

LEAF 24°N
ANDREAS GALLIKER

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SHINRIN-YOKU

Shinrin-yoku - forest bathing - a Japanese term for taking in the atmosphere of the forest in order to gain relaxation and recreation. These short visits to nature have become in Japan a recognized activity to escape from one's everyday life, leaving the civilized world behind and looking for inspiration and silence. Scientists have proven that a stay in a natural environment leads to a decrease of blood pressure, strengthens the immune system and stimulates brain currents which make us feel good and these are just a few effects among many. Responsible for these benefits are natural oils which we inhale and our perception of nature such as the colors and the noise of the leaves blowing in the wind.

But I think there's more. Spaces and forms built and created by nature have an undeniably amazing beauty. Processes strive towards perfection and the atmosphere which arises is a sense of pure harmony.

Our subconscious has an unimaginable effect on our mind and is again influenced by the space and the spirit of every single place. So what if we sense the balance of our environment, its atmosphere, and assign it subconsciously to our balance of mind and our intellect? What if we unconsciously notice the immense beauty of nature that makes us feel better? And what if we've missed something we have needed all that time since we left our natural habitat?

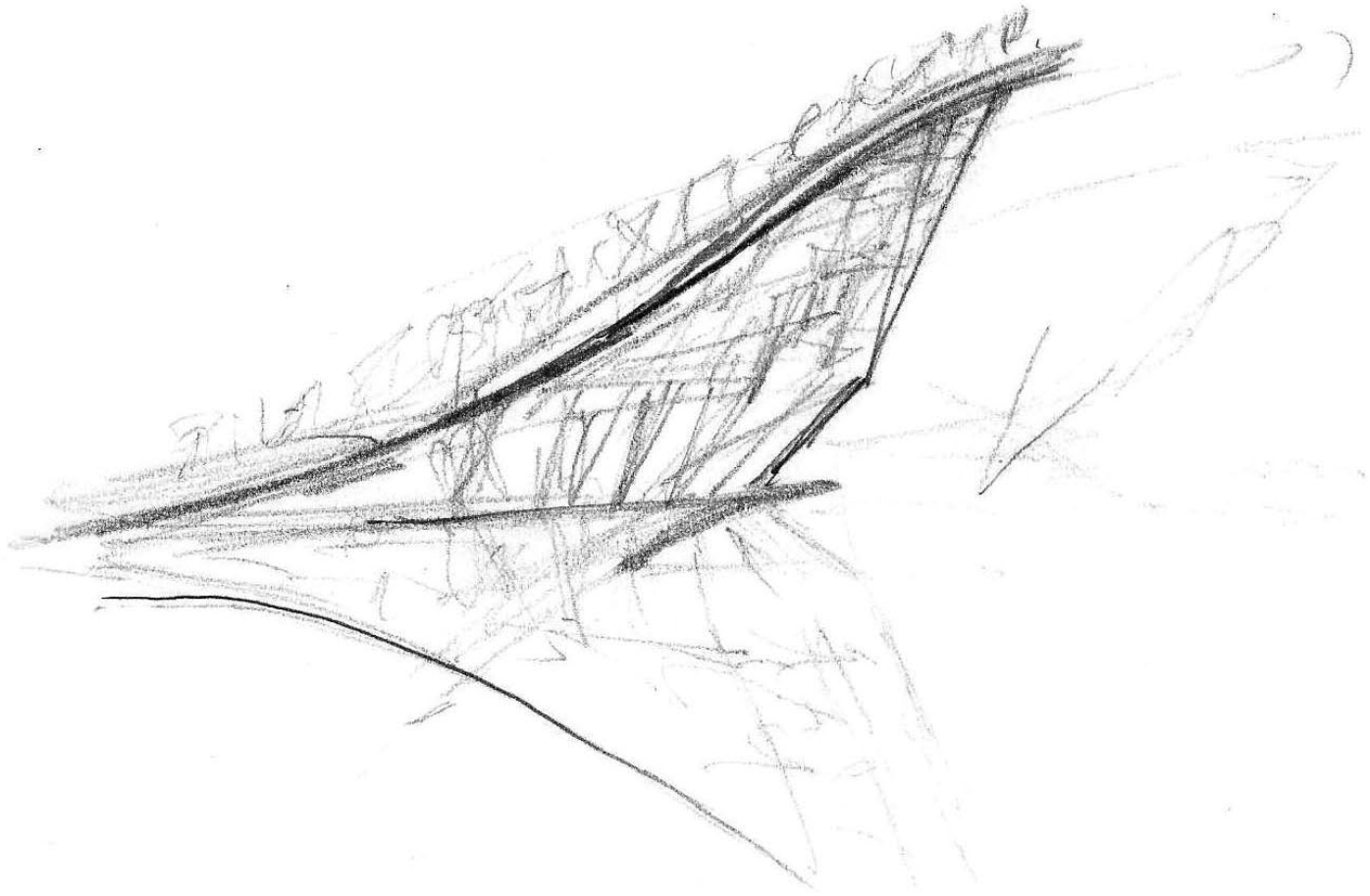
VISION

I have a vision of a complete new standard of living on the edge between pulsating city life and relaxing nature. Of an urban living form where natural forms and organic processes create with their harmony and atmosphere the perfect environment for people. Of a city where every single apartment reflects the highest quality of living, where it isn't a question of status and money.

It is a vision where respect for nature plays an important role, with the idea of giving nature back what it provides. In contrary to existing cities which grew with our historical development, it is a complete new city form where every shape is reconsidered. A living environment which suits all our needs and doesn't interrupt the natural circuit but supports it. An encroachment that has minimal bad effect on nature but supports its diversity.

And it is a vision of the ideal of natural harmony. The sun as the one source of life with which everything aligns. Water as symbol of fertility and vegetation, as a circuit striving to perfection. Finding solution for our concepts and discovering order in complexity. Using spaces and atmospheres as a guide for future concepts. Thinking about how to create a design for a city, where our natural habitat stands in the centre.

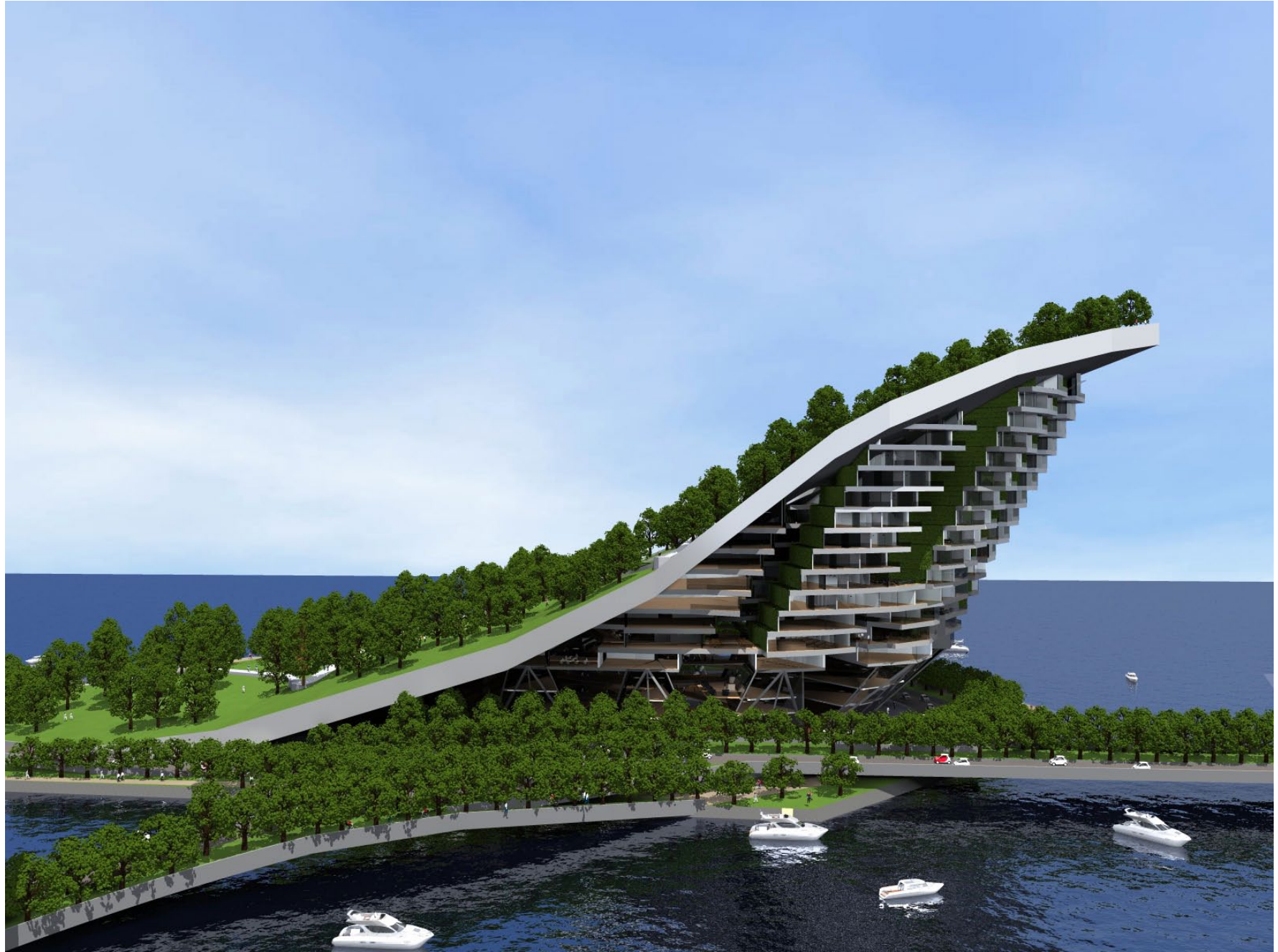
Leaf



CONCEPT

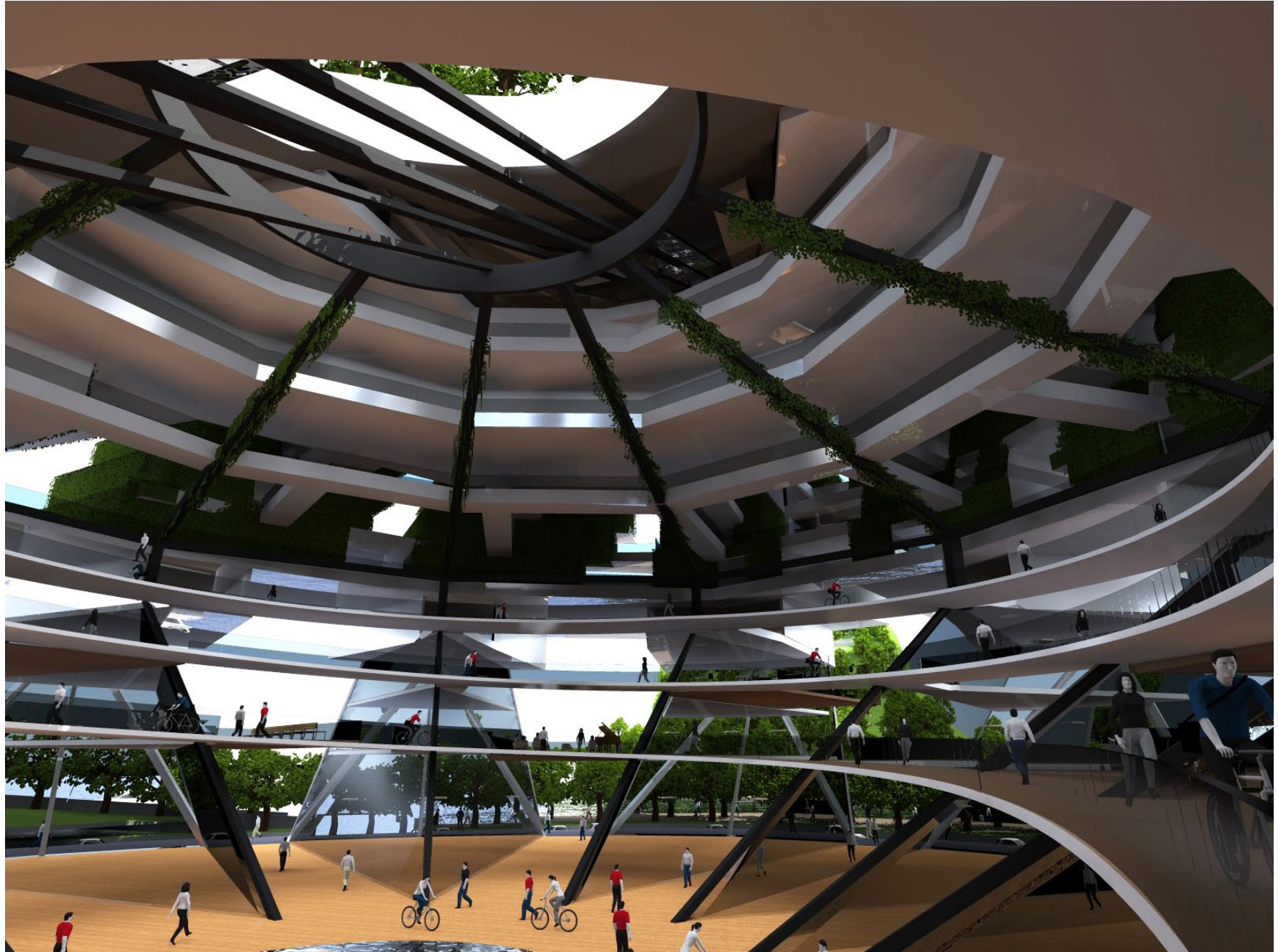
The city is composed of an extendable arrangement of buildings in the shapes of leaves. This concept is developed especially for a tropical area of a geographical location of 24°N.

