The wheels of a Circular Economy go round and round

Thematic Research Paper

Confidence must be earned

Amundi

ASSET MANAGEMENT

Contents

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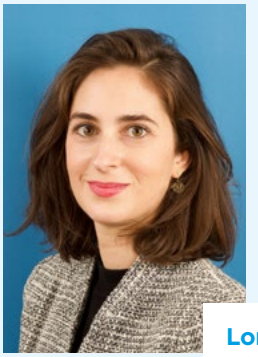

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Foreword

The awareness of the finiteness of our natural resources as well as the fight against climate change make us look for an alternative development model. The Circular Economy could be part of the solution and has become increasingly successful in recent years : the concept has spread from a small circle of insiders to a growing number of companies and citizens.

However, defining the Circular Economy is not easy and there is no universal definition today. **At Amundi, we consider that the Circular Economy is a change of economic model that allows producing sustainable consumer goods, while protecting nature - by giving it time to regenerate - and ensuring the well-being of individuals.** There is an urgent need to promote a society in which natural resources are protected, in which nature has the time to regenerate, where consumption is reasoned, where the life of goods is extended to the maximum and where waste is treated to be recycled in new products.

The Circular Economy obliges to review each step of the production, lifespan and treatment of the goods produced. The Circular Economy is not reduced to the treatment and recycling of waste, contrary to a certain collective imagination. It therefore seemed necessary to study the reality of this concept and its operational translation by companies in their business-models. **In 2020, we launched a campaign to engage four sectors, identified by the European Union as priorities in view of their environmental impacts but also their strong potential for circularity: Automotive, Construction & buildings, Electronics & ICT and Fashion.** We have been in active dialogue with about thirty companies and have analyzed their strategies, policies and the solutions they are developing. This paper is the result of our research and presents our main conclusions for each sector.

The Circular Economy is multifaceted and the importance of some pillars can vary according to the sectors and sometimes even to the companies within a sector. **The Circular Economy is under construction and with this engagement campaign, we hope to influence and help companies to define the priorities to preserve our planet's resources and fight against climate change.** We discovered a myriad of exciting projects that bode well for the future. Companies have been willing and transparent to share some of the challenges they face, for example in moving from pilot projects to implementing a new business model.

However, if the development of a Circular Economy is desirable by companies, it cannot be considered as the only solution to the challenges we face. Consumers also have a role to play through a reasoned consumption of goods and products. Companies alone will not be able to find solutions; it is society as a whole that must agree to change its way of life.

Executive Summary

Our economy is based on the exploitation of natural resources and on the belief that these natural resources are infinite. We are now at a turning point where we are realizing the finiteness of our world and the fragility of the ecosystems we live by. **We are aware that the intensive exploitation of natural resources at an increasingly rapid pace prevents nature from regenerating and thus contributes to its impoverishment.** Our linear economic model - which consists of producing, consuming and throwing away - has devastating impacts on our environment and compromises it in the long term, by contributing to the decline of biodiversity and the aggravation of climate change.

We therefore need to move from a linear economic model to a circular economic model that will limit the damage to the environment, giving it time to regenerate by promoting the extension of the life span of produced goods - notably through eco-design, reparability, durability, and the second-hand market. It must also include better treatment of waste allowing raw materials to be reused to create new goods... thus closing the loop.

How can companies evolve their business model to make it circular even though their strategy is mainly based on increasing the number of products sold?

At Amundi, we consider that the Circular Economy is a change of economic model that allows to produce sustainable consumer goods, while protecting nature - by giving it time to regenerate - and ensuring the well-being of individuals. This new economic model translates into i) a better management and use of natural resources, ii) goods designed and produced to last, iii) consumers who are informed about the environmental impacts of what they buy and who consume sensibly, and iv) a more efficient system for processing end-of-life products from which more secondary raw materials can be obtained.

In 2020, we launched a three-year commitment campaign on the development of the Circular Economy in four sectors: the Automotive sector; the construction sectors; the Electronics and ICT sector and the Fashion sector.

We have brought together about thirty companies with whom we have held discussions and for whom we have been able to assess the maturity of their policies in this area, identify good practices and then share with them our recommendations to be implemented in the coming years.

The Circular Economy: a new legislative challenge for the European Union to achieve carbon neutrality by 2050

The European Union (EU) has set itself the goal of being carbon neutral by 2050 and has defined a Green Deal of which the Circular Economy is a pillar. The New Circular Economy Action Plan (CEAR) defines seven sectors that have the most potential and on which efforts should be focused in priority: Electronics and ICT; Batteries and Vehicles; Packaging; Plastics: Textiles; Construction and buildings; Food, water and nutrients.

