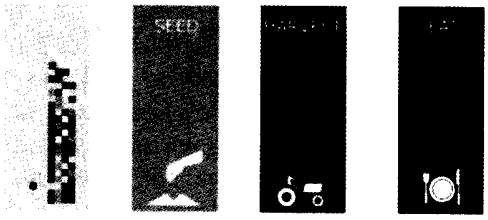

Figure 9 : Loft London Farm Tower: new way of living and new way of production.

The project is made by layers: the living space extends vertically to leave permeable the space of the city floor, as city park and community service, while in the underground space are placed the market, a cultural center and space for indoor growing. The residential towers, in which experiment new ways of living as co-housing and co-working, are interconnected by "cultivated" bridges, hence the slogan social network, re-interpreting the nature of the inhabited bridge; In addition to outdoor growing previously described the project involves the use of new techniques for indoor growing, such as hydroponics, aeroponics and fish that are side by side with traditional production techniques.

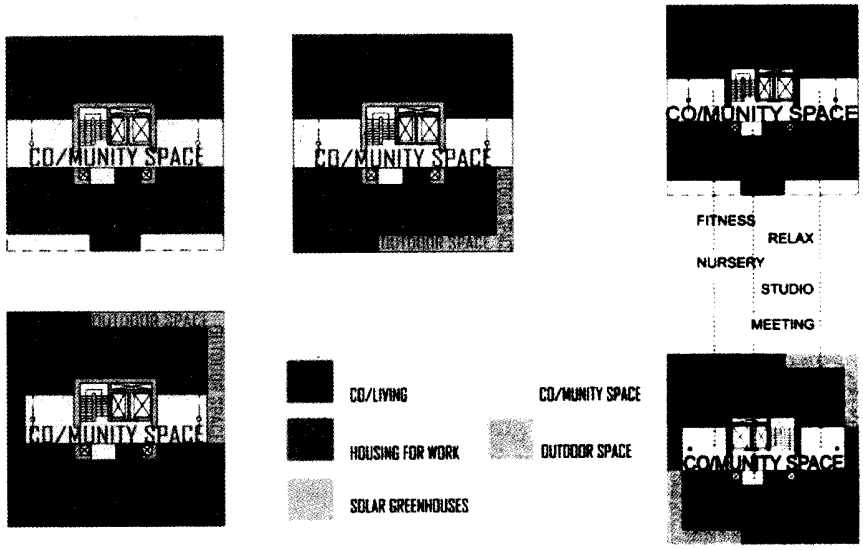

Figure 10 : Experimentation on new forms of living: expand residence in transitional spaces.

Agriculture faces a big challenge: to ensure a healthy diet for a growing number of people and find methods of cultivation always less aggressive to the environment and the soil. It isn't secondary the energy aspect: if resources and the food issue is solved through the cultivated bridges and through space for indoor farming able to generate work and income, the energy issue is dealt trying to make "autonomous" the tower throughout active systems of energy production and water recycling to irrigate.

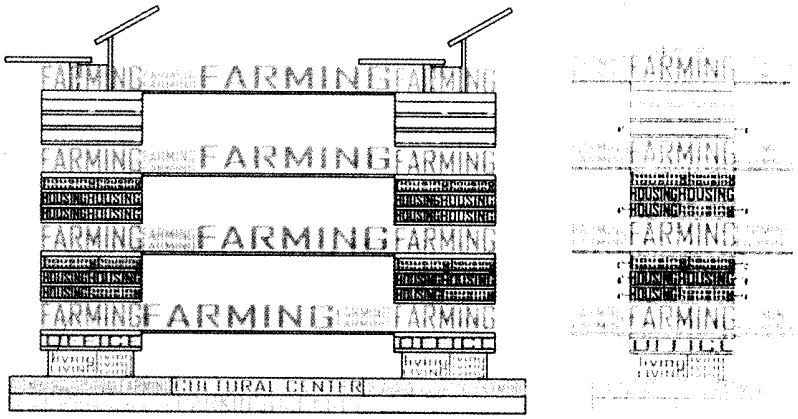

Figure 11 : Loft London Farm Tower model complex: diagram of functions.

Figure 12 : Loft London Farm Tower: re l use of urban spaces.

Conclusion

For this "new urbanity" an intensive production of housing is inadequate if it's not based on a complex urban public space qualified and capable of preserving the identity and welcoming new intellectual streams and propose new forms of collective communication and expression along with new methods of production of energy and food. A complex system that thrives on relations and that certainly has several advantages listed followed: the integration between production sites and social housing, agrohousing,resulting in the creation of new professional profiles, the reduction of the supply chain that provides for only the producer and the consumer eliminating the intermediate steps, highly polluting, such as the transport, the ability to adapt the system to any kind of weather and society anywhere in the globe. For what concerns the food production innovations, we can say that: the indoor crops, such as hydroponics, thanks to the integration of mineral nutrients allows to cultivate without earth, water and recycling systems, the farm produces as a greenhouse throughout the year in a more stable base, because it is less subject to significant weather events, disease or animals.

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