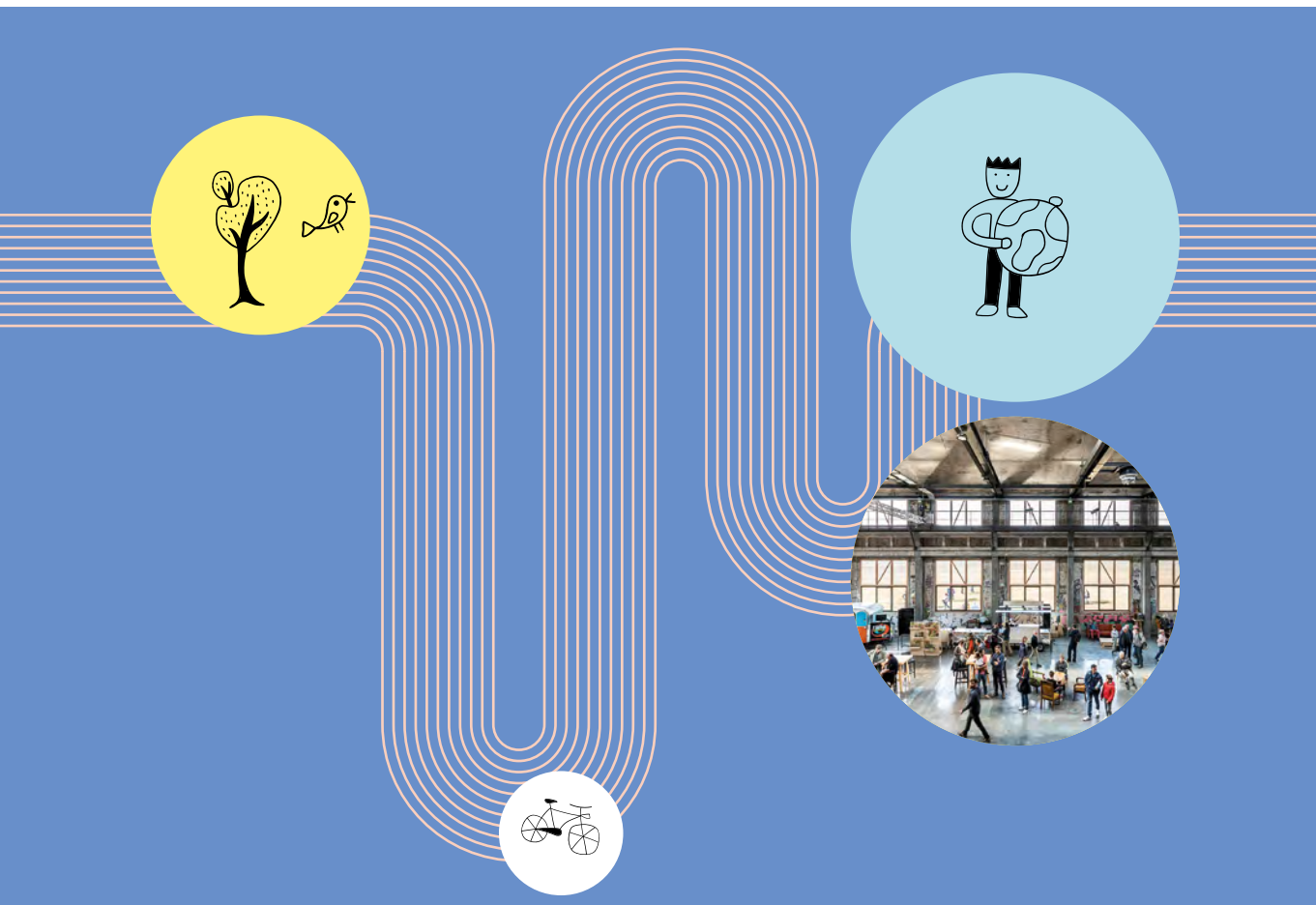
Trend note #13

Low-tech, Just-tech, Right-tech: new approaches for cities and regions

July 2023

Read the document



BOUYGUES CONSTRUCTION

linkcity

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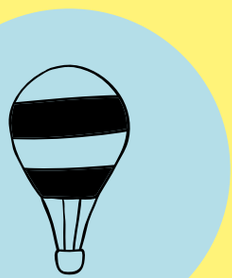
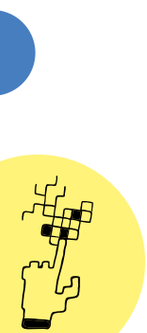




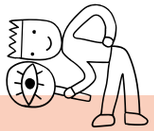
Basics

In response to the current unsustainability of our economic and industrial models, concepts such as low-tech, right-tech and just-tech have been gaining ground over the last ten years. These concepts, which challenge the race for technological innovation as an end in itself, encourage us to re-think our ways of producing and consuming to ensure that our actions remain within planetary boundaries.

Low-tech, Right-tech, Just-tech?

The unsuitability of the term "low-tech" has led to the use of other concepts emphasising the "techno-discernment" of the approach such as "right-tech", "just tech" or "fair tech".

However, given that "low-tech" is the most widely theorised concept, and the one that brings together the most players, this trend note will be based on this concept throughout the rest of this document.



