

IS TECHNOLOGICAL INNOVATION THE ONLY PATH TO THE FUTURE OF THE CIRCULAR ECONOMY?

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Jean-Paul Raillard taught economic management techniques before joining the Syndex consultancy in 1983, focusing on missions relating to social dialogue and serving as managing director from 2008 to 2014. Chair of the board of Envie 44 since February 2016, he was appointed chair of Fédération Envie in June 2019. He also chairs the supervisory boards of Envie Autonomie, a public interest cooperative, and Groupe Estille.

Fédération Envie is an umbrella group comprising 52 workforce reintegration businesses that employed 3,700 people in 2022, 2,800 of whom were on reintegration contracts. It is the first actor to cover the entire reuse chain, including logistics and the processing of electrical and electronic equipment waste and medical equipment waste. Envie has a threefold mission that is social (inclusiveness, reinsertion into the workforce for people struggling to find employment), environmental (development of repair and reuse), and economic (revitalizing local economic and industrial ecosystems).

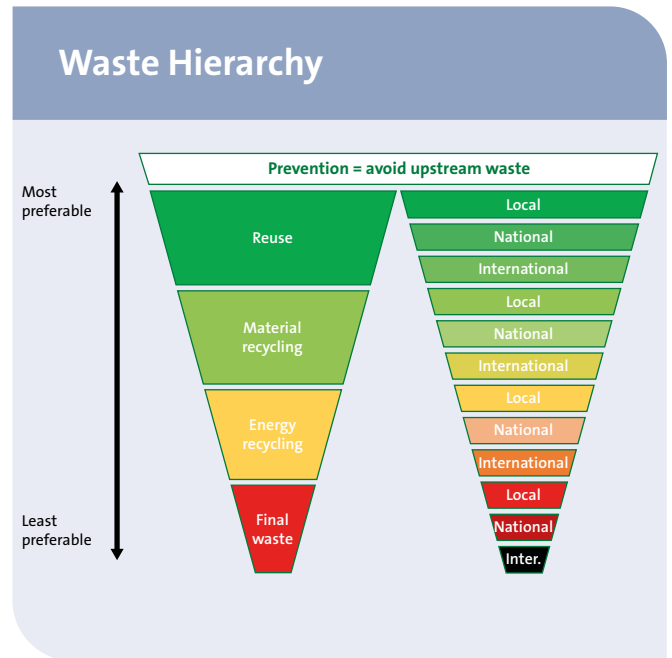
The increasing scarcity of resources and the ever greater social and environmental cost of their extraction mean it has never been more vital for the circular economy to become the dominant economic model in our societies. Many solutions have arisen to meet this challenge, including eco-design for new products, extending the lifecycle of products already in the market, repairing products, and the functional economy. Technological, organizational, societal and social innovations are essential in each of these spheres.

INTRODUCTION

The excellent recent book by Franck Aggeri¹ begins with these words: *“Innovation is the new modern religion. Everywhere we laud its virtues and its prophets who seek the construction of a better world.”* Against the background of the climate and environmental crisis facing humanity, countless politicians, academics and business leaders repeat the same message, leading to the belief that this is the only path to carbon neutrality by 2050. The watchword is that “only disruption brings success!”

Leaving aside the mantra-like aspects, the question is far from simple. On the one hand, innovation can only be judged through the prism of its results over the more or less long term and its impacts on ecological balances. On the other hand, it must be understood in a wider sense and not simply as something all too often centered only on technology.

¹ Franck Aggeri: *L'innovation, mais pour quoi faire?* [Innovation, for what purpose?], Seuil 2023.



INNOVATION AND THE CIRCULAR ECONOMY

The circular economy, the focus of the Envie networks actions, is one of the most promising avenues for combating reckless consumption of non-renewable natural resources. The linear economy is founded on per capita consumption growth. Its unlimited exploitation of resources not only often causes irreversible environmental damage but is also a source of waste, whose management poses on-going challenges.

The circular economy, according to the European parliament’s definition is “a model of production and consumption, that involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible.” The idea is to prevent the production of waste, or to reuse it to create new value.