The shape of the construction extends towards the light, aligned with the sun. Inspired by the structure of a leaf, an inclined lift runs like the main leaf vein through the building and connects the leaf veins, the different floors. The apartments are all oriented to the south and begin at the height where the inclination of the front facade overlays the street underneath. Thanks to the slant, one can't see nor hear the street from the apartments. On the north side, the back of the leaf, a green area extends from the ground to the top, creating an adjoining recreational zone. Due to the park on the slanted roof, green walls in the atrium between the flats and the overhanging construction, the green area is more than two times as large as the area of the ground floor.



The two different angles of the front facade divide the building into public space underneath and a private part above. The slant of the lower part is aligned with the incidence angle of the sun on the 21st of December, 12 am, at a location of 24°N. The slant of the private part above is aligned with the incidence angle of the sunlight, when the sun is directly over the equator, on the 21st of March, 12 am.

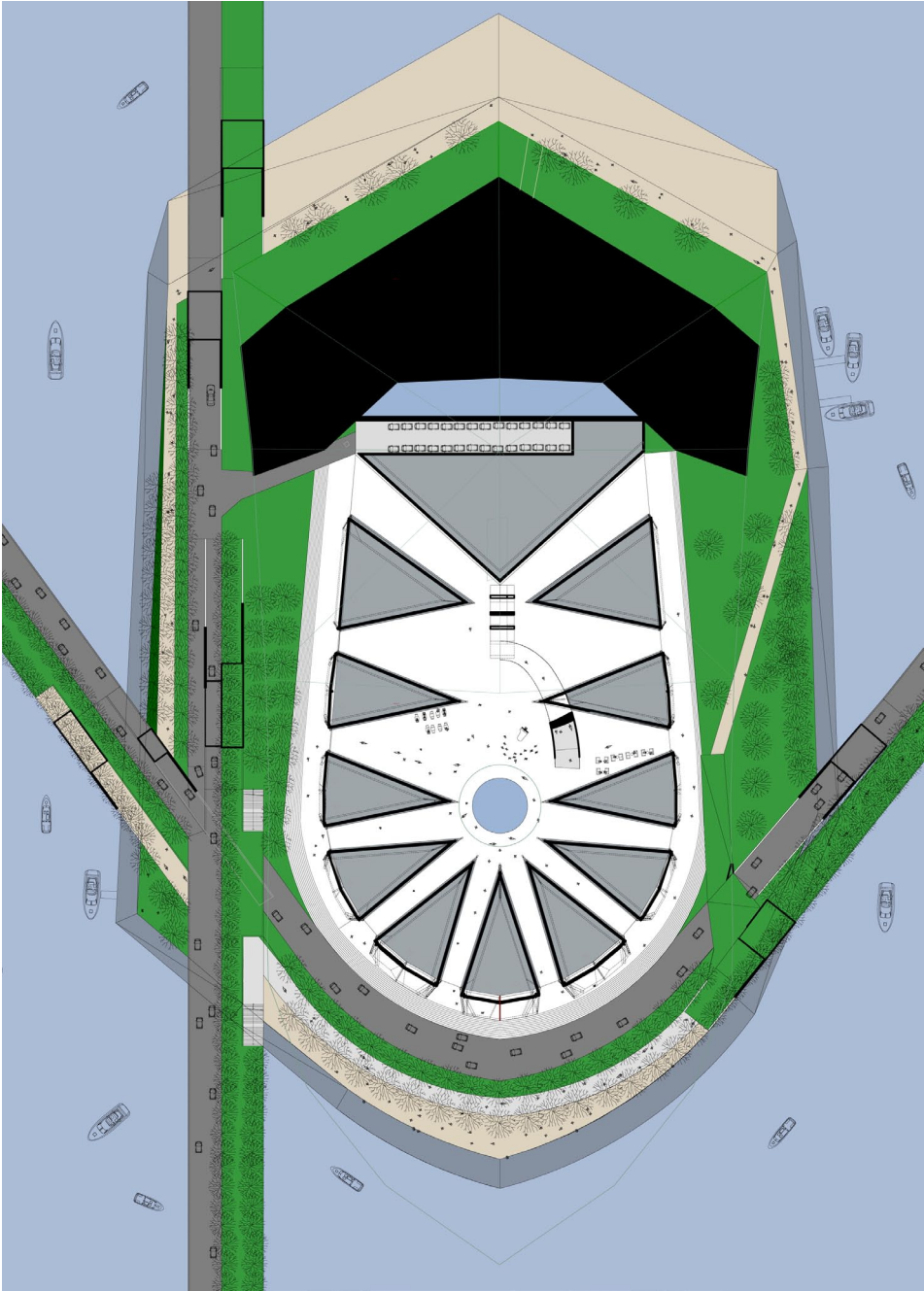
Consequently, in summer, at all locations between 24°N and 24°S, the leaf construction casts a shadow on the public area in front of the building and protects the apartments from the sun during mid-day and afternoon, the hottest daytime. In winter, and during the rainy season, the roof builds a covered outside area lightened by the sun and provides a very small angle of incidence of sunlight on the apartments, to adjust room temperature.



PUBLIC SPACE

The inner construction of the building is based on the structure of a tree, according to the vein structure of a leaf. The ramification of the branches forms the lower public area and the leafage builds the private area above. Together they extend along the inclined lift to the top. The public area of the leaf consists of a big hall, bounded by branches. These branches include stores and restaurants. The idea is to create a public space as a meeting point, away from any streets. A cultural space sheltered from the rain, secure from the sun and the heat, but still with an overwhelming natural atmosphere.

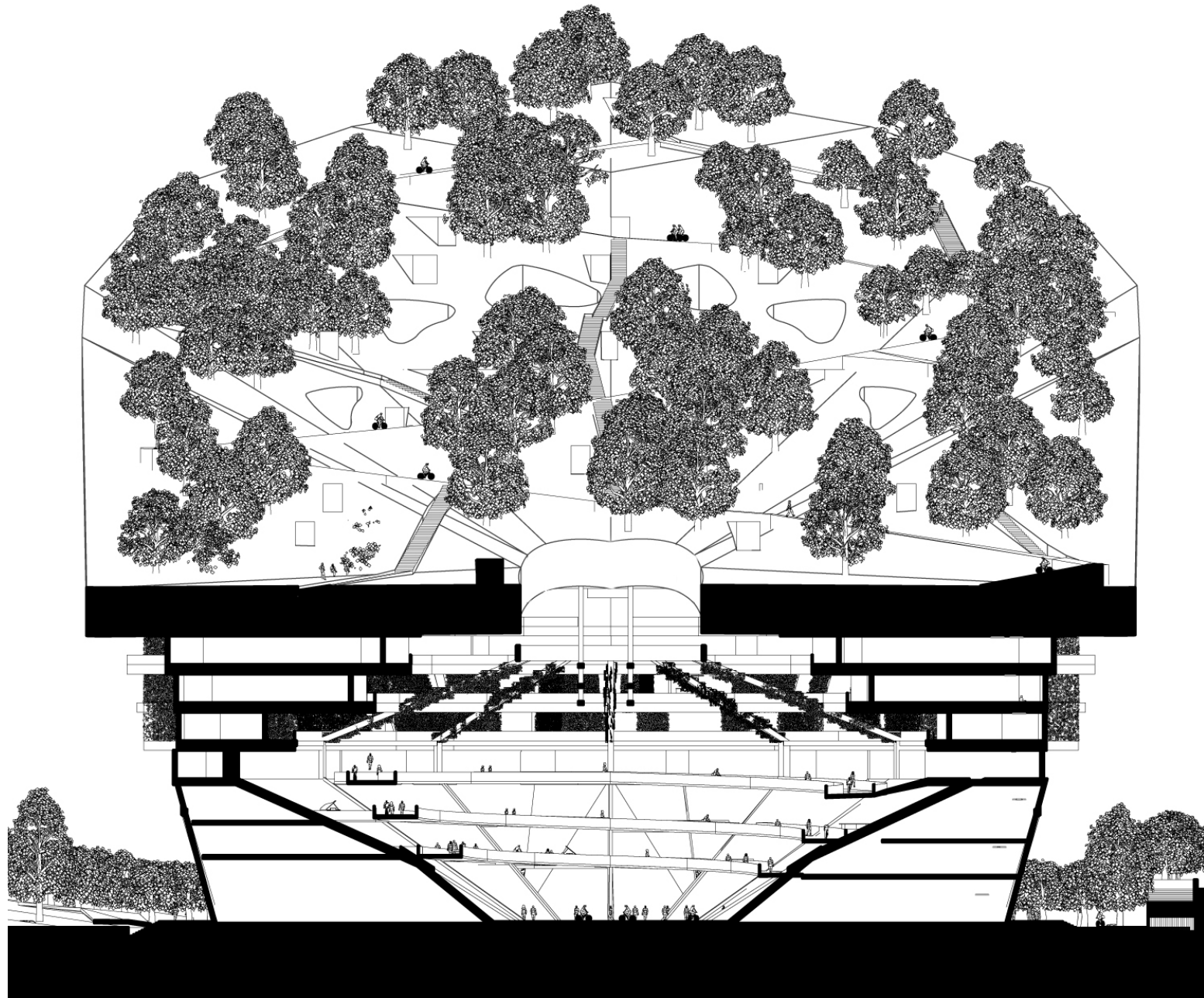
On the groundplan, each branch has the shape of a triangle, aligned to the centre of the hall, steering every alignment and gaze into the middle. Regardless of where you are, you can see outside in almost every direction but the construction still builds a protective wall to the exterior.



Towards above, the branches become narrower, allowing more daylight to flow through the room. Due to these openings, which run through the whole leafage, the sun shines through one of the gaps into the room, depending on its location.

In the morning, the sunlight shines directly into the room from the east, in the evening, it shines in from the west. In winter, during midday and afternoon, it shines through the southern gaps. From spring to autumn the sunlight doesn't reach the gaps at midday but lights through the opening in the middle of the roof into the hall. On the 21st of June the sun shines at an angle of exactly 90° through this opening in the centre and directly onto the pool of water, which is collected when it rains.

Around the centre, a spiral winds up along the branches. It serves as a path to gain access to the stores, restaurants and terraces. Thereby, the whole building is accessible by bicycle. The terraces represent the first leaves of the leafage and provide meeting points for the residents.



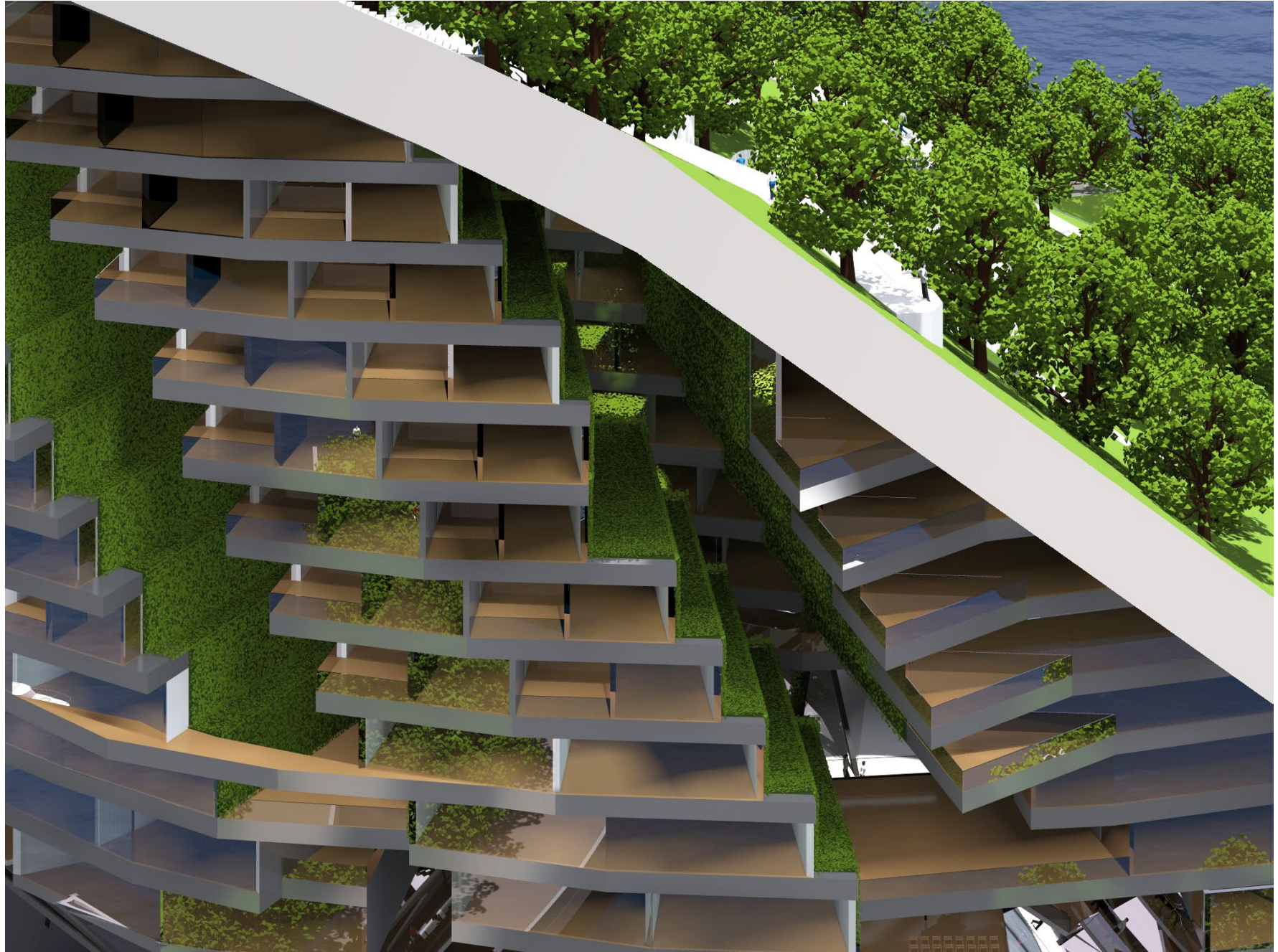
They build places, where people meet during the hot daytime for a break, when the hall provides shadow, as well as in the evenings, when the temperature has cooled down and the restaurants are exposed to the last sun rays.