Criteria for a low-tech approach

Although there is no single definition of low-tech, a study published by Ademe in 2022 (Bloquel et al., 2022) identified the fundamental criteria most commonly shared by the main low-tech players. These include:

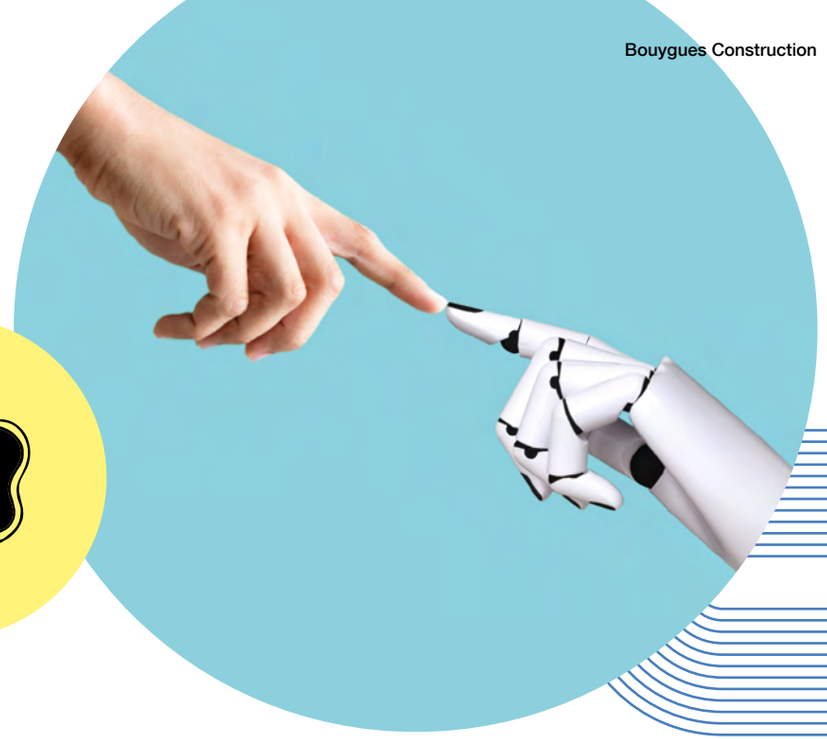
- **Taking account of ecological limits and environmental impact**
- **Questioning why and how to achieve frugality**
- **Making the approach accessible and democratising technology**
- **Taking account of systemic implications**
- **Reducing complexity or striving for simplicity**

> **A portmanteau term with ambiguous, not to say paradoxical, meaning, 'low-tech' is still struggling to find its way into everyday language and consequently to become the cornerstone of shared visions, whether or not they are supported by cultural institutions.**

D. Kaplan

Digital thinker and co-founder of the Plurality University Network, 2021

©Yes We Camp



Beware of preconceived ideas!

Developing low-tech solutions doesn't mean abandoning high-tech ones!

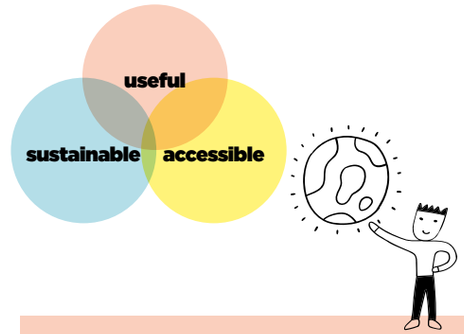
This term has often been contested for a number of reasons: it's vague, it implies an opposition to high-tech that is considered sterile, and its use of the term "low" suggests the concept of decline. Although, etymologically, the concept of low-tech was developed in opposition to high-tech, it does not imply a rejection of all technologies. Above all, it means rethinking our needs in order to demonstrate "techno-discernment" by using technology judiciously with the aim of preserving resources (Bihouix, 2021).

Good to know

Low-tech applies to a process, not to its outcome

"An object is not low-tech per se. It is more (or less) low-tech than an alternative solution that meets an initial need." (Bloquel et al., 2022)

The triple low-tech approach



Low-tech around the world

Low-tech initiatives are a worldwide phenomenon, as evidenced by the Low-tech Lab platform, which currently lists 951 projects in 91 countries that meet the following three criteria: usefulness, sustainability and accessibility. While the term "low-tech" has become established in recent years (Abrassart et al., 2020), other concepts and theories have emerged around the world ("bioregion", "Jugaad innovation", etc.).

Challenges

Excessive use of resources to make the transition to a low-carbon world

The “low carbon” world is a “high materials” world

In response to climate change, governments around the world are taking steps to achieve carbon neutrality by 2050. To get there, energy transition plans are relying on “green” technologies (wind turbines, solar panels, electric batteries, etc.) and digital technologies (new sensors, satellite data, blockchains, etc.), with the digitalisation of our economy becoming one of the key factors in reducing our carbon footprint. However, reducing our CO_2 emissions means extracting more minerals (copper, iron, zinc, manganese, lithium, cobalt, graphite, rare earth elements, etc.), leading to the paradox that the “low-carbon” world is a “high-materials” world, with all its environmental, health, human and social consequences (Pitron, 2021).

Ultimately, metal extraction consumes more and more energy and energy production consumes more and more metals, creating what Philippe Bihouix and Benoît de Guillebon[1] describe as a vicious circle of energy and metals.

FIGURE IT OUT

According to the International Energy Agency (IEA), to honour the commitments of the 2015 Paris Agreement (i.e. keeping the rise in average global temperature well below 2° C compared with pre-industrial levels), humanity will need

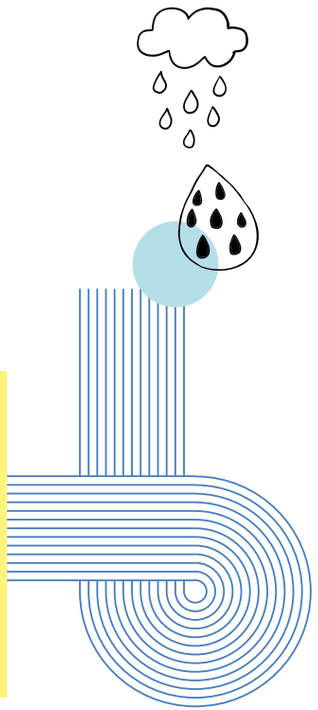
to quadruple

its global metal production by 2040 (IEA, 2021).

Ademe estimates that to produce electrical appliances with a high electronic component, it takes on average between

50 and 350 times

their weight in materials, for example 800 kg for a laptop and 500 kg for a modem. (Ademe, 2018).



Good to know

Water, a natural resource under pressure

Extracting and refining the metals needed for energy and digital transition requires large quantities of water and is contributing to the rise in water stress. Yet 70% of the world’s main mining sites are located in areas of high water stress (Toledano & Roorda, 2014).

