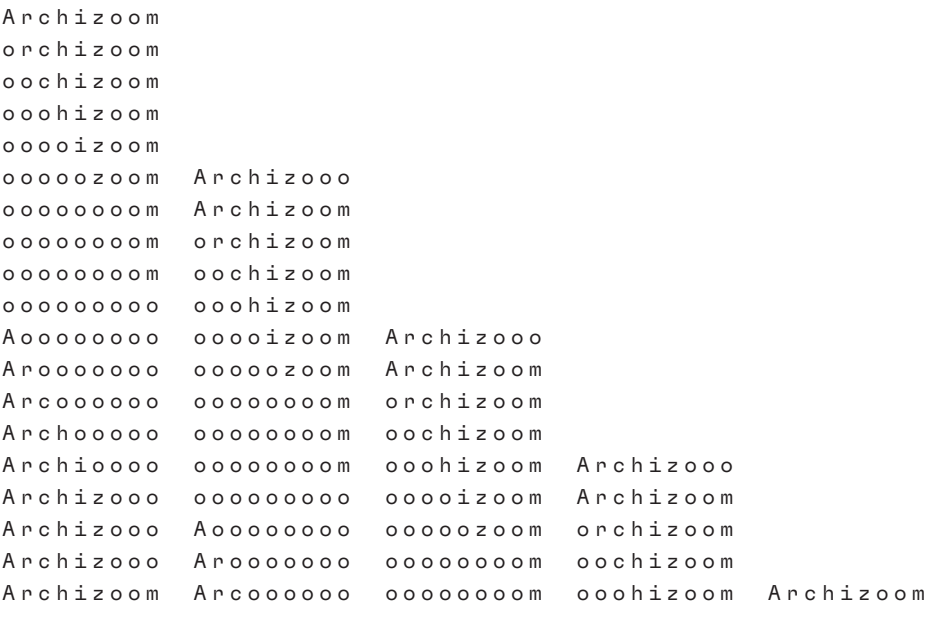
Ultimate Matter
Raum404 + Archizoom

EPFL, Lausanne

English



Ultimate Matter
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Lucile Ado
Oscar Buson
Solène Hoffmann
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Archizoom, EPFL
September 2022

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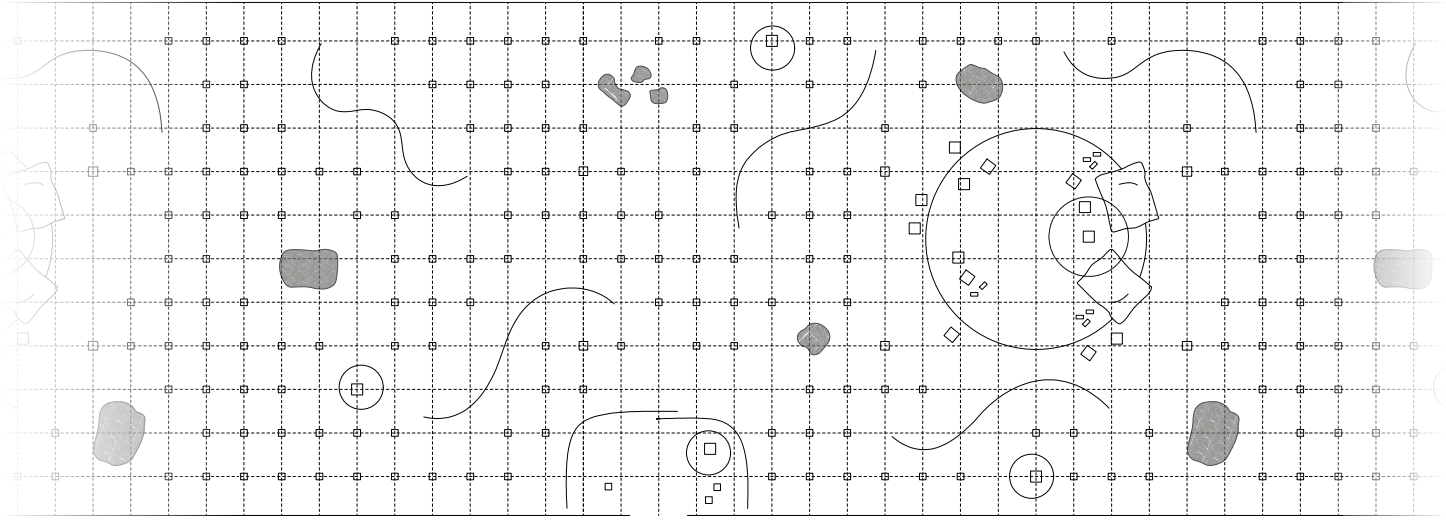
Foreword