On top of the branches, a metal construction forms a dome. The inner part of the leafage rests upon this dome, which is on the one hand an element of construction and contributes, on the other hand, to the atmosphere of the hall.

The slant of the branches inside the building serves perfectly as a tribune, with people standing around the spiral. Further, a scaffold could be attached to the branches around the hall. It could be fitted with seats to form a stage for concerts or events. The stage can be located behind the water pool. That way, the space can be easily changed to a theatre or a concert hall. During the day, it could serve as a public space for everyday life and at night for cultural events.



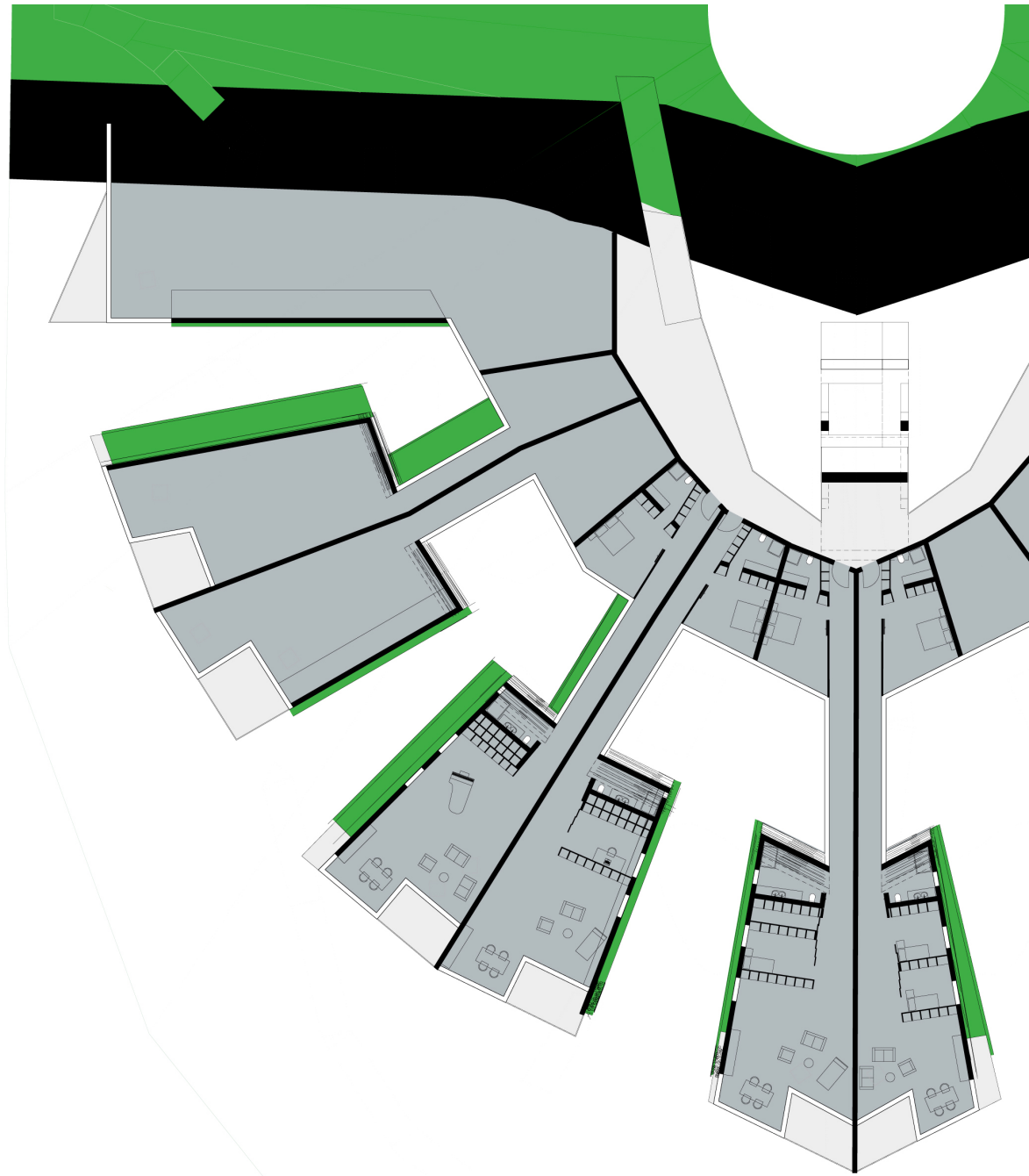
The illumination of the space at night is exactly opposite to the one at daytime. Whilst providing shadow during the day, by night the branches serve as the source of light. The openings, on the other hand, work exactly opposing to this principle. They provide light by day and are obscure by night.



PRIVATE SPACE

Composed of apartments lying irregular upon another, the leafage extends over the public space to the top. The piled living rooms in the front are the extension of the branches underneath. Inclined atriums behind divide the apartments into two units, the living area in the front and the sleeping area in the inner construction. The two parts of the apartments are connected by private bridges.

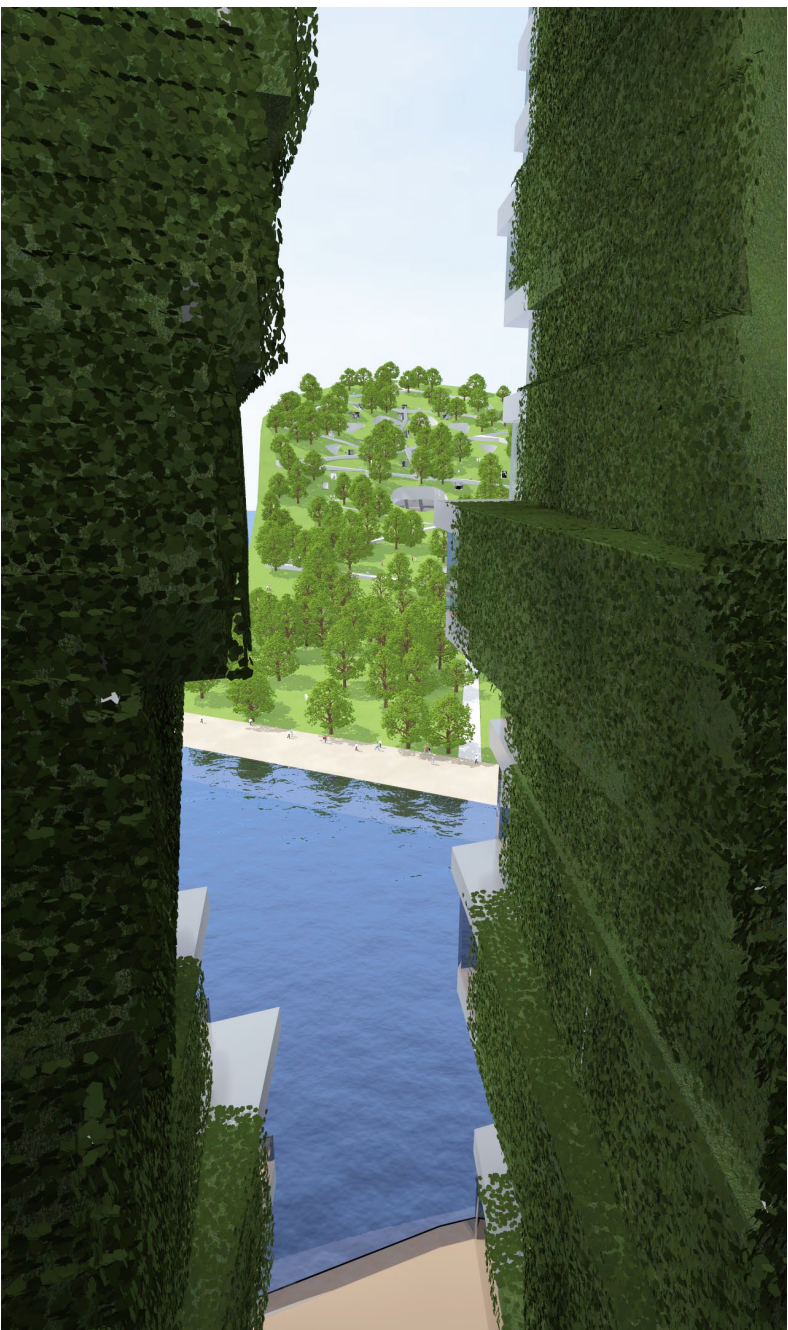
The orientation of the windows of the living area to the front and to the side ensure the privacy of the bedrooms. The windowless greened back and the sidewalls make the view of the bedrooms look like a small garden. Openings on top of the atriums spend daylight to the bedrooms, let heat escape and let rain water the plants on the back wall. The greened sidewalls of the leafage are watered by an irrigation system that collects rainwater on the roof.



The uniqueness of the apartments has the ability to modulate a space for any requirements. Movable wall closet elements define the space of the living area, whereby the dividable room can be reorganized at every time. The elements can compose one to two additional rooms which can be separated by sliding doors. Apartment choices no longer require a clear plan of the future, but allow for uncertainties. A separate room for a child as well as an extra work space no longer poses a problem. It further provides the possibility to move the two rooms together for an event that requires the whole space.

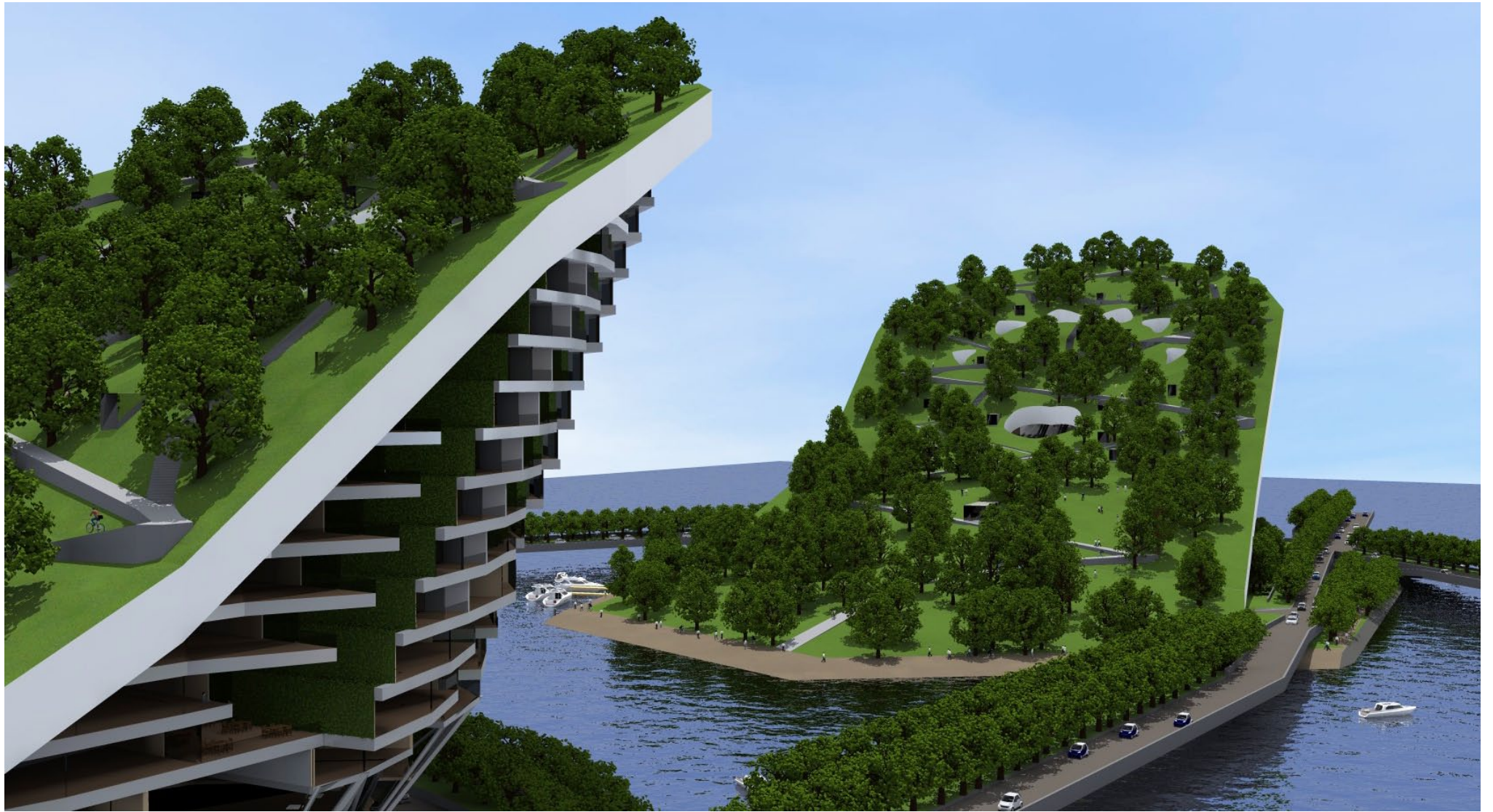
These possible compositions enable to configure a flat of two to four rooms. The possibilities range from studios, one- or two-child family apartments to residential communities. The adaptability of the apartments even allows to combine two flats.