Not all sectors in our analysis are equal when facing with the multiplication of legislations and therefore the magnitude of the task to establish a Circular Economy. Car manufacturers, for example, have been regulated since the beginning of the 2000's on reuse rates, recycling rates and recovery rates of end-of-life vehicles[1]. They have therefore integrated the need to design their models by thinking in particular about the end of life of vehicles and their dismantling in order to achieve the rates of reuse, recycling and recovery required by the EU[2]. **The construction sectors was also regulated relatively early on with two European Directives on waste treatment:** the Landfill Directive (1999) and the Waste Framework Directive (2008). These directives aim to limit the types and quantities of waste landfilled and to establish respect for the waste hierarchy according

1. Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles.
2. Minimum reuse and recycling rate of 85% of the average vehicle mass - Minimum reuse and recovery rate of 95% of the average vehicle weight.

to which disposal should be the last resort[3]. These two sectors have thus entered the Circular Economy through the subject of waste for years. They must now implement the other components of the Circular Economy and especially face new challenges: the end of life of electric batteries for the automotive sector and the extension of the life span of its products, including via promoting second life or integrating recycled content, for the construction sectors.

The Electronics sector is in a very different situation, with legislation that is still underdeveloped, even though the pace is accelerating recently, particularly in France. Consumer pressure, which is relatively weak for the automotive and construction sectors, is however important for the Electronics sector. Indeed, the repeated scandals regarding programmed obsolescence and the incessant renewal of electronic equipment (smartphones, tablets, computers, etc.) have shaken the major brands and forced them to integrate certain elements of the Circular Economy.

The fashion sector is an exception with no legislation on the Circular Economy and very little consumer pressure. The CEAR is one of the first texts that directly targets the sector. Thus, an article published on July 7, 2021 by Le Monde and signed by 150 leaders of French textile companies asked for the sector to be more regulated on environmental issues[4].

Companies must better define their Circular Economy strategy

We note that for the four sectors analyzed, the Circular Economy strategies are often in their infancy and need to be much better structured. Some companies are doing better than others, especially in the automotive sector where we can see more successful strategies - especially with factories entirely dedicated to this topic. **In the vast majority of cases, the Circular Economy remains limited to a sub-subject of the Sustainable Development strategy and the knowledge of this subject by the highest authorities - Board of Directors and Executive Management - is weak.** Qualitative commitments have been made, but they are more like declaration of intentions than real objectives. It is also revealing to see that few companies have set quantitative targets or have defined performance indicators to be followed over time.

The Circular Economy cannot be reduced to an addition of small actions. It is a systemic change, which must be done at all stages of production of a good. It is therefore necessary to review the processes but also and especially the business model of the company in the light of this concept.

Companies must then train all their employees, from the Board of Directors to the operational staff, in order to disseminate the change at all levels. **A real strategy must be built with quantitative objectives, policies, indicators monitoring and timeline.** Partnerships with other companies in the sector but also with other players in the value chain are also good practices that we would like to see multiplied and that would undoubtedly allow the dissemination and the change of culture at a faster pace.

Rethinking the use and utility of the product

The implementation of a Circular Economy cannot be done without a deep rethinking of the use and the utility of the product put on the market. The business models of companies nowadays are mainly based on an increase in turnover, linked to the quantity of goods sold. It is therefore in the interest of companies to perpetuate the linear model - produce, consume and throw away -, to produce low quality goods or to use programmed obsolescence so that consumers renew their purchase.

The Circular Economy, on the other hand, **proposes a new model in which the good has been designed to last and in which its longevity is key.** Wealth is no longer translated by the accumulation of goods but by goods whose quality is proven and which last. **This longevity translates into eco-design, reparability, durability and recyclability.**

Eco-design is an important step because it allows answering many issues related to the end of life of

3. Waste hierarchy: prevention, preparing for re-use, recycling, recovery, disposal. Preventing waste is the preferred option and sending waste to landfill should be the last resort.

4. https://www.lemonde.fr/idees/article/2021/07/07/nous-marques-textiles-demandons-a-etre-plus-regulees_6087296_3232.html

the product and its recyclability. Indeed, if a good is designed from the beginning by applying the pre-requisites of recyclability, it has more chance to reach a significant recycling rate. These pre-requisites are known today: limit the number of materials used, avoid mixing materials with each other, use materials that are technically recyclable, etc. However, many innovations are still missing this important step.

Reparability and durability, which can be associated with the quality or the resistance of a product, are two tools that can significantly extend its life. They allow avoiding the extraction of raw materials, the production of a new good and the repurchase of it by the consumer. These two aspects can also promote the second life of products, in particular via a system of resale of second-hand products.

Faced with these components of the Circular Economy, the sectors studied are very unequal. The automotive sector is rather successful on all these aspects, which is partly due to the high price of the product. However, the sector has to face new challenges, such as the end of life of electric batteries, the end of the sale of thermal cars by 2035 in the EU and the introduction of new laws promoting the purchase/sale of second-hand spare parts.

Construction is trying to integrate these concepts into its innovations but is facing an aging fleet that was built at a time when these considerations were non-existent. Simply complying with waste laws has required significant financial investments in a sector where margins are low. It is still difficult to question their business model and the proposed solutions still only concern a small part of the market, especially since some players are still reluctant to these new approaches, whether they consist in increasing the use of wooden structures, integrating recycled products or integrating the disassembly stage from the design stage. Technical solutions and changes in mentality are the main obstacles for this sector.

The Electronics sector has focused on reducing energy consumption to the detriment of material circularity. This is largely due to the fact that electronic equipment was not designed to be repaired but to be replaced. This is a striking example of a linear model. In a linear model, the circularity of materials or eco-design are unnecessary. As consumers become more and more aware of this trick and legislation becomes more stringