HYPERLOCAL BLOCK

Towards a new self-sustaining urban typology

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Année académique 2021-2022

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hyperlocal

/hʌɪpəˈləʊk(ə)l/

adjective

relating to or focusing on matters concerning a small community or geographical area.

Oxford Languages

Abstract

The Covid-19 pandemic made us reconsider the importance of resources and services in times of crisis, pointing at our dependence on energy, food and industrial products. The lack of accessibility to city, regional and global infrastructures forced us to reconsider what we find within the walkable distances, further highlighting how unbalanced modern metropolitan life is. These particular conditions invite us to reflect on a series of issues concerning urban typologies; in particular we now have the opportunity to rethink the notion of community based on factors such as the sudden narrowing of the range of resources supplying, the affirmation of the digital, the desynchronization of traffic flows and more. This strong acceleration should push us towards a new attitude and a new urban organizational model inspired by self-sufficient ecosystems. It is therefore time to identify the elements of this model and find the way to assemble them in order create a new hyperlocal habitat…

...but will hyperlocalism and self-sufficiency provide effective solutions for the creation of new resilient urban communities?

INTRODUCTION

Hyperlocal paradigm

The pandemic has had a range of effects on the global economic system, most noticeably by disrupting worldwide supply lines and highlight the importance of local network resilience. Many nations reconsidered their need of local means to ensure a self-sufficient market and to guarantee supply of resources when entire countries were forced to lock down and global networks were interrupted. While international tourism and large social events have been forbidden, local networks have been revitalized in alternative forms, with citizens focusing to their neighborhood communities to help older people and companies adapting their business in new ways to serve their community. An additional effect of the pandemic's intensification of hyperlocalization seems to be a rise in socially aware consumer attitudes, with a particular emphasis on helping small companies which have been the most impacted. As the globe slowly unlocks again, it's likely to occur that we will still allocate our purchasing disposal toward local companies and communities, in which we are able to see major effects. These trends may, in the coming years, lead some companies to concentrate only on local or neighboring markets in

order to minimize possible vulnerabilities associated with global supply chain. Even for smaller companies, concentrating their efforts and resources on local areas where they can get a bigger impact and reap the most rewards may be the best course of action.

"*With one of the biggest global economic downturns in recent history, the year 2020 has made the interconnections between business, society, technology, capitalism and growth perhaps more visible than ever.*"[1]

Because the impacts of the pandemic were not perceived uniformly, throughout the population, major companies, came under growing criticism. Large technology corporations largely gained from the pandemic's accelerated digitalization, while other economies declined, resulting into heated debates about the growing centralization of richness and power in just a few companies.

The myth of perpetual economic progress is more and more being questioned as people examine the sustainability of consuming more and more goods and turn to more responsible consumption behavior. The common criteria of success within the traditional economic system are being reinterpreted as more people become aware of the unsustainable nature of accelerated production and consumption of products. Governments, organizations, and corporations will increasingly be labeled on their carbon footprint and overall environmental effect in the future.

With the advancement of technology allowing for regional manufacturing of commodities, the focus on small communities induced by the epidemic, along with climatic concerns, may, in the coming decade, establish a new paradigm based on hyperlocalisation

1 Sandal, G. *What's next for capitalism? The forces shaping future economic systems in the 2020s*. Future Proof https://www.futuresplatform.com/blog/whats-next-for-capitalism.

and a rediscovered notion of community. As a consequence, in the event of hyperlocalization, major changes in the existing geo-economic structure may occur. This will be determined by the next decisions made by the authorities, organizations, and corporations, as well as the changing habits of consumers.[2]

Cities and their surrounding regions should create the energy, products, and food required to sustain the human needs. For this to happen it is required a self-sufficient system at a multi-scalar dimension: from the single dwelling to the whole city.[3]

In the first part of this study the focus is put onto the scale of the city block to explore new potentialities within the urban fabric as it is easier to directly refer ourselves to the everyday conception of human needs and activities.

2 Sandal, G. *What's next for capitalism? The forces shaping future economic systems in the 2020s*. Future Proof https://www.futuresplatform.com/blog/whats-next-for-capitalism.

3 Guallart, V. *The Self-sufficient City*. (Actar Publishers, 2014). pp. 29-30

HYPERLOCAL SCALE

Genesis and transformation of the urban block

To understand the importance of the city block in the formation of the urban fabric over the centuries, it is certainly useful to identify its genesis and the reasons for the various transformations of its shape overtime.

It's fundamental to recognize that the totality of the urban environment goes beyond the simple addition of its single structures. A city is composed of built units called "urban blocks" that serves as an interface between the dimension of individual buildings and larger neighborhoods. By consequence, these components serve as a bridge between the individual's personal domain and the public sphere. This is the reason why they are also called "building blocks of the city".

"Without the block, there would be no streets, just roads. Without streets, there would be no street life, just trafc. Without street life, there would be no city, just buildings. In more prosaic terms, the block is no more than the land and building area defned by streets. But it is the nature of the interface between the two that

has a critical impact on the quality of the spaces between those buildings."[1]

It is crucial to understand the beginnings of urban fabric, especially the urban block, in determining the existing urban framework within which we will be constructing in the future. We can't hope to have a beneficial effects on urban fabric until we understand how it works and why. The typical urban block is inconceivable as a distinct unit. It is more of a component of a structure that is dependent on both its mutual connection with the street as well as the substructure of smaller partitions, almost autonomous, known as "plots". As a consequence, these plots can be filled by a diversity of buildings with a variety of purposes. There is an intrinsic potential for change implied by this structure, and the plot represents the foundation for this. The fabric of ancient cities has evolved as a result of the overlaying of many structures working at different scales to generate a variety of distinct yet cohesive urban morphologies.

The traditional way of masterplanning by plot and block, in which each lot owner is free to make his own choices, has recently been replaced by a preference for masterplanning by single blocks, in which the single block or group of blocks is built only one developer using the residual areas remained after the streets have been trace Today's masterplanning generally focuses on creating one "mega plot" that may host a single structure or many buildings that are connected by a common podium or basement. Even though imperceptible, one of the most important aspects of the "ancient city" has been omitted in this new paradigm: plots are no longer considered when planning new developments. Once we realize this, we start to

1 Tarbatt, J. & Tarbatt, C. S. *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*. (RIBA Publishing, 2020). p. 3.

see why ancient blocks have been able to adapt and transform to adapt to new circumstances, whereas blocks in the modern era are often entirely substituted when they no longer serve the purpose.[2]

The history of the block starts at the beginning of Roman Empire, when the word “insula”, meaning “island,” was invented to indicate both a housing building and a urban block. Because the block acquires its shape from the surrounding streets’ paths, the word “island” is self-explanatory. To put it another way, it’s a piece of private property surrounded by public city roads. It is estimated that insulae hosted 90 percent of Ancient Rome’s inhabitants, and therefore, they formed the city’s overall fabric, interrupted by commerces, public buildings, and more wealthy villas. What distinguishes the block, which is part of a system of roads, from the linear structure of streets themselves is basically the fact that for a block to form, a minimum of two streets is required. Moreover, a single block does not form a city.

The methodical masterplanning of new towns in perpendicular grid patterns is attributed to the Ancient Greeks more than four centuries earlier, during the late classical period (5th-4th century BC). While classical Greece was experimenting with grid-based masterplans, comparable patterns were also being used in Babylon. Invention of the Ancient Greeks and other ancient civilizations, this grid-based strategy had a significant impact on Roman urban planners, who continued to use this procedure that culminated in the allocation of construction plots by a lottery.

When Europe’s political and economic situation stabilized in the medieval period (10th-11th century AD), a new phase in urban growth began. The unplanned, apparently ‘organic’ city, most frequently

2 Tarbatt, J. & Tarbatt, C. S. *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*. (RIBA Publishing, 2020). p. 6.

identified in the medieval cities constructed during this time, is a direct consequence of the masterplanned cities of the Ancient greeks. On closer look, what appears to be a “unordered” structure may reveal to simply be a irregular (**Image 1**). Rather of being “unplanned,” such formations are more accurately described as the consequence of cumulative choices of multiple stakeholders over an extended time frame. Moreover, it is attested that surveyors were frequently used to lay out “new” medieval settlements (those that were not based on pre-existing urban structures), although with quite low level of precision. Since medieval land partition was based on geographical features or pre-urban land boundaries and paths) and because tools were used to create organic patterns in contrast to the geometric masterplanning of preceding and

Image 1. Medieval block, London.

succeeding periods, it is not unexpected that the outcomes created organic patterns. Wealth acquired from colonies was used to fund significant city expansions throughout the British Empire prior to the nineteenth century.

Traditional medieval townhouses were reimagined in the classical style and melded with masterplanned expansions following classical ideals through the Georgian terrace, a sort of row house. The results were blocks which are separating the main dwelling in a hierarchical manner, orienting it towards the street, from the houses serving it, accessible via a back corridor called mews, seeking to avoid for its wealthy residents to cross with the plebs. Whereas mews blocks often take orthogonal shapes, the s o-called “great estates,” on the other hand, were mostly grid-like, but with inclu-

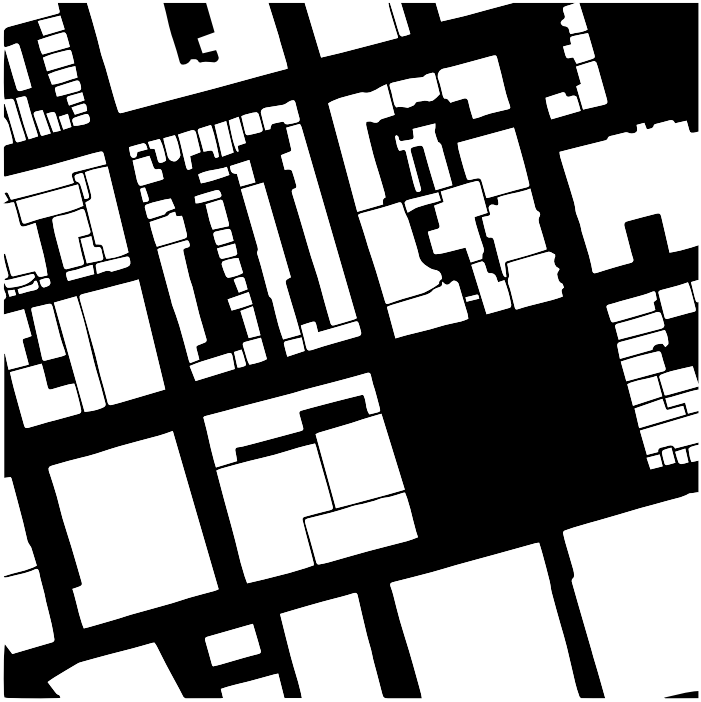


Image 2. Georgian gridded block, London (Belgravia).

sion of architectural compositions, like crescents and rounds and formal courtyards and parks.

The grid was implemented largely in America, where, with a few rarities, it became the main model during colonisation between the first part of the 16th century in the South and the 18th century in the North.

Barcelona was expanded in accordance with Cerdà's 1858 design (**Image 3**), which used the tested gridiron pattern now with the chamfered square blocks of roughly 113m. This visual distinction that characterizes the old town, with its medieval pattern, and the organized expansion, is indisputable. During the same time period, other gridiron extensions were planned, such as the one in Berlin with James Hobrecht. The new buildings were made up of narrowly plotted rect-

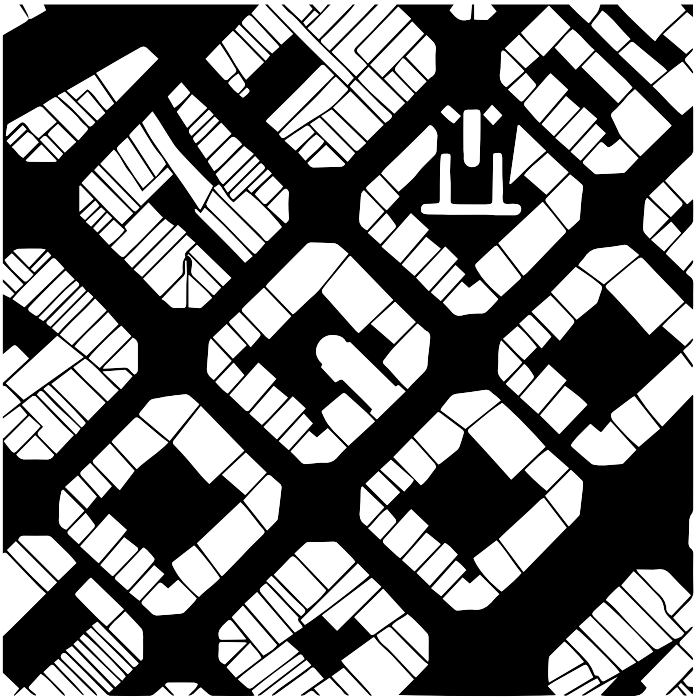


Image 3. Cerdà's expansion, Barcelona.

angles. The high density of housing, along with a lack of fresh air circulation, supplied argumentations to identified in medieval structure as well as in the European gridiron, (and therefore the block) as indicators of desolation of the city's structure.

The twentieth century saw a determined shift away from conventional urban blocks in favor of innovative conceptions in urban design, including highly dense and independent "point blocks" and "slab blocks", as well as lower-density typologies that separated motorized traffic from pedestrian mobility. Both solutions deteriorated the block-to-street relation found in conventional urban blocks, and both failed in the end. It was at this time that interest began to be reframed on the beneficial aspects of classic urban forms, such as perimetral urban blocks, which once again started to be reintegrated in urban planning theory and practice around the end of the 20th century. Suburbanisation also appeared to be a common tendency which influenced the transformation of the block with a durable impact.

Britain's Garden City Movement, in contrast to the expansions proposed in Copenhagen and Amsterdam, was more focused on the suburbs.
As an altruistic solution to congestion in England, Ebenezer Howard started the movement in the late 18th century. He had a vision of creating self-contained satellite towns that would mix the advantages of city life with rural labour. His ideas, which were basically resumed as layout scheme, were put into practice in the development of new suburban garden cities in Northern London (**Image 4**). He had a big impact on how new suburban blocks were built. They were mostly composed of perimeter blocks with low population density due to the implementation of single-family housing with gardens. Communal gardens were included in the inside of a few of the blocks as a new concept in suburb block planning. This trac-

es back to the medieval block's organization, when horticulture was a priority, and to the rural philosophy of self-sufficiency.

Image 4. Garden suburb, Hampstead.

"Le Corbusier's theoretical projects for freestanding towers and slabs such as his 'Plan Voisin' and 'Ville Radieuse' produced in the 1930s, and his built work such as the Unité d'Habitation in Marseille, which included an enclosed internal street on the 5th foor, inspired numerous like-minded schemes [...] But applied to damper climates, with poor connections and occupied by disadvantaged communities, they created the perfect conditions for communities to fester and ultimately disintegrate, creating a new kind of slum scenario with residents dislocated from the city and deprived of any of the benefts of city life."[3]

3 Tarbatt, J. & Tarbatt, C. S. *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*. (RIBA Publishing, 2020). p. 26.

These many instances of urban structures show the reasoning that influenced a systematic detachment from the conventional urban or perimeter block. However , there has been a pushback, which intentionally or unintentionally led to a reconsideration of those urban forms that originated from the Greek's plans.

In the United States, the "New Urbanism Movement" intended to restore a feeling of belonging and neighborhood that had been lost due to postwar suburbanisation. While the constructed projects that embraced New Urbanism's principles have been questioned for being nostalgic (and obviously directed at the wealthy), they were remarkable as they sought to promote 'walkable' and accessible neighborhoods made up of small blocks rather than isolated cul-de-sacs, and thus attempted to create the prerequisites for communities to develop on their own. The concepts are expressed at three levels: city-town, neighborhood-district-corridor, and block-street-building. The principles assert for the physical definition of roads that are secure, walkable, and accessible.

All these different projects, groups, and manifestos portray a vast assortment of ideas and goals on their own. Taken together, they show a growing agreement that cul-de-sac suburbia, as well as high-density urban planning had to be rethought.

The Self-Sufficient Urban Block

"What kind of potential could be derived from the interaction of a number of buildings in an urban system that promotes the distributed management of resources? How can energy be generated and stored in cities?"[1]

To respond to the necessary transformation of its form it is useful to think about the potential new purposes and uses of the city block in a scenario which is headed to the promotion of a hyperlocal system and allows the enrichment of a community.

The functions enclosed in a city block may vary depending on the scale to be handled within the city. A city block's diversity of functions increases urban complexity while reducing required travel distances for a segment of the population.

City blocks, from a organisational perspective, are entities that enable direct interconnections among private units, people, or communities without having to enter public space. In opposition to buildings, they don't have their own legal standing, but t hey can, however, enable the creation of facilities with energy and environmental capabilities that can be controlled collaboratively, by inducing a strong social foundation and in a more effective manner than in a single building.

Each city has blocks of various sizes, functions, and densities constructed over time that, when combined

1 Guallart, V. *The Self-sufficient City*. (Actar Publishers, 2014). p. 115

together, form neighborhood layouts.

When we take in examination the suburbanisation of the 20th-century in the United States, every person owns a house surrounded by a small green piece of land with no connection to the neighbor plots. Moreover the place for social interaction became the privatized area of the golf club. These areas were developed in a very inefficient way, in a period when energy was much cheaper.