What is exhibited at Archizoom is the ultimate stage of the matter. This is what we call the residues of everyday consumer goods that have undergone recycling and recovery processes. Our Zurich-based architecture and urban planning firm Raum404 has used satellite images, data and field studies to map the impact of waste movements in Switzerland. The concept of the Anthropocene is thus made tangible. It refers to the current geological era in which the force of transformation of the environment is coming from the human species.

On the occasion of the 50th anniversary of the Meadows report, in a context of dependence on and scarcity of fossil fuels, and supported by recent projects, Raum404 opens the ways for an urbanism and an architecture aware of the finitude of the world.

Lucile Ado and Oscar Buson

Slag, KEZO Collection area, Hinwil, Zurich, 2022. Picture by Solène Hoffmann and Sophie Wietlisbach



Scenography plan for the exhibition *Ultimate Matter*, Archizoom EPFL, September 2022.
Plan by Solène Hoffmann and Oscar Buson

The exhibition

Gigantic agglomerates of unidentifiable matter, stony shapes with a golden sheen or fine dust, the residues of waste incineration plants return to the earth, abandoned under plastic sheeting. To observe the final stage of matter is to verify the impossibility of perfect recycling and the infinite reuse of matter. It means understanding its incessant growth, its course and its impact on the territory.

In reaction to the metropolisation of the globe, the Italian group *Archizoom Associati* imagined in 1969 a critical utopia: a reflection of the contemporary state of homogeneous urbanisation of cities and the countryside. They project a new way of life in a totally anthropised territory, without limit, the *No-Stop City*.

The exhibition *Ultimate Matter* evokes a landscape in perpetual expansion. A taxonomy of slag lines the space: the pieces gravitate there, captioned according to their compositions and territorial trajectories. This matter is then visualized on the Swiss landscape through a cartography of its spatial impact, as well as through satellite images and photographs of burial sites.

This strategy of excess brings to the surface the archipelago of a new and very real geological stratum. If future civilizations will be able to find the palimpsest sedimentary layer of the Anthropocene, it seems necessary to us to show this material to better represent the physical impact of our lifestyles on the ground and our environment.

The following research comes from the work of Raum404, led by Lucile Ado and Oscar Buson.

Solène Hoffmann and Cyril Veillon

MATTER, ENERGY, SPACE

Matter and energy

To produce the objects around us, raw materials must be extracted, processed and transported. When these same objects fall into disuse, the materials of which they are made can be recycled or reused. All these operations require energy. During a life cycle, matter is lost and energy is dissipated at each stage. To produce a new object from an existing one, matter and energy must be reintroduced. At the very end of the waste recovery process in its most advanced form to date, remains a fine dust whose physical properties are so degraded that no use is possible. This matter is so loaded with heavy metals and its composition so unstable that it is the last in the chain of materials, in opposition to raw material. It is what we call “ultimate matter”, at different levels of corruption, that lines the exhibition space.