The division by the atriums of the apartments are not only the separation of two different functions of the rooms. It is the edge between day and night, between contemplation and vitality.



The sleeping area is a place of privacy, intimacy and silence. For that reason, the bedrooms are located in the inner construction of the building, protected by the walls of the atrium, far away from the everyday life. Its atmosphere defines the experience of concealment. Bounded by the vegetated backwalls of the living area, the view only reaches through a small gap between the leafage, providing a view over the city. Due to the inclination of the facade, one only sees the water in front of the building when looking down.

Representing the border between privacy and public life, everyone crosses the bridge over the atrium daily. The atrium provides light for the sleeping areas and the public space underneath. It also enlarges the green area of the leaf. Vertical gardening on the walls is not only an environmental and aesthetic component, but also serves as an isolating element. The openness of the construction from the public space through all the atriums lets the airflow interfuse the building and climate it.

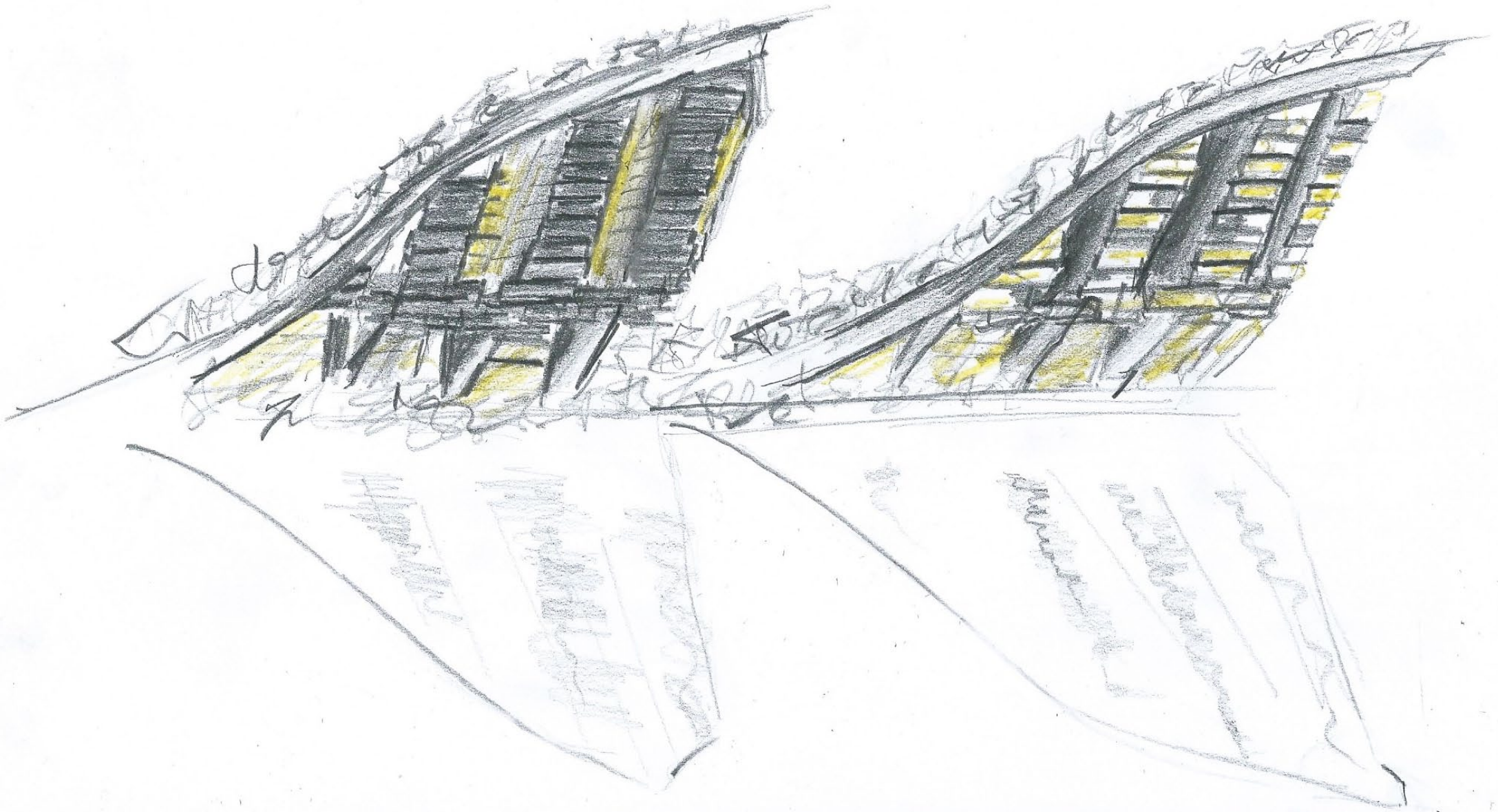


Protected by the wind, drones deliver the post through the atriums, putting the delivery into the postboxes of each flat and making it possible to deliver every size of package efficiently and reliably.

As one walks into the living area, one is overwhelmed by the stunning view. This room represents an area of vitality, diversity and magnificence.

Due to the positioning of the leaves behind each other, the view from the apartments is always directed to the back of the leaf in front, to its green area. The leaves form a landscape of hills. In conventional cities, views to the south are disturbed by shaded facades of the houses in front. In this city, due to the inclination of the leaf in front, its back, the park, is illuminated by the sun.

The inclination of the housing units to the front guarantees total privacy. Thanks to this inclination, the sun only shines on the eastern balconies during morning and on the western balconies in the



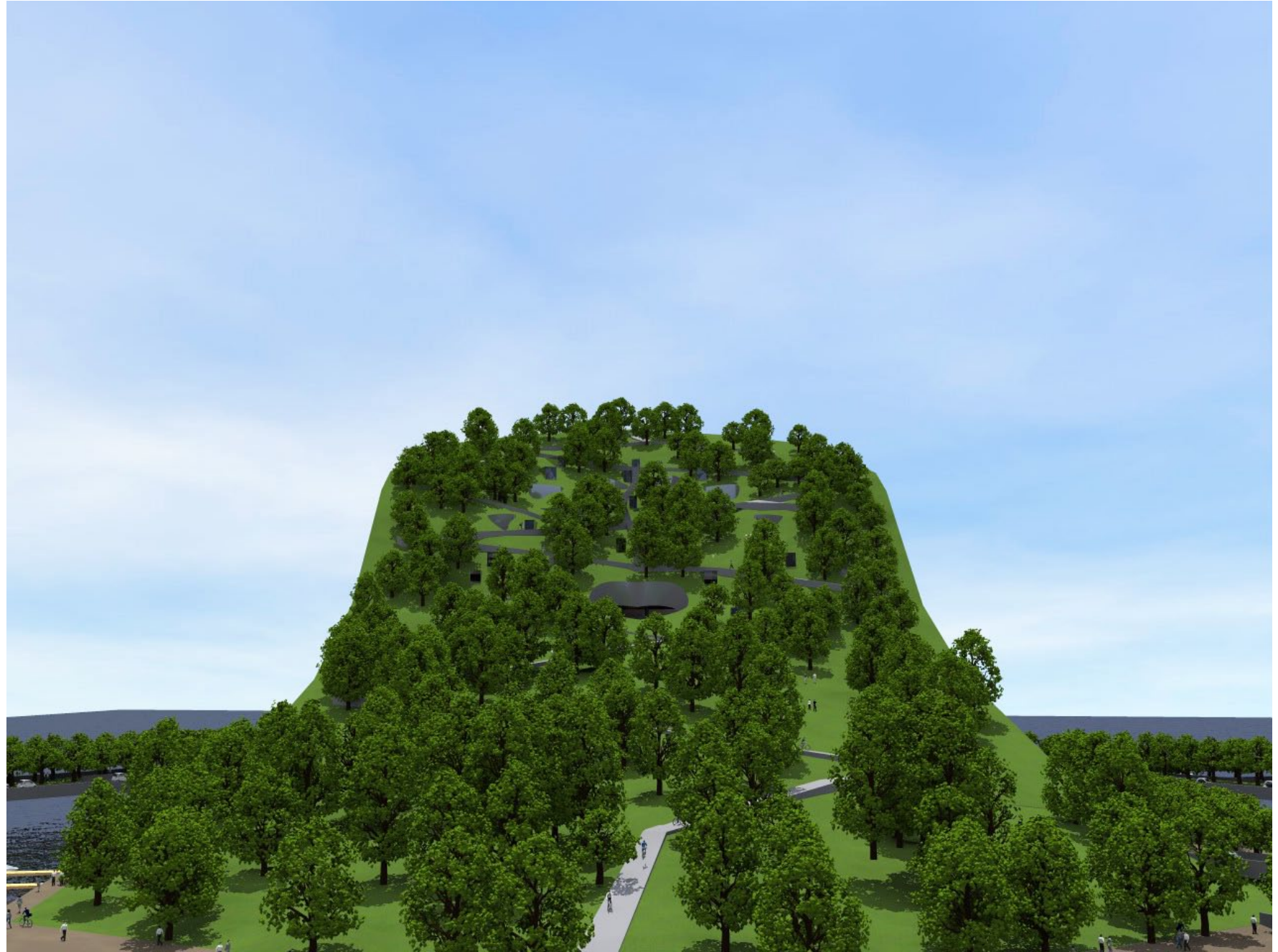
evenings. These are the times, when it is enjoyable to be in the sun. During midday and afternoon, when people avoid the sun, all balconies are shaded and can comfortably be used.

By the slant of the front facade the city underneath is not noticeable by hearing nor seeing and the open space and the streets are sheltered. When it rains, the road remains dry and the noise of the cars silent, keeping the quiet.

In the evenings, you can observe how people slowly go to bed, how the evening turns into the night. During dinner all lights in the front, the living area, are illuminated. As the time goes by, people go to their sleeping areas, turning the lights in the front off until the light only shines from the bedrooms through the atriums until eventually, everything gets dark. This illustrates the progress of time in the evening.

At night, the back of the leaf is sparsely illuminated, only the openings in the roof are recognizable. It feels almost like being in the countryside.

Illumination of the leaves in the evening on the right, in the late evening on the left



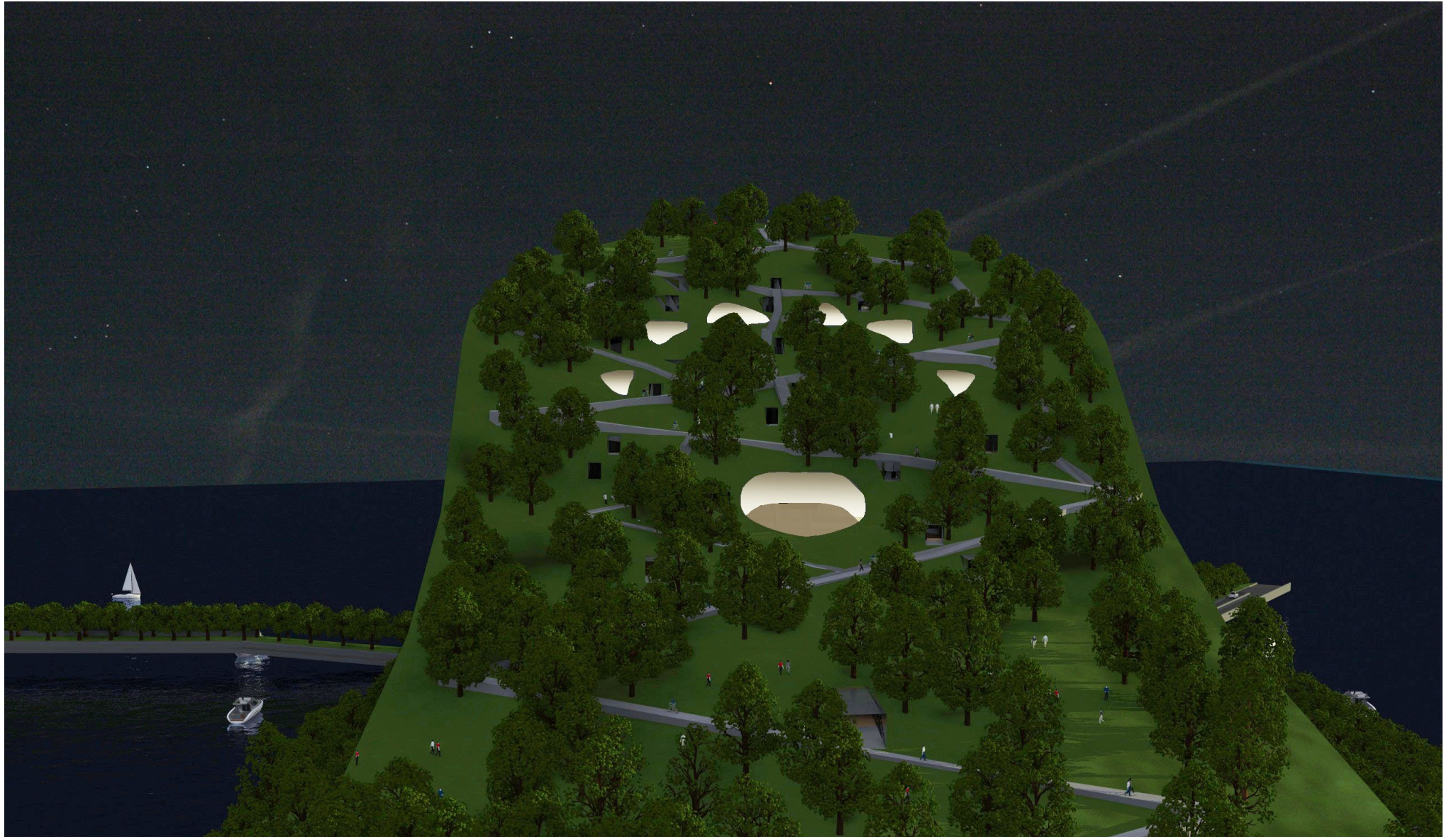
BACK OF THE LEAF

Over the roof, the back of the leaf, a park extends that fulfills the essential assignment of a leaf, looking after the balance of oxygen and carbon dioxide in our atmosphere. In tropical climates, nutrients are mostly situated in the trees instead of the ground, whereby the roots are shorter and the humus is thinner. As a result the width of the roof of about five metres lasts for the whole construction.