These considerations leads to the necessity to increase urban density and social interaction in the present times. Most cities still exclusively take in evaluation the possibility of constructing structures upwards in respect to the ground level. Everything that is constructed underneath is almost always exclusively considered in terms of a distinct type of regulation, such as fire codes or economic activity standards; however the possibility densification of cities through the arrangement of facilities and infrastructures in the underground levels appears to be a more than valid option.

Urban blocks in New York, Barcelona, and Paris would need less production facilities if they had to generate their entire energy requirement locally since the energy demand in mixed-use buildings happens discontinuously throughout the day.

As a consequence, resource supply systems must be structured to accommodate spikes in demand. Buildings with only one destination of use can be problematic. When they have generate electricity locally, there will always be demand peaks that are exceptionally high during specific times in the day and other times when very few energy is utilized. During the evening and on weekends, an independent apartment building will consume more energy than it does during the day; Workplaces and enterprises, on the other hand, consume more throughout the day. As consumption rates are extremely varied depending on time, if mixed-use units are developed, the consumption rates will be

compensated. Energy production, which includes both electricity and water heating, should rely on a mixed system that includes geothermic installations, solar energy, and, when needed, micro wind turbines and biomass facilities.

If resources are created locally and existing resources are properly preserved, cities can attain energy self-sufficiency. No massive migration processes are expected in Europe and the United States in the next future. Because of the economic expansion in developing nations and the Western economic crises, urbanisation in United states and Europe will be focused more on repurpose instead of on expanding the existing urban structure. Any new development will provide a chance to define self-sustaining typologies on a local and regional scale. The task is to redesign cities in the attempt to increase their efficiency. As previously anticipated, energetic self-sufficiency may be accomplished by generating energy through various of methods in order to attend the total requirement. The scale of a city block allows for the implementation of many technologies that are both cost-effective and beneficial when integrated into intelligent networks that control production and consumption for various assets.

Future photovoltaic technologies will be more efficient by implementing the usage of nanomaterials, which may be applied through a different methods, such as painting, to almost any surface. Management systems that allow for regular maintenance are essential for ensuring efficiency of energy production systems. The usage of thermosolar modules, which generate hot fluid that may be used for heating or sanitary water heating, is another source of potential energy. The use of hot water to generate energy has been particularly explored in small-scale constructions.

The use of underground tubes for geothermal technology enables to receive water at a stable temperature throughout the year. The fact that the ground-

water is at around 17 degrees even in the winter implies that you spend less energy to heat it. Whereas in the summer, this implies less cooling for air conditioners. Biomass boilers can provide hot water that may be utilized efficiently in city block or neighborhood scale facilities.

Two crucial techniques for achieving an annual neutral balance between production/consumption of energy in city blocks are the integration of multiple energy production technologies and higher building insulation to reduce energy losses. The most effective systems are those in which demand spikes cause minimal variations from normal supply.

To build off-grid city blocks that are self-reliant, we will need to provide larger local energy storage for unproductive days (for example due to weather conditions) or in case a building produces more energy than it consumes. As electric mobility grows and a new retail for old batteries emerges, vehicle battery racks may be installed in the underground floors to collect energy that is generated but will not be immediately consumed. The proportions of city blocks are ideal for building "power generative" residences within cities. In this scenario, an intelligent network would be required to manage this enormous potential of energy output and consumption, and in order to make city blocks working together as a system.

"Whereas cities build habitable structures the respond to the way of living, relating with others, and working that is characteristic of each particular time period, workplaces -their location and accessibility- are key to organizing people's daily lives. Housing follows work.

Urbanization processes in Europe, America or China are linked to their industrialization processes. At the beginning of the 21st century, in countries like the United States, 1% of the population works in the primary

sector, 16% in the secondary sector, and 83% in the tertiary sector. More than 40% of work in the tertiary sector is done "on the network", which means that the worker's location is no longer a relevant factor. In fact, we are witnessing a growing phenomenon in which things are being produced locally again, but "local" can be almost anywhere."[2]

Creating values that can compete in the global marketplace is one of the primary axis of every economy. Developed economies are now confronted with the necessity to return to generating resources locally, rather than merely leading global information processes while actual product manufacture takes place in emerging markets.
Especially referring to uncertain times as we are experiencing in the present with global health crisis, local manufacturing is an assurance of survival. Energy production, in particular, is an element of local independence. The production of food and goods contributes to socioeconomic development. Moreover with the spreading opportunity the teleworking implies that people can practically work anywhere and at any time. As a consequence, working closer to the place of residence, minimizes time lost due to forced movement and can improve people's productivity and quality of life. We may think of new workstations under the roofs for freelancers who conduct business digitally. The ground level, is dedicated to commerce, with housing floors right above: a new type of vertically structured functional hybridism in buildings.

While in the industrial economy, production was concentrated in big factories so that millions of people around the world could get their hands on products, the information culture allows people to make anything,

2 Guallart, V. *The Self-sufficient City*. (Actar Publishers, 2014). p. 126-127

in any corner of the globe, by sharing knowledge and making things with their own machines. A “Fab Lab” is a manufacturing workshop where almost anything could be created using digital automated machinery and online information. There would be an innovative market being proposed by the Fab Labs; based on “on time, on site” production. The ultimate goal would be that with Fab Lab’s machines you can manufacture anything from a little digital device to a house. Large wooden boards may be cut using a milling machine to build furniture or house elements. Furthermore one of the primary effects of promoting self-sufficiency is the curiosity in how things came to be and where they came from.

The idea of producing food at the city block’s scale is becoming more popular within cities. Green roofs are a viable option considering they can offer appropriate isolation and have the capacity to store precipitation, preventing drainage systems from becoming overburdened when heavy rains fall. They also provide a more natural environment on urban rooftops. Beyond the renovation of existing structures, the concept of a “urban farms” is being investigated in various of places all over the world, where vertical farming employing hydroponic technologies might be a solution. In the event of world population overgrowth, which may occur in the future, this approach sounds actually reasonable. Once the capacity of traditional agriculture is reached out, new methods of food production (as the urban vertical farms) may arise in the cities.

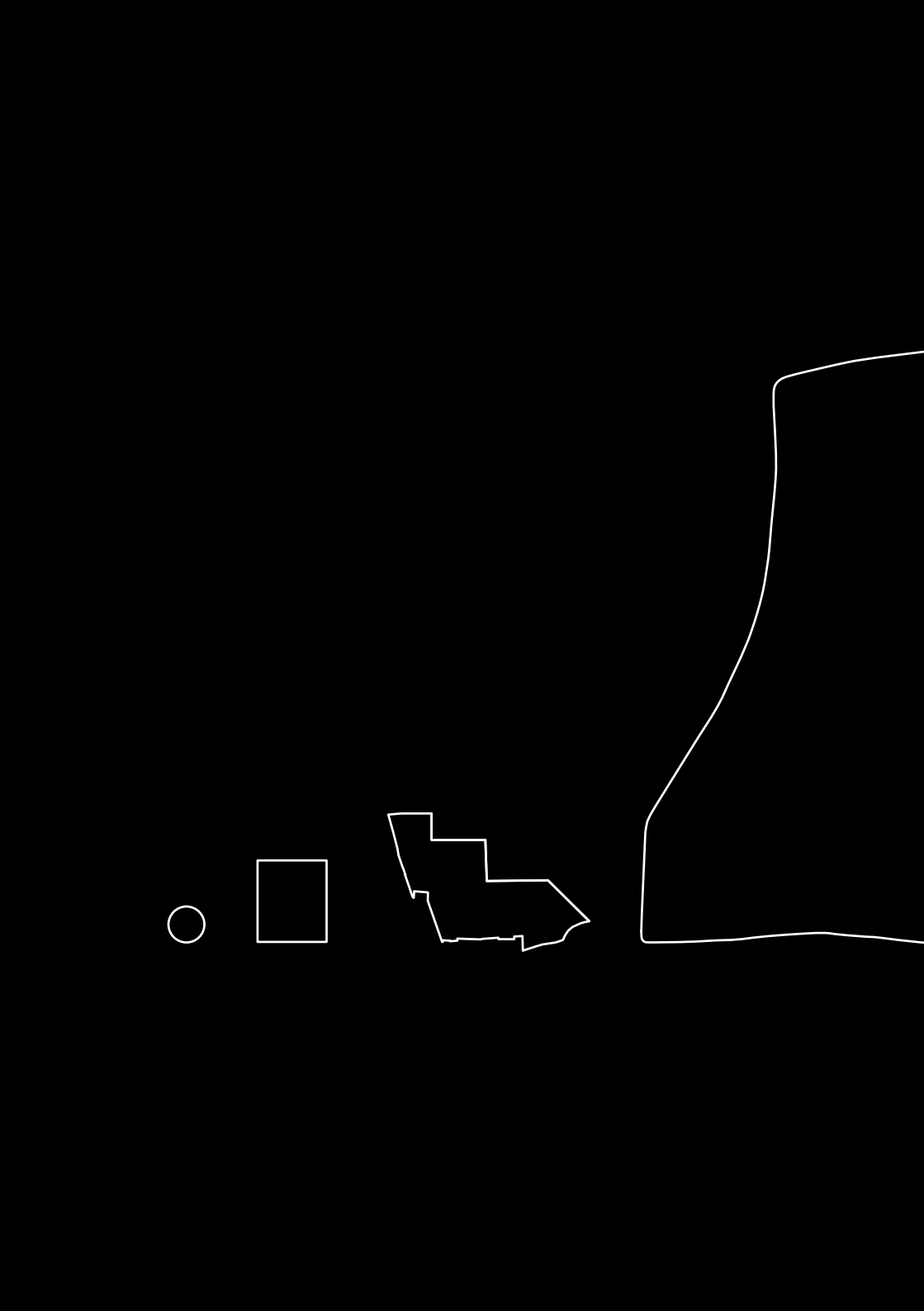
For local farming, an efficient water cycle management system may be implemented on a city block scale beside of the energy production and consumption plan. Different types of water can be separated in different places depending on where they come from, whether it is treated water, rainwater from roofs, groundwater, gray water, or black water and used for different purposes.

In the next decades, we must demonstrate the need of preserving the farmlands on which cities have grown to become metropolis. We need to reinvent the processes of creating, distributing, and consuming food in a way to praise local culture.

HYPERLOCAL SAMPLES

In this second part, four different case studies will be examined. As anticipated in the introduction, to establish a new effective self-sufficient model it is important to imagine a system that works as a multi-scalar network and for this reason the selected projects vary in size and typology: from a small village composed of 20 households up to a whole new city with 60'000 dwelling units (210'000 inhabitants). The case studies are presented in ascending order based to their surfaces; the third example (Ecoquartier Les Vergers) concerns a recently realized project, while the other three consist in unachieved design.

The projects are first of all presented following the authors' descriptions and according to their vision of a self-sufficient architectural and urban habitat; each of them is then followed by analysis supported by diagrams which allow to compare the four projects, in plan and in a typical section, on the spatial organization of some of their design features.



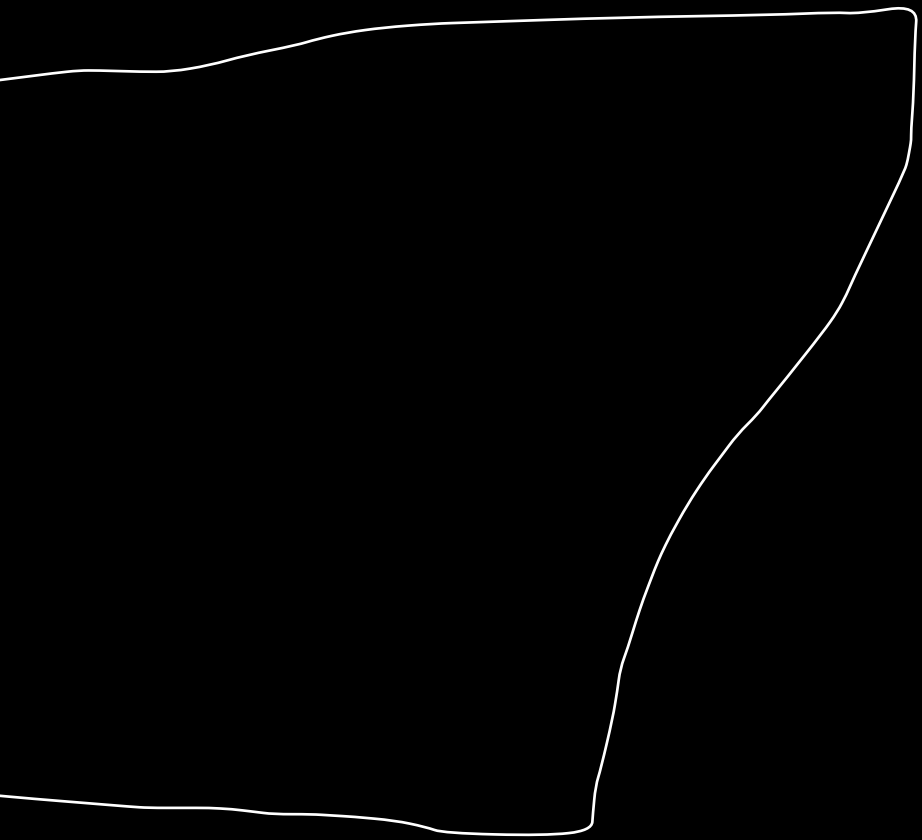


Image 5. ReGen Village, View of community spaces.

EFFEKT, ReGen Villages

Typology	New model for off-grid eco-villages
Location	Almere, Netherlands
Year	2016
Size	1.5 ha
Population	75-100 people
Density	5'000 inhabitants/km^2

A new urban plan for a self-sufficient unit was presented in 2016; a community incorporating just about all the features of an idealized contemporary town where inhabitants would co-generate space and at the same time preserving the natural environment. The concept of a self-sustaining regenerative rural settlement has been exhibited by Danish architectural

practice EFFEKT in Venice at Biennale of Architecture. The size of the unit was calculated to be around 15500 m^2, based on the necessity to supply every household with the fundamental necessities for their autonomy and annual activities, such as a household, food, connection with nature, power, water, and so on. Other units are planned to be developed in Germany, Denmark, Sweden, and Norway.[1]

ReGen Villages is an innovative template for the creation of off-grid, interconnected, yet resilient eco-villages constituted of self-sufficient households all over the world.

The term "regenerative" refers to a situation in which one system's outputs become the input of some other. Aquaponic and aeroponic cultivation, water management, and waste-to-resource technologies are just a few of the many innovative solutions that are included into this all-encompassing approach.

As these new technologies are implemented, ReGen Villages may be able to alleviate some of the problems associated with the increasing global population, expanding urbanization, depletion of natural resources, and shortage of food, all while cutting global CO2 emissions and relieving the load on local and national administrations in these rapidly shifting social and economic conditions.

The project focuses on applied technologies; existing technology is simply incorporated into a small community design that provides clean electricity, water, and food directly on the doorstep. The aim of the project is not only to offer environmental and economic benefits, as well as social cohesion by establishing a structure to involve inhabitants and cultivating a feeling of belonging, in which individuals become part of a common local ecosystem. The ultimate goal is then to

1 Kleszcz, J. *A Transgressive Approach Towards Agritectural Space: The Idea of Agricultural-Urban Use Settlements*. Urban Development Issues 54, 15–26 (2017). p.20

reconnect people with the natural environment and their consumption with the producing process.[2]

"Urban dwellers across the world work hard to pay the commodities of their homes, such as mortgage, energy, water and heating, cooling and food. We envision homes that work for you, producing clean energy, water, food off the grid at affordable land prices outside our big cities."[3]

Self-sufficiency system in this project is imagined on four interconnected layers (waste,food,water,energy), giving birth to a regenerative cycle (**Image 6**).

Waste: household waste is sorted into different categories so that it can be re-used for multiple purposes; bio-waste that is non compostable is used in the biogas facility; compost becomes food for soldier flies and livestock; soldier flies are fed to the fish and manure from livestock is used to fertilize the seasonal gardens; fish feces becomes fertilizer for the plant in the aquaponic system

Food: the aquaponics systems produce vegetables and fruits for the homes; seasonal gardens produce a wide variety of products for home consumption; livestock and fish are the primary protein food source.

Water: the settlement is designed to collect and re-use rainwater; the biogas facility uses the burning of bio-waste to extract water, that is then stored; grey water is separated to be re-used in the irrigation of seasonal gardens; clean water from the water storage is distributed to the aquaponics system when needed.

Energy: solar cells on the settlement provides energy for the home and distributes the surplus of energy to the smart grid; the energy produced in the biogas

2 ReGen Villages. EFFEKT https://www.effekt.dk/regenvillages.
3 Sinus Lynge, co-founder of EFFEKT, interview to Dezeen

facility is added to the smart grid; the surplus energy from the smart grid will be used to power the electric car charging stations.

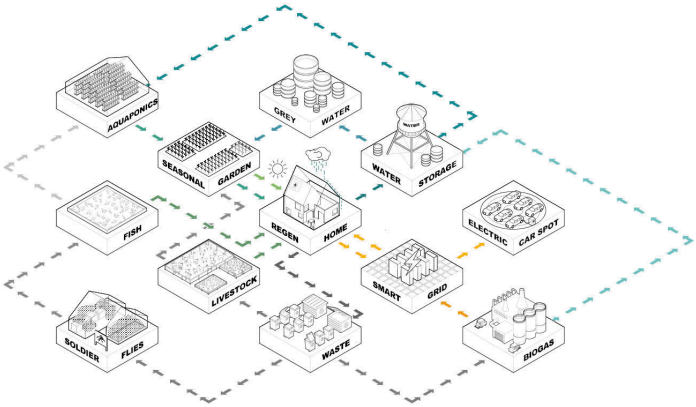


Image 6. ReGen Village: Regenerative System.