The economic interdependence of metals

Owing to the demand and price of certain small metals, the costs associated with a specific mining operation cannot be covered. This is why many of these metals are only mined as by-products of other metals (France Stratégie, 2020). High-tech technologies are particularly sensitive to these effects of interdependence. For example, tantalum, germanium and gallium (which are critical metals for digital technology) are not viable stand-alone metals.

FIGURE IT OUT

It is estimated that

more than half of the sixty metals

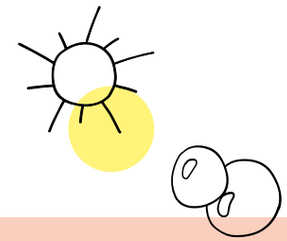
we use today are linked to the fate of other metals (Bihouix and de Guillebon, 2010).

The colossal impacts of high-tech on the environment and public health

“Clean” technologies require “dirty” metals

So-called “clean” technologies require the use of rare minerals “which are anything but clean to mine” (Pitron, 2019). Guillaume Pitron describes it as an “environmental nightmare, with heavy metal discharges, acid rain and contaminated water, among other hazards.”

The mining of these minerals, which is often carried out outside the European Union, also has a human impact, with tens of thousands of children working in some countries, and is responsible for several armed conflicts (Lapique, 2019).



The carbon impact of digital technology

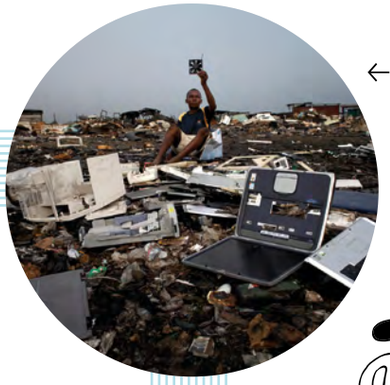
The digital sector currently accounts for 3% to 4% of worldwide greenhouse gas emissions (ARCEP, 2020). If the digital sector were a country, it would have around 2 to 3 times the carbon footprint of France. In 2019, the digital landscape was made up of 34 billion devices for 4.1 billion users, i.e. 8 devices per user (Bordage, 2019). The high rate of replacement of digital equipment (for example, five years for computers when they should be kept for 20 to 44 years in view of their environmental impact) is problematic (EEB, 2019).

[1] Philippe Bihouix, an engineer trained at the Ecole Centrale de Paris engineering school and director of the AREP group, is a specialist in the exhaustibility of mining resources. He promotes low-tech solutions and has authored essays on environmental and technological issues. Benoît de Guillebon, also an engineer trained at the Ecole Centrale de Paris, set up and developed APESA, a technology centre specialising in environmental issues and risk management.

The alarming state of electronic waste

Over 50 million tonnes of electrical and electronic equipment waste are generated each year worldwide, 80% of which is sent illegally to a developing country and ends up in landfills with no real monitoring, even though the waste contains numerous substances that are hazardous to the environment and to health (Platform for Accelerating the Circular Economy & World Economic Forum, 2019). If nothing is done, the amount of waste will reach 120 million tonnes per year by 2050.

In Europe, at the other end of the chain, technology continues to be one of the fastest-growing waste streams, with annual growth rates of 2% (French National Digital Council, 2020).



← ©Andrew McConnell, Rubbish Dump 2.0

Investigation

Agbogbloshie, a district of Accra, the capital of Ghana, is a dumping ground for computers and electronic waste from Europe and the United States. Hundreds of tonnes of electronic waste are dumped there every month, where they end up being dismantled, mainly by children looking to salvage copper, hard drives and other components that can be resold. Toxic metals such as lead, beryllium, cadmium and mercury are released in dangerous quantities, causing considerable damage to human health and the environment.

> **Despite appearances and promises of dematerialisation of activities, the figures show that we are continuing to consume an exponential amount of resources. Globalisation has not only relocated production activities, it has also shifted its impact onto the environment and working conditions.**
>
> **ADEME, Paris Region Institute, AREP,** *2021*

An underdeveloped recycling industry

Metals such as copper, iron, gold and platinum are relatively well recycled, but "almost all of the small metals used for high-tech functions in the digital sector are barely recycled at all" (France Stratégie, 2020).

> **Currently, only 1% of rare earth elements are recycled. This is because they are often present in small quantities and that it is difficult to separate rare earths from other metals for the sake of recycling them. To encourage manufacturers to recycle them, the process would have to become profitable.**
>
> **Emilie Janots**
> Lecturer and researcher, ISTerre Laboratory, University Grenoble Alpes

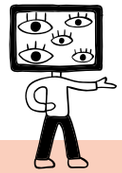
Geopolitical factors affecting access to rare earth elements

As rare earth elements become an indispensable part of high-tech manufacturing – whether for energy transition, digital rollout, or the assembly of high-precision missiles – several analysts are warning of a potential escalation in geopolitical tensions. With reserves of the most critical materials concentrated in just a few countries, many experts (including the International Energy Agency) are concerned about future conflicts over access to the world's most critical materials.

Another issue is ecological sovereignty and energy autonomy at a time when a "mining nationalism" is emerging in many countries. Argentina has already introduced barriers preventing the export of 37 mineral resources, for instance (Pitron, 2019).

FIGURE IT OUT

China currently supplies
98%
of the EU's rare earths needs, Turkey
98%
of the EU's borate needs, and South Africa
71%
of the EU's platinum needs (European Commission, 2020).



The high-tech rebound effect

High-tech is often responsible for a rebound effect. This refers to the historically observed phenomenon whereby an innovation, instead of leading to energy savings, as expected, results in over-consumption of the technology or resource in question. For example, improvements in the energy efficiency of cars, rather than reducing demand for fuel, encouraged motorists to travel longer distances and buy more cars, without reducing the impact on CO_2 emissions. Another indirect rebound effect occurs when the financial savings from lower energy consumption are used to purchase other goods that do require energy.

> **By trying to free ourselves of fossil fuels, by switching from an old order to a new world, we are in fact creating a new and even stronger dependency. [...] The smallest of our daily actions and even our major collective choices will be totally dependent on rare metals.**
>
> **G. Pitron**
> *Journalist, specialist in the geopolitics of raw materials, 2019*

Building better with less

Working with what's already there

The low-tech approach can be applied to all forms of construction, whether housing, schools, offices or other types of building. As well as advocating the responsible use of high-tech, the low-tech approach involves consuming material resources in a responsible way. What this means in the construction sector is primarily avoiding new construction or demolition, and instead favouring the refurbishment, renovation and conversion of existing buildings.

Renovation and extension of the Paul Valéry mixed regional housing estate in south-eastern Paris

This project is part of an ambitious environmental and circular economy approach. The design team worked meticulously to plan for selective deconstruction and maximise on-site reuse. In total, more than 30% of the on-site materials are recycled, and more than 80% of the furniture will be reused in the final project. In addition, the project team called on the French Workers' Association (the Association Ouvrière des Compagnons du Devoir et du Tour de France) to organise workshops to raise awareness of the importance of reuse.

© Agence Engasser + Associates

Client: SPL Ile-de-France Construction Durable on behalf of the Paris Region

Architects: Agence Engasser + Associates

General contractor: Bouygues Bâtiment France

Delivery: 2026

↓

Cycloponics

Cycloponics is a start-up that converts unused urban basements into agricultural land (growing such crops as mushrooms, chicory and sprouts). Cycloponics sells its produce directly to local residents, restaurants and grocery shops, and organises educational tours for schools and local residents.

A new way of building

The low-tech approach involves choosing construction methods that have the least possible impact on the environment. This approach advocates eco-construction (choosing biosourced and geosourced materials, construction techniques that use as little machinery and resources as possible and generate as little waste as possible, etc.), low energy consumption in terms of uses and responsible use of high-tech.

Good to know

The low-tech approach strongly supports bioclimatic construction. This means taking the climate and the immediate environment into account right from the design stage of the construction or refurbishment project, in order to reduce energy requirements for heating, cooling and lighting. The design is mainly based on the choice of appropriate materials, the use of air circulation techniques, the use of solar radiation or geothermal energy and the recovery of rainwater.

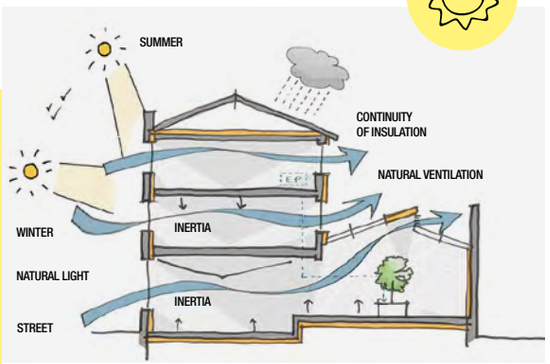


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Illustration of the bioclimatic principle by the architects' cooperative, FAIR

↑

©Luker Chocolate, 2019

Client: MEC Arquitectura, Manuela Eblé Cárdenas

Architects: Manuela Eblé Cárdenas + Jellyshot Group S.A.S.

Delivery: 2019

Chocolab, Necocli, Colombia

The Chocolab is a development and innovation centre designed by MEC Arquitectura in 2019, based on an architecture that aims to reduce energy consumption throughout the building's lifecycle. It also actively gets the community involved in the construction process and serves as an educational programme on the processing and use of wood (teak).

The building has natural ventilation and uses a permeable low-tech facade system to ensure that sunlight can enter. As a result, the interior of the building benefits not only from good lighting conditions to fulfil its educational function, but also provides a cool environment and a high level of thermal comfort. The building has also been designed to be flexible and adaptable.

Josephine Baker high school, Hanches, France

The design of this high school reflects an exceptional environmental approach. On this pioneering site, a large proportion of the earth excavated was reused to make bricks for the construction of several of the school's walls. Over 500 tonnes of bio-sourced materials such as wood, straw and hemp were also used to construct the framework, walls and facades, as well as to provide insulation for the building.

↑

©Cabinet Créa'ture Architectes

Client: Centre Val-de-Loire Region

Architects: Créat'ure architects

General contractor: Bouygues Bâtiment France

Delivery: 2023

↑

Eduard Hueber, archphoto ©Baumschlager Eberle Architekten

Client: AD Vermietung OG

Architects: Baumschlager Eberle Lustenau GmbH

General contractor: Rhomberg Bau GmbH

Delivery: 2013

22-26 Building, Lustenau, Austria

The architecture firm Baumschlager Eberlé based its design on the worldwide consensus of a thermal comfort scale of between 22° and 26° C, hence the concept of "no less than 22, no more than 26", or the 22-26 building. In 2013, the agency designed a building without any technical installations. In this building, there is no need for a heat pump, dual-flow ventilation or cooling system. Heating is provided solely by the waste heat from users, computers, lighting and solar radiation. All that's needed is smart software to control the flow of energy throughout the building.

Vernacular architecture: the example of the Nubian vault

The technical concept of the Nubian vault is an ancient architectural process mainly built in raw earth. The winner of the 2020 "Le Monde-Cities" urban innovation prize, the Nubian vault marks the revival of an architectural process dating back more than 3,500 years that is particularly well suited to sub-Saharan countries. It costs between 30% and 60% less to build than a concrete house, can easily last fifty years (five times longer than a breeze-block and sheet-metal house), is weather-resistant and, above all, provides protection against the heat (there is a temperature difference of 4° to 6° C between inside and outside).

Certification schemes to encourage the use of low-tech construction materials

To boost low-tech construction and restoration, the Low Tech Building Association has brought together a number of consulting firms, including ELAN, a Bouygues Construction subsidiary specialising in sustainable property, to create a "Low-Tech Building" label. Its standards are based on three pillars: low energy consumption in construction and operation, purpose (providing a response to the real needs of residents) and resilience.

Bâtiment Frugal Bordelais
L'Urbanisme résilient

The Bordeaux Frugal Building label
In May 2021, Bordeaux City Council launched a set of guidelines to help buildings adapt to climate, energy, environmental, economic and social challenges. The aim of the Bordeaux Frugal Building label is to promote buildings that are adapted to the local area, that preserve existing natural spaces, that focus on local industries and that take into account the use of buildings and the quality of life of their occupants, while reducing their impact on the climate.