In its most complete form, the circular economy promises “to break the link between economic growth and environmental impact, thanks to strategies to reduce impacts at source and the creation of material and energy loops.”²

Infinite circularity does not exist in the waste management cycle, but the European Union’s waste hierarchy (see above) makes it easy to identify the efficiency of the means employed.

Waste prevention is the number one solution to pursue. In the sectors where Envie operates, we focus on extending the working lives of electronic and electrical goods, centering initially on preventive maintenance, servicing and repairs. The next phase is reusing and preparations for

reuse, making it possible to return to service products that may or may not have been classified as waste.³ Dismantling waste appliances to recover spare parts falls within this category.

Recycling materials is a third method for extracting as much material as possible. The efficiency of recycling processes is an important area for innovation.

TECHNOLOGICAL INNOVATION IS VITAL, BUT ONLY PART OF THE SOLUTION

A simple example illustrates the complexity of the conditions facing technological innovations. Everybody knows about the problem of serious plastic pollution in rivers and oceans. According to a 2019 study by the International Union for Conservation of Nature, 35% of microplastics in water are released when washing synthetic fabrics. How can we tackle an issue that causes massive biodiversity destruction and whose impacts are felt in the food chain? A first step is to fit filters to washing-machine outlets. In the Envie network, we ran a trial in the town of La Rochelle that allowed us to demonstrate the efficiency of the two types of filter on the market, but also highlighted obstacles to their use: the cost of installing, emptying and cleaning the filters, while also avoiding tipping its contents down the sink!

2 F. Aggeri, R. Beulque, H. Micheaux, *L'économie circulaire [The Circular economy]*, La Découverte, 2023.

3 Reuse: any operation by which substances, materials, or products that are not waste are used for the same purpose for which they were conceived. Preparing for reuse: any operation to check, clean or repair for recovery, by which substances, materials or products that have become waste are prepared so that they can be reused without any further pre-processing.

Having these filters available to buy is a major technological innovation and they should be fitted to all new washing machines, but our study also showed that, above all, it is the type of fabric being washed that determines the amount of microplastics retained in the filter. Synthetic fabrics are the leading cause, but even clothing made from fabric with the very lowest ecological impact (linen and biosourced cotton) contains an increasing amount of synthetic fibers, elastane in particular, in response to consumer expectations (comfort, fashion, etc.).

It appears that this innovation – microplastic filters – offsets only the effects of excessive consumption of products that otherwise directly pollute the oceans. Is it not the case that true innovation would take the form of widespread actions to promote frugality and a responsible attitude to acquiring and discarding clothes? This is something that we encourage via the GreenFriday© movement that Envie started in 2017: consumption is not the goal, simply the means.

The response to every problem raised by the environmental crisis is not always rooted in technology, despite what others may claim. This means that embedding much-needed frugality into consumption habits could be thought of as an innovative mechanism, signaling a clear break with one of the tenets of our liberal economies. Similarly, returning to simpler, more robust and less energy-intensive designs for electrical and electronic equipment requires a mindset very different from the endless, and often highly illusory, race for ever more sophistication.

The circular economy [...] is one of the most promising avenues for combating reckless consumption of non-renewable natural resources

INNOVATING VIA PREVENTIVE MAINTENANCE, SERVICING AND REPAIRS

France's environment and energy management agency (ADEME) estimates that 50 to 70% of household appliance problems are caused by misuse, and that the instructions are read by only 46% of households polled.⁴

This is an area where we want to take things further than simply advice offering at the point of sale, or on the ADEME or envie.org websites. A washing machine or refrigerator, just like a heating boiler, is a complex device whose electronic components and mechanical parts are subject to wear in use. Why not offer a preventive maintenance contract to check that the device is operating correctly, while also offering advice on how to use, service and cleaning it with the aim of extending its working life?

A study allowed us to demonstrate that there is significant demand in towns and cities for regular (annual) visits by technicians who can inspect appliances and offer advice at a reasonable cost of a few dozen euros a year.

