NOTE RAPIDE
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HOW PARIS REGION RISES TO THE CHALLENGE OF THE CIRCULAR ECONOMY

20 tonnes
OF MATERIALS ARE CONSUMED BY EACH PARIS REGION INHABITANT PER YEAR (INCLUDING INDIRECT FLOWS)

60%
OF THE TOTAL CONSUMPTION OF MATERIALS IS DEDICATED TO ENERGY, FOOD AND CONSTRUCTION

FOR LOCAL AREAS OR TERRITORIES, THE DEVELOPMENT OF THE CIRCULAR ECONOMY IS LESS OF AN ENVIRONMENTAL CHALLENGE THAN AN ECONOMIC IMPERATIVE AND, MORE GENERALLY, A MATTER OF RESILIENCE. THIS IS PARTICULARLY TRUE IN THE CASE OF THE PARIS REGION (KNOWN AS ÎLE-DE-FRANCE), A WORLD-CLASS METROPOLIS WHICH IMPORTS ALMOST ALL ITS RESOURCES. THUS, THE PARIS REGION'S REGIONAL WASTE PREVENTION AND MANAGEMENT PLAN COMMITS THE REGION TO CREATING THE DYNAMICS OF A CIRCULAR ECONOMY IN ORDER TO LIMIT THE CONSUMPTION AND WASTAGE OF RESOURCES.

Over 60% of global resources are consumed[1] by metropolitan areas and over 80% are appropriated by 20% of the world's population. The Paris Region is no exception to this. Because of its 12 million inhabitants resulting from an annual increase of 50,000 to 60,000 inhabitants per year over 30 years, the capital region is a large consumer of resources: each inhabitant consumes 6.5 tonnes of materials per year for food, energy or construction materials. These three fields of activity account for 60% of the total volume of materials consumed.

However, the ecological and material footprint of a Paris Region inhabitant is actually much greater due to a high level of consumption of finished products. These account for 31% of the inhabitant's ecological footprint and are mostly manufactured outside the Paris Region, which increases the consumption of "hidden" materials. For example, manufacturing and distributing a TV set that weighs 11 kilograms consumes 2.5 tonnes of extra materials. Producing a computer requires 240 kilos of fossil fuels, 22 kilos of chemicals and 1.5 tonnes of water, *i.e.* quantities much larger than the final weight of the computer. All in all, a Paris Region inhabitant's visible and invisible consumption is close to 20 tonnes per year (see the diagram).

HIGH DEPENDENCY ON FOREIGN MARKETS

These high levels of consumption result in strong pressures on natural environments because a significant portion of these resources are non-renewable. This inevitably leads to a gradual deterioration in supply conditions in terms of price, quality and quantity. Thus, the region's dependency

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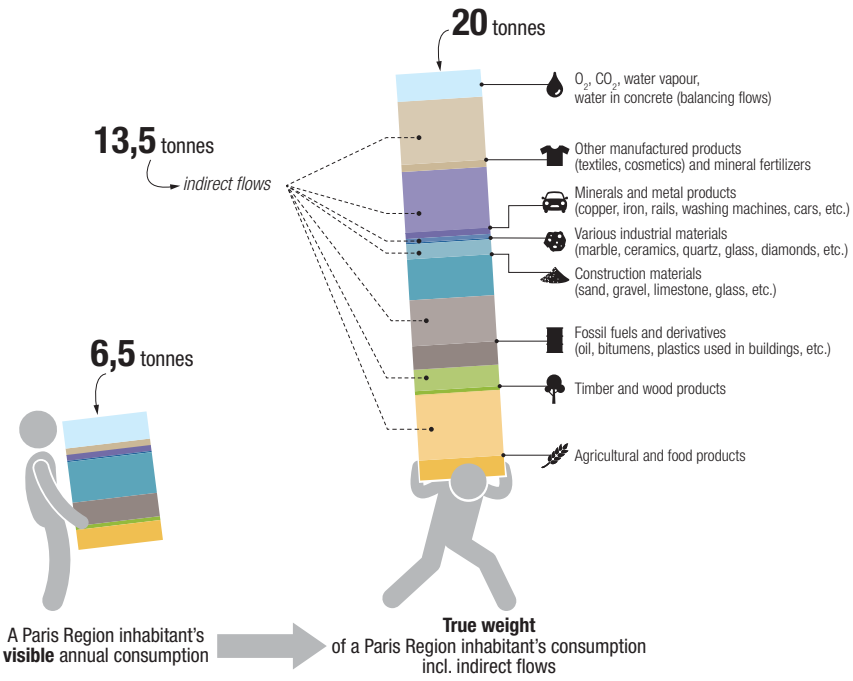
RESOURCES/RESERVES?