Getting future users involved

The low-tech approach also means empowering people rather than making them dependent on technological tools and the systems into which they are integrated. This means, for example, gaining a better understanding of how our living spaces work and encouraging people to adopt new behaviours (switching lights off at night in commercial buildings, closing blinds, etc.), promoting frugal equipment and setting up initiatives to foster social links, such as sharing services and equipment.

Collect'IF Paille, France

Collect'IF Paille was founded in 2015 with the purpose of promoting and popularising the use of straw in construction in the Paris region. The association offers a "Pro-Paille" training course based on the Professional Rules for Straw Construction (CP2012), which covers the theoretical and practical aspects of this construction method.

Planning the low-tech city

There is a great deal of talk about the smart city which is based on the massive use of digital technology. But the low-tech approach challenges us to find alternatives to the ultra-connected city, with the aim of moving towards greater frugality and empowering everyone (Social Economy Lab, 2022).

Renaturing cities

Our climate is going to experience more frequent and intense heatwaves, increasingly harmful levels of pollution, and a growing number of people affected by these hazards. Nature-based solutions are the answer to these challenges. Before providing high-tech solutions, a low-tech approach urges us to preserve living things and to take inspiration from them. For example, reducing the imperviousness of soils and restoring nature to the land can help combat urban heat islands.

Green Shades, Valladolid, Spain

"Green Shades" is a nature-based solution that was introduced in the Spanish city of Valladolid in 2020. It is a canopy made of tensioned sails that contains vegetation and incorporates an integrated irrigation system. The system creates shaded areas in public spaces, helps improve air quality and regulates humidity. Lightweight and easy to install, it can be placed in streets where the lack of space or difficulty of maintenance mean that it is impossible to install trees or other types of vegetation.

> **Another type of smart city is indeed possible, one that would adopt a more sober and measured approach to its tools and practices, that would be closer to its citizens' interests and would be more concerned about social injustices.**
>
> **C. Diguet**
> *Institut Paris Région*
>
> **F. Lopez**
> *historian of architecture and technology, 2019*

©Singular Green

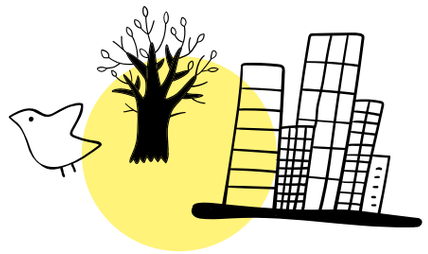
Depolluting cities

Some initiatives make use of biotechnologies to offer solutions for de-polluting confined spaces. In line with the low-tech approach, which consists of using technologies judiciously, these initiatives can provide alternatives when nature-based solutions are not appropriate.

©LIQUID3

"Liquid3", Belgrade, Serbia

In 2019, Serbia ranked fifth among the most polluted countries in Europe, and it is the European country with the most deaths linked to air pollution, with 175 deaths per 100,000 people (The Index Project, 2023). Seeking to do something to address this, the University of Belgrade's Multidisciplinary Research Institute has created Liquid3, an urban photobioreactor that harnesses the power of microalgae to combat greenhouse gas emissions and improve air quality. It contains 600 litres of water and uses microalgae to capture carbon dioxide and produce oxygen through photosynthesis. Microalgae are estimated to replace two ten-year-old trees or 200 square metres of lawn, and thus represent a sustainable alternative concept for making urban environments with limited space and heavy pollution greener.



Developing urban biodiversity with urban acupuncture

Urban acupuncture is an urban strategy that combines urban planning with acupuncture derived from traditional Chinese medicine: the city is treated as a living organism. Unlike costly large-scale urban projects, and sometimes disconnected from local issues, urban acupuncture aims to revitalise defined areas through micro-interventions, thereby "making the city react", i.e. triggering positive chain reactions that will improve living conditions in the neighbourhood. Examples include de-sealing certain areas of public car parks, creating landscaped ditches, recovering rainwater, etc.

Good to know

Urban heat islands raise temperatures by as much as 2° C for a city of 1,000 inhabitants and up to 12° C for a city of several million inhabitants (Février et al., 2009). A study by Ademe (2021) indicates that trees are the nature-based solution that provides the greatest local cooling (up to 2 to 3 degrees).

Bringing public spaces to life

Designing public spaces can also be inspired by the low-tech approach. This can mean, for example, working with existing structures, intensifying uses, encouraging the sharing of space, encouraging the reuse of street furniture and regenerating sites such as brownfield sites.

Wikado, Rotterdam, Netherlands

In 2008, Superuse Studios designed a children's playground for the "Kinderparadijs Meidoorn" foundation in Rotterdam, based on the principle of reuse. Wind turbine blades were used to create this play area for children. Resistant to wind and weather, ergonomic and hollow, they are like mikado sticks in the design of this urban park. By making small modifications to the blades, the studio was able to make the project fun and child-friendly. Elsewhere in Rotterdam, other wind turbine blades have been reused as street furniture (e.g. benches, bicycle shelters).

©Denis Guzzo, 2008

In addition to reused furniture, there are a number of other low-tech developments that can be designed to enrich neighbourhood life and make it more dynamic. For example, installing small elements of street furniture, amusing markings on the ground, active design, installing temporary works of art, planting vegetation, etc. are all ideas to help bring public spaces to life.

Active design

An inexpensive architectural concept to integrate sports and leisure activities in the city centre, such as the use of colour in public spaces.

Portable streets by Jaime Lerner

Architect Jaime Lerner has designed "portable streets" to inject new life into neighbourhoods that are considered to be too sleepy. The aim is to add a new element to the urban landscape by installing street furniture that allows street vendors to set up. The modules are flexible and mobile, and the portable streets were tested in 2007 in a district of São Paulo with the aim of breathing new life into the streets.

©Jaime Lerner Architects Associates

Complete streets, Quebec, Canada

The City of Quebec adopted a Complete Streets policy in 2017, the first of its kind in Quebec. This is an integrated approach aimed at creating a network of streets and public spaces that improve the quality of living environments and cohabitation. Complete streets (known as "rues conviviales" in Quebec) must be accessible, in line with their context, safe and comfortable for everyone to use, whatever their mode of travel, their personal condition or even the season. There are three main aspects to complete streets: active streets, green streets and winter-friendly streets (taking winter conditions into account when making design choices). The concept has since been adopted in several Canadian cities.

©Google Street View

Before

After

©City of Quebec
Redevelopment of Chemin de la Canardière, Quebec, 2018

Tactical urbanism: less action but greater results

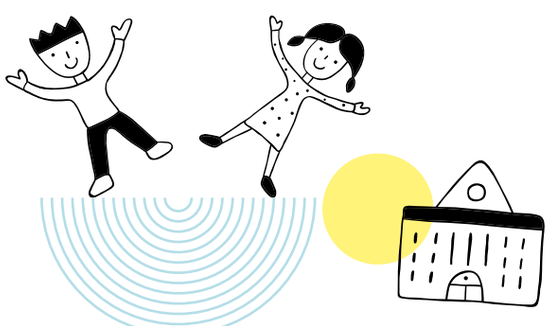
Tactical urban planning consists of carrying out actions in targeted urban areas, in a short space of time and with minimal resources, in order to improve neighbourhood life.

Encouraging soft mobility

The low-tech approach can also be adapted to other areas of urban planning, such as mobility and transport networks. While one of the main challenges is to find more environmentally-friendly alternatives to the use of private cars, we also need to examine our needs, so that we can travel less but travel better, by combining a variety of solutions. A number of initiatives are based on the principles of fair need, accessibility and frugality, with the aim of moving towards more active forms of mobility (walking, cycling, etc.), shared mobility (public transport, car-sharing, car-pooling, etc.) and inclusive mobility (accessible to as many people as possible).

Woodybus, Le Pellerin, France

Woodybus is a collaborative public transport system that was created in 2022. It is intended to replace the cars that drop off children living within a 3-kilometre radius of the local school, and to encourage them to take up cycling. Eight children pedal to power the vehicle's electric battery, while an adult driver takes care of steering and safety. Designed and manufactured by a majority of subcontractors within a radius of less than 100 km of the assembly site, Woodybus has a chassis made from wood from the Landes region, which is almost five times lighter than aluminium. This prevents a great deal of electricity consumption (reducing the carbon footprint by around 1 tonne of CO_2) and eliminates the heavy pollution generated by the production of aluminium.



Vlotek, France

Since 2022, Vlotek has been helping to bring about an accessible, frugal and local ecological transition by providing families who want to reduce the environmental footprint of their journeys with low-tech kits to transform a simple bike into a cargo bike – an economical and sustainable alternative to purchasing an expensive cargo bike.

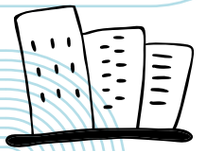
Empowering local residents

The low-tech approach encourages the use of easily mastered technologies wherever feasible, so that they can be as widely adopted as possible and so that local communities can achieve greater autonomy. Town planning can also contribute to greater Clientship of projects to reinforce the circularity of the economy of everyday consumer goods (repair, reuse and, where necessary, recycling).

The Repair Café foundation, Amsterdam, Netherlands

The Repair Café initiative was launched in Amsterdam in 2009. Following its success, a Repair Café foundation was created in 2011 and the model has since spread around the world. At each Repair Café, a team of volunteers repairs all kinds of objects brought in by visitors (visitors themselves play a part in repairing their own objects). Repair Cafés are part of the low-tech approach, their aim being to restore the practice of repairing objects to combat over-consumption and product obsolescence, thereby encouraging people to consume less and repair things rather than throw them away.

> **Building a low-tech region means enabling residents to fully inhabit their city, enhance their skills, meet their own needs as far as possible, and gain greater freedom.**
>
> **Jean-Baptiste Thony**
> *Bordeaux city councillor with responsibility for the circular economy, zero waste, cleaning and local currency, 2022*



La Fumainerie, Bordeaux, France

La Fumainerie's mission is to empower citizens to support the transition of urban systems of food and excretion towards more circular models that maximise the recycling of nutrients released by our excrement. The association introduced an experimental network in July 2020 to promote sustainable, circular management of excreta.

"Low-tech with Refugees", EKO!, France

Since 2018, the Eko! association's "Low-tech with Refugees" project has aimed to improve the resilience and autonomy of people living in exile while contributing to local sustainable development by spreading low-tech know-how and systems. Following an initial trial in Greece, the programme has expanded to the cities of Marseille and Briançon, offering migrants and local residents training courses leading to qualifications and workshops in a range of low-tech skills (eco-construction, waste management, woodworking, bicycle repair, energy systems, agro-ecological market gardening, beekeeping, sanitation, etc.).

Relying on locally available resources

The development of low-tech also has great potential at a regional level. Whether for questions related to energy, waste management, water purification or tourism, the low-tech approach can provide many solutions to make regions more sustainable and resilient.

New models for managing waste, energy and water treatment

The treatment and management of water, waste and energy are crucial factors in the smooth running of a region.
A number of low-tech solutions are emerging that enable more sober and circular development by addressing local challenges.

Modul'o, France

Tryon, a manufacturer and integrator of micro-methanisation units, has created Modul'o, a solution to help locally recover bio-waste from households and businesses. It can be set up as close as possible to the sources of waste, thanks to modules that are quick to install, and that blend well into the landscape. The process is modelled on the digestion mechanism of a cow, and is entirely natural, producing both biogas, a renewable fuel, and a natural organic fertiliser known as digestate. Tryon opened its plant in Carrières-sous-Poissy, to the west of Paris, in 2021.

©Modul'O/Tryon

Green Watech, Marrakech, Morocco

Wastewater, the main source of drinking water pollution, has been treatable since 2018 with Green Watech's low-tech soil filter, which exclusively uses materials that are widely available and easy to find anywhere to treat and reuse wastewater.