Similar to the wax film of a leaf, the back protects the building from the heat with its vegetation and its roof of soil. The vegetation and the stratum on the roof have a strong effect of isolation and the inclination provides a flat angle of incidence of the sun. The sleeping areas are located right underneath, thus, especially the bedrooms are cooled, where a comfortable temperature is most important. The back of the leaf has no windows, only small entrances to the apartments, which are shifted from each other.



The park builds the second main social space of the city, into which every flat has direct access over its back door. Connected through roads drawn on the organic form up the hill, every apartment can be reached by bicycle, which gives each flat a feeling of a detached house. Cafes and restaurants, distributed over the whole open space, create meeting points and the slant of the meadow provides a place for silence and inspiration. The open space provides the possibility to do a bicycle tour or to take a walk to the top of the leaf. Looking back, one has the view of a whole city, whereas looking forth, one can enjoy a landscape of hills. It is an adjoining recreational zone in front of one's backdoor.

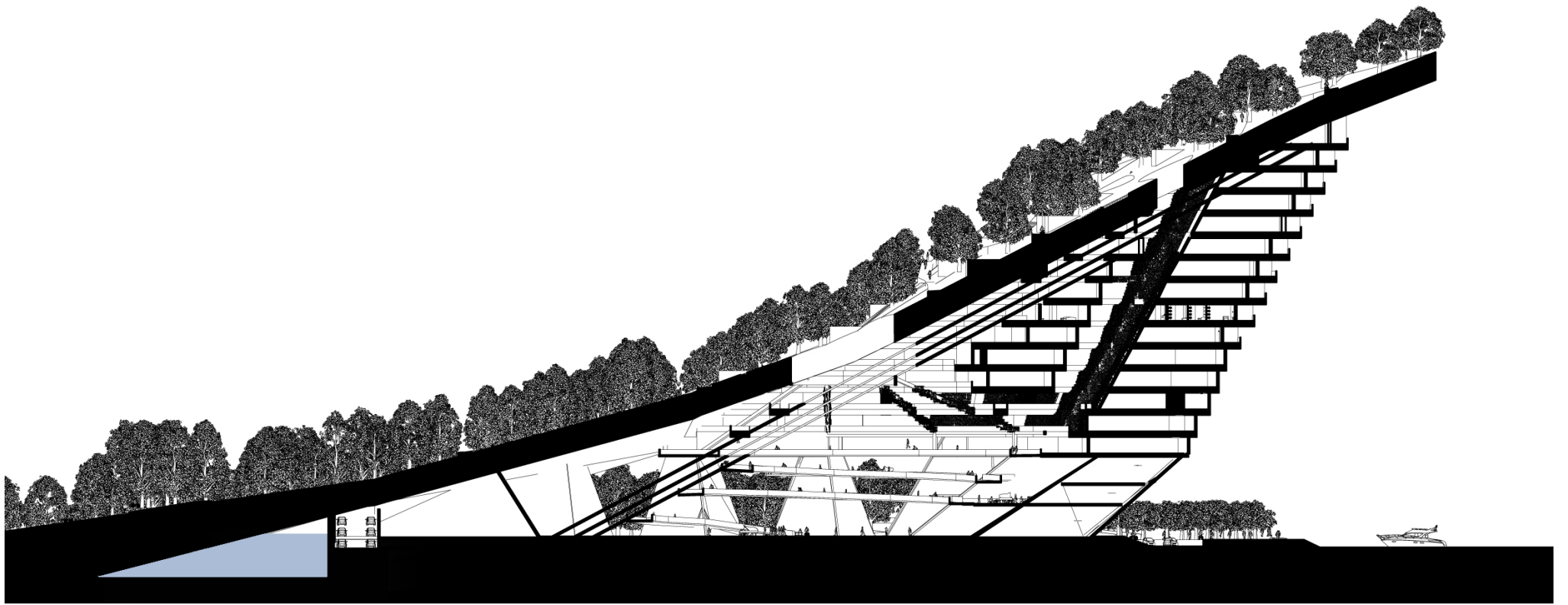


In the evenings, when the sun slowly goes down, the openings of the atriums are being illuminated by the light of the sleeping areas, the opening of the public space by the branches underneath. To symbolize the longing for the sun, the illuminated elements resemble the sunrise, with the opening of the public space as the celestial body itself and the openings of the atriums as sun rays. In the evenings, after the sunset and in the morning, before the sun rises, the apartments and the openings of the atriums are illuminated. The whole scene brings to mind sunset and sunrise. During the night, when the lights in the apartments are turned off, only the main opening of the public space is visible, reminding that the sun will rise again.



The cross section of the roof construction has a form similar to a flat „V“, like a leaf, in order to provide stability. This shape also protects the park from the noise of the streets in front and besides the building and gives a feeling of concealment.

When it rains, the green area absorbs the rain water and prevents the canalizations from overflowing, particularly in areas with a large amount of rain. A drainage system collects the water that the ground can't absorb and leads it along the shape of the roof down to a water reservoir, located underground. The reservoir converts the rain water into drinking water and thereby builds the supply of water of the building. Due to its location underground, the water stays cool, despite of the heat outside.

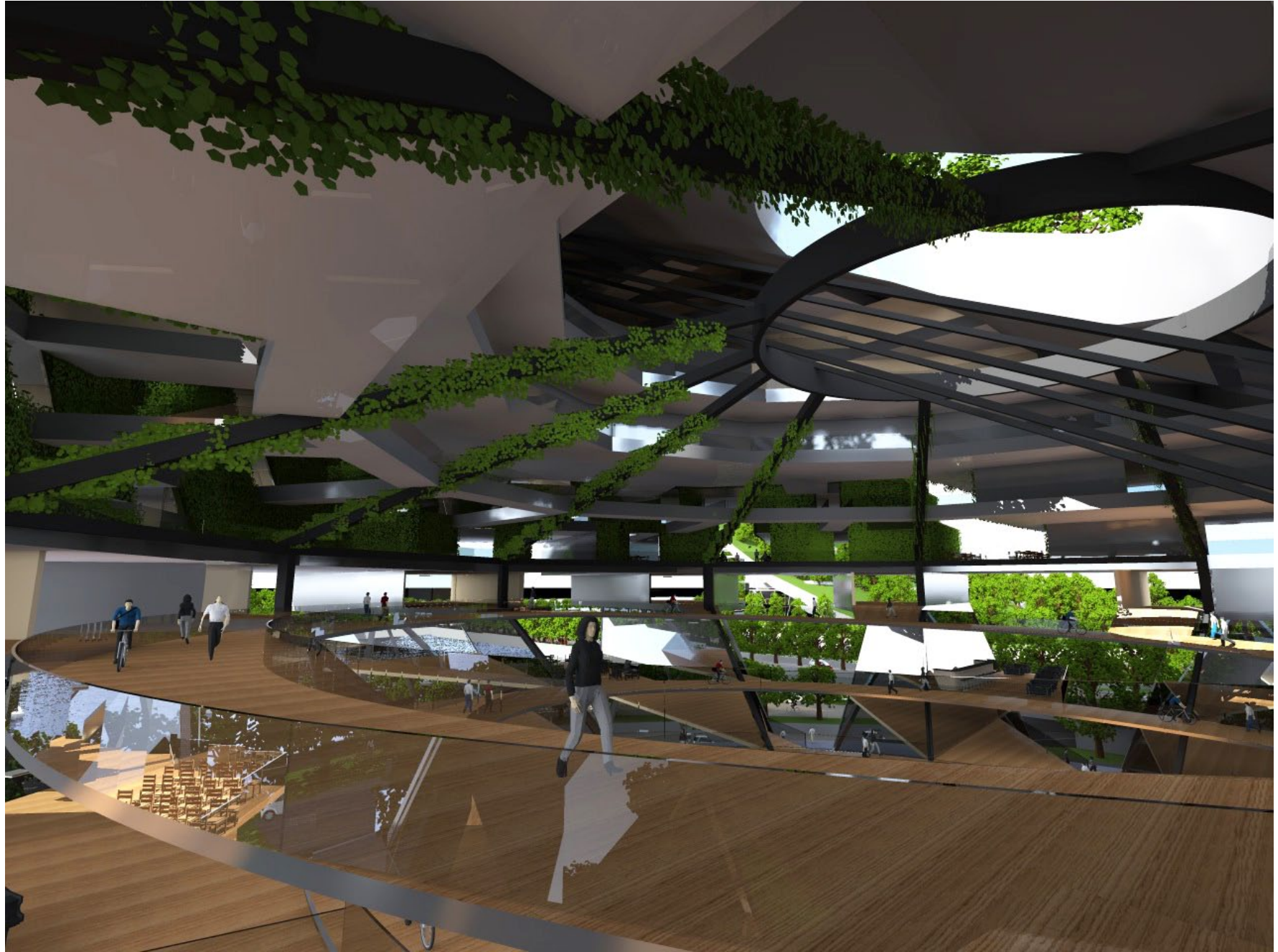


CONSTRUCTION

The leaf is basically leaned on the branches in the public space. The front construction of the leafage stands directly on the branches, while the inner construction is supported by the dome of the public space. The water reservoir pulls with its enormous weight the construction to the back, which enable the overhanging shape.

The construction of the building has the dimensions of a freight ship. Thereby, the leaves can be built in a shipyard and pulled on pontoons of reinforced concrete to any destination, where the swimming constructions can be anchored to the ground.

The construction of the leaf is built of ecological and sustainably produced building materials. The shapes gain their form through an innovative process called plotting, whereby one can manufacture any forms in very big sizes.



The sustaining elements of the construction, which means walls and ceilings, consist of compound concrete. In opposition to the nowadays used steel reinforcement in the concrete, the reinforcement consists of bamboo, by what the construction is much lighter and the flats are not surrounded by a faraday cage. The plaster of the walls is substituted by cast, which regulates the humidity inside the building.

The pillars are plotted in a compound material, that consists of carbon fiber. Thereby, a strong stability is ensured and the construction elements are much lighter.

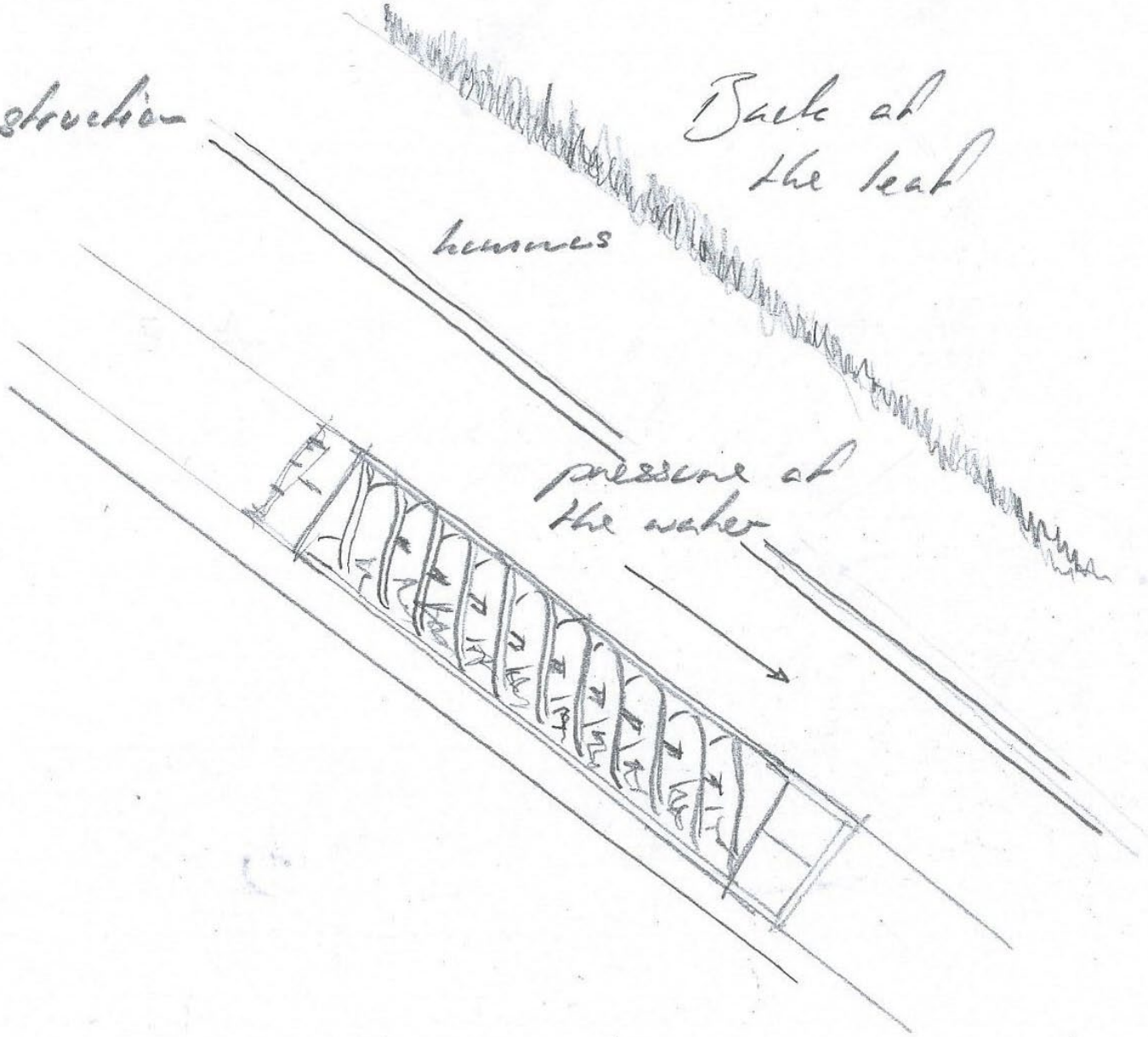
Installations in the apartments also have a demand for lightweight materials. For reason of ecology, those installations consist of local recourses, as for instant loam, bamboo, cast and wood.