"Our modern lifestyle is utterly unsustainable and this calls for more resilient solutions for the future. The technology already exists, it is just a matter of applying science into the architecture of everyday life. ReGen Villages is engineering and facilitating the development of off-grid, integrated, and resilient neighborhoods that power and feed self-reliant families around the world. The time has come to redefine residential real-estate development for the next three billion people coming to the planet."[4]

The village mimics the traditional castellum typology in its appearance, although obviously without delimitation walls as it hasn't any defensive purpose. The thoughtful reference to the circular enclosed typologies as I can also be the Chinese Hakka Tolou immediate-

4 Sinus Lynge, co-founder of EFFEKT, interview to Dezeen

ly refer to an image of self-reliant and autonomy. The project's major orientations are defined by its internal, structural, and concentric relationships, as well as the architectural form of the dwellings and facilities, which is obviously influenced by the archetypal form of the home. Residential housing is blended with car parks and facilities to form the village's outer ring. The second circle defines an area dedicated to social activities, leisure, and education which is clearly linked to and integrated with the farming plots.

The square meters indicated by EFFEKT to ensure the supply of basic needs for the inhabitants of the village appears to be quite generous and they are probably due to the fact that the project doesn't have to deal with high density as it is located in a rural context (**Image 7**).

The greenhouse surrounding the houses acts as a climate filter. During the winter, the sunlight warms up the greenhouse's environment, as such the air is pre-heated even before it enters the house. In the summer this system might lead to overheating problems, but the greenhouse may be opened up in order to provide natural ventilation (**Image 8**). Horticulture can be practiced in this buffer zone of the greenhouse between private and public space creating a zone of production and social interaction which can also imagined to be integrated in common areas in bigger projects. This image of a productive environment which is extended to allow for community interactions can resumes the main vision of the architects and is often the case for other self-sufficient projects as it is described in the next study cases.

The idea has been carefully designed to give ecological, economic, and social benefit by developing design solutions that integrate autonomy along with a framework that emphasizes community cohesion. The main objective is to develop a mutual residential system in which housing is an integral element of a

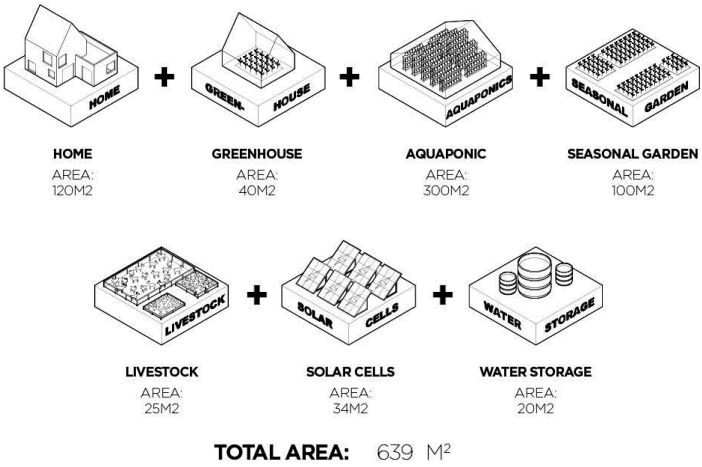


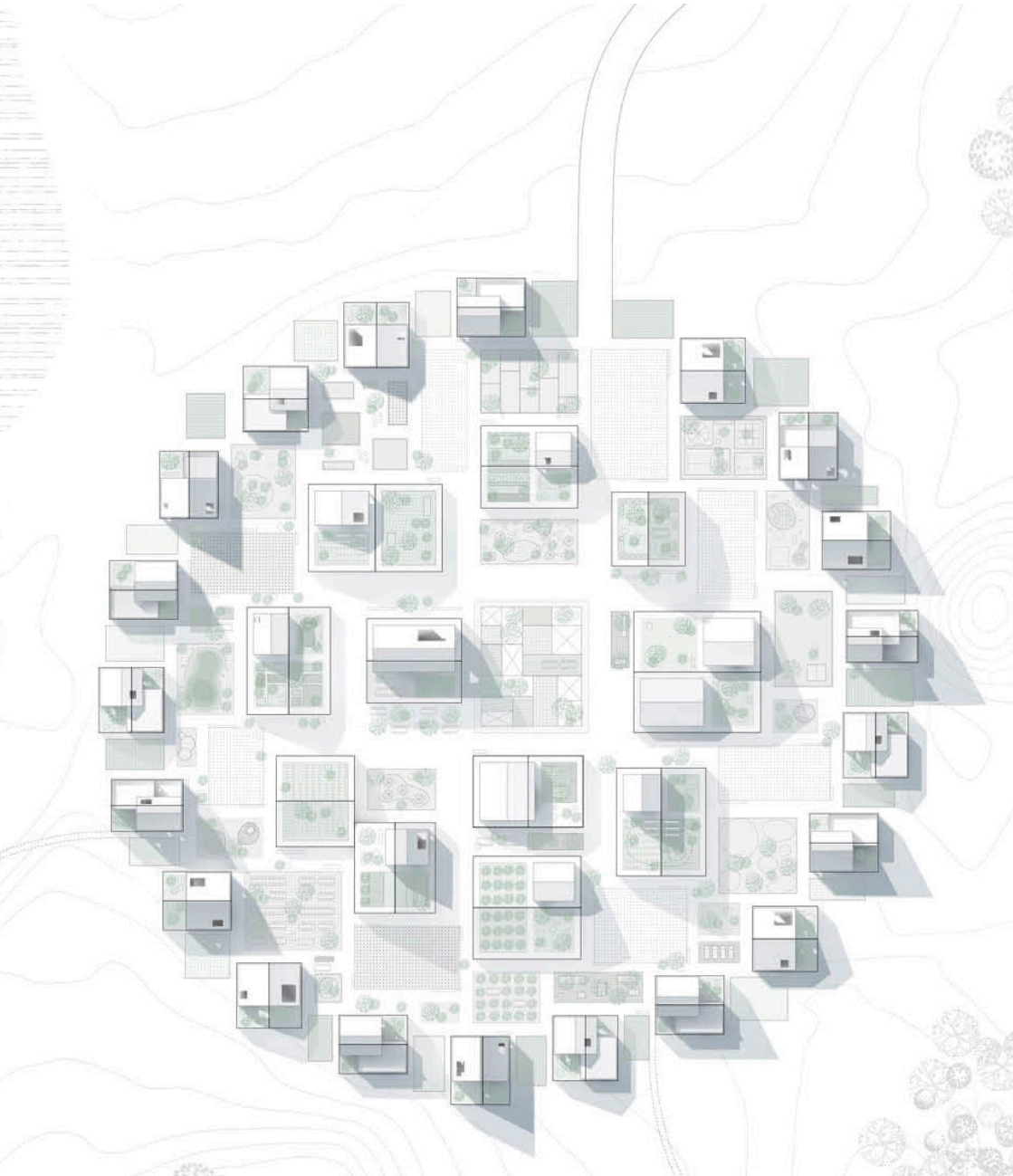
Image 7. ReGen Village: Basic needs for a family of 3 per year.

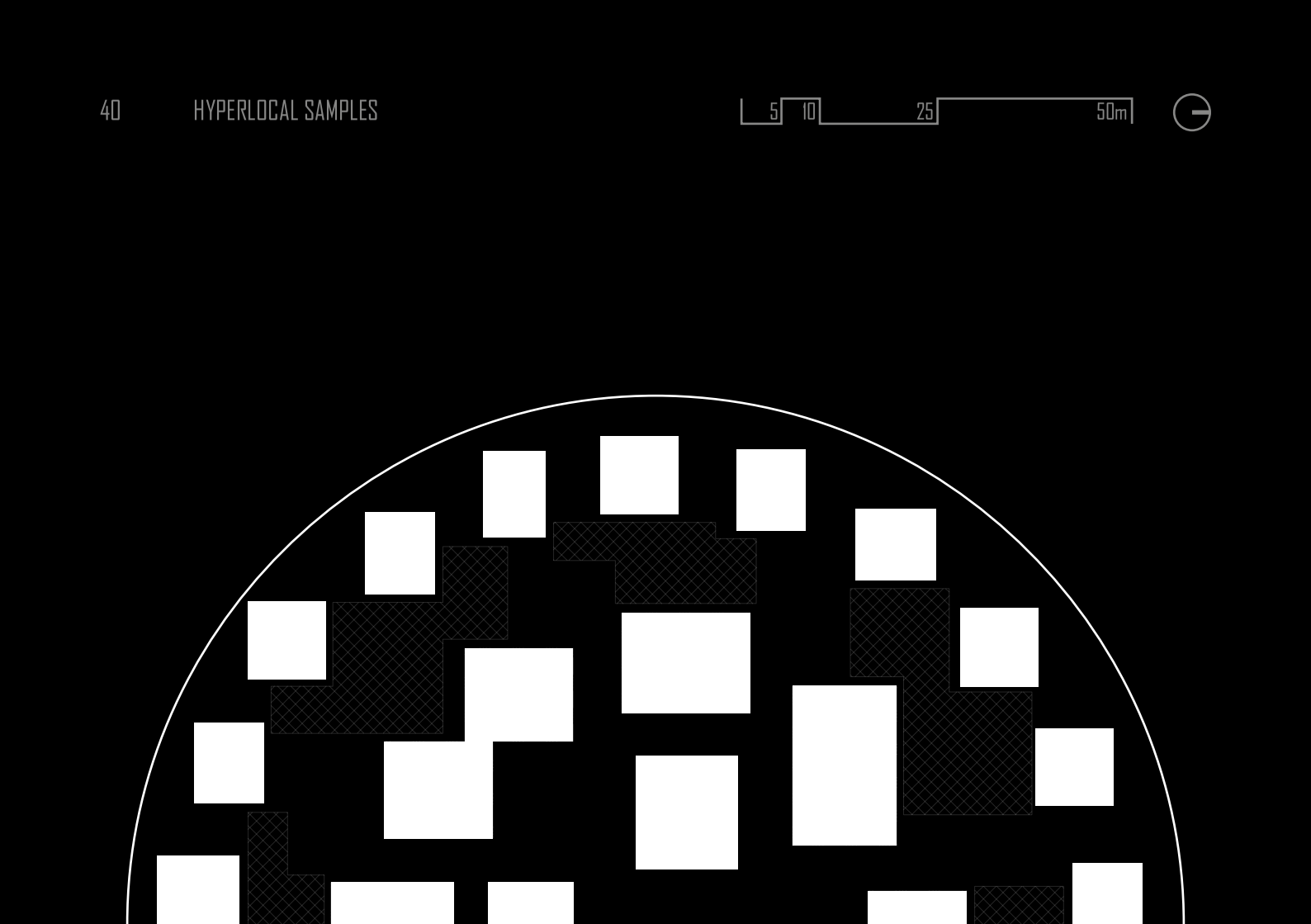
Image 8. ReGen Village: Extended living zone.

harmonious and shared local environment, reconciling people with nature and balancing consumption and production.
The suggested combination of a productive environment and single-family houses provides a new residential density optimization and a holistic vision. Notably, the emphasis on managing local production and consumption with in-situ waste treatment will lead to lower travel expenses. Because the productive and biological landscapes may be changed to be regionally specific, this design is deemed as scalable and adaptable to different environmental conditions. Recalling that the capacity to replicate a whole project in its technical features does not necessarily guarantee the success in developing a new acceptable socio-economical model in an other region of the globe. Unless comparable stakeholders and supporters are coordinated, this may be successful for one case but fail in another due to its complex combination of actors and interests.[5]

5 Roggema, R. *TransFEWmation: Towards Design-led Food-Energy-Water Systems for Future Urbanization*. (Springer Nature, 2021). p. 293

Image 9. ReGen Village: Site plan.

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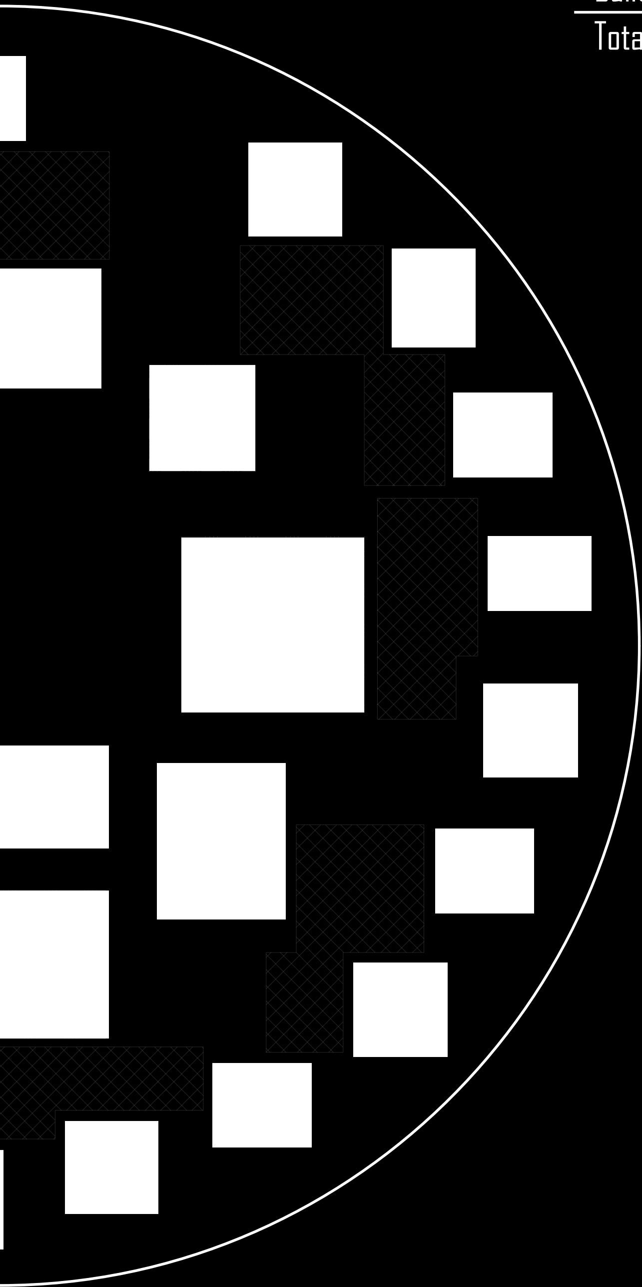
50m

$$\frac{\text{Buildings footprint}}{\text{Total surface area}} = 30\%$$

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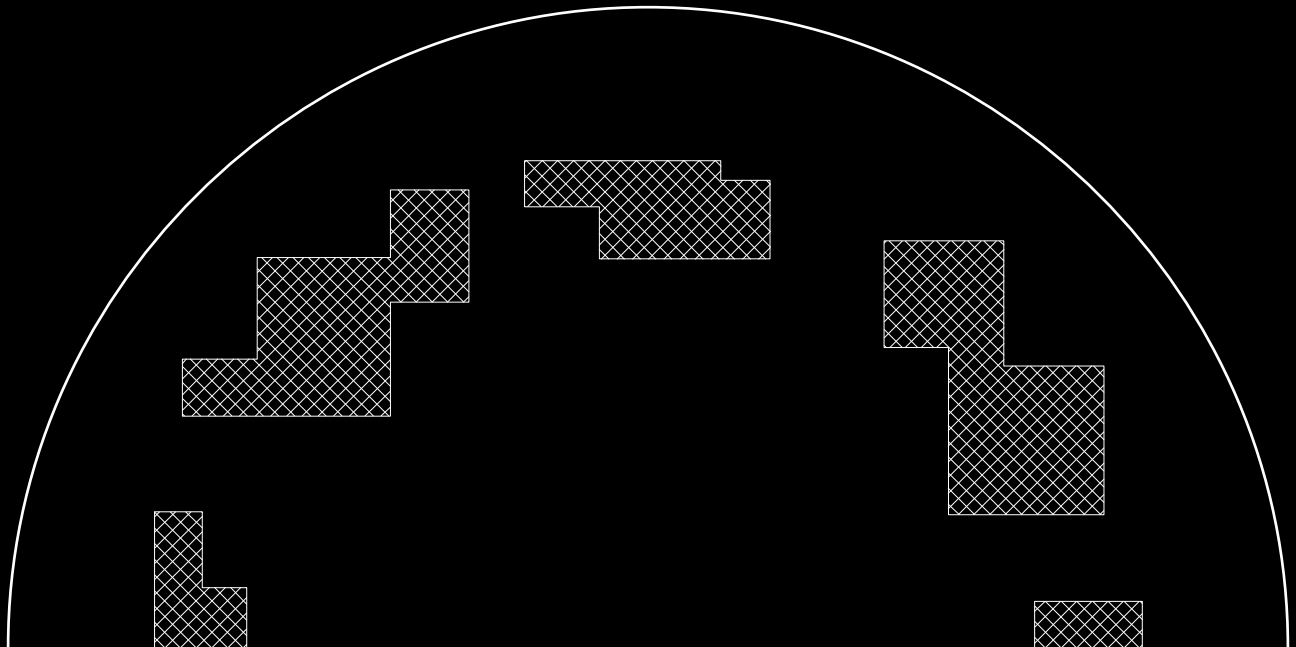
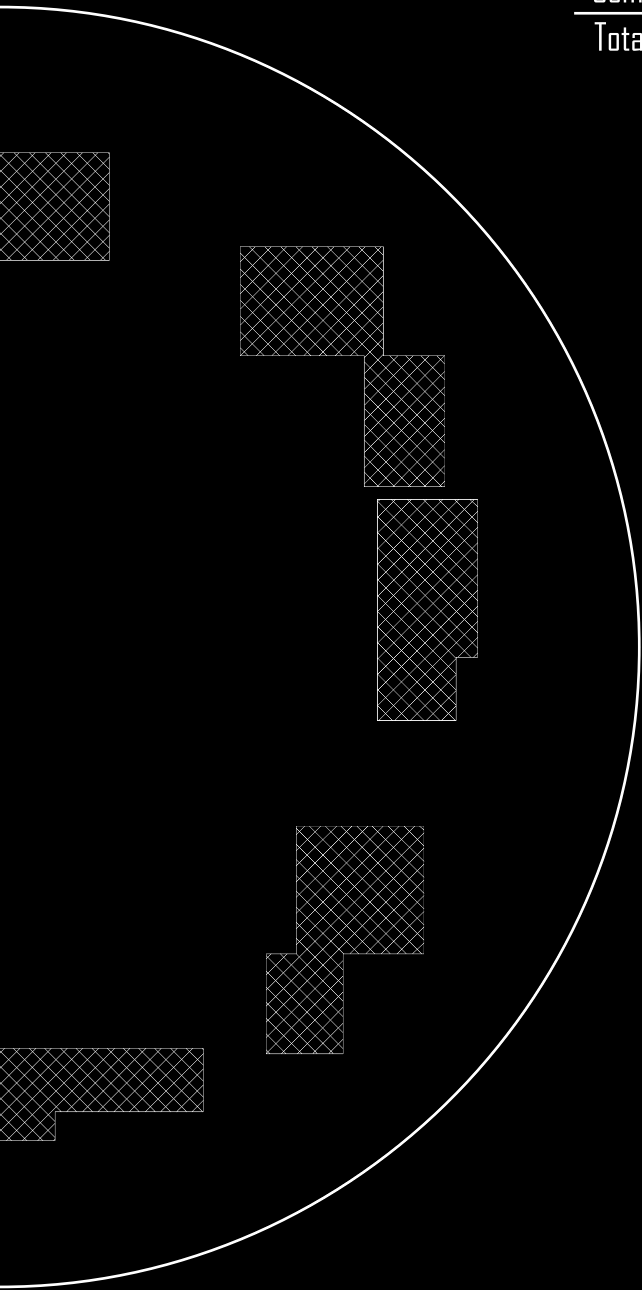


$$\frac{\text{Community spaces}}{\text{Total surface area}} = 16\%$$

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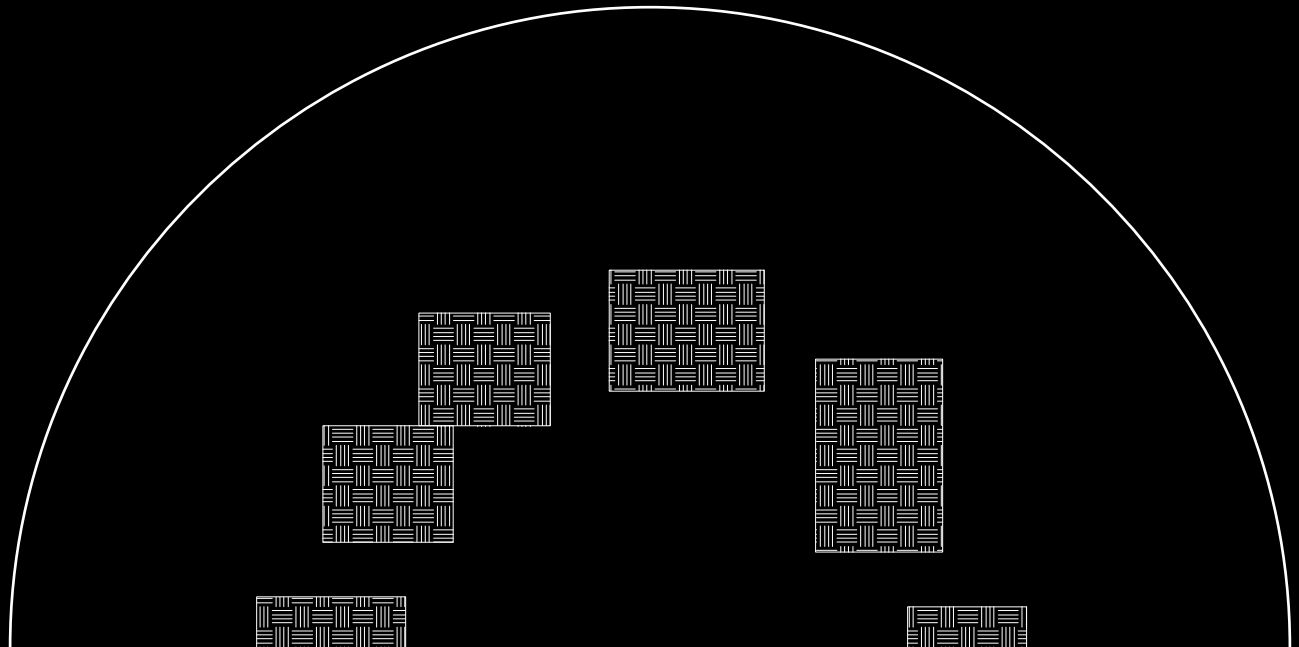
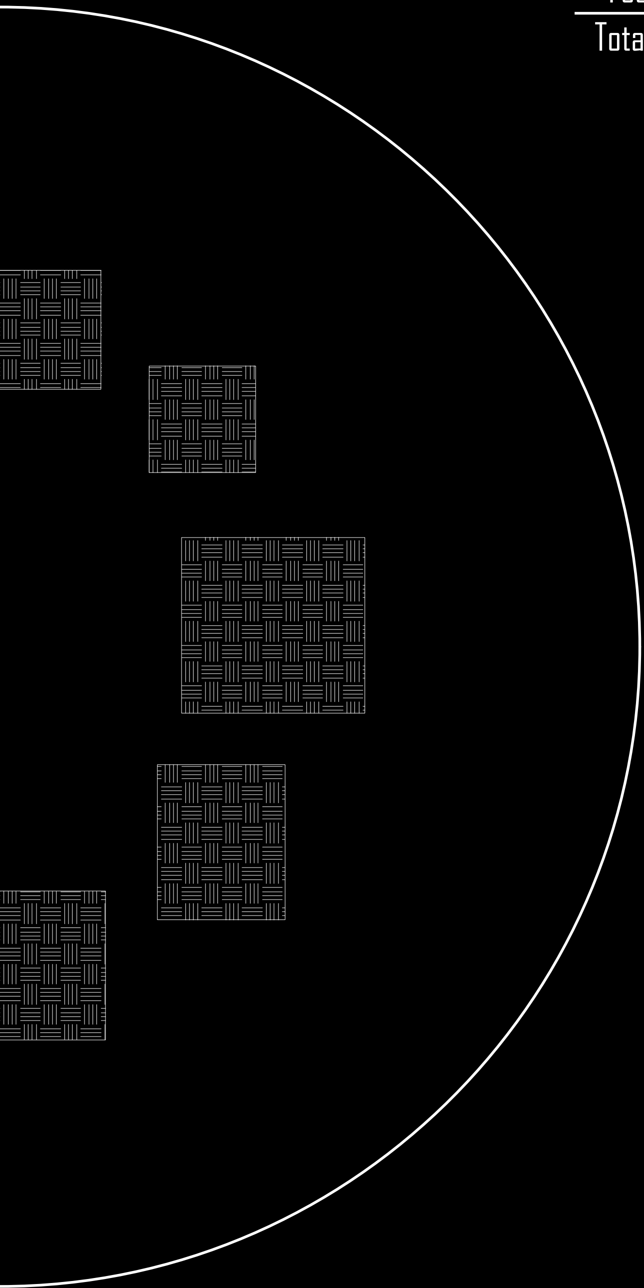


$$\frac{\text{Food production}}{\text{Total surface area}} = 14\%$$



Prefabricated and demountable living box

Extended living zone

Pre-heated in winter and openable for ventilation in summer

Built-in solar panels

Built-in water collection

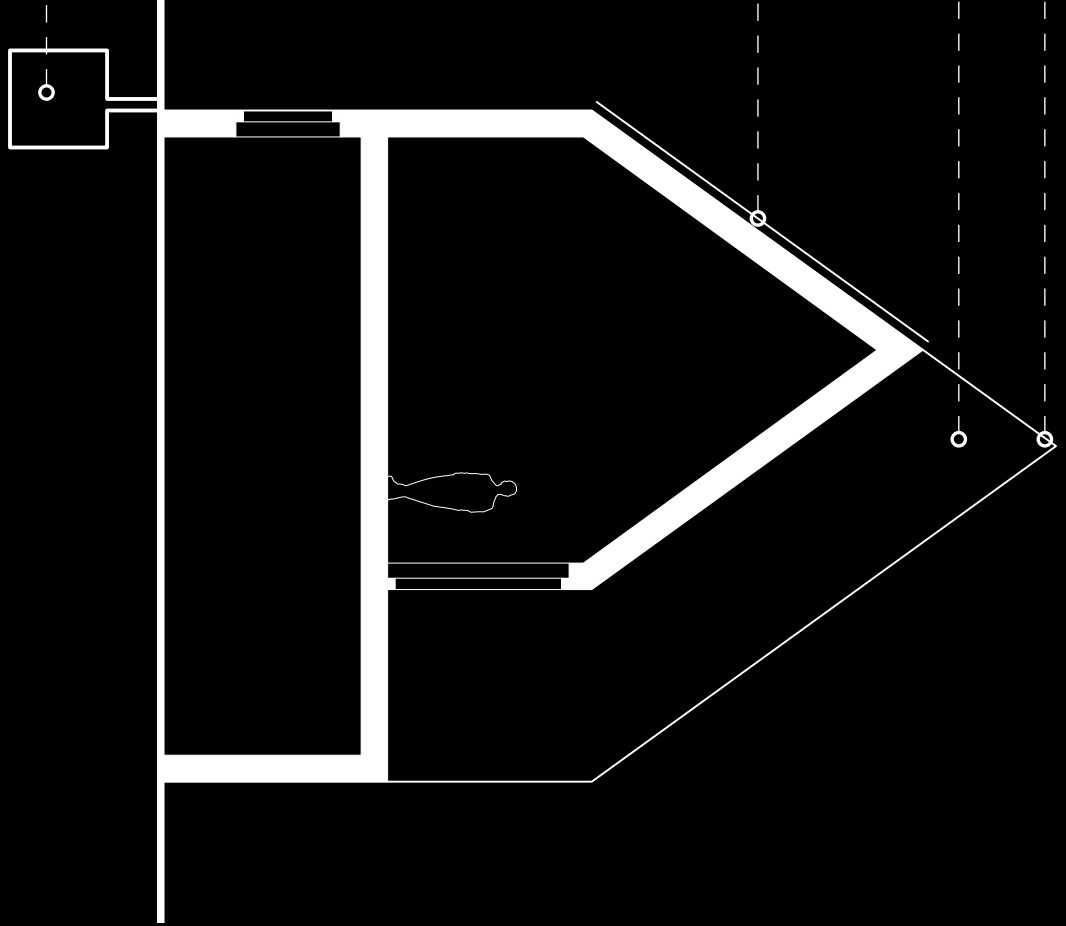


Image 10. The Self-Sufficient City: Courtyard View.

Guallart Architects, The Self-Sufficient City

Typology	Design for post-Covid-19 neighborhood
Location	Xiong'an, China
Year	2020
Size	8 ha
Population	1'800 people
Density	22'500 inhabitants/km^2

During the first phases of the pandemic, the 1st prize proposal for a blueprint of a post-Corona self-sufficient city in Xiong'an new district (about 100 km southwest of Beijing) was submitted by the Barcelona-based company Guallart Architects. The designs won the competition in 2020 and the construction is expected to be finished in 2025. The project aims to

create a new urban standard in the aftermath of the coronavirus crisis, which may be used as prototype in many places throughout the globe. The wooden project, dubbed "The self-sufficient city" proposes a new sort of urban plan that combines old European urban blocks, contemporary Chinese towers, and a sustainable farming environment (**Image 11**). This new urban environment provides residents with a single location where they may live, work, rest, and create resources while keeping interconnected worldwide. This design offers a full living even when confined for extended periods of time.

Vicente Guallart, the principal of Guallart Architects, co-founder and former Director of IAAC (Institute for Advanced Architecture of Catalonia) envisions this "self-sufficient city" as a series of strata, each establishing a set of practical requirements for individual

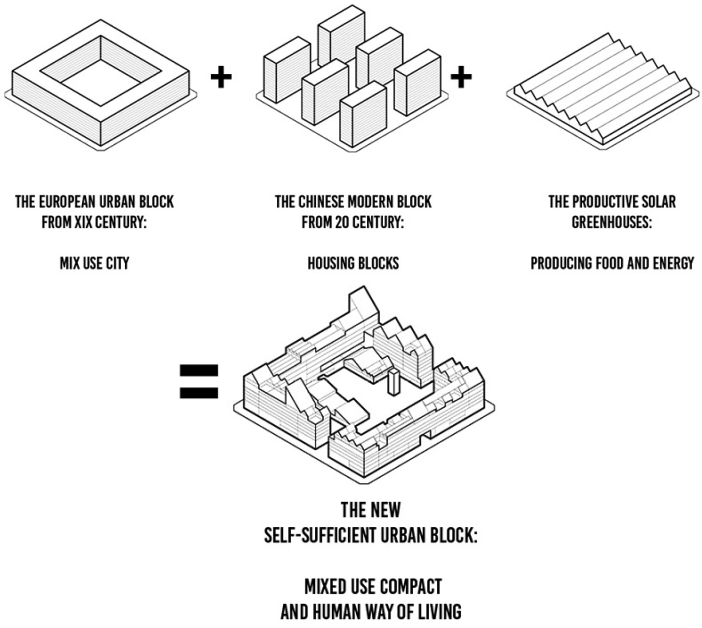


Image 11. The Self-Sufficient City: New urban typology.

living at various scales. The construction will be made of mass wood using passive design techniques and will be grouped into four blocks. Apartments, dwellings for all ages, offices, a swimming pool, a grocery store, a nursery-school, an administration center, and a fire station are all part of a mixed-use design (**Image 12**). Each one of the structures is topped by greenhouses which will provide enough food for everyday fruit and vegetable requirement, enveloped underneath sloping roofs which capture solar energy (**Image 13**).

The residences in Guallart Architects' design would all include a big south-facing terrace that will serve as the principal recreational place during periods of confinement. Additionally, the units will include telework areas, enabling the creation of social networks at a local level for resource exchange. Co-working digital factories would line the bottom floor, providing inhabitants with a lab for 3d printing and fast prototyping devices for designing and fabricating small everyday products. To promote a distributed model for urban management, the project will include an integrated metabolic system that combines power and alimentary output, water reemployment, and material recycling.[1]

According to Guallart, the innovations of the first twenty-first century, automation, robotics, and worldwide networked connectivity, is allowing us to rethink our industrial production methods and locations. Furthermore, similar ideas can improve our ability to fight climate change.

"We live in the eternal paradox by which we inhabit cities that were built in the past, following the cultural and productive models of their time, while there are already new methods of production, technologies and

1 Guallart architects proposes its 'self-sufficient city' for a post-COVID era. designboom | architecture & design magazine https://www.designboom.com/architecture/guallart-architects-self-sufficient-city-housing-post-covid-08-11-2020/ (2020).

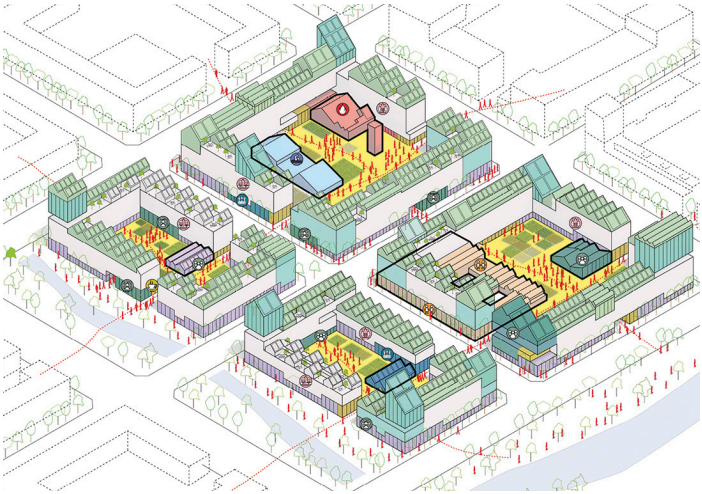


Image 12. The Self-Sufficient City: Social interaction.

organisational principles of society that define a differ-

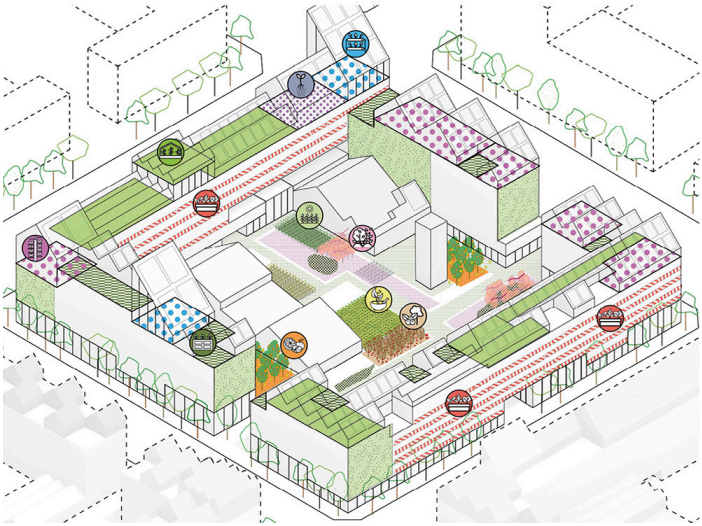


Image 13. The Self-Sufficient City: Food production.

ent human future and urban paradigm."[2]

Opportunities and resources to execute changes in urban models are required for change to occur. This is precisely what occurred in 2020, as a result of the confluence of climate and health problems that afflicted every country on the planet.