An acceleration in the rate of consumption of resources is deteriorating the conditions for accessing them through higher pricing, smaller quantities and poorer quality. It is also aggravating the environmental impacts of exploiting these resources.
Renewable resources may be replenished if they regenerate themselves at a similar, or even faster, rate than that of consumption. This poses the challenge of the sustainability of these resources in terms of operational threshold.
As regards non-renewable resources, the reserves correspond to the stock that is currently exploitable under technically and economically sustainable conditions. When we refer to the depletion of certain resources, it is actually in terms of the available reserve based on current knowledge. Faced with the increase in demand, if shortages occur in the near future they will not be due to a lack of resources but to the impossibility of exploiting them for technical or cost reasons or due to their inaccessibility.

on foreign markets is made worse by the Paris Region's need to import certain strategic resources. For a dozen years, the Paris Region has produced on average over six million tonnes per year of non-hazardous residual waste. Treated by incineration or put in landfills, this waste bears witness to the linear nature of our economy. Thus today the idea is to reduce the share of residual waste by upstream development and implementation of programmes and courses of action based on eco-design and the prevention, reuse and recycling of waste.

To meet these planetary and local challenges, the circular economy makes us rethink our ways of producing and consuming in order to reduce resource extraction. Adopting the working principles of a more circular economy means relocating the production of goods and using environment-friendly manufacturing processes. It also implies drastically reducing waste and the quantity of consumed goods by adopting more economical and collaborative consumption practices and by reusing, repairing and recycling assets as much as possible. The potential for improvement is substantial in all economic sectors. Under its energy transition law, France has set itself the goal of cutting by 30% its domestic consumption of materials per GDP unit by 2030. As the Paris Region accounts for 31% of national GDP, it has great responsibility for achieving this target.

A Paris Region inhabitant's visible and hidden resource consumption per year and per category of material



Source: Vincent Augiseau, Sabine Barles, "Bilan de flux de matières de la région Île-de-France en 2015", Paris 1 Panthéon-Sorbonne university, UMR géographie-cités for the Paris Region, 2018

SETTING SOBRIETY CONSERVATION GOALS BASED ON THE METABOLISM OF THE PARIS REGION

How can this be achieved? Developing recycling loops alone will not relieve the constraints on resources. Theoretically, if all waste could be recycled over and over (which is impossible), this would meet only 18% of the current needs for resources. Thus, in addition to recycling, it is necessary to work on sobriety. The only way to improve the materials footprint in the Paris Region and in supply areas in France and abroad is to adopt a comprehensive approach both upstream (supply, eco-design, recourse to renewables) and downstream (extending life cycles, waste recycling). Although self-sufficiency seems utopian, there nevertheless exists a great potential for progress in the areas of food supply, construction works, energy and recycling.

CHANGING OUR FOOD SYSTEM

The 5,000 farms in the Paris Region are not sufficient to meet the food needs of 12 million consumers. To work towards a more circular food system, it would be necessary to develop local production (fruit, vegetables, but also stockbreeding) while at the same time changing nutritional practices (demitarianism[2], hunting down waste) and agricultural methods (less impact on the environment) to make the system sustainable. Currently, the supply of local products mainly concerns cereals (bread, beer, etc.) as well as fruit and vegetables (consumer associations, fruit-picking on farms, etc.). Many short local supply chains remain to be structured upstream of the food system to produce good quality commodities and process them.