roof construction

Back at
the seat

hinges

pressure of
the water

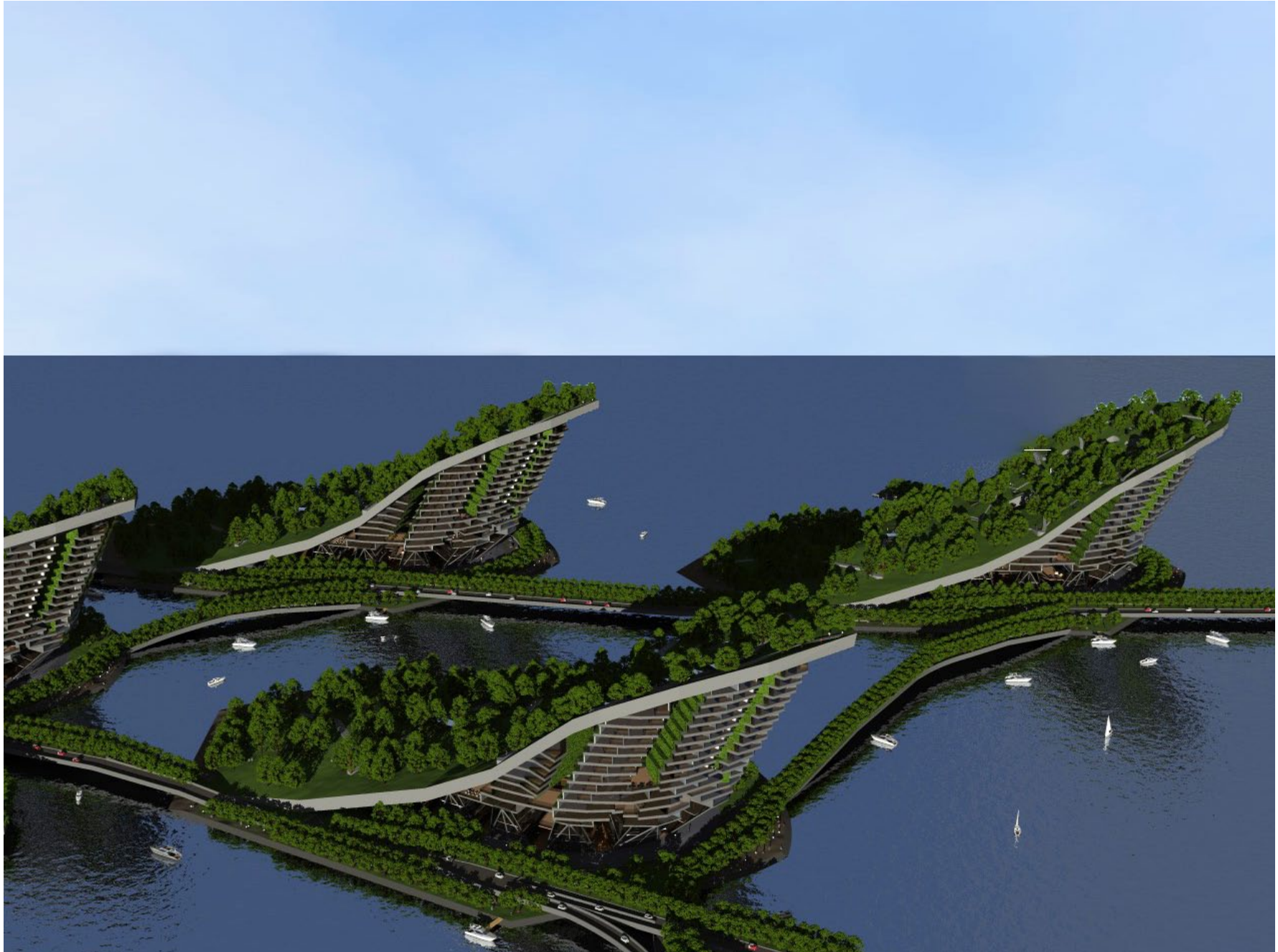


ENERGY SUPPLY

The energy demand to cool and heat the building is minimal. As a result, the building provides passive solar energy in winter and an optimal shading in summer.

The energy supply is based on the process of photosynthesis. All windows in the public space and the living area, which are aligned to the sun, have integrated solar cells. The system in the windows is invisible and generates power from the brightness of the daylight, even if the sun doesn't shine.

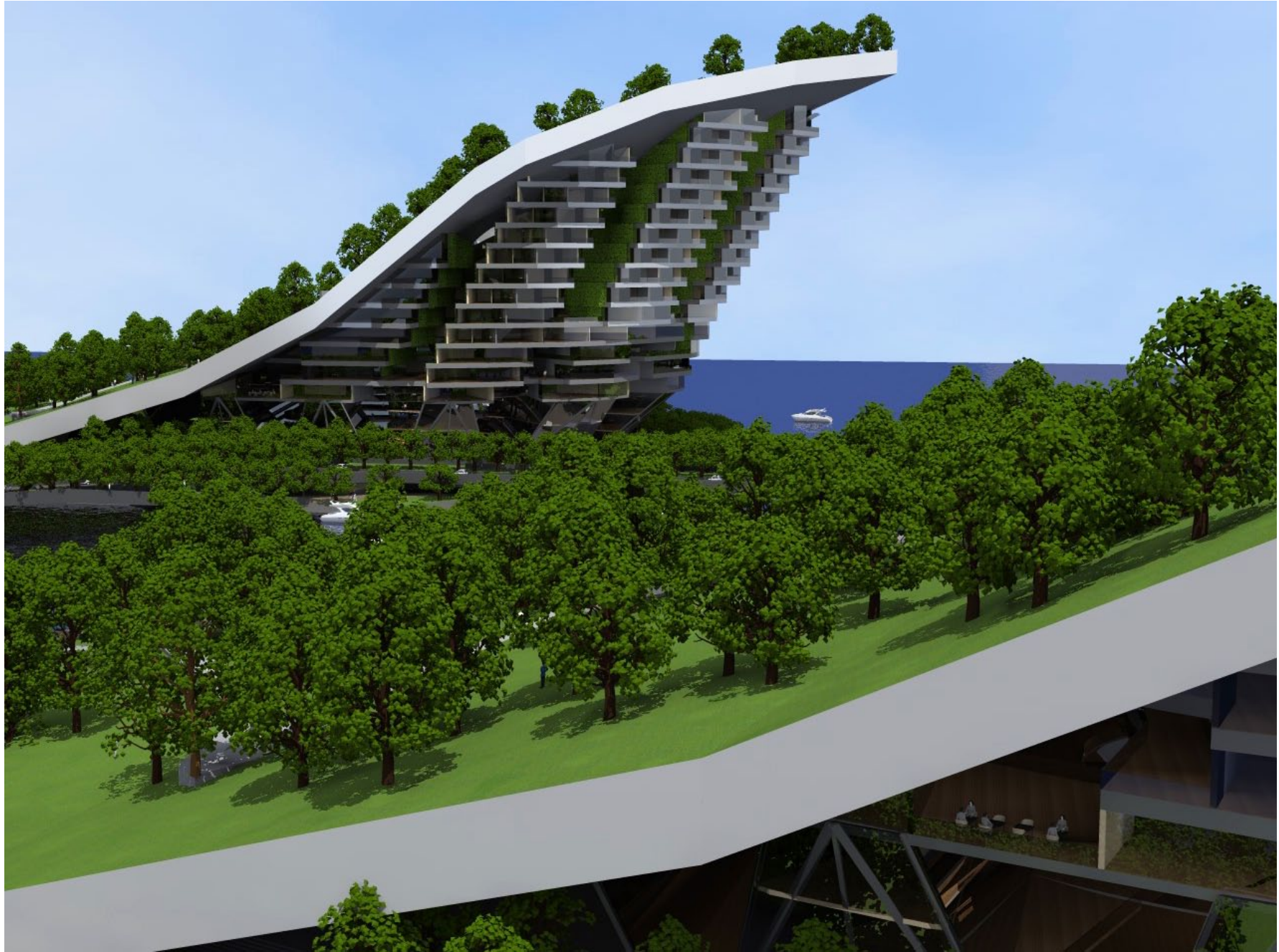
A second way to generate electricity is achieved by using the rain water, which is absorbed by the back of the leaf. When it rains the water is collected underground and leads down a pipe into the reservoir. In this pipe are turbines, which spin due to the water pressure. Thanks to the large surface of the roof and the amount of rain in tropic areas, the volume of water has enough power to spin the turbines and generate significant energy.



CITY

The city is composed of an extendable arrangement of leaves, all aligned to the south with a small deviation to either east or west. The individual orientation follows the example of nature and leads to a charming atmosphere, preventing monotony and sterility. Based on the thought of the tension between sunset and sunrise, when the natural light source disappears, the buildings are arranged in a way that every leaf is as long as possible illuminated by the sun. This structure resembles a fish scale formation and lets the shadow of the leaves in the morning and the evening, fall into the spaces between the buildings. This way, the apartments are illuminated during the moderately warm hours and the parks on the roofs are exposed until the last rays of the sun are gone.

Depending on needs, the composition of the leaves can be built in water but also on a green area. Water as environment has the advantages that more habitat and green areas can be arisen, wi-



thout damaging existing natural landscapes. The water canals work simultaneously as a further water supply, a way of transportation as well as an aesthetic element. If the city is located on the water, the leaves can float on pontoons of reinforced concrete, where the foundation of the anchorage is the only interference with nature.

Due to the orientation of the leaves to the south in their fish scale formation, the views of all apartments extend into a landscape of hills. In order to generate individuality and utility, the roofs of the leaves can be designed specifically. The green space can be used as a park, serving as a social meeting point and adjoining recreational zone. Further, there is the possibility to plant a forest in order to expand the local rain forest and support its diversity. Depending on the requirements, the roof can even be utilized to for agriculture so as to ensure self-sufficiency. The interaction between these three possibilities, which appear on the landscape of the hills, mediate a diversified atmosphere and define the character of the city.