While fighting the Covid-19 epidemic in the short term, the long-term problem is avoiding a global climatic disaster caused by global warming and its consequences on our cities and health integrity. The main urgencies to be resolved as soon as possible concern renouncing to the usage of non-sustainable fuels as well as transforming the energetic paradigm in our society by structurally incorporating renewable energies. Europe has established a goal of becoming a zero-emissions continent by 2050, whereas China has claimed to accomplish it by 2060. For this to happen, interventions are necessary on many levels. One of the major issues that might contribute in meeting the established goals is the conversion of the metropolitan urban model and of the current manufacturing systems.

The establishment of industries and productive regions within cities, was spurred by masterplanning models from the First Industrial Revolution during the 19th century. This may be observed in cities such as Barcelona, New York, and Paris. The Second Industrial Revolution, which was related with 20th century modern urbanism, pushed cities into industrial, residential and leisure zones to functional isolation, as well as hyper-specialization and high localization of production lines. The advent of the Third Industrial Revolution and the establishment of the digitalisation, we saw in the very first moment how industrialized nations concen-

2 Guallart, V. *The Digital Reindustrialisation of Cities*. Archit. Design 91, 24–31 (2021). p. 26.

trate on developing digital technologies, design, and services, while emerging countries, particularly in Asia, emphasized industrial production. This model, nevertheless, appears to be destined to wither away since it creates important socioeconomic disparities and leads developed economies to be unable to manage the production of a significant number of basic goods.

As a consequence, a new stage of the urbanization in the digital era, who will be particularly pertinent following the crisis and the present fight against climate problematics and social disparities, might be built upon new practical doctrine driven by digitization. Guallart Architects designed the Self-Sufficient City to illustrate these concepts and to serve as the foundation for this new holistic urban strategy.

The foundation of these ideals is that the economy of the next decades should refocused on producing at a local scale while being globally interconnected. This might establish a new kind of digital globalisation, one that isn't dependent on producing goods in low-cost corners of the world and then shipping them around the world in containers. It also shouldn't be dependent on the rising dominance of massive digital platform.

"We have already proven that global connectivity works, even with the increase in teleworking and video conferencing during the Covid-19 pandemic, but now we must invest in the local production of resources. In recent years, collaborative networks have been developed based on open-source design principles linked to technology centres and collaborative citizen platforms. Now, it is necessary to develop the physical infrastructures in cities so that this can happen in a systematic and massive way, using technologies such as digital printing, the production of electronic elements, the production of energy and food (in rural or urban environments) and the incorporation of new production

systems in the city."[3]

Global connection and local production is a social and ecological paradigm that promotes the reduction of the amount of energy required to maintain vasts urban agglomerations while enabling local neighborhoods to create most of their own goods and supplies. Reducing reliance on foreign resources ultimately reduces political and economic ties with nations that, in many circumstances, do not share Western principles of human rights. Reducing global product traffic implies lowering the amount of energy required for the worldwide cities' infrastructure to operate, which would help in an attempt to dampen global warming. Local resource development should also help to reduce global migration due to financial purposes and prevent social disparities, which might lead to global tensions in the long run.

In terms of urban planning, this implies the possibility to create a urban model that is not based on function segregation, as is the case in the contemporary city, which requires mobility across residential, industrial, and commercial sectors. The potential is rather to create neighborhoods where you can accomplish each of these everyday tasks within one kilometer of radius, all with a quite high population density. They constitute prolific communities which run at a biological pace while being linked at a regional and global scale via virtual connection and public and mobility infrastructure that is shared. With the possibility to live, work, and play all within easy walking distance, this new city promotes a healthier, more fulfilling lifestyle for its residents (**Image 14**). Neighborhood-scale equipment and services would be provided by the city, which would be distributed around the city, as well as

3 Guallart, V. *The Digital Reindustrialisation of Cities*. Archit. Design 91, 24–31 (2021). p. 27.

bigger scale equipment, such as health facilities, sports centers, convention centers, and leisure areas, that act as metropolitan hotspots and require excellent public transportation accessibility. It is imperative that our cities undergo a fundamental shift from regions that buy goods and generate pollution to places where commodities are generated, used, and repurposed in a complete circle. We must start to cultivate food, pro-

Image 14. The Self-Sufficient City: Reprogamming of basic activities.

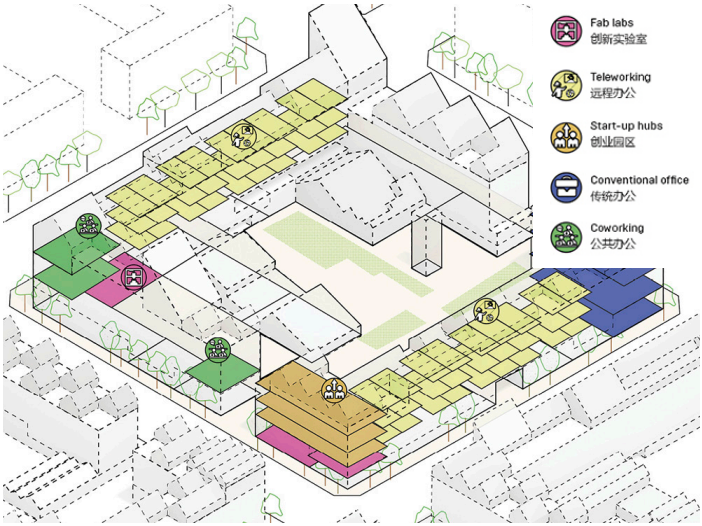


Image 15. The Self-Sufficient City: New distributed working models.

duce electricity and goods in order to survive, minimizing their reliance on the global economy. This ecologically sustainable and interconnected world requires new processes and activities in the local environment, and buildings play a functional role in accommodating these new functions and activities. In the upcoming decades, this will be the next task for buildings, blocks, and communities. If new construction and architectural requirements appear each five decades, the closest objective is to design or restore old structures so that they become self-sufficient. Buildings must create the energy they consume in order to function, connect local farming with water recycling, and include areas for digital manufacturing in order for this to be achievable. All these projects should rely on innovative designs that convert the architecture from "machines for living" into living organisms (**Image 16**). For these reasons, the construction elements of these new structures should be of organic provenance, like wood, which is renewed throughout biological treatments and may potential-

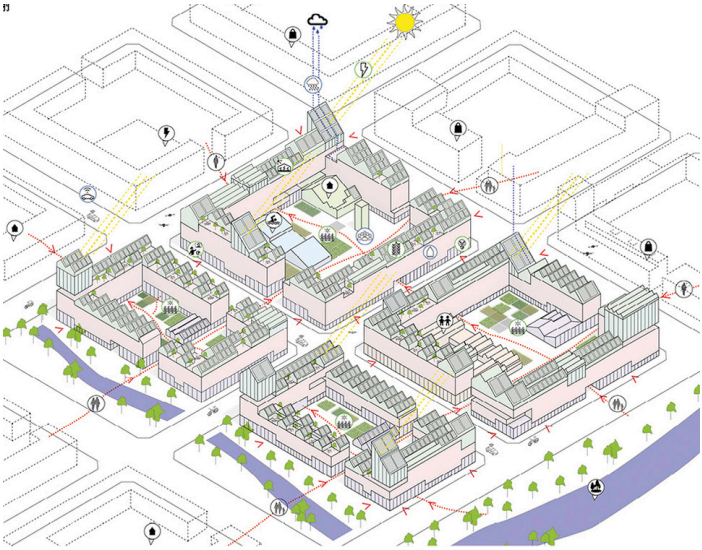


Image 16. The Self-Sufficient City: Urban metabolism.

ly be an unlimited resource when forests are maintained properly.

A new industry based on digital manufacturing, on-demand, and on-site production must be established. The conventional industrial model led to the expansion of companies, assuming that increasing production volume would cut commodity prices. As a result, production has shifted to a few locations throughout the world where labor is less expensive. This has resulted in a greater reliance on a small number of cities around the globe and a small number of corporations for nearly everything. When we look at the status of industry prior to the middle of the twentieth century, A great variety of commodities were made in cities, in ateliers and by small manufacturers. The idea of coming back to industrial product manufacturing to medium-sized factories and workshops in cities is based on the same philosophies as organic products: it may be slightly more expensive in financial terms. However, it is more valuable to society since it empowers local groups, requires fewer resources, and is mostly created by its users. This production paradigm is conceivable because digital production, such as 3D-printing or robotics and other high-tech machinery that transform materials to create goods, now accounts for a major amount of industrial output. This sort of manufacturing has a minimal noise and pollution impact, which allows it to be incorporated into city neighborhoods.

Digital manufacturing enables the creation of parametric designs that change over time or may be customized by consumers. It is not logical anymore to constrain the manufacture in a few locations and major companies, as the distribution is possibly compromised in times of crisis. It makes far more sense to move products manufacturing closer to where they are required, while simultaneously boosting the local economies through decentralized production. Similarly,

this urban industrial paradigm might enhance the conception, development, manufacture, and distribution of these next-generation items to all take place within the same structure. Exogenous contributions of raw materials required for industrial growth must be reduced to a minimum. For decades, garbage burning has been advocated as a way to generate heat and energy networks in cities, but the resulting carbon dioxide emissions have had a substantial environmental impact. The recycling of many types of urban garbage may effectively turn a town into a mine. Items can be recycled instead of being burned to generate energy that is then used to make new materials and goods. This can be accomplished by separating the constituents of the items to be recycled and then using various techniques to reintegrate the old items back into the cycle. This is called circular economy and it decreases the import of materials into cities, resulting in significant environmental advantages. New items have to be designed with the intention of being recycled, in order for circular economy to be efficient. Resources, materials, and people from the surrounding regions all contribute to circularity. Cities would not exist without the environment that surrounds them and offers environmental benefits. Following the concept of a productive, sustainable, and interconnected city, where structures are living beings, may be applied to characterize a new urban scenario witness of this digital era where people are facing an environmental crisis of which they are actually guilty.

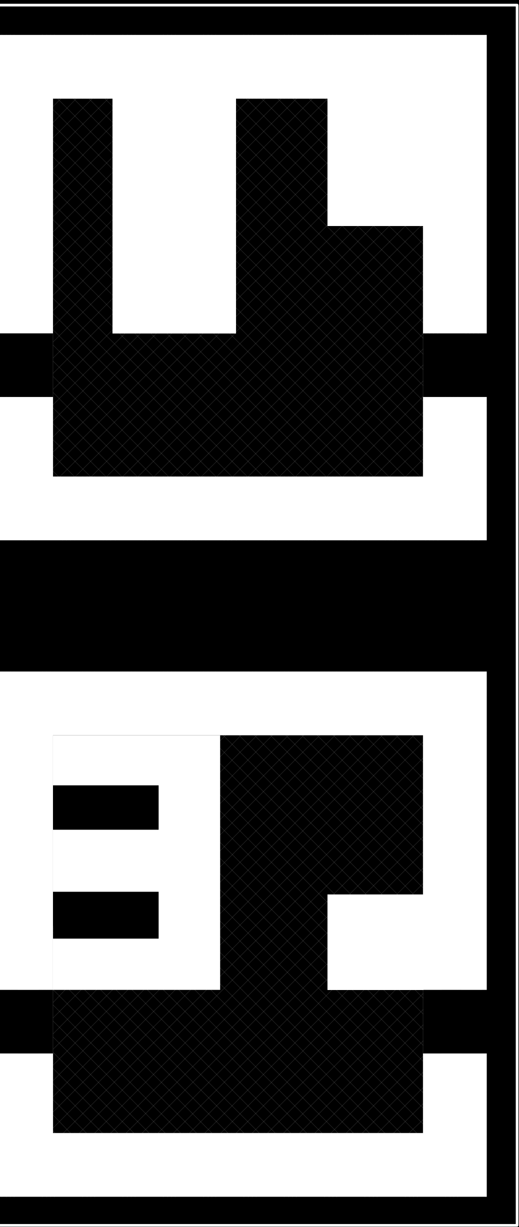
"These new cities, based on the circular bio-economy that tends towards connected self-sufficiency, could be called 'biocities'. Cities, rather than growing against nature, should be integral parts of nature."[4]

4 Guallart, V. *The Digital Reindustrialisation of Cities*. Archit. Design 91, 24–31 (2021). p. 26.

Image 17. The Self-Sufficient City: Site plan.

10 20 50 100m

$$\frac{\text{Buildings footprint}}{\text{Total surface area}} = 37\%$$

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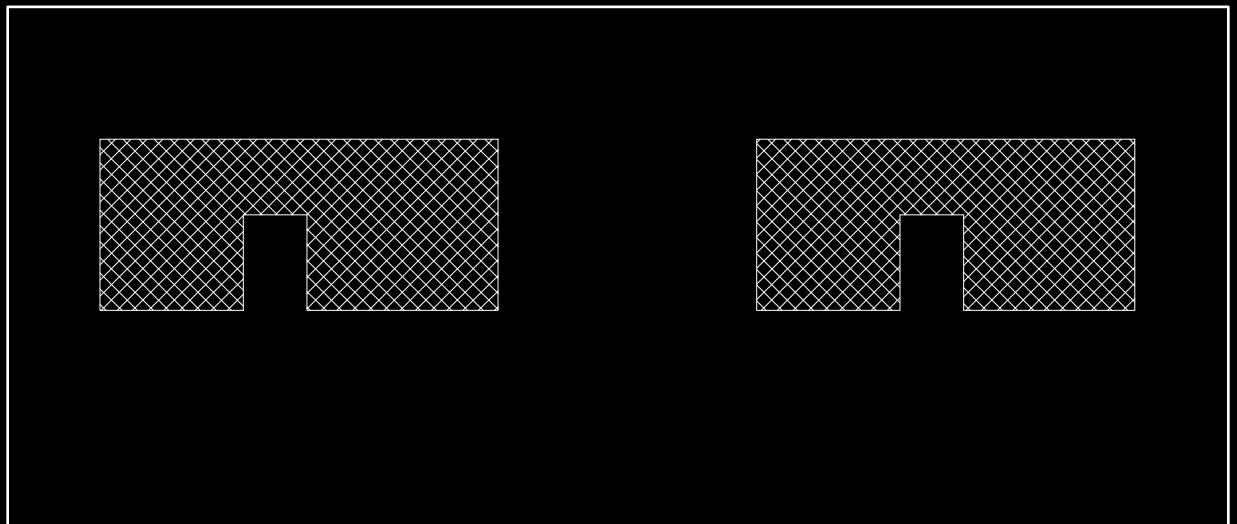
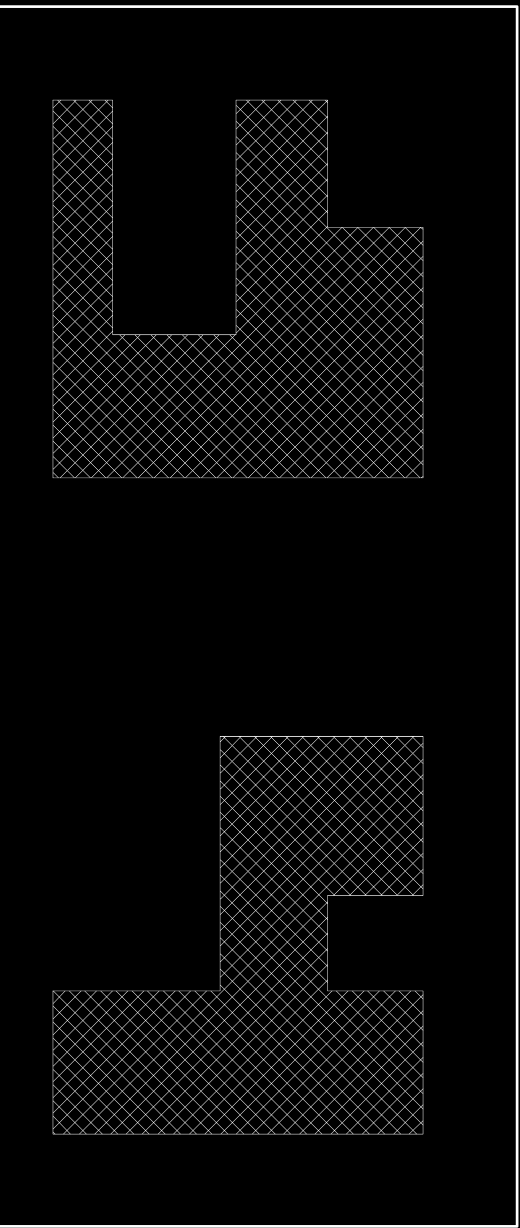