It is a giant filter system made up of various natural components, which can treat a cubic metre of water in just twenty-seven hours and make it suitable for domestic consumption (irrigation and household use). The filter now has the capacity to treat the wastewater from 10,000 Moroccan homes, in a context where 32,000 villages have no access to a sanitation service, and allows water to be reused for agriculture rather than drawn from the water table.

National Biogas Programme, Senegal

Under Senegal's National Biogas Programme, several thousand biodigesters have been installed, enabling households to dispose of their organic waste and convert it into energy for cooking and lighting. The programme, which has created more than 12,000 jobs, ultimately aims to improve the living conditions of Senegal's rural populations by creating a sustainable biogas market.

Transforming farming practices

The low-tech approach provides an alternative to the current model by helping people to reclaim their working tools, strengthening local know-how and developing new synergies between urban and rural communities.

Atelier Paysan, France

The Atelier Paysan (Rural Workshop) is an agricultural and rural development organisation that has been promoting a farmer-based agro-ecology since 2009. Its goal is to help producers regain technical sovereignty and autonomy through mutual support and the reappropriation of know-how. The cooperative has also developed a number of partnerships with universities and social economy structures in the realms of agricultural development, research and experimentation.

Cargonomia, Budapest, Hungary

Cargonomia is a hub that has been linking sustainably farmed local food production activities with locally manufactured low-tech transport solutions since 2015. The project brings together three active players in the social economy: the biodynamic farm at Zsambok offers boxes of farmer-produced food, the social cooperative Cyclonomia has set up a participatory bicycle workshop that handcrafts its own low-tech solutions for transporting goods in urban areas, and Kantaa is a courier company.

Revitalising regions

The low-tech approach also contributes to regional development by capitalising on local know-how and taking account of specific local factors. Many projects are helping to reterritorialise the economy (relocating activities, developing local crafts, promoting the circular economy, etc.).

Fabrique Cycle Terre, Sevran, France

Cycle Terre, formed in 2018, reuses unpolluted excavated soil to produce raw earth materials for the construction of new districts in Greater Paris. Located in Sevran, in the north-eastern suburbs of Paris, the Fabrique Cycle Terre is the first unit in France to transform inert excavated soil into building materials. The company also offers technical support in the use of earth materials, and it provides training for masons directly on site.

Another aspect of regional development involves new forms of tourism that both promote the local economy and protect the environment (clean travel choices, holidays in eco-designed locations, integration into local ecosystems).

The Slow Tourism Lab, Troyes, France

The Slow Tourism Lab, which was set up in 2017, is a sector incubator aimed at supporting innovative slow tourism businesses. Set up in partnership with the Aube department's technology park and tourism committee, it is the world's leading incubator for start-ups and businesses looking to innovate in sustainable tourism. The Slow Tourism Lab is intended to promote a more sustainable, slow and human way of travelling as opposed to mass tourism, and to create innovative tourism technologies and services applicable in rural areas for leisure and business tourism.

SAS Minimum - Le Pavé, Aubervilliers, France

Founded in 2018, SAS Minimum-Le Pavé is a company that designs and markets new materials made from recycled plastic. Each material is 100% made from plastic waste, with no added resin. The company has already completed several projects in France and has been given a contract by the Bouygues Group to produce 11,000 seats for the stands in the Olympic swimming pool and Arena 2 for the 2024 Olympic Games. They will be entirely manufactured from plastic waste collected in Seine-Saint-Denis, consisting mainly of shampoo bottles and bottle tops.

Overcoming barriers

Low-tech approaches to construction, urban planning and regional development encounter several types of barrier that can be grouped into these four categories[2].

Semantic, cultural and psychological barriers

The failure of certain players to identify with the terms low-tech, right-tech and just-tech, not to say a wariness of the terms in some cases, is contributing to slowing down their development. There are also major cultural and psychological barriers that make it difficult for them to be widely accepted and adopted in projects. In the face of "progressive" thinking and a fascination with technological innovation, low-tech is often associated with new restrictions and constraints leading to a loss of personal freedom and comfort. In order to inspire, encourage and project ourselves in a low-tech society, it is important to develop new, positive images.

Regulatory and insurance barriers

Regulations are often unsuitable or do not cover low-tech innovations and approaches, which can lead to insurance companies and financial backers being over cautious (Ademe, 2022).

Good to know

Innovation permits enable structures to experiment with a solution so that if they are successful and not dangerous, they can retroactively examine how to modify the regulations to adapt them to the solutions.

Economic barriers

Low-tech initiatives may have to face higher construction costs (in particular, as a result of supply constraints and the higher proportion of human labour involved in the construction process).

> **It is still cheaper to consume resources or emit greenhouse gases than to mobilise human labour. This is blocking the emergence of many repair solutions and small-scale forms of work.**
>
> **P. Bihouix**
>
> *Engineer and Director of the AREP group, specialist advisor to the Social Economy Lab, 2021*

Barriers linked to habits

The low-tech approach often requires greater user involvement. Devices are less automated, less digital, which can lead to additional cognitive and time burdens, slowing users down from changing their behaviour.

[2] Categories derived from barriers identified in the following studies: Ademe, 2022; Social Economy Lab, 2022; La Fabrique Ecologique, 2019; Martin & Colin, 2021.

Positioning of players

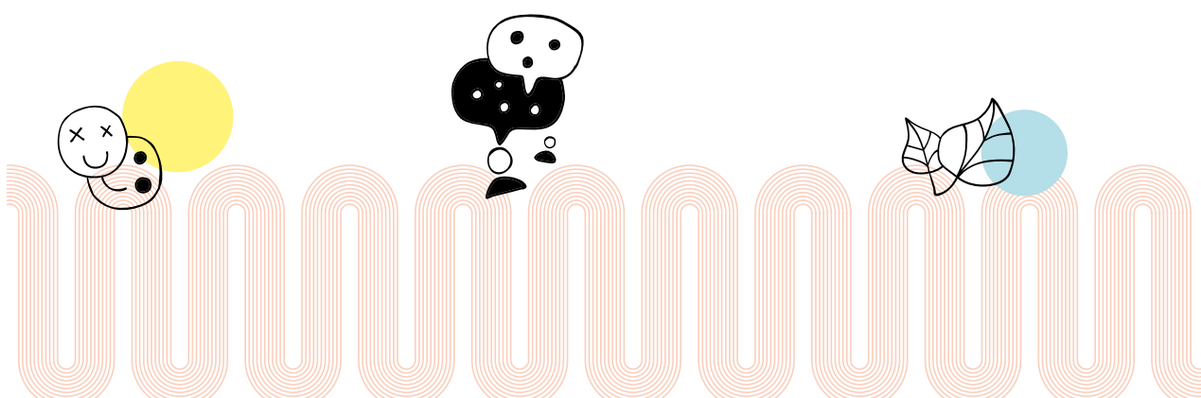
Faced with the urgency of the situation, a number of players involved in the urban fabric are beginning to develop a low-tech approach to projects, offering robust, repairable and sustainable solutions. Some of the pioneers are described below.