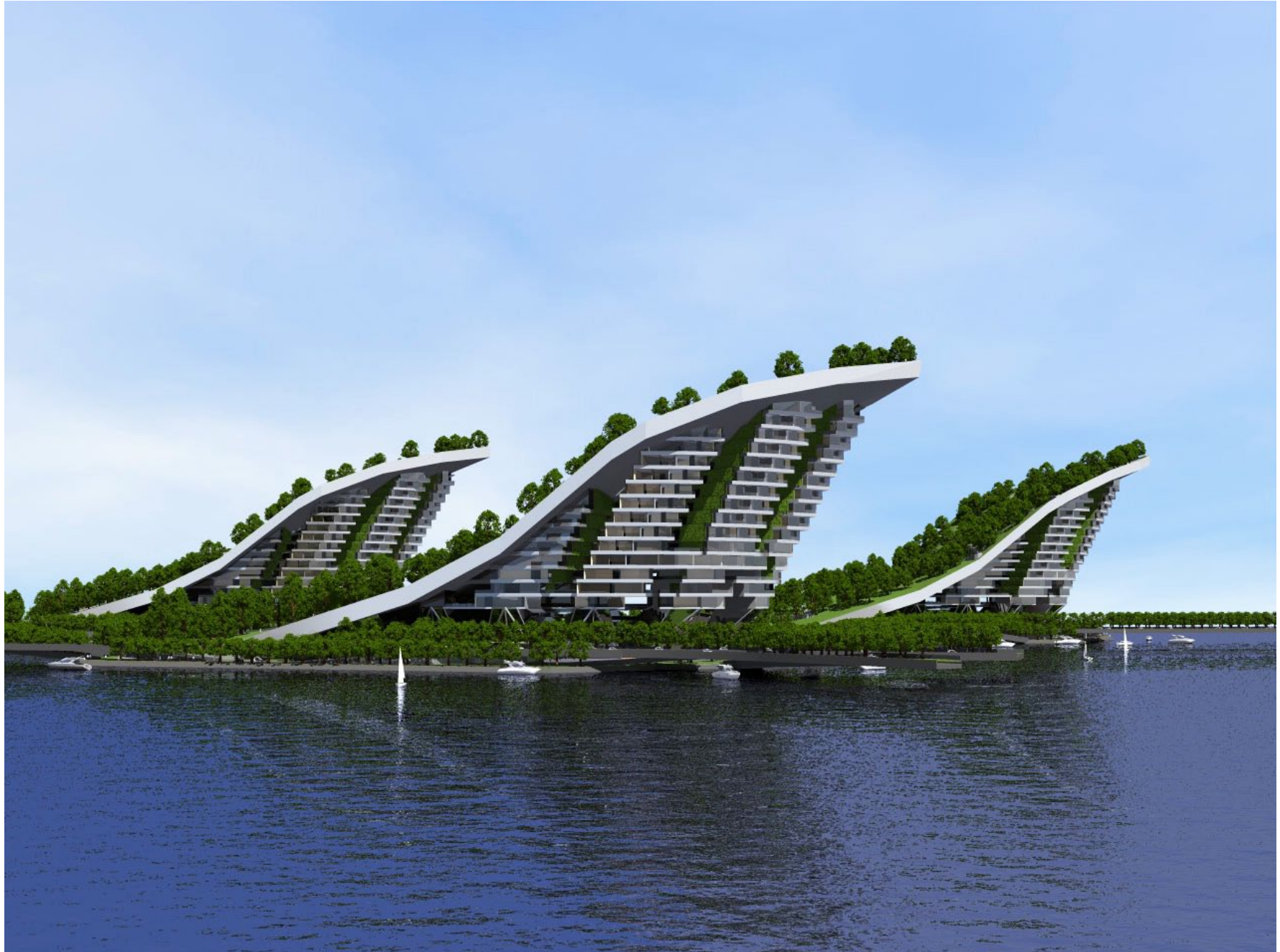


OUTDOOR AREA

The first priority regarding the infrastructure is the ability to reach every single leaf by foot and by bicycle without crossing a street. In order to achieve this demand, the infrastructural system contains many bridges and different levels of streets and pavements.

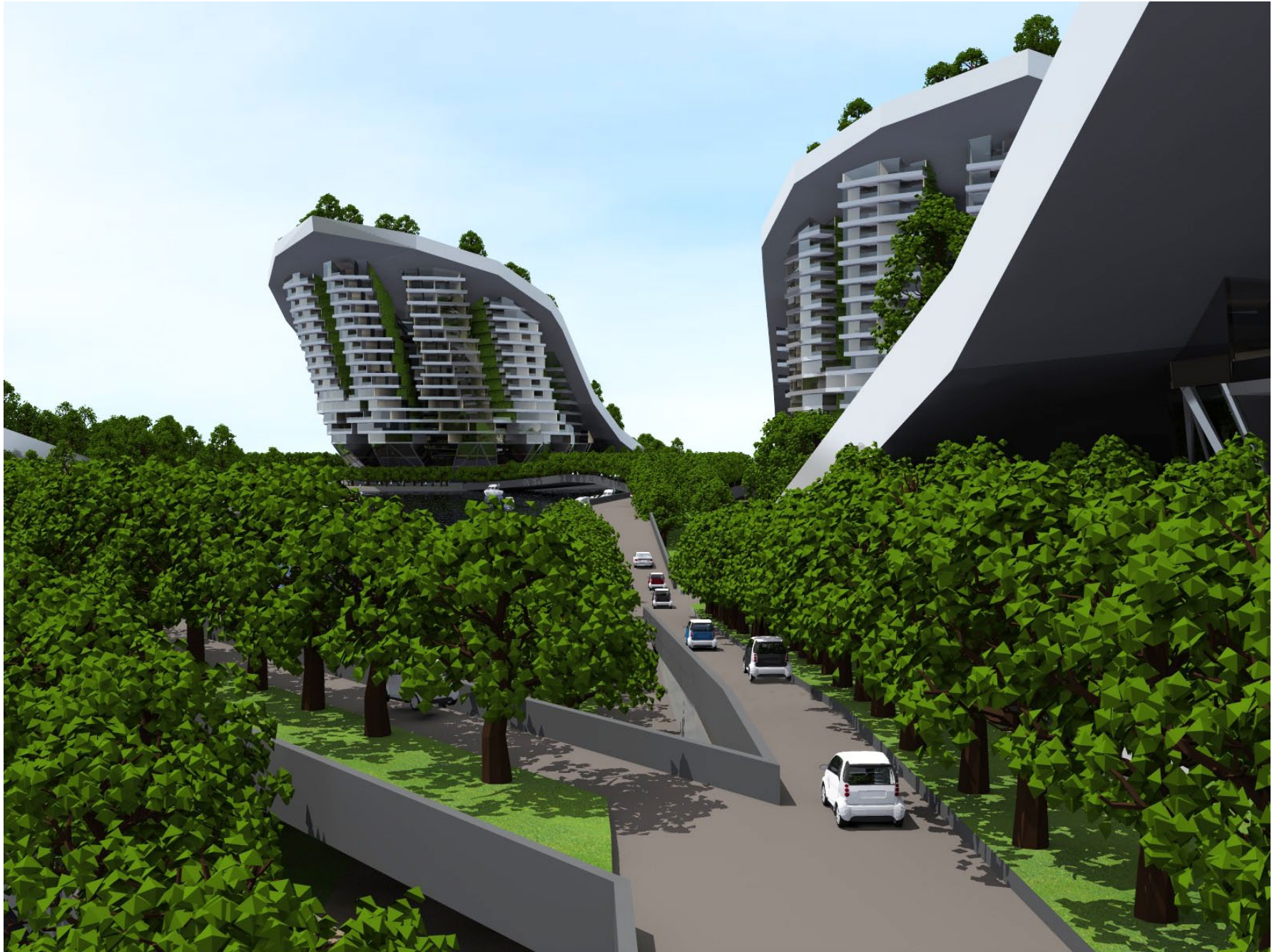
Cyclists and pedestrians share the pavements, which are significantly elevated from the streets in order to increase the quality of walking and cycling in the city.

In existing cities with tall buildings, it is a known problem, that the vertical facades of skyscrapers radiate the sunlight and the heat to the streets. As a consequence, the streets and pavements reach inconveniently hot temperatures. In this city, due to the slanted front of the buildings, the sun rays can't be radiated. From spring until autumn, the angle of incidence is too steep to reach the facade of the leafage. In winter, the insolation hits



the facade of the leafage, which doesn't warm up because of the small angle.

In front of every leaf, an open space extends, that is covered by the overhanging slant of the building. Since the construction shelters from the rain, the public space can always be used. Residents can wander next to the water when it is raining, with an outdoor feeling but still be protected by the shielding construction above.

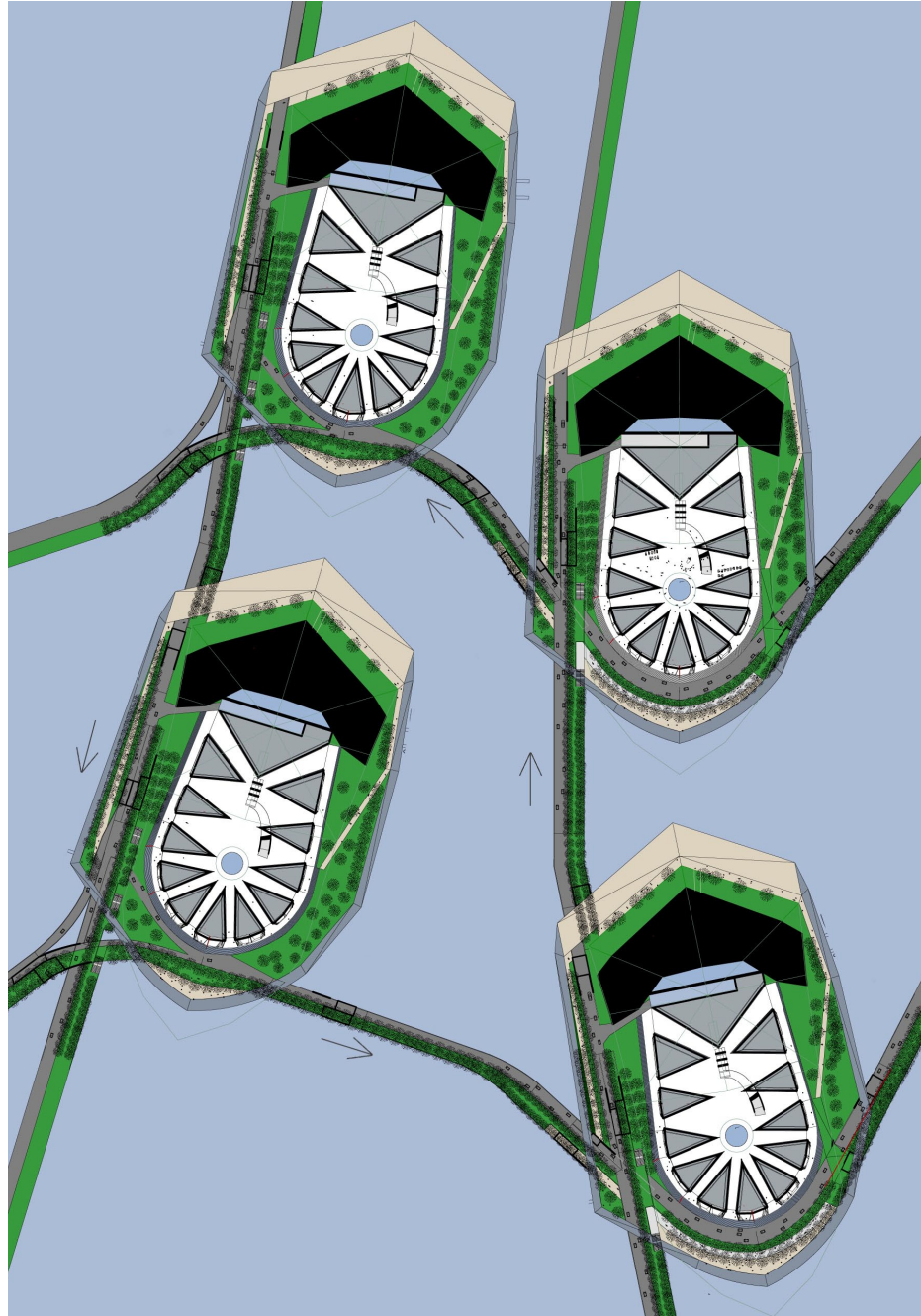


STREETS

The streets and bridges adjust to the irregular composition of the buildings. As a consequence, the alignment of the streets fits in organically with the variety of the concept. Thanks to the many curves, the streets seem to be much shorter than they actually are, thus gaining a natural atmosphere.

Following the streets, the pavements are overlaid with avenues of trees, whereby the streets are less visible and the noise is slightly absorbed. In the morning and afternoon, the trees give shade to the streets, which reduces the effort of the vehicles to cool their motors and cockpits. As a result of these avenues, the residents are able to reach each building by foot or by bicycle, sheltered from the sun and a little from the rain.

The road network is formed by one-way streets, which are adjusted to the fish scale formation. Due to only one traversing direction, the crossings are much simpler to use and therefore efficient and the streets, having only two lanes, are much

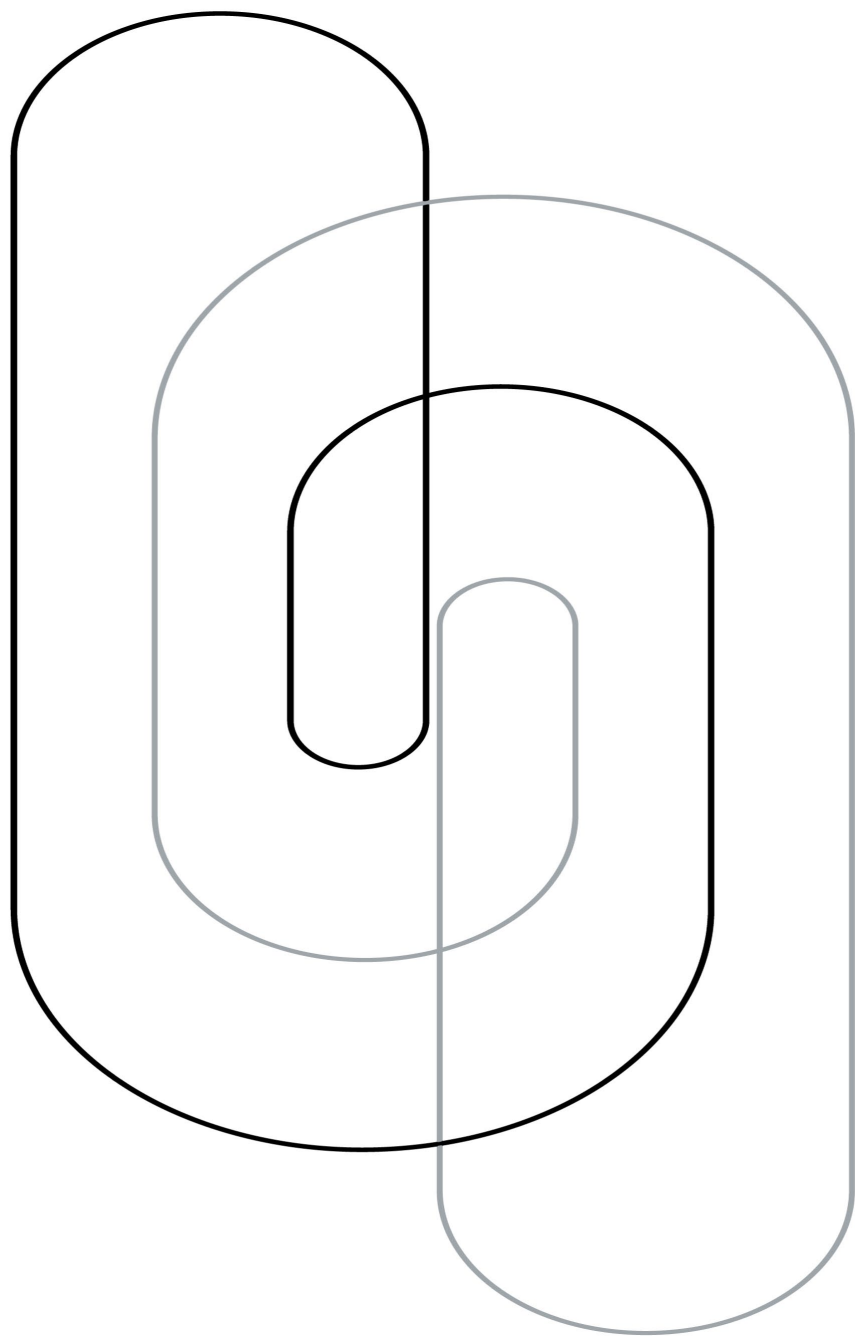


narrower, which reduces the street noise. In the one-way street system, the motorists need to go to length a short detour, but the traffic flow is ensured.