$$\frac{\text{Community spaces}}{\text{Total surface area}} = 25\%$$

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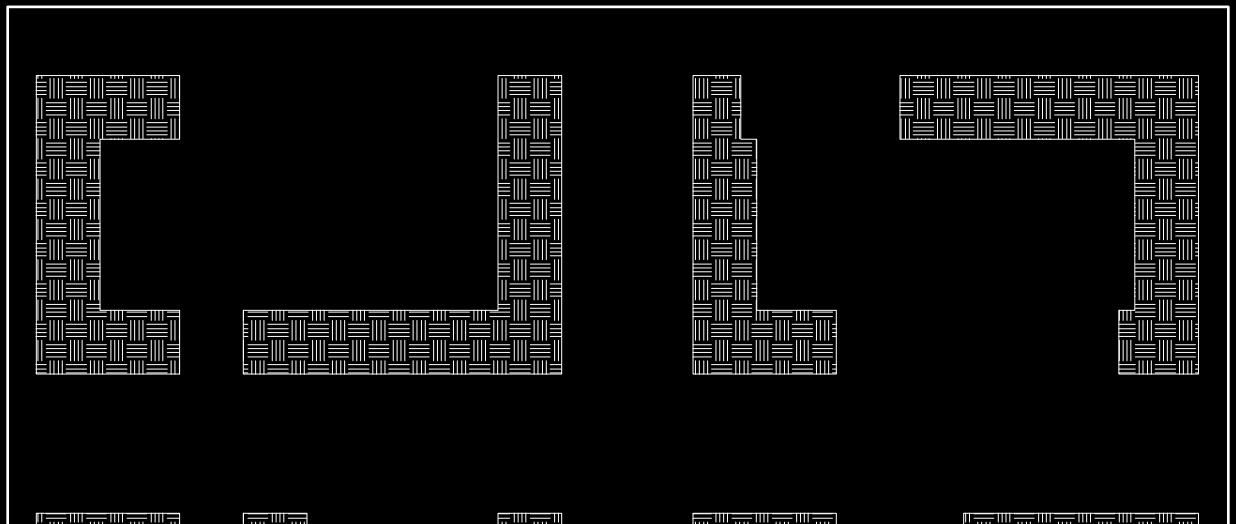
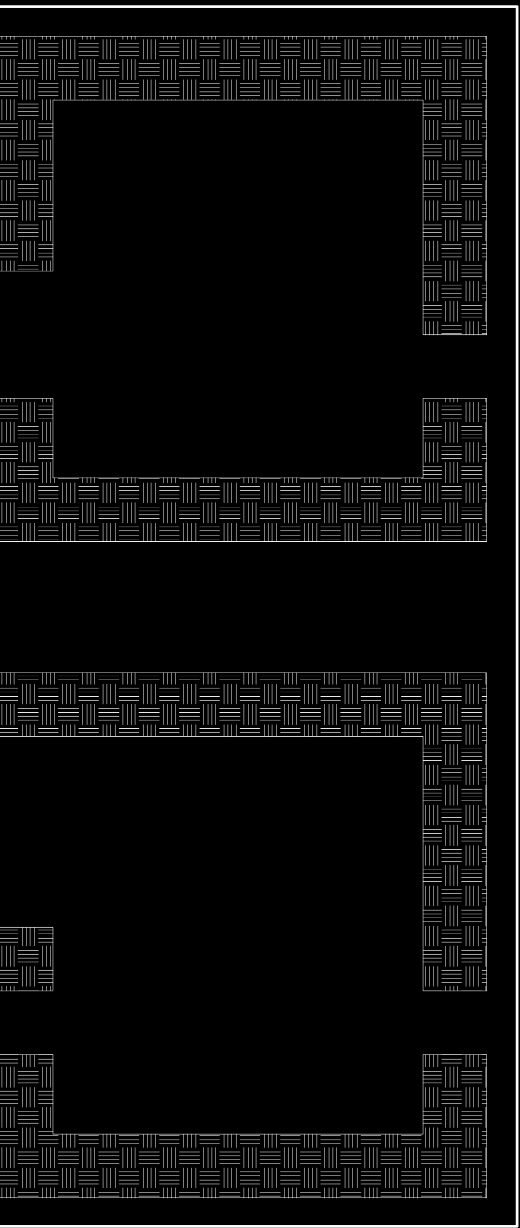




$$\frac{\text{Food production}}{\text{Total surface area}} = 25\%$$

Built-in solar panels

Greenhouse for food production

Ventilated apartments

Ground floor with community facilities

Built-in water collection

Battery racks for electric vehicles charging

Image 18. Écoquartier Les Vergers, View of community spaces.

Ecoquartier Les Vergers

Typology	Masterplan for an eco-district
Location	Meyrin, Switzerland
Year	2015-2021
Size	16 ha
Population	3'000 people
Density	18'750 inhabitants/km^2

Initiated by the Municipality of Meyrin, the bold Les Vergers Ecoquartier project includes the construction of 1350 new apartments and public facilities in more than 30 buildings. Built on a plot of land covering approximately 16 hectares, the district will eventually accommodate around 3'000 new inhabitants and 10'000 m^2 of commercial space. As the owner of almost

half (47%) of the building rights, the Commune has been involved in creating the conditions to enable Les Vergers to achieve the exemplary objectives set for this district. This is reflected, for example, in the fact that all the buildings meet the Minergie A energy standard. The district is based on the three pillars of sustainable development: social solidarity, environmental responsibility and economic efficiency. The realization of this important project will increase the population of the municipality by 15%.

In order to achieve a site management that combine environmental performance, social attractiveness and economy of means, the choice was made to implement a so-called “participatory” approach, aiming to encourage citizen participation and give voice to all the actors interested in the project.

In 2012, an evolving chart was drawn up, in order to define precise performance objectives to be achieved for the eco-district. This chart addresses numerous points such as: energy efficiency and the reduction of greenhouse gas emissions, the quality of construction and the comfort of occupants, the ecological and social value of outdoor spaces, water management, clean construction sites, household waste management, social diversity, entertainment and urban conviviality, eco-activities and finally mobility.

The Vergers eco-district is built on dismissed agricultural land which is now urbanized. Displaying a deliberately rural character, while remaining refined, its various public spaces have been designed with the aim of reconciling city and countryside, in accordance with the principles of urban agriculture. Their maintenance and the market gardening of the district were entrusted to the Agricultural Cooperative Farm of the Vergers district. Beyond the environmental and aesthetic aspects, urban agriculture is conceived according to another axis in Les Vergers. Through the participatory approach initiated by the municipality of Meyrin in April 2014, the

word was given to the current and future inhabitants, in order to allow them to co-construct the public spaces of the eco-district. Among the main wishes emanating from these discussions appears the desire to reconnect with the land, gardening and the cultivation of fruits and vegetables. With the turn of the century, food has indeed become a major concern of the population. What do we eat, where does our food come from, who produces the food we eat, is it healthy, what impact does it have on the planet and on our health?

The eco-district presents a great architectural diversity. In this context, public spaces are very important: they are the ones that give the neighborhood a bond and unity. They participate in the construction of its identity. Public spaces allow to integrate the district into the Meyrinois urban context, while harmonizing the diversity of buildings and populations. They participate in the construction of a green context of urban biodiversity, open to the appropriation by the inhabitants. These spaces can, if they are well designed, become spaces for exchanges and meetings. The Municipality pays particular attention to the quality of its public spaces. It has succeeded in obtaining their mutualisation, meaning a single space combining private and public land areas, without having to use fences to distinguish them. The public spaces are therefore considered as a single entity, extending "from façade to façade" and independently of the land area.[1]

The energy supply of the Vergers eco-neighbourhood is based on a judicious use of the surrounding resources. A renewable heat network meets the heating and hot water production needs of all the buildings in the district. All the buildings are self-generating and meet Minergie-A standards, a record in Switzerland on this scale. The district will use an innovative heat-

1 Ecoquartier Meyrin Les Vergers. https://www.lesvergers-meyrin.ch/ecoquartier/.

ing network (**Image 19**). Operating like a “giant central heating system”, the district heating network supplies the entire neighbourhood. The heat is produced in a central heating plant and distributed to the buildings through underground pipes. Water from the Rhône’s water table will be collected in wells located a few hundred meters away in Peney. This water will first be sent to an industrial zone to cool facilities and then to the central heating plant at Les Vergers. It will then be directed into a heat pump which will distribute the water for heating the district. Finally it will be returned to the water table through the Lac des Vernes.

All buildings meet high to very high energy performance standards in terms of thermal insulation. All of them are also self-generating energy. The electricity needed to run the building is produced by large areas

Image 19. Écoqurtier Les Vergers: Heating system.

of photovoltaic solar installations on the roof.

The Vergers eco-district has a special focus on soft mobility: pedestrians and cyclists have a dense network of paths throughout the neighbourhood.

The tram and bus stops are located nearby, on the edge of the district. Only two streets in the district are designated for motorized traffic, and they have the status of a “meeting zone”, or more commonly “20km/h zone”, which means that pedestrians have free movement and priority over all vehicles.

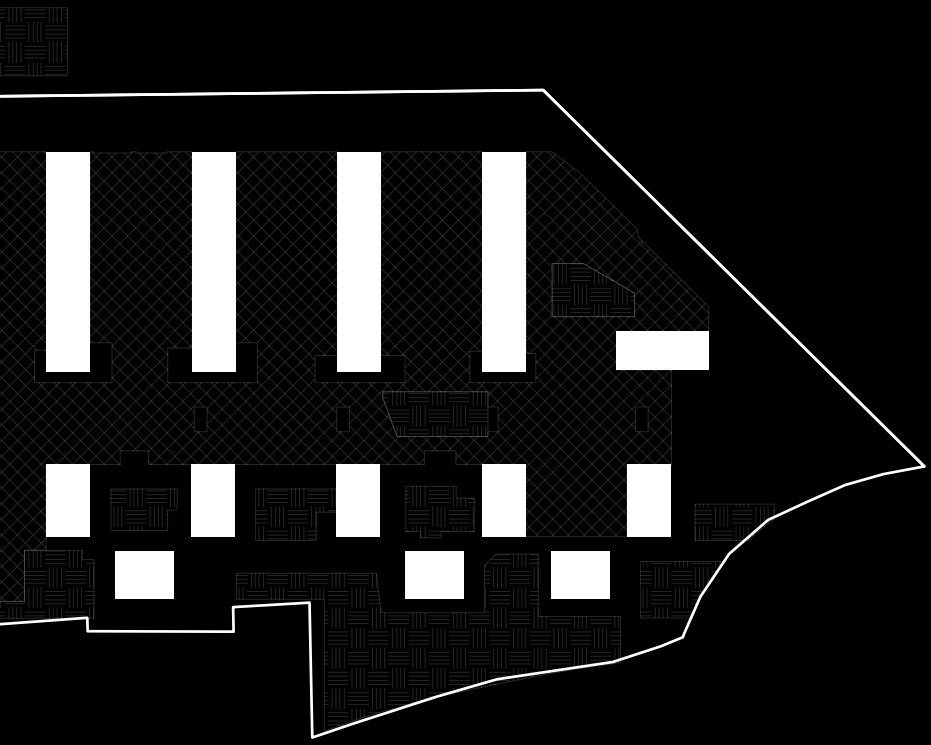
Vehicle access is only allowed on the two lanes that give access to the three underground car parks (1245 places). These car parks are deliberately disconnected to the housing: they are only accessible from public spaces, which encourages meetings, exchanges and the animation of the district.

One of the main success factors for this type of project clearly lies in the solid establishment of the participatory approach. The approach facilitated by the City has made it possible to lay the organizational foundations on which the project owners and the inhabitants gradually become the actors of their place of life. It is now a question of pursuing this social innovation by identifying the success factors, the challenges of participation and the benefits that the approach brings to the community.

Image 20. Écoqurtier Les Vergers: Site plan

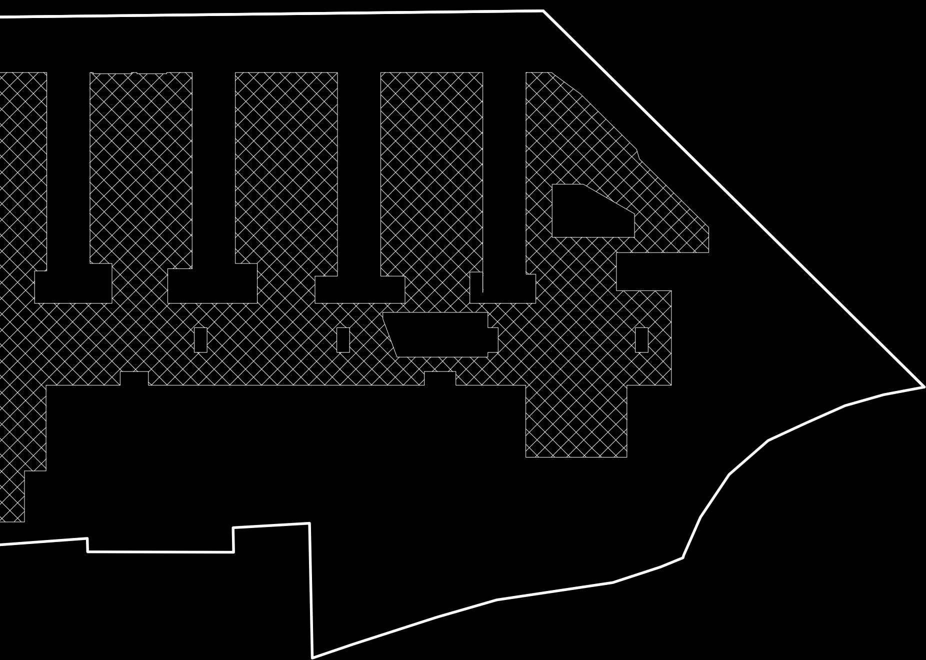

20
40
100
200m

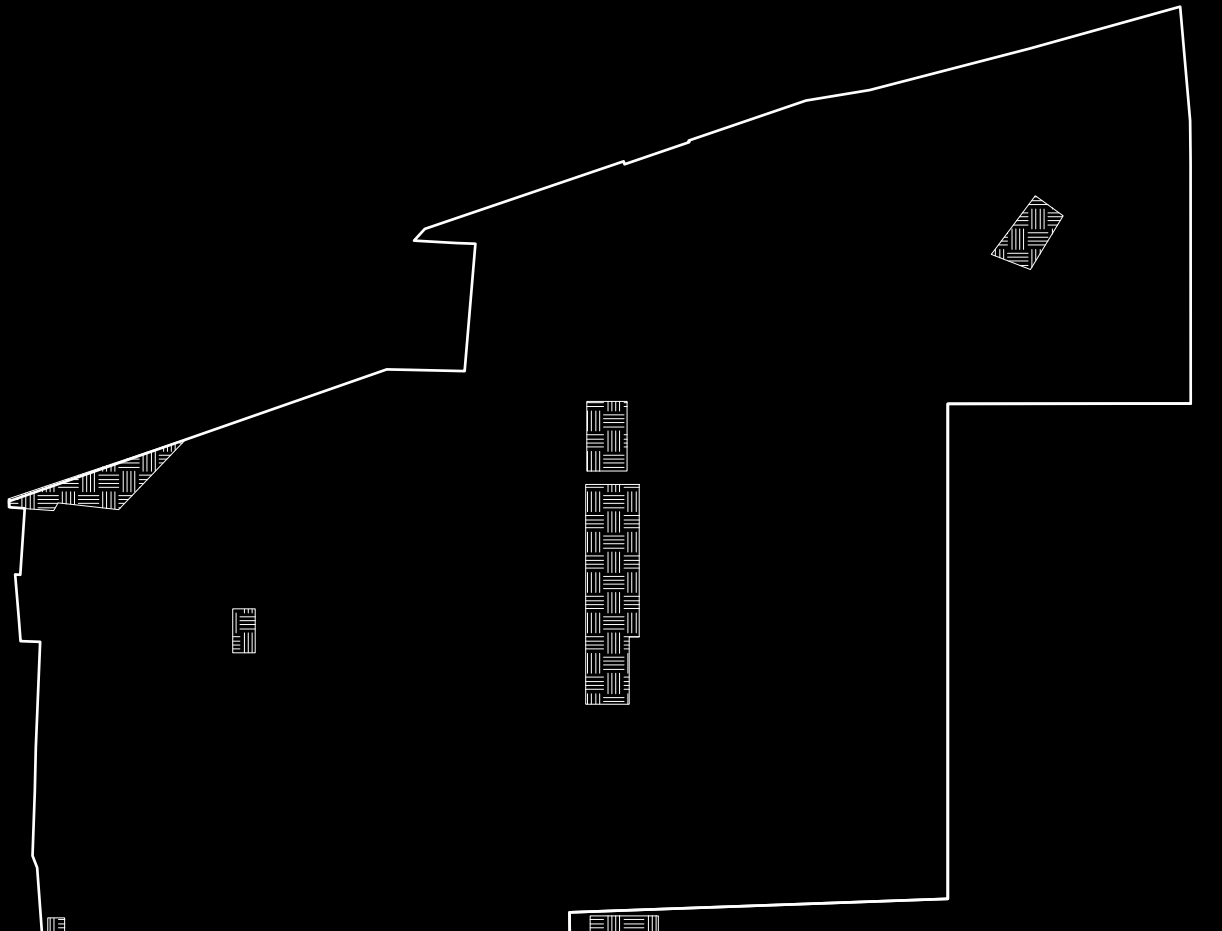
$$\frac{\text{Buildings footprint}}{\text{Total surface area}} = 16\%$$