Matter, energy, space

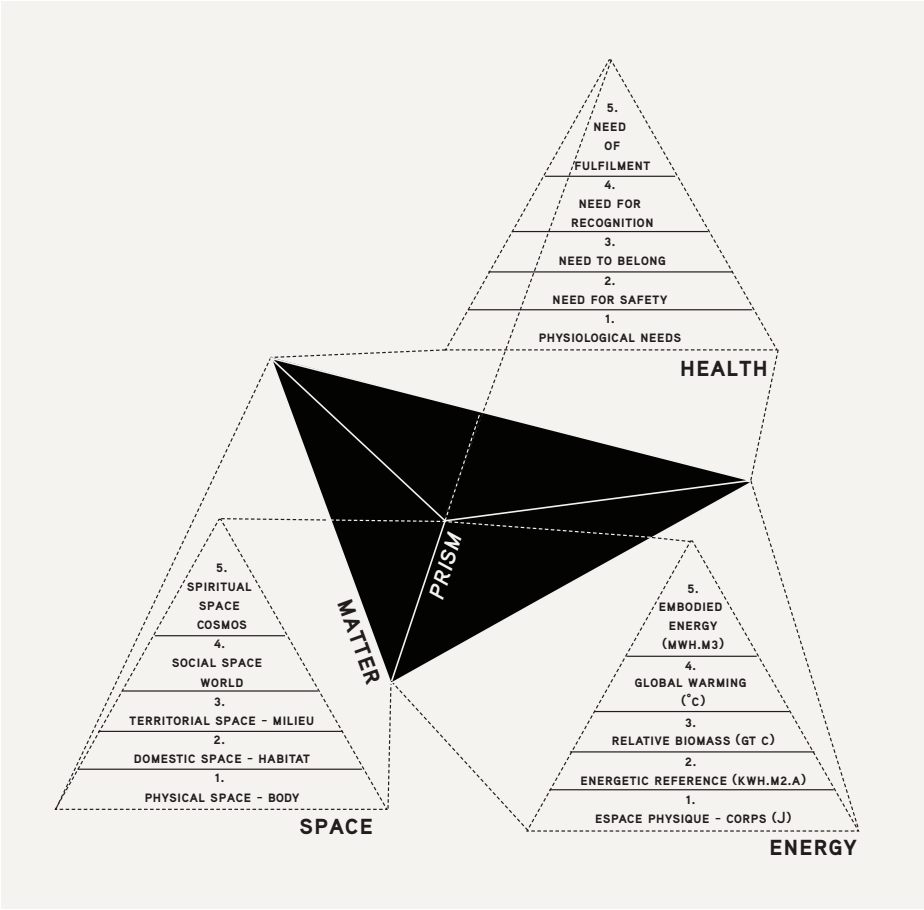
The transformation of space also requires large amounts of energy. While the natural environment is powered by solar energy, which comes from the cosmos, modernity has largely built itself on the energy extracted from the bowels of the earth. As this energy is extracted from the depths of the earth, the renewable energies, coming from natural forces, reach us in a diffuse form, like a small cosmic rain. Fossil fuels, on the other hand, come in pockets, in concentrated form. Their unprecedented power has enabled the industrial revolution, the comfort we know in Western countries and the urbanization of the world. But such a system is dependent on an exponential increase in energy consumption and a growing production of greenhouse gases.

Life in the prism of the relation between matter, energy and space

Through a long process of metabolization, a balance has been established between the energy emitted and that absorbed by the *Earth System*. This chemical and climatic balance is the space of the biosphere. Thinkers such as James Lovelock imagined in the late 1970s that the earth itself could be a living being, which like a body with its organs, would live on through the species that make up biodiversity. And it is this very biodiversity that is so badly damaged by the contemporary lifestyles of the human race. While the existence of life depends solely on natural forces, the contemporary lifestyles of mankind draw largely on fossil fuels. This is a first paradox that it is essential to challenge in order to promote an urbanism and a society in transition.

1972 – 2022 Meadows report

According to ancient tradition, at the foundation of Rome, all the most precious objects were buried in a pit. This cavity had the same name as the universe: *Mundus*. Linked to the same concept of openness, it will become “world”, *Monde,* in the French language and “mouth”, *Mund*, in German. Rome was built from all these objects, they are the ones that, buried under the earth, remained after its fall. Is it the destiny of our planet to become “ultimate matter”? In other words, are we going to consume all our resources? These questions are not new. In 1972, the Meadows report first highlighted that planetary limits would have a major influence on global development in the 21st century and proposed different transition scenarios. Where do we stand fifty years later?



Life through the lens of the matter-energy-space relationship, Luxembourg in Transition, Energyscape team © Raum404

The Gasshof/Bergweid landfill in Lucerne in 1966.
Picture by Josef Bieri, 1966

From 1914 to 1954, the waste of the city of Bern was transported to Witzwil by rail. Approximately 590,000 tons of waste were eliminated during this period. In the referendum of October 28, 1951, the city of Bern finally approved the construction of a waste incineration plant.

Convicts sorting waste in Witzwil. Picture by Alfed Dudlerm, 1953 © Private Collection

WASTE COLLECTION AND PROCESSING OF THE ULTIMATE MATTER

Waste collection

Historically, garbage pickup has long been relegated to the lower classes of society, or to criminals. Indeed, no one wants to dedicate themselves to this kind of work on their own or without urgent necessity. In terms of logistics, little by little, special vehicles were developed for the collection of household waste. In Switzerland, the train is chosen to be used for this purpose.

Incineration

The first waste incineration plant was built in Zurich in 1904. It was situated outside of the city for quite some time. Now, this former plant is fully part of it and in the process of being demolished to make room for a park, swimming pool and more in the Viadukt area.

“Hygienist city”

The problem of the household waste in the urban centers became worse with the introduction of the tin can and domestic heating with mono-fuels, first coal, then oil. Despite increasing heat recovery, incineration costs remained so high that efforts were made to make the landfill, which had fallen into disrepute, respectable again. Thus, the “orderly landfill” was developed, in contrast to the unregulated and mostly illegal landfills popping out in every municipality.

A relatively simple machine, the waste compactor, put an end to all other developments for the time being with its worldwide triumphal march in the mid-1970s; a “highly compacted landfill” was created with a bulk density of 0.8 to 1 tons/m3, without intermediate covers.

Prisoners cleaning the streets, watercolor by an unknown artist, c. 1825, Historisches und Völkerkundemuseum St. Gallen

Waste incineration plant at the Josefstrasse
(center down, by the viaduct), Zurich

Source: www.limmattalerzeitung.ch/limmattal/zuerich/energiewende-die-aelteste-kva-der-schweiz-stellt-die-kehrichtverbrennung-ein-ld.2106332
(consulted on July 18th, 2022)

Poster of the Lenzburg cannery, 1941.
Source: Museum für Gestaltung Zürich, Poster Collection, Zurich University of the Arts

Waste disposal with the “Ochsnerkübel” at the Beau-Rivage Palace in Lausanne, 1914. Source: Historical Museum of Lausanne

Contamination

Following the discovery of leachate produced by household waste, which became more complex in the 1950s, landfill sites had to be found outside groundwater areas. Before that, leachate was reduced by intermediate landfill covers; the “sandwich landfill” was created.

Today these polluted liquids are collected and found to be degradable in municipal sewer systems. For a long time, “orderly landfills” have no longer been set up on a community-by-community basis, but on a regional basis, in order to be able to amortize the considerable investments for machinery and infrastructure.

Residues

In the middle of the 19th century, an incinerator was developed in England, which was then in full industrialization, in order to solve the problem of the growing volume of waste. In Switzerland, as previously stated, the first plant of this type began operation in Zurich in 1904. In the 1960s and 1970s, larger incinerators were built a little bit everywhere.

Currently, there are thirty waste incineration plants in Switzerland. Some of the slag is used as building material and backfill and, to a lesser extent, as a gravel substitute in road construction; the rest goes to landfills.

Iron-manganese in leachate from old landfill site “Chüelochtobel” Küssnacht am Rigi, Zurich.
Source: Schenker Richter Graf AG (2021). “Bauvorhaben auf alten Siedlungsabfalldeponien”, Lucerne

Disposal of Swiss residues near the salt mines of Heilbronn, twenty kilometers north of Stuttgart (DE). Source: Südwestdeutsche Salzwerke AG, 2017

Paradoxes

After reviewing documents and maps on waste management and landfill sites, it appears clearly that the whole process presents two major paradoxes:

1. The “proximity” paradox

Waste incineration plants were/are located away form urban centers and housing (when possible), while they should be closer to these areas in order to distribute the energy they produce, be it electricity or heat.

2. The “transport” paradox

Household waste incineration plants, seeking rentability, must import and burn residues coming from abroad (mostly Germany, Italy, Austria and Liechtenstein). Switzerland is also exporting special waste and slag (mainly to Germany, 20,000 tons/year).

This import/export seems absurd when it comes to sustainability. The plants have made quite some progress in the treatment of ashes, smokes, and other residues, to release less CO_2 and to “be green”. At the same time, waste is being transported on trucks for hundreds of kilometers.

Urban mining

It was not until the late 1980s that slag began to be processed and attempts were made to separate it into fractions in order to recover metals. In Switzerland, metals are nowadays removed from slag before it is landfilled.

One of the goals of the new ordinance on waste (2016) is to be more efficient in retrieving materials from residues, in particular metal. For this, new technologies have been developed, such as dry discharge (*Trocken-entschlakung*). The process, quite costly, permits to gain 99% of metal out off slags.

Network

The waste management cycle is now quite saturated, with more and more incineration and less space to store the non-combustible part: the slags.

The problem needs to be tackled at different scales with all the actors in the creation, disposal, and recycling of residues. These form a network that we want to represent through mapping.

A quick look at the map of waste networks shows us the complexity and interdependencies when it comes to waste and landfill management. The area of influence of the different incineration plants goes beyond cantonal boundaries in some cases, which asks for intergovernmental cooperation.

Moreover, we can ask ourselves whether the zones always make sense, in terms of distance. Indeed, some communes are linked to a plant in another canton further than it should. This is obviously a political situation that is not easy to change.

Top: Recycling plant, Hinwil, Zurich.
Picture by Lucile Ado © Raum404

Bottom: Type D landfill site in Châtillon, Fribourg. Most of those sites are soon reaching their maximum capacity (by 2023).

Source: www.rts.ch/info/suisse/13116261-les-machefers-ces-dechets-dont-personne-ne-veut-mais-quil-faut-bien-stocker.html (consulted on September 19th, 2022)

Bags containing sorted out metals in Hinwil, Zurich.
Picture by Lucile Ado © Raum404

“One must observe a fundamental difference between environmental aids of the structural type (including clothes) and those of which the campfire is the archetype. Let the difference be expressed in a form of parable, in which a savage tribe arrives at an evening camp-site and finds it well supplied with fallen timber. Two basic methods of exploiting the environmental potential of that timber exist: either it may be used to construct a wind-break or rain-shed – the structural solution – or it may be used to build a fire – the powered-operated solution. An ideal tribe of noble rationalists would consider the amount of wood available, make an estimate of the probable weather for the night – wet, windy, or cold – and dispose of its timber resources accordingly. A real tribe, being in inheritors of ancestral cultural predispositions, would do nothing of the sort, of course, and would either make fire or build a shelter according to prescribed custom-and that, as will emerge from this study, is what Western, civilized nations still do, in most cases.” (Bahnam, 1969)

This parable shows us that several paths are possible. Today, the climate emergency is forcing Western societies to take measures for an energy and ecological transition to get out of their dependence on fossil fuels. A new architecture of the world and new social arrangements must be built on our renewable resources, through non-radical projects, inscribed in each situation and aware of the finitude of the world.