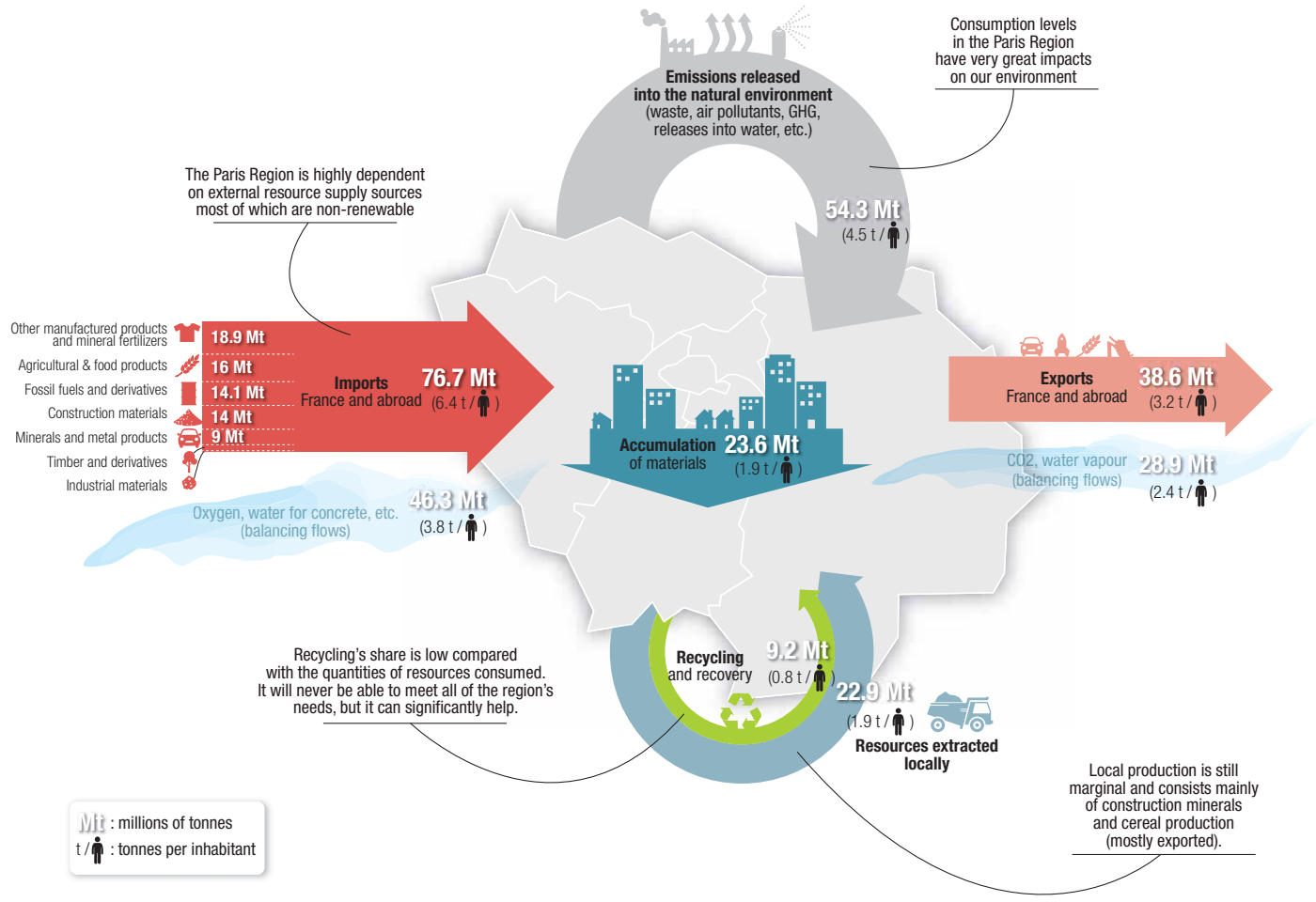
There is also a great potential for recycling biowaste, particularly leftovers, kitchen waste and unsold food stocks. Every year, the inhabitants of the Paris Region generate around one million tonnes of biowaste, almost none of which is recycled. Organic materials mixed with other waste are sent to incinerators or landfills.

Since the end of the 19th century, the collection of mixed waste to protect public health has undermined the traditional activity of ragmen who used to recover fabric, rabbit skins, horns, etc. to make paper. Since January 1st 2016, the new sorting obligations for large producers of biowaste[3] and the generalisation of these obligations by 2025 to include all waste producers, notably those of household waste, have completely changed the situation. Two ways of adding value to food waste remain to be developed: materials recycling (compost, animal food, etc.) and energy recycling (production of biogas for energy and mobility).

RETHINKING SPATIAL PLANNING

In terms of spatial planning, the scope for improvement is also considerable. A worldwide shortage of most construction materials such as

Balance of material flows excluding indirect flows in the Paris Region in 2015



Source: Vincent Augiseau, Sabine Barles, "Bilan de flux de matières de la région Île-de-France en 2015", Paris 1 Panthéon-Sorbonne university, UMR Géographie-cités for the Paris Region, 2018.

RARE/CRITICAL METALS

Rare metals make up a set of some 50 chemical elements produced in low quantities. Their economic value is high, even very high, for three reasons: certain industries are very dependent on them; their required degree of purity is high; and accessing their deposits can be challenging. Some metals are referred to by the European Commission as "critical metals". There were 14 of them in 2011, rising to 27 by 2017. In addition to being rare, critical metals are strategically important to the technologies of the future. Encouraging the effective use and recycling of critical raw materials is a priority activity area of the EU's plan in favour of the circular economy.

limestone, stones, clay, etc. is unlikely, except for wood. However, in spite of their high intrinsic value, these materials are not easy to transport because of their heavy weight and shortages may occur locally.

Although the subsoil in the Paris Region contains a rich diversity of non-metallic materials, the region's shortage of construction materials has been increasing for 20 years. The region already imports 47% of the natural aggregates it uses for building and public works[4]. However, thanks to the Grand Paris Express project, urban renewal programmes, the Olympic and Paralympic Games in 2024, but also the legal obligation to build 70,000 homes per year, the need for building materials has reached 30 million tonnes per year and should increase in the coming years.
Such pressure on resources (notably alluvial granulates) has already been observed and will greatly affect deposits in the Paris Region as well as in neighbouring regions (Normandie, Centre Val-de-Loire, Grand-Est, etc.) which currently meet most regional needs. The recycling of construction and public works waste alone cannot meet the needs for materials, even though it can partly meet this demand. So it is important to call into question the planning models in order to take these constraints into account. This means using new building materials such as bio-sourced materials, recycling all construction and public works waste and massifying its re-use, favouring rehabilitation over construction, deconstruction over demolition, limiting urban sprawl and optimising the use of vacant spaces around transitional urban development projects... In short, in order to reduce the constraints on mineral resources, planning policy as a whole must be entirely reconsidered.

THE ENERGY TRANSITION: STRIKING A BALANCE BETWEEN AUTONOMY AND USES

In the Paris Region the local production and recovery of renewables cover only 8% of regional energy consumption. Several plans, strategies and programmes have been deployed on a regional scale to dynamise this transition in the main areas where potentials remain that could be used for energy purposes, *i.e.* agricultural and forest biomass, local renewables (geothermal power, solar power, etc.) and waste (biowaste, refuse-derived fuels, etc.). The regional energy and climate strategy aims to increase fourfold the quantity of renewable energy produced in the region while reducing its energy consumption by 40% by the year 2050.

The three challenges facing the Paris Region's cross-cutting approach to planning


Pierre-Yves Brunaud/Picturetank

1. A new way of managing space

The globalised economy implies the organisation of sectors into networks whose hardware and flows now go far beyond territorial boundaries. This calls into question the importance of the proximity principle enshrined in the Environment Code regarding the structuring of economic sectors and the Paris Region's ability to consume locally the raw materials generated by recycling.
The development of local production and processing capabilities (energy, food, construction materials, etc.) and the implementation of recycling require special facilities (waste processing plants, sorting centres, methanisation units, construction material recycling plants, etc.), the construction, acceptability and maintenance of which clash with other current and future uses of regional land. The needs of the circular economy and, more broadly, of the ecological transition greatly intensify competition for regional land as a resource. Thus, it is urgent to draw up a strategy that preserves land and prioritises its uses on the basis of strategic needs.


baranozdemir/iStockphoto.com

2. Digitalisation: a true or a false friend?

The development of digital technologies provides an opportunity to reduce our consumption of resources. For example, sensors and their related data could improve the monitoring of flows of energy, water and waste and optimally shorten them. The development of digital platforms can also foster the emergence of more virtuous consumption modes. However, in practice, the accelerating use of digital technologies is contributing more and more to climate disruption. Five years ago, these technologies accounted for only 2.5% of greenhouse gas emissions (GGE), whereas they now account for 3.7%*, *i.e.* more than GGE by civil air transport. Thus, digital technologies will alleviate the constraints on the environment only if they can generate more savings to offset extra resource consumption (materials and energy). Such an assessment of digital projects remains to be conducted.

*Source: "Lean ICT - pour une sobriété numérique", The Shift project, 2018.


Bellastock - Alexandre Icsiq Photographe

3. Territories that are committed

Local territorial strategies based on the circular economy are emerging in the Paris Region, most often supported by inter-municipal authorities and aimed mainly at recycling waste. The leverage effect of public procurement* is also developing through shared activities (*e.g.* EcoCIRC within the Matériaupôle project, Métropole du Grand Paris/MGP). To mobilise economic players, some local authorities have launched experimental industrial and territorial ecology projects. This is the case of, for example, the Yvelines and Essonne "départements" (counties) and the city of Paris through the Recyter programme steered by the Paris Île-de-France Chamber of Commerce and Industry (CCI). The challenge today is to broaden the scope of these strategies to include all circular economy policy levers. In particular, local authorities could more actively encourage their inhabitants to adopt more responsible consumption patterns. To this end, they may set up dedicated spaces (reverse supermarkets, recovery depots, recycling plants, etc.), raise people's awareness through environmental education or organise "zero waste family challenges".

*See the technical file on "The Circular Economy and Public Procurement" published by the ARENE energy-climate department of IAU îdF in 2017.


A. Lacouchie/IAU îdF


C. Bertolin/IAU îdF

Left: Tree trunks cut in Montmorency forest (Val-d'Oise "département").

Right: A wood-fired heating plant in the Cochennec neighbourhood of Aubervilliers (Seine-Saint-Denis "département").

Regarding energy transition strategies, the resources issue deserves to be better understood as it is at the heart of potential conflicts of use. For example, forests are of crucial importance to the production of renewable energy, but also to the development of bio-sourced materials and the preservation and restoration of green and blue belts, etc. As for the incineration of household and other similar types of waste, it now plays a significant role in the production of local energy. Thus, the question is: how can we reconcile waste prevention, material recycling/recovery and the production of carbon-free energy? The only way to implement a sustainable energy transition strategy is to adopt a cross-cutting form of project governance combined with a systemic approach to resources.

TAKING BETTER ADVANTAGE OF THE "URBAN MINING"

Most consumer products in the Paris Region have been made elsewhere. As soon as a product reaches the end of its life-cycle, it loses its value to such an extent that it becomes negative because of the cost of processing it as "waste"[5]. This rapid resource devaluation is common and generally occurs well before the product or the materials it contains are actually consumed. For these end-of-life products or the materials they contain to have any positive value, there has to be a demand for them on the market. If the supply of recycled products/materials exceeds demand, the product may end up being recycled to produce energy. This is what happens to many cardboard boxes, which end up being incinerated instead of being recycled and re-used. All these products and materials that end up in garbage cans before even being used form part of an "urban mine" that should be used to sustain the value of these resources as long as possible within the system. The region's potential for recycling remains great in terms of reclaiming waste from building and construction works as well as biowaste, plastics and glass from household packaging. Screens, telephones, lamps, cars, planes and wind turbines all contain materials that are theoretically recyclable. Metals, which are so crucial to the construction, industrial and digital sectors, are not only available under ground. Most metals are almost totally dependent on external sources. According to the ADEME Agency, the concentration of precious metals in "urban mines" is mind-boggling: 40 to 50 times higher than in natural deposits, the most accessible of which have already been mined[6].

In the Paris Region, base metals (steel, iron, copper, aluminium, etc.) are widely recycled: some 1.5 million tonnes are recovered from the construction, industrial, transport and household sectors. However, at this point in time, other so-called rare or critical metals (see box) are very difficult to recover. Their quantities are minute and they are often mixed with other materials. Yet recycling these metals has become a strategic necessity[7]. They include lithium in batteries, indium in touch screens and solar panels, neodyme in electric engines, rhodium in catalytic converters, germanium in optical fibre, tantalum in miniaturised capacitors, platinum for fuel cells, etc. The Paris Region and France as a whole are very dependent on a small number of countries that export these minerals. Five countries alone - China, Russia, South Africa, the Congo and Brazil – produce over 60% of these metals[8] which are also found in end-of-life vehicles (ELV) as well as in waste electrical and electronic equipment (WEEE).