20
40
100
200m

$$\frac{\text{Community spaces}}{\text{Total surface area}} = 46\%$$




20
40
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200m

$$\frac{\text{Food production}}{\text{Total surface area}} = 8\%$$

Solar panels

Community space

Community space

District heating system (teleheating)

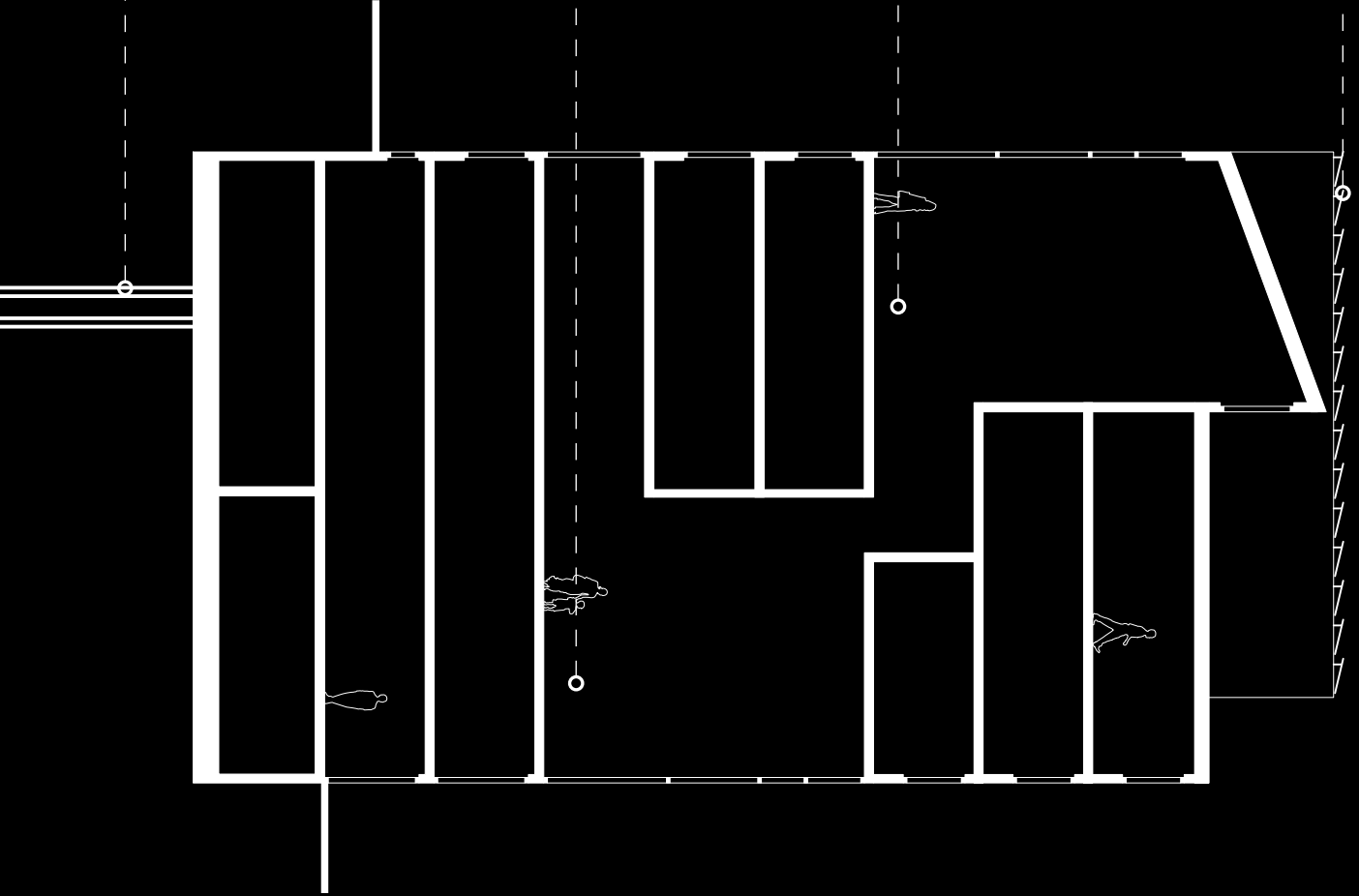


Image 21. Self-sufficient city: Aerial view.

WOHA Architects, Self-Sufficient City

Typology	Masterplan for a new town
Location	northern Jakarta, Indonesia
Year	2016
Size	730 ha
Population	210'000 people
Density	28'700 inhabitants/km^2

In 2014 the Singapore-based architectural practice WOHA designed a master plan for a new town in the north of Jakarta.The architectural goal was to accommodate 210'000 people on an area that mesures 730 hectars, covered with rainforest and confined by a building height regulatory limit of 60 meters. It was important for the authors to keep as much of the forest

as possible, so they combined the allotments of the land with the layering of the self-sufficient city model. A three-dimensional master planning strategy is used to imagine a tropical "eco-town-in-the-forest". There are four levels to this stratification: a "transportation and services layer" which includes all transportation and services systems; a "parkland layer" developed underneath the blocks that allow for public activities and community interactions (**Image 22**); a "residential and workplace layer" structured into a series of elevated streets and courtyards and "one-unit-thick" flats which allow for proper ventilation; and a "rooftop canopy layer" which is at the same time a protection (for sun and storms) and a production-oriented element for food and solar energy (**Image 23**). The project was designed to be completely self-sufficient in terms of main resources (water, food, energy and waste management) while at the same time minimizing the impact on indigenous vegetation and animal species. Over 3 km² of solar panels on the rooftop canopy layer, in combination with a passive design, would allow the city to run with net-zero electricity use.
Every building is capped at the same height using the "inverted skyline" typology, which guarantees that no energy is lost due to over-shadowing (**Image 25**).

"The bar-graph silhouette of a modern city skyline is universally accepted as a symbol of urban identity, but although 'picturesque· and signifying an image of diversity, the built form of that skyline - especially in the tropics - has become problematic. The street level of the newly built cities is less than interesting and usually very repetitive, whilst the shadows created by the uneven heights of the towers stymie the potential for solar energy collection."[1]

1 Bingham-Hall, P. & WOHA Architects. *Garden City Mega City: Rethinking Cities for the Age of Global Warming*. (Pesaro Publishing, 2016). p. 86

Image 22. Self-sufficient city: Parkland layer view.

Image 23. Self-sufficient city: Rooftop canopy layer.

Image 24. Self-sufficient city: Section.

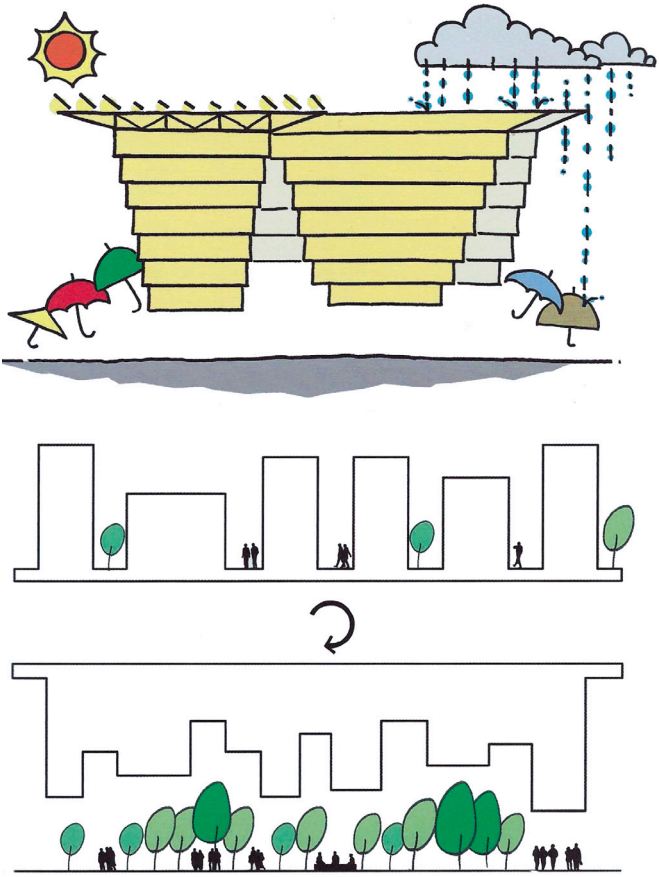
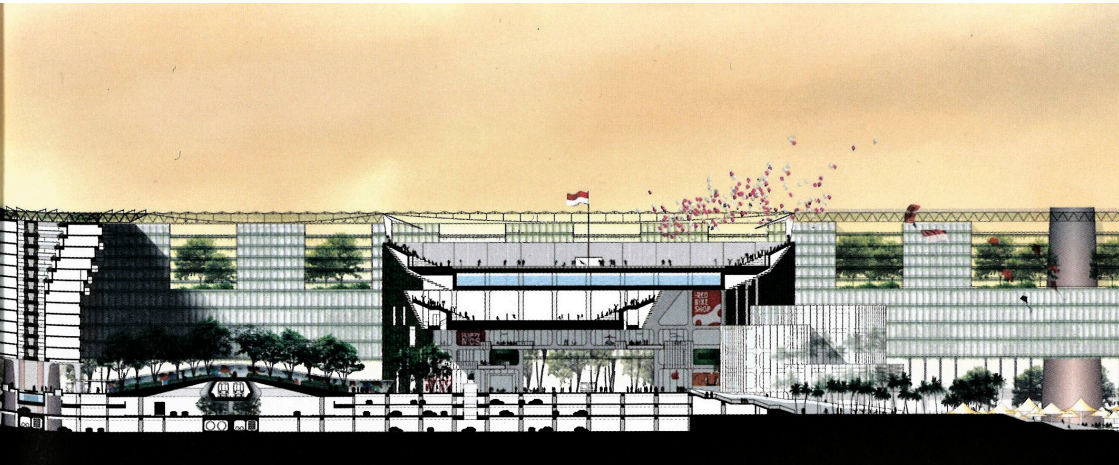


Image 25. Self-sufficient city: Inverted skyline.



Inverting the skyline would solve those two issues, especially for new constructions with huge sites. Towers which touch the ground delicately would free up the street surface, and by capping the towers at the same height, it is ensured that the rooftops are never shadowed and solar energy potential is maximized. The “Inverted Skyline” will immediately create a more aesthetically and spatially intriguing situation at street level by replacing the fixed ground-plane with a fixed roof-plane. The wider roof surfaces will significantly increase the shade on the streets and public spaces underneath, which is particularly valuable in tropical towns. Existing topography and vegetation can be preserved, and the area is perceived as a urban village. As the canopies are translucent, they are also used to cover urban gardens on top of the roofs, which would be watered by rainwater gathered over the large surface.

Pedestrian connection is emphasized in design, including well-connected transportation pathways. Only trams and bicycles would circulate in the Parkland Layer in order to create an unpolluted environment. The topography would be shaped to give a diversified topographic scene. Multiple ground levels of “sky streets” in the housing and work layer would connect a number of “sky towns,” allowing inhabitants to interact and build communal ties within their aerial neighborhoods. The rooftop would combine leisure spaces and urban farms to both enjoy of a view and at the same time be part of a productive village lifestyle.

Through their vision of a self-sufficient city, the authors tried to frame a realistic picture of the urban future of a dense, social and sustainable megacity.[2]

By 2050, it is expected that 75% of the global population will live in cities, therefore our present city

2 Wong, M. S., Hassel, R. & Yeo, A. *Garden City Mega City: Rethinking Cities for the Age of Global Warming*. CTBUH Journal IV, (2016). p. 50-51

development and urban design will shape the habitat of the coming generations. Although the principle of sustainability has been unanimously endorsed, the different implementation procedures have proven to be far from effectively beneficial. Working in tropical Asia, for WOHA Architects the most important goal has been to increase the amount of natural ventilation and shade while reducing the consumption of unsustainable energy. Every WOHA project has been designed as an energy-saving machine, both in terms of the general structure and each individual component. Because the structures are considered as environments instead of objects, the conventional distinctions between inside and outside, as well as between environment and architecture, were blurred. Since WOHA began developing their concepts on a larger scale than a single building, their energy-saving solutions were incorporated and gradually expanded to meet the needs.

"Only two percent of our land surface is urbanised, but that two percent (containing half of the world's population) consumes eighty percent of our energy, and most of that is fossil fuelled. The absurdly unsustainable cities imperil us all, and in order to radically reduce the energy wastage and environmental destruction, every network and every process of our cities need to be re-examined."[3]

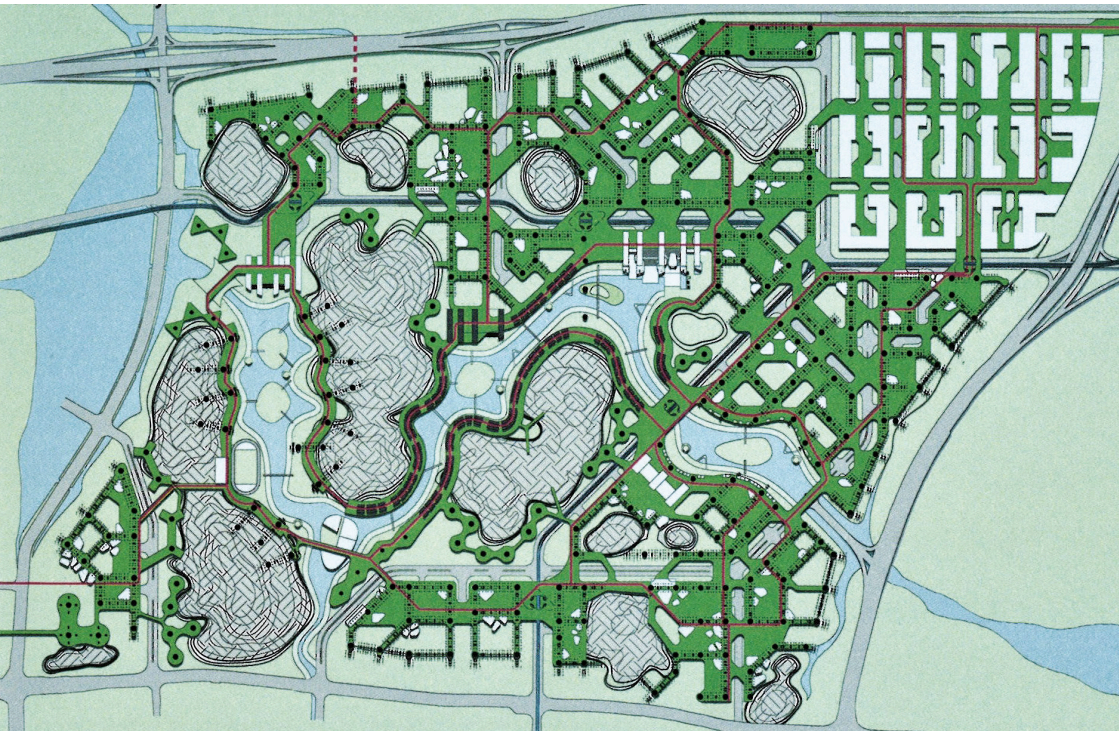
Megacities must immediately rethink their transport systems as well as their food and energy production techniques. Many things will be made possible by technological advancements that we do not yet know about, but the fundamental methods that we do know about may now be put to the test in the world's largest cities. WOHA's inventions and constructed architec-

3 Bingham-Hall, P. & WOHA Architects. *Garden City Mega City: Rethinking Cities for the Age of Global Warming*. (Pesaro Publishing, 2016). p. 284

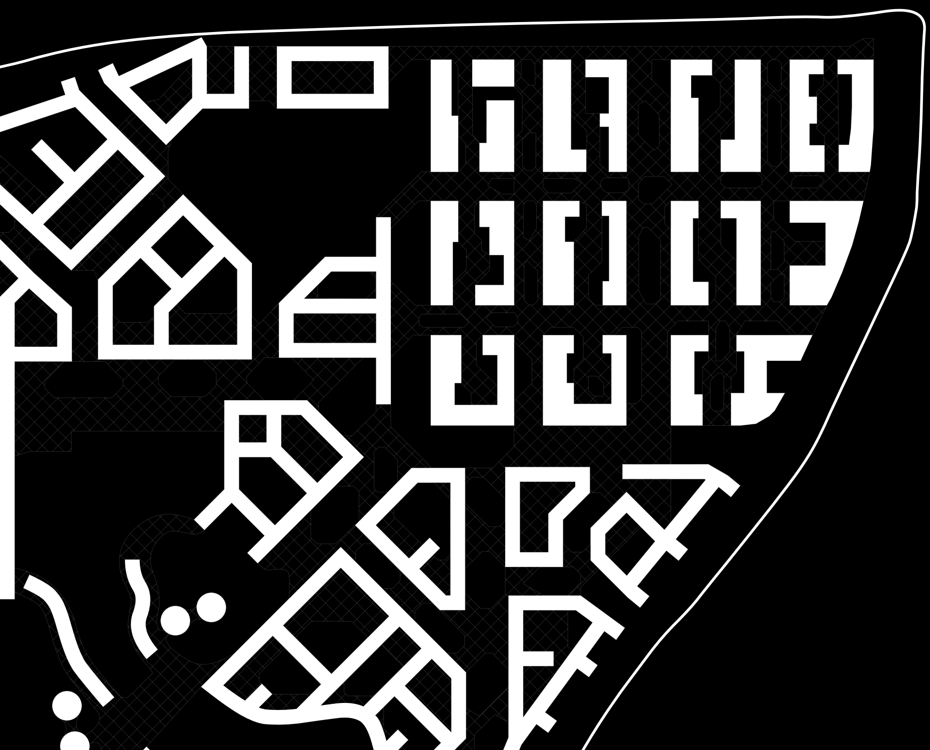
ture are the result of research and development, and they answer to a whole new set of conditions that are becoming ever more urgent. They have therefore abandoned the micro-scale and the limits of bi-dimensional city planning to address a three-dimensional combination of architecture, infrastructure, and ecological systems, at the macro-scale of the metropolis.