GREATER GENEVA, ENERGY LANDSCAPE

VISION OF A DECARBONIZED TERRITORY

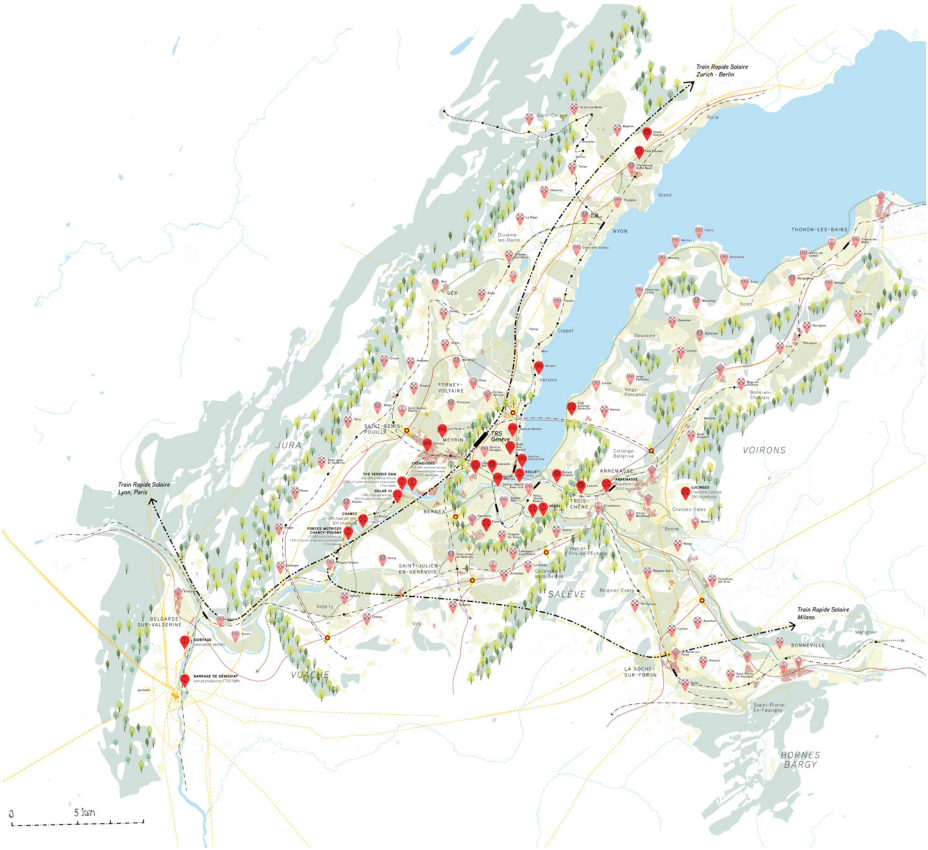
The resource city, post-oil city

The contemporary city is still largely dependent on the conception of the industrial city of the 19th century. One of the major factors that influenced its morphology was the pollution resulting from the consumption of fossil fuels and the separation of living and working areas. As a consequence, the travel time between the different urbanized areas increased. The change in the relationship between town and country is another consequence, with the marginalization of the productive function of the countryside.

Within the framework of the consultation Greater Geneva, the Energy Landscape team led by Raum404 has put into account the spatial consequences of territories in transition to understand how the city-territory can renew the broken link with its landscape seen under the energy prism.

Colonizing the oil infrastructure

The Geneva airport conversion project is structured on local energy networks and a climate system.
It is a city of short paths, healthy and habitable, productive and qualitative, and deeply linked to its energy landscape. Living on the Cointrin site also means changing the paradigm of people's movements, transforming a non-place for millions of anonymous passengers into an inhabited place rich in biodiversity for 30,000 new individuals who live and work there. Transforming the Cointrin site into a new district of Greater Geneva means eliminating the largest consumer of fossil fuels and giving the site the chance to produce clean energy.