Social housing providers are also interested as these visits would improve users' practices, curb electricity use and reduce the risks of fire and water damage. These contracts would also enable us to create jobs to reintegrate people into the workforce. The overall benefits to society would be significant, although the figures have yet to be worked out (in terms of consequences for appliance lifetimes and validity of a business model for the project's partners).

In terms of repairs, a major innovation following the 2020 french law on the circular economy and combating waste (AGEC) was the creation of Repair Funds. Managed by eco-bodies (Ecosystem and Ecologic for electrical and electronic waste), these funds are designed to incentivize consumers to repair rather than discard, and to establish a genuinely functional national repair ecosystem. The large majority of workshops operated by Envie are QualiRépar-certified, with certification in progress for the remainder, as this is needed for clients to take advantage of the repair bonus payment scheme.

Innovation, whether technological or not, can have very positive effects on device lifetimes and repair costs via a number of advances that herald a real step forward for the circular economy.

- Eco-designing products to make them more robust, easier to use, more reliable in use and with better physical access to parts requiring repair or replacement. Several projects exist currently, backed by innovative companies we are delighted to collaborate with by informing them of our observations, based on the 150,000 devices we renovate annually. For example, some refrigerator manufacturers restrict the physical capacities of components on power supply cards, leading to breakdowns that we see very regularly. This example calls to mind the issue of planned obsolescence, banned in France since 2015, which seeks to limit either the cost or lifetime of devices and appliances. The creation of a "reparability index" in 2021, with a "durability index" to follow in 2025 for certain classes of devices, is one the AGECE law's major innovations.
- Giving as many people as possible access to repair services is a major innovation in recent years thanks to the opening of countless repair cafés, as well as online tutorials and repair training sessions held at third places. At Envie Le Labo in eastern Paris, we hold monthly sessions to teach local people the basics to enable them to carry out simple repairs themselves, at no cost.
- Ensuring access to affordable new and second-hand spare parts will also be a major step forward in terms of extending appliance lifetimes. Envie launched a vast project in cooperation with AGORA that culminated in 2022, offering all professionals B2B access to our marketplace of over 100,000 items. This involved significant expenditure by our network in terms of storage space and creating jobs in testing, listing, storing and distribution. But the most productive innovation

⁴ <https://longuevieauxobjets.gouv.fr/comprendre-la-demarche>



Envie Le Labo.

would be if all professionals, and that includes us, always prioritized acquiring guaranteed used parts rather than new ones. We plan to launch a B2C marketplace for used parts soon.

SOURCES OF INNOVATION IN PREPARING USED EQUIPMENT FOR REUSE

Preparation for reuse is a very different type of operation than repair or reuse. It means taking a waste product and turning it into something that can be used again, backed by the two-year guarantee we offer across the Envie network. For a household appliance, this involves dismantling it completely to identify any faults and assess overall condition, a complete clean and then the replacement of all worn or defective mechanical, electronic or external parts, followed by a final quality inspection. This all takes around six hours to complete when conducted by an employee on a reintegration contract working under the supervision of a team leader who is an experienced professional.

It is not easy to find a business model that makes it possible to then sell this appliance at a price that is affordable to low-income households (no more than 50% of the price of the new product); this requires constant work to improve productivity and quality.

To help us achieve this, in 2020 we launched a project known as RR 3.0, which aims to introduce excellence

into every stage of our preparation for reuse operations. Run by an experienced engineer and a full-time workshop leader at a laboratory in Roanne, we are trialing processes for sorting collected products, organizing successive tasks, saving water and energy and inspecting products that are then distributed across our entire network. Our workshop processes are regularly updated to align with instructions from the project steering committee.



Envie workshop, Maine.



Panel workshop, Saint Loubès.

with recycling industry actors (Derichebourg, Suez, Veolia, etc.) and eco-bodies.

In a European first, we worked in cooperation with SOREN, the eco-body responsible for managing waste photovoltaic panels, and a Japanese manufacturer to install a line for reusing and processing photovoltaic panels at our site in Saint-Loubès, in western France in the fall of 2022. This initiative was supported by the government, ADEME and local authorities in the Nouvelle Aquitaine region.