Rare metals must be considered as precious "raw materials from recycling" to be captured rather than to be seen disappearing as "final waste". Their unavailability would strain the development of digital technologies, electric vehicles, renewables, etc. Even if the massive deployment of these low carbon technologies manages to reduce greenhouse gas emissions, there is a risk that they may lead to an increase in the consumption of resources already deemed to be "critical". Thus, this industrial strategy must necessarily be combined with the development of sectors dedicated to

PUBLIC POLICIES

The official recognition of the circular economy concept came with its inclusion in the 2015 Energy Transition for Green Growth Act. This law sets an material-saving objective of 30% relative to GDP. It also lays down major changes in terms of production (prohibition of plastic bags, criminalisation of planned obsolescence, etc.) and of sustainable consumption (fight against food wastage, etc.). It was followed in April 2018 with a road map that set out a series of concrete measures. It also gave regional councils "a role to play in supporting local circular economy initiatives" by entrusting them with responsibility for drawing up a regional strategy for the transition to the circular economy. Thus, the Regional Council of the Paris Region firmly undertook to draw up a strategy that covers all the powers exercised by the Region. It is expected to be finalised in 2019.

repairing, re-using and recycling materials and to generating alternative materials and, especially, to implementing a low-consumption policy.
The region features other recycling hubs, notably for processing the waste generated by major urban regeneration projects, construction/deconstruction works or the digging of the Grand Paris Express network. The high level of consumption of Paris Region inhabitants and the diversity of the region's economic activities are major potential drivers of recycling. Currently, recycled glass is mainly obtained from household packaging which captures only 60% of the material, whereas there are other reserves of glass (in windows, for example). Regarding plastics, the government has set an ambitious national target of 100% recycling of plastics by 2025. The Paris Region has a significant reserve of this material, but the plastics recycling sector remains relatively little known[9].
The very diffuse nature of the circular economy raises central questions about assessing and linking the various possible courses of action. Faced with the circular economy challenge, the Paris Region has to deal with three major cross-cutting (transversal) public policy issues: managing competition for the use of land; ensuring consistency with the digital transition; and linking up the various territorial planning strategies. Without over-multiplying the efforts made and in order to progress consistently towards a "more circular" regional territory, the watchwords will be cooperation, reciprocity and moderation.■

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RESOURCES

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- Understanding the circular economy principle, Fondation Nicolas-Hulot pour la nature et l'homme, 2017. https://bit.ly/2EyERai

1. Weight of Cities Report, UNEP, 2018
2. This term refers to a food diet with reduced milk and meat content.
3. This mainly concerns businesses involved in the upkeep of green spaces, multiple retailers, agri-food industries, canteens and restaurants, wholesale markets or fairground performers. Biowaste production thresholds applicable by law were gradually cut from 120 tonnes/year in 2012 to only 10 tonnes/year in 2016.
4. See the Regional Overview of Granulates in the Paris Region by the IAU, the Driee and Unicem in 2017.
5. This is the position of the Ellen Macarthur Foundation: "In Europe, the recycling of materials and the conversion of waste to energy represent only 5% of the initial value of the raw materials used. A motor vehicle is parked for 92% of the time. Along the value chain, 31% of food is wasted. And offices are used on average for only 35 to 50% of the time, even during working hours."
6. One tonne of a mineral extracted from a mine contains two to three grams of gold, compared with between 120 to 200 grams, or even more, in electronic products," says Alain Geldron of ADEME (French Environment and Energy Management Agency).
7. For more information, read: "The Recommendations of the Strategic Metals Committee on the development of French industrial skills in the recycling of critical metals", Comité pour les métaux stratégiques (Comes), 2018.
8. Source: Criticality files published by this portal www.mineralinfo.fr
9. This sector will be the subject of a study by the Waste department (ORDIF) of IAU ÎdF in 2019.

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