Resource Map, International Consultation Greater Geneva, team Energy Landscape © Raum404

No-oil, urbanising the oil landscapes, International Consultation Greater Geneva, team Energy Landscape
© Raum404 and Big picture

An incubator city

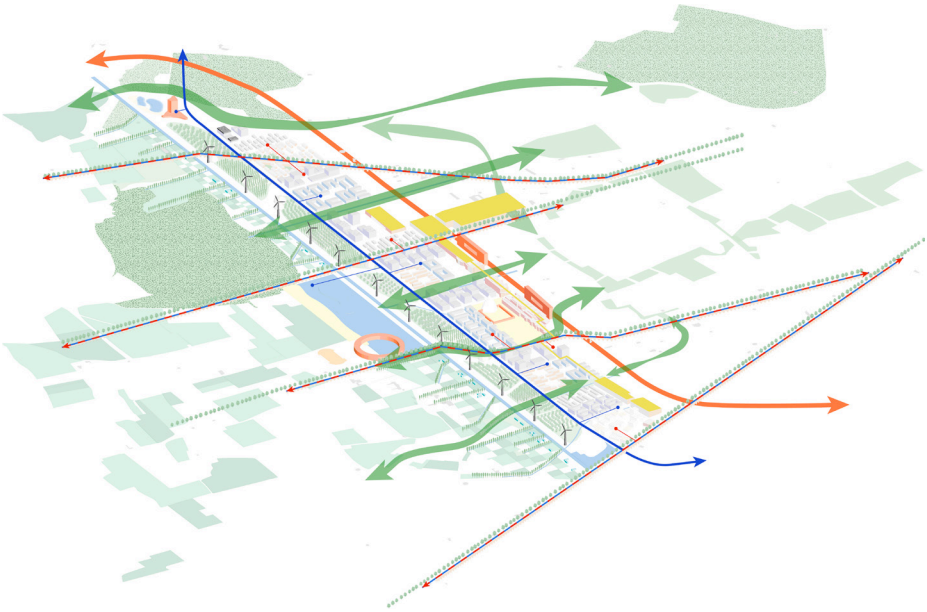
This example illustrates the main guiding elements of a transitional urbanism for a society that frees itself from its dependence on carbon-based energy. Permeable soils are planted, never built. Productive nurseries are at the heart of the urban project. Planting an urban nursery means absorbing CO_2 and allowing a local network of trees with species adapted to the urban climate. Urban nurseries are livable, they contribute to the quality of public spaces, and they house open-ground crops at the foot of the trees. The superposition of landscape and agricultural structures is favorable to the urban climate and to biodiversity, and has a positive impact on the absorption of CO_2.

Ecological corridors

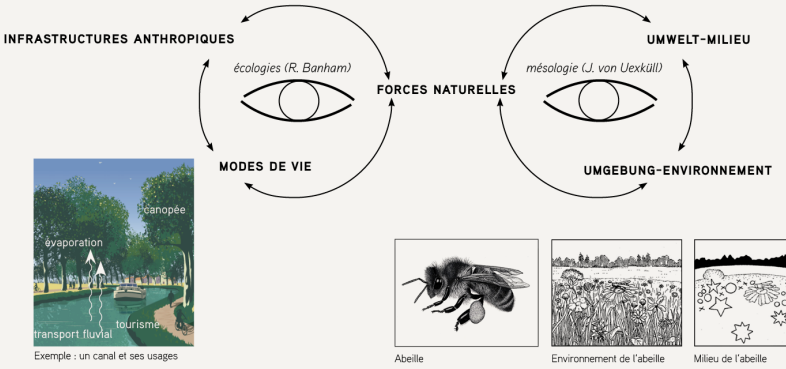
Greenways play an important role in the urban micro-climate by extending the climatic qualities of forests to urbanized areas and have a positive influence on the urban heat island effect. In a post-oil city, green corridors connect places of relaxation which become accessible and combine the urban environment with the countryside by creating a continuity between the built and the green.