This is a major innovation because the first line allows us to test the panels' reuse potential by testing every individual cell in each panel. This allows us to refurbish some of the panels, which are then re-sold with a power output rating of around 90% of their power output when new.

Panels judged unfit for reuse pass to a second line where a new technology is used to delaminate them, separating the glass panel from metallic components including silica, copper and silver.

Instead of crushing as would previously happen, this technique means rare-earth elements can be recovered efficiently for subsequent reuse in the manufacture of new panels in France or Europe. This is a critical challenge for the development of renewable energies in Europe. The Envie network's unit in Saint-Loubès leads the way as it is home to the only technology in Europe able to recycle silver, a critical metal that is essential to the energy transition.

With the inauguration of this first installation, the social and solidarity economy is showing it can compete with recycling industry heavyweights, forming a circular economy loop with impeccable environmental credentials.

Innovation can sometimes appear conventional, but if we apply the latest industrial standards in our workshops we must also, at the same time, think about how to improve conditions for upskilling our workforce, given that we only have a 12- to 14-month window, the average length of a reintegration contract in the Envie network (maximum two years). This means every investment decision is weighed in terms of this criterion, which is absolutely essential for us.

Is it not the case that a true innovation would take the form of widespread actions to promote frugality and a responsible attitude to acquiring and discarding [...]?

TECHNOLOGICAL INNOVATION AND RECYCLING PHOTOVOLTAIC PANELS

We are present across the entire value chain for electrical and electronic equipment waste, as well as dealing with the sorting and final treatment of certain types of waste: chiller units, small electrical appliances, televisions, etc. Our installations are often established in very close cooperation

SOCIAL INNOVATION HAS AN ESSENTIAL PLACE

As we have seen, the concept of innovation is generally associated with technological advances. But we have also stressed that searching for the best way to upskill employees on reintegration contracts, so that they can transition into long-term employment, also demands innovations in training approaches that create the same amount of value by investing in people. In 2023, we continued to explore this avenue with the creation of the Envie

college, which exists to train people to repair and recondition household appliances. This is our hands-on contribution to re-establishing a complete industry for repairing and reusing appliances, bearing in mind that there is currently a shortage of several thousand of these technicians.

A further example highlights the importance of innovation in terms of working conditions. In October 2022 we



Small electrical appliance processing line, Portet sur Garonne.

inaugurated Envie's new sorting and recycling unit for small electrical appliances in Portet-sur-Garonne, south-west France, designed and installed in partnership with Derichebourg Environnement.

As well as doubling the recycling capacity and benefiting from the latest sorting technologies for recovering waste and improving safety, particularly fire risks, another standout feature of this new industrial line is that it offers working conditions that are much better than at other recycling centers in Europe. The 50 or so employees work from booths that are insulated from the remainder of the line, providing them with ambient air of sufficient quality to make masks unnecessary. This is another European first.

50 to 70% of household appliance problems are caused by misuse

providing that the innovations that allow us to proceed along this path are assessed and rolled out with these criteria in mind.

The experience gained in the Envie network over the past 40 years in reintegration into the workforce via repairing, reusing and recycling contributes to the creation of a new, greener economic model. We have never stopped innovating and proving that, leaving aside the rightful place of technology itself, the true challenge lies in investing in *“potential innovations that are more frugal, centering on transforming lifestyles and modes of production and consumption in ways that are compatible with planetary boundaries and the needs of future generations.”*⁵

Envie is determined to continue innovating in its field, seeking to forge lasting partnerships with players that share our goals for a world that is more sustainable, fairer and more caring. This is what it means to be an entrepreneur in the social and solidarity economy. We have a duty to be ambitious, for the good of our employees and for the planet as a whole!

CONCLUSION

Innovation, be it technological, organizational, societal or social, is essential to making the circular economy the dominant model, and to avoid deviating from the pathways to carbon neutrality and biodiversity protection by 2050.

But all investments in innovation have to be judged in terms of their long-term effects, environmental and social externalities that absolutely must be planned for. The circular economy has the capacity to become a major source of value creation and job creation in the future,

⁵ F. Aggeri, *L'innovation, mais pour quoi faire? [Innovation, for what purpose?]*, op. cit.