The crossings are constructed similar to the motorways without traffic lights, but with direct connections to reach the crossing streets. Thereby, the constant stop-and-go can be prevented, which also reduces the noise and prevents traffic congestions.

In every leaf, small cars, which are available for all residents, are parked behind the public space.

The aim is to achieve a traffic system similar to the exemplary system of transportation in Masdar. Masdar is a city in Saudi Arabia, near Abu Dhabi and is qualified as city of the future. Its transport system, called personal rapid transit system, consists of electric motorized individual transport, where the user selects his destination and the vehicle drives autonomously to the selected location.

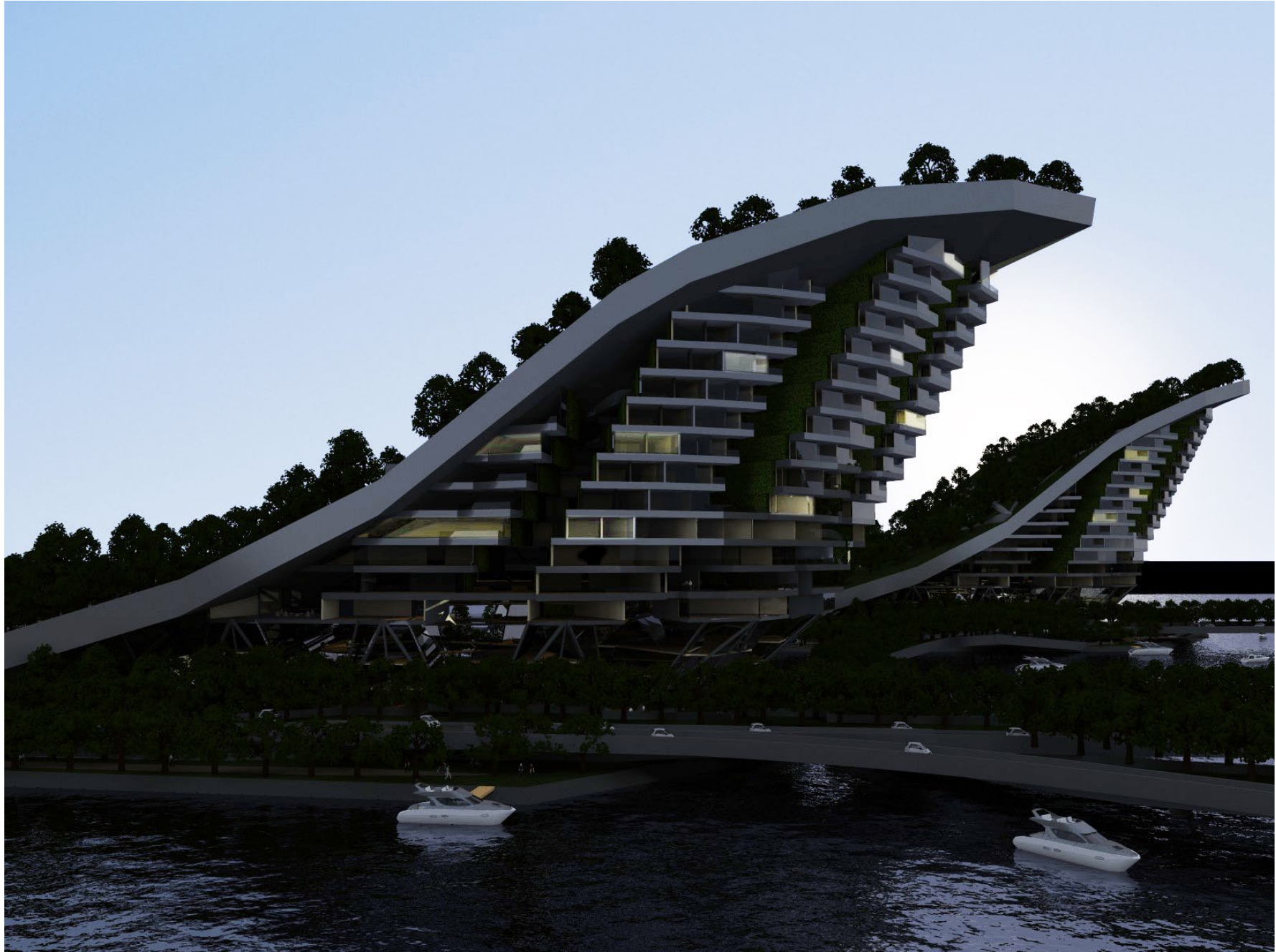


UNDERGROUND

Five meters underground, an underground railroad crosses the city. It's formed like a snail shell. The network consists of two lines through which every place is accessible. The passengers are able to reach the centre of the city very quickly from everywhere, but at the same time don't need to drive through it to approach any other location. Thus, the system relieves the centre from traffic and the passengers are able to reach their requested destinations rapidly, mostly without changing trains.

WATERWAYS

If the city is built on water, the canals between the leaves provide an additional way of transportation, through which the destinations can easily be approached without a detour. It's a beautiful type of transport through which the streets could also be relieved from traffic. On the eastern and western side of every leaf, ship harbors are located.



NO LIGHT POLLUTION

The roof in interaction with the slant of the front facade build together the shape of a leaf, that extends towards the sun. It almost seems as if the overhanging roof construction covers the apartments underneath. Due to the alignment of the flats to the front, the only openings on the back of the leaf are the openings of the atriums, the public space and the slightly illuminated apartment entrances.

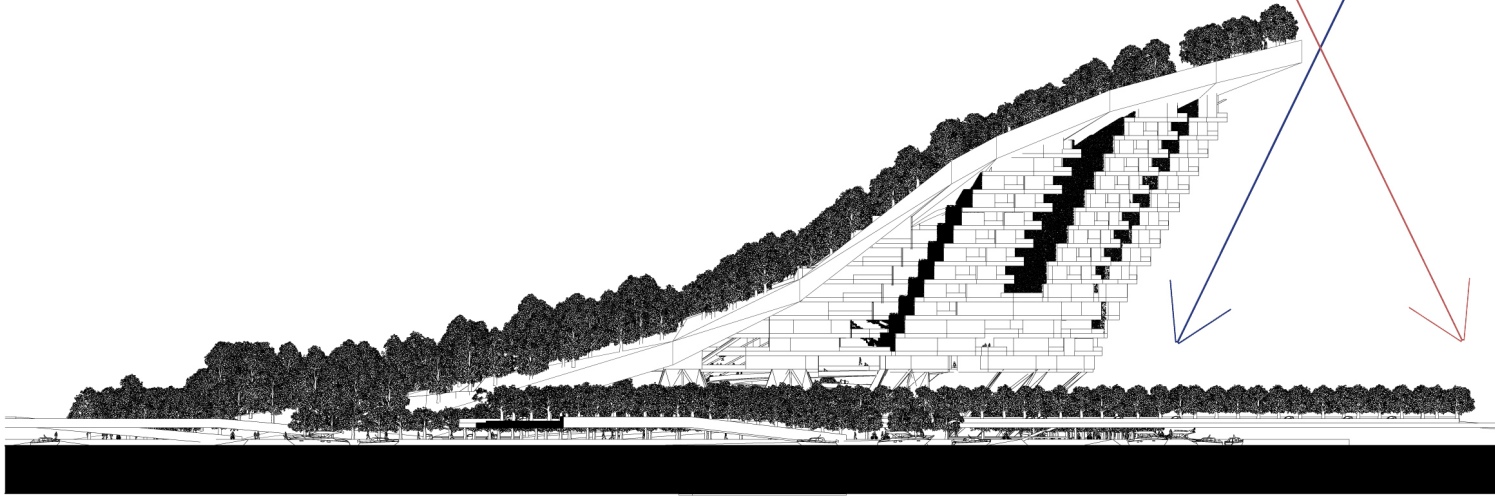
Besides the gentle punctual illumination of the ascent following up the roofs, there are no other lightings. Thereby, at night, the significant light spreads only over the front facade. Owing to the overhanging construction of the leaf, the sky gets less illuminated.

The street lighting is located under the slant of the front facade of the building as well as under trees, where the leafage can trap the light, preventing it from spreading in unintentional directions.

EQUATOR 0°N

Incidence angle of the sun on the 21st of June

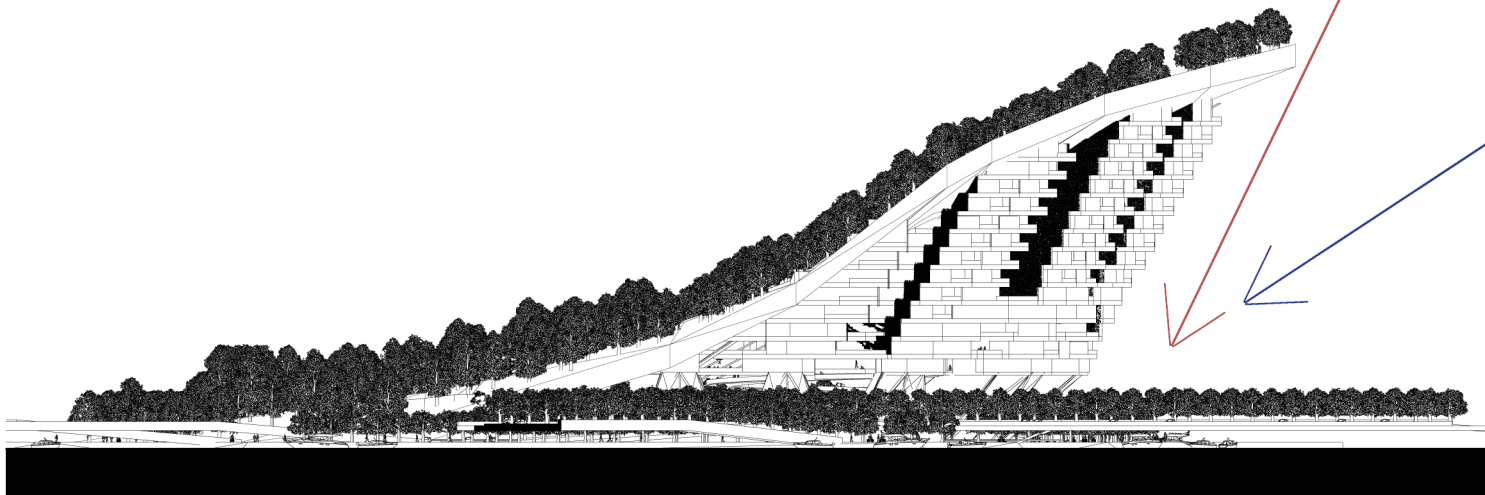
on the 21st of December



EUROPE 48°N

Incidence angle of the sun on the 21st of June

on the 21st of December



LOCATION

The city can be located anywhere in the world. The selection of the place of 24°N is based on the Tropic of Cancer. The inclinations of the front facades are aligned to the incidence angle of sunlight at 24°N . If the city's located north or south of the Tropic of Cancer, the basic effects of the irradiation of the sun change. If the location is closer to the equator, the sun doesn't shine at all into the flats during hot daytime. If the city is located in a colder area, north of 24°N , the sun shines during the cold season of the year into the apartments and heats them up.



CLOSING WORD

It is time to draw a line and start from scratch. It is time, that we get to know a totally different form of cities. Besides the existing form of city planning that grew with our historical development, a new urban concept should emerge that stands on the edge between pulsating city life and relaxing nature. A city that has minimal bad effects on nature and support its diversity. A city with atmospheres and systems striving after the example of natural perfection in order to achieve an ideal standard of living.

Thanks to Guy Markowitsch, Katherine White, friends
and family for their support.