In the non-profit sector

The mission of the association of Low-tech Labs is to share low-tech solutions and the low-tech ethos. It documents low-tech solutions and how they can be rolled out, facilitates the provision of collaborative tools and community programmes, and shares experiences and first-hand accounts from low-tech ambassadors. The association also coordinates 20 local Low-tech Lab (LTL) collectives, helping to bring the low-tech philosophy to life locally around the world (LTLs in Yaoundé, Lausanne, Montreal, etc.).

The Barcelona-based Slow Lab is a collective project at the crossroads of the "slow movement" philosophy and low-tech approaches. Basing its projects on slowness and traditional techniques, Slow Lab aims to question and rethink some of the tools we use every day, with the aim of reducing our societies' dependence on high-tech.

The Low Technology Institute, in Wisconsin, United States, aims to create do-it-yourself, resource-efficient solutions and identify low-tech solutions to ensure the sustainability of the world of tomorrow. The association has set up a blog, podcast and videos to publicise the work of the institute and other players.



In construction, real estate and architecture

Bouygues Bâtiment France has developed the "Archisobre" concept building, an approach designed to steer construction towards a very low carbon footprint, reducing the carbon impact of a commercial building by a factor of three.

↑
©NeM / Niney and Marca Architects

Groupama Immobilier has developed a project to restructure an office building known as the most "zero" building in Paris, with the aim of becoming the first example of a building to be rehabilitated using a low-tech approach in Paris. The aim is to produce zero carbon, zero waste, zero excess and install zero air conditioning.

↑
©Groupama

Kolûba is an alternative Turkish construction collective with a cleaner, healthier and more personal approach to housing. The group mainly builds homes using earth, straw and wood, and its main goal is to encourage more widespread acceptance of natural construction.

FRUGALITÉ HEUREUSE & CRÉATIVE

The "Manifesto for Happy Frugality", written and published by engineer Alain Bornarel and architects Philippe Madec and Dominique Gauzin-Müller, encourages those involved in urban development to move towards a different model based on frugality in terms of energy, materials and technology and for the local area.

In partnership initiatives

The work presented by the Institut Paris Région at the 41st meeting of the Fnau network of urban planning agencies on low-tech life in 2040[3] (C. Lopez et al., 2021) is also helping to create a vision of a low-tech city. This initiative sees the low-tech approach as a genuine project for society, and mentions various measures that could change French people's daily lives: a ban on SUVs, creating a personal transitional income, reducing working hours, etc.

In October 2021, Paris & Co launched a working group dedicated to accelerating low-tech urban innovation. Bouygues Construction is a member of the group. Its aim was to "bring together professionals from the real estate, property development, construction and energy sectors to challenge the technological innovation race and come up with solutions that are ideally suited to the needs and constraints of today's cities."

In research and training

The development of low-tech solutions in society also involves research and learning. APALA, a non-profit organisation that was set up in 2013, brings together around ten people from scientific and technical backgrounds to provide low-tech and open source technical solutions to sustainability issues. A large part of APALA's activities revolve around research, which provides a key link with the academic world. Under its impetus and that of the Low-tech Lab, a "low-tech engineering" option has been opened at the Centrale Nantes engineering school.

In France, Low-tech Skol trains Circular Economy and Low-tech specialists to help companies make the transition from their current model to a low-tech model. These specialists become multi-skilled individuals who can be employed in any type of sector, and who are capable of providing and implementing simple and effective ideas in companies to generate savings.

[3] IPR. (2022). Low-tech life in 2040. Podcast: https://www.institutparisregion.fr/economie/commerce-et-consommation/la-vie-low-tech-en-2040/

Faced with environmental, social and public health challenges, the increasing scarcity of resources and the related geopolitical risks, players from all sectors are committed to developing new modes of production and consumption. Far from rejecting all technology, the low-tech (or just-tech, right-tech) approach calls on us to rethink our needs so that we can use high tech responsibly. Beyond that, we need to initiate profound organisational and cultural changes to ensure that our societies operate within planetary boundaries.

For the urban and regional planning sectors, this new approach offers an opportunity for innovation, focusing on the search for exactly what is needed, and the implementation of construction and development models that consume less energy and resources and produce less waste. At the same time, this approach encourages more involvement on the part of users and residents, empowering them and giving them greater autonomy.

Far from the “smart city” and “green tech” models that depend on increasingly inaccessible energy, metals and rare earths, the low-tech approach provides an innovative framework for designing, constructing and developing cities and regions that are more sustainable, more inclusive and more resilient.

> **The high-tech city is neither an obvious choice nor a foregone conclusion. Other options are possible and desirable, such as the low-tech city (or metropolis), i.e. a city which, without an outright rejection of technology and technical innovation, shows greater ‘techno-discernment’, both for the environment and for our individual and collective autonomy and resilience.**

Philippe Bihouix

Engineer, Director of the Arep group, specialist advisor to the Social Economy Lab

Further reading and viewing

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Audiovisual content

- Circular Metabolism Podcast, “Metabolism of Cities” (Youtube channel): https://www.youtube.com/@MetabolismofCities

Portal and newsletter

- Low-Tech Magazine. https://solar.lowtechmagazine.com

Credits

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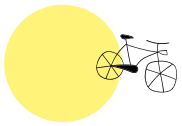

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