Walkable city, network city

Generous covered lanes follow the existing mobility axes to connect the great landscape with the urbanized areas. The massiveness of the architecture allows for the integration of the excavated earth. Large massive arches support a tree-lined promenade in the open ground. These arches are reminiscent of the portico of Saint Luke in Bologna. The efficient soft mobility network is also the network that connects the local energy production sites to the consumption sites and becomes a new aerial renewable energy network.



Cointrin sustainable district, International Consultation Greater Geneva, team Energy Landscape © Raum404



réalités anthropiques

L'humanité au centre de la lentille pour évaluer l'impact de l'activité humaine sur le territoire.

réalités non anthropiques

Le monde du vivant dans sa globalité au coeur du sujet de la transition écologique.

Resource Map, International Consultation *Luxembourg in Transition*, team Energyscapes © Raum404

Water, a precious resource

Today, the more and more frequent and intense periods of drought force us to reconsider the management of this precious resource: water. Infiltrating it is no longer an issue, it is now a question of planning the infrastructures to preserve it. Thus, large recreational areas and/or built infrastructures can be linked to large reservoirs in urban projects.

LUXEMBOURG IN TRANSITION / ENERGYSCAPE

Life at the heart of transition issues

While in the consultation Greater Geneva we were interested in the energy and landscape infrastructures that make up the urban space in order to elaborate transition scenarios, in the *Luxembourg in transition* consultation, with the same challenge (zero net carbon in 2050), we have integrated a new element into this relationship between space, matter and energy: life. By adopting virtuous lifestyles and territorial planning logics to fight against climate change, we preserve the health (and even the subsistence) of future generations, and perhaps even of our generation, this is the Pascal's wager. Adopting these choices also contributes immediately to the quality of our lives and our individual and local community health. Life in its broadest sense (human and non-human) is, in our opinion, the element that will allow territories, wherever they are, to achieve carbon neutrality within the time frame recommended by international agreements.

EVENTS

Saturday 24 September, 2 p.m. – midnight
Night of the Museums
Guided tours (30')
3.30 p.m., 7.30 p.m., 9.30 p.m.
Animation *Tridel Metamorphosed*

Monday 26 September, 6 p.m.
Opening and lecture by Raum404:
Lucile Ado, Oscar Buson, [FR]

Monday 10 October, 12.15 p.m.
Demolition as an exception?
Lecture by the collective Countdown 2030

Monday 24 October, 5 p.m.
Guided tour by Raum404 [FR]

Monday 24 October, 6.30 p.m.
Round Table *Urban Bricolage?* (1),
Reuse: from teaching to practice
Moderated by Corentin Fivet [FR]

Monday 14 November, 5 p.m.
Guided tour by Raum 404 [EN]

Monday 14 November, 6.30 p.m.
Round Table *Urban Bricolage?* (2),
Which processes and technologies for reuse?
Moderated by Martin Fröhlich [EN]

Monday 28 November, 6.30 p.m.
Lecture by Charlotte Malterre-Barthes [EN]

SUPERONDA TALKS

This autumn the SUPERONDA lectures are organised with IBOIS. They will focus on our constructive choices, mostly dictated by the dynamics of supply and demand of raw materials, as well as by the resulting international trade flows. This critical analysis of innovation is intended to give new impetus to the wood construction industry, fostering the local circular economy.

Monday 3 October, 6 p.m.
Lecture by Mario Rinke

Monday 17 October, 6 p.m.
Lecture by Sarah Nichols

Monday 21 November, 6 p.m.
Lecture by Stéphane Berthier

Monday 5 December, 6 p.m.
Debate with Mario Rinke, Sarah Nichols, Stéphane Berthier and Yves Weinand
Moderated by Christophe Catsaros

PODCASTS *ULTIMATE MATTER*

At this point, can we still reduce the amount of material produced by our consumption habits?
Archizoom is launching a first season of podcasts to share the experiences of various actors working in sectors that are able to reduce or even eliminate the waste produced by the built environment. These podcasts are available on audio platforms such as Spotify or Soundcloud.

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