This ambitious approach is certainly commendable and promises to be a sustainable long-term vision. Therefore it must be constantly and firmly supported by tangible solutions to demonstrate an improvement in the quality of the built environment and beneficial also at the scale of the individual.

Image 26. Self-sufficient city: Ground level.



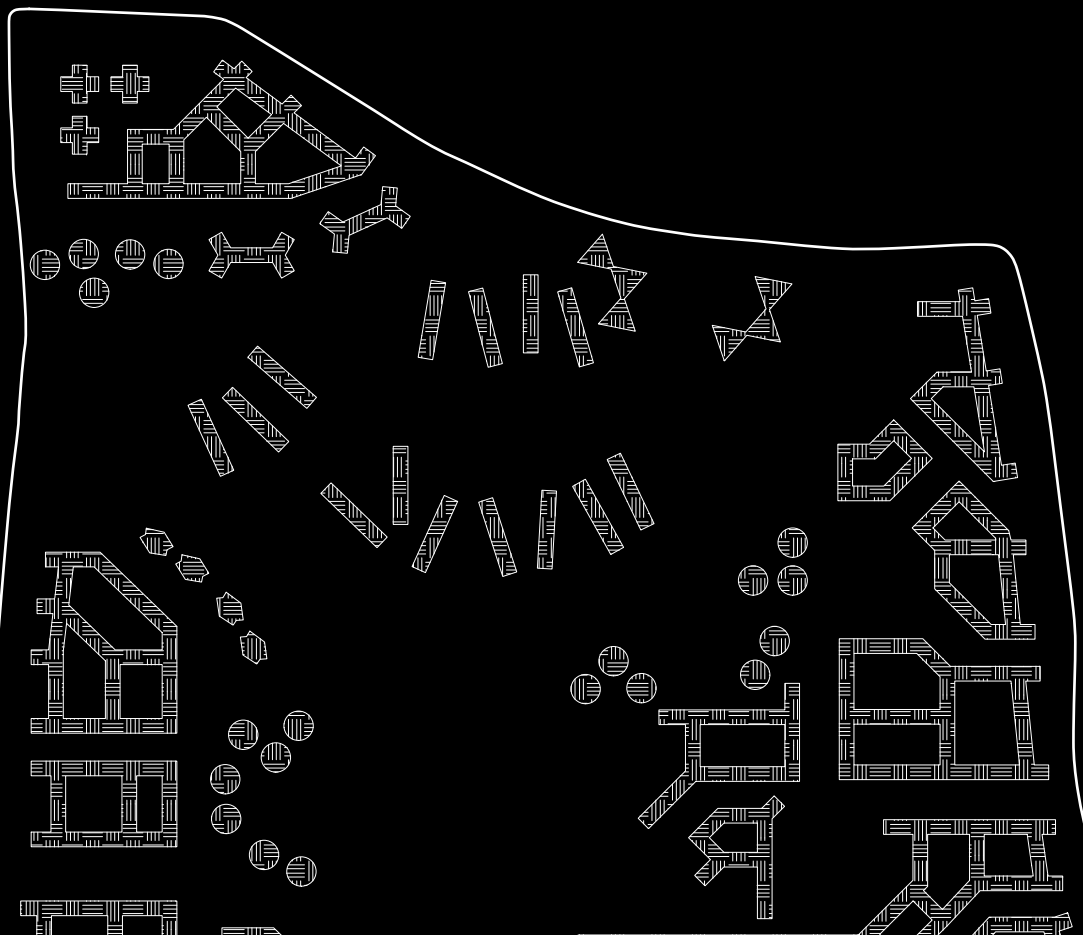

100
200
500
1000m

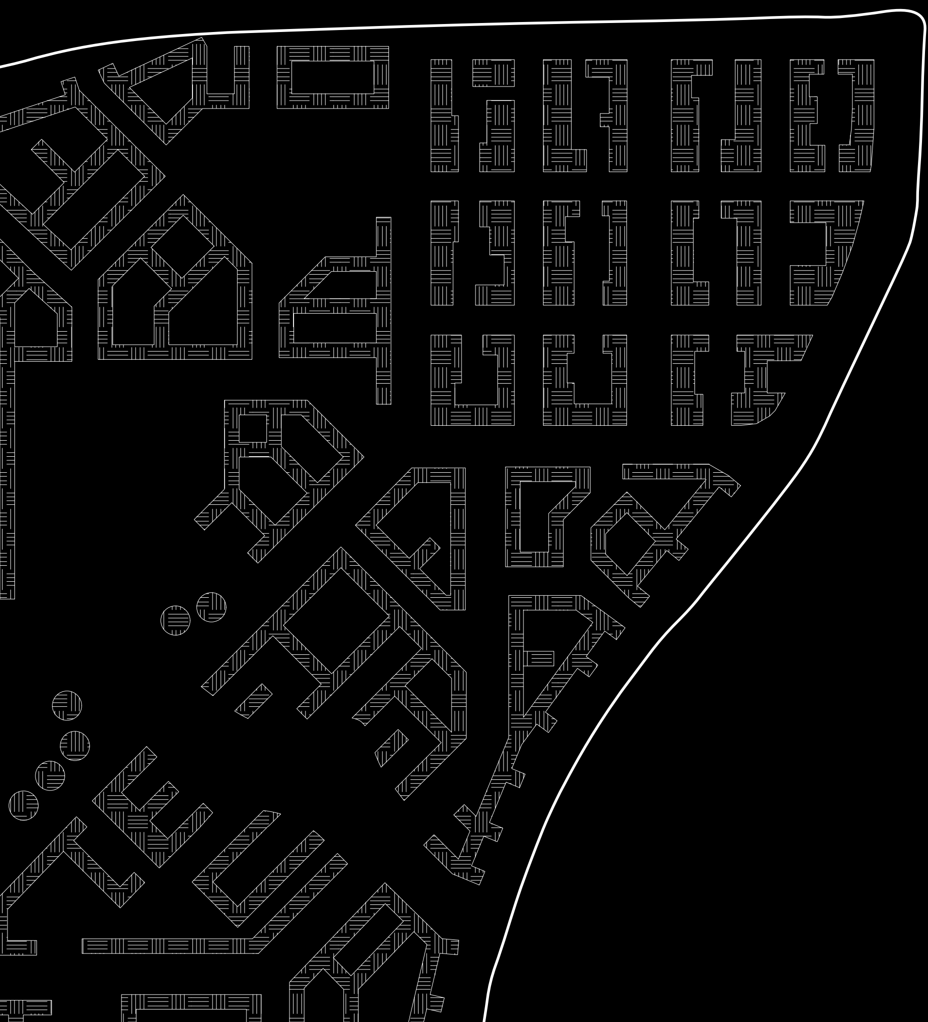


$$\frac{\text{Buildings footprint}}{\text{Total surface area}} = 21\%$$

100 200 500 1000m

$$\frac{\text{Community spaces}}{\text{Total surface area}} = 33\%$$


100
200
500
1000m



$$\frac{\text{Food production}}{\text{Total surface area}} = 20\%$$

Solar panels

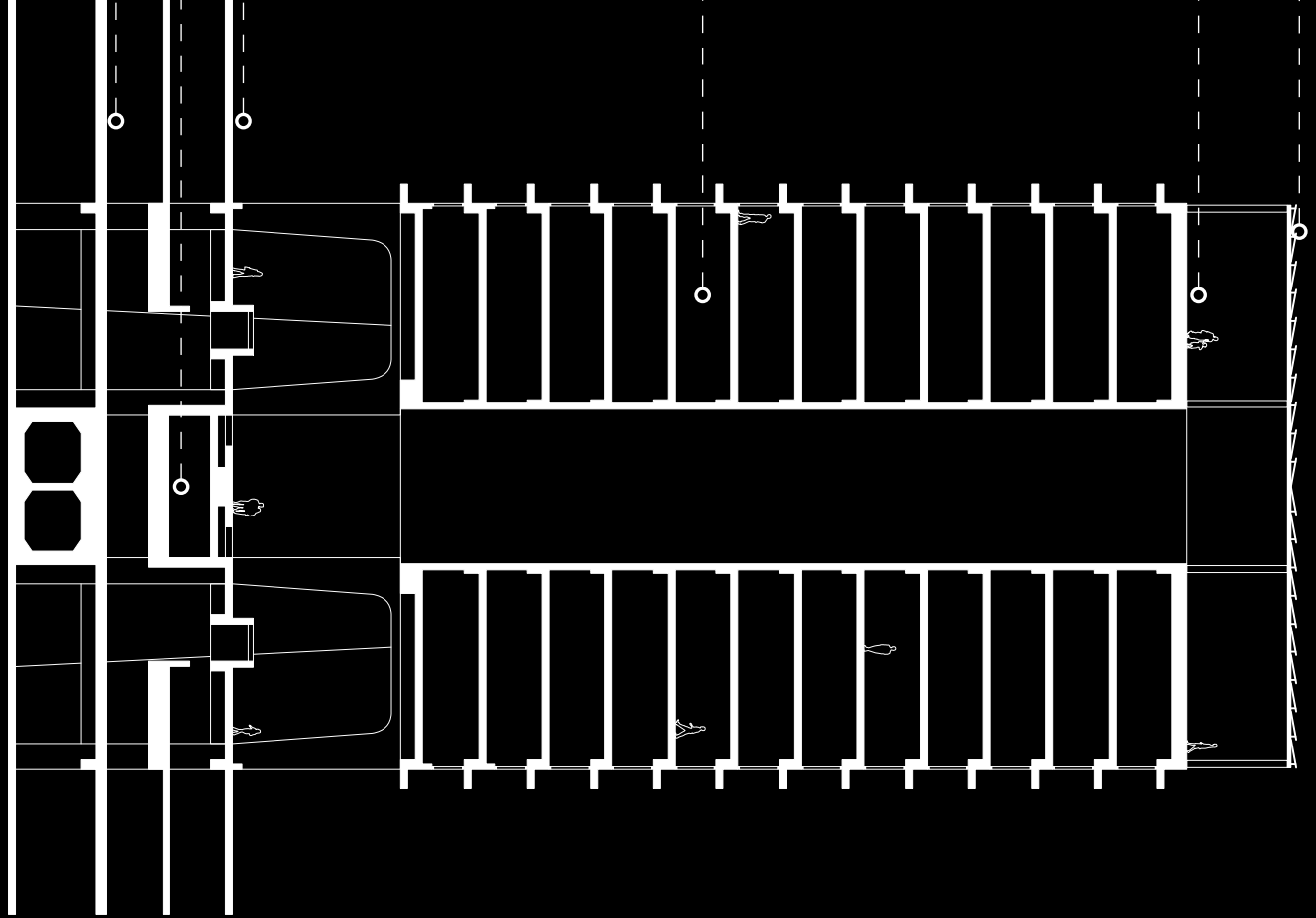
Rooftop canopy layer for food production

Cross ventilated one-unit-thick apartments

Parkland layer

Built-in water collection

Transportation layer



CONCLUSION

From a certain point of view, it could be considered that the prospect of an economic model aiming at total self-sufficiency is potentially risky and presumptuous in its attempt to deviate from the benefits brought by a globalized model.

During the Covid-19 epidemic, Europe benefited significantly from its open economy, which allows it to obtain products and services from all over the world. Some European leaders argued that our economy's reliance on foreign suppliers has weakened its resilience, and therefore Europe should now reduce the reliance on other economies. For some people Self-sufficiency or reduced economic openness, might seem to be a risky policy approach as it might increase Europe's vulnerability and ability to react to the next crisis. It might be crucial for people, companies, and governments to be able to obtain commodities from other regions around the world. This conception emerges from Johan Norberg's article "Covid-19 and the Danger of Self-sufficiency: How Europe's Pandemic Resilience was Helped by an Open Economy".

"It is diversification, not concentration of production, that will make Europe more resilient when the next emergency hit. We don't know where the next crisis

will come from. Nature will throw nasty surprises at us, and we will make stupid mistakes, some of which will have devastating consequences."[1]

Following Norberg's conception, in order to ensure us a greater chance of better dealing with the next crises the best way is to become wealthier and increase technology. In this sense, his ideal strategy for resilience is one that promotes specialization and independent thinking, as well as allowing individuals to improvise in the event of an emergency; and t his can only be achieved if commodities, services, and technology are allowed to come from abroad.

Evidently the goal is not to create isolated realities that form hermetic and completely autonomous environments, pretending to cut the connections and exchanges with the outside. It is not even a question of denying the social foundation of our civilizations, in fact, as Vicente Guallart states:

"People don't live in dwellings. We live in a continuous system of different-scaled functional nodes which allow us to carry out our daily activities. We live on the planet and carry out the functions we desire in order to develop as people, in our homes, in our neighborhoods, in cities, in a region, or globally. We carry out every action that is characteristic of the act of inhabiting on multiple scales, at a number of different moments, in a continuous system that is adapted to our social reality."[2]

The establishment of a "connected self-sufficiency" makes it easier to withstand global collapse. In

1 Norberg, J. *Covid-19 and the Danger of Self-sufficiency: how Europe's Pandemic Resilience was Helped by an Open Economy*. (ECIPE, European Centre for International Political Economy, 2021). p. 1

2 Guallart, V. *The Self-sufficient City*. (Actar Publishers, 2014). p.44

moments of crisis, such as the in the current situation, ensuring the provisioning of resources as well as the stability of ongoing urban activities is crucial. The versatility and responsiveness of a networked structure is enhanced by the integration of self-sufficient components.

It is more a question of clearly defining each of the nodes forming this network organized at different scales and setting a common goal with the aim of improving economic, social and environmental sustainability. In this sense, in addition to technical and technological solutions that could lead us to greater efficiency in the exploitation of resources, the role of the architect can prove to be crucial in recognizing the needs and identity of a specific community and designing an urban and architectural environment that supports its values.

Despite having ascertained the need to think at different scales, when it comes to designing the scale of the urban block it seems to constitute a good dimension to delimit a community and begin to develop the characteristics of a hyperlocal architecture.

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Iconographies

Image 1. Medieval block, London. Image adapted from *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*.

Image 2. Georgian gridded block, London (Belgravia). Image adapted from *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*.

Image 3. Cerdà's expansion, Barcelona. Image adapted from *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*.

Image 4. Garden suburb, Hampstead. Image adapted from *The Urban Block: A Guide for Urban Designers, Architects and Town Planners*.

Image 5. ReGen Village, View of community spaces. Credit EFFEKT

Image 6. ReGen Village: Regenerative System. Credit EFFEKT

Image 7. ReGen Village: Basic needs for a family of 3 per year. Credit EFFEKT

Image 8. ReGen Village: Extended living zone. Credit EFFEKT

Image 9. ReGen Village: Site plan. Credit EFFEKT

Image 10. The Self-Sufficient City: Courtyard View. Credit Guallart Architects

Image 11. The Self-Sufficient City: New urban typology. Credit Guallart Architects

Image 12. The Self-Sufficient City: Social interaction. Credit Guallart Architects

Image 13. The Self-Sufficient City: Food production. Credit Guallart Architects

Image 14. The Self-Sufficient City: Reprogamming of basic activities. Credit Guallart Architects

Image 15. The Self-Sufficient City: New distributed working models. Credit Guallart Architects

Image 16. The Self-Sufficient City: Urban metabolism. Credit Guallart Architects

Image 17. The Self-Sufficient City: Site plan. Credit Guallart Architects

Image 18. Écoquartier Les Vergers, View of community spaces. Credit Joel Decosterd

Image 19. Écoqurtier Les Vergers: Heating system. Credit Services Industriels de Genève (SIG)

Image 20. Écoqurtier Les Vergers: Site plan. Credit Brodbeck-Roulet Architects

Image 21. Self-sufficient city: Aerial view. Credit WOHA Architects

Image 22. Self-sufficient city: Parkland layer view. Credit WOHA Architects

Image 23. Self-sufficient city: Rooftop canopy layer. Credit WOHA Architects

Image 24. Self-sufficient city: Section. Credit WOHA Architects

Image 25. Self-sufficient city: Inverted skyline. Credit WOHA Architects

Image 26. Self-sufficient city: Ground level. Credit WOHA Architects

Acknowledgement

Thanks to Jeffrey Huang, Frederick Chando Kim and the whole MxD team for their dedication, the always relevant suggestions and great support.

Special thanks also go to my relatives and those close to me for their trust and constant encouragement.

Énoncé théorique de Master
École Polytechnique Fédérale de Lausanne
Section d'architecture
Année académique 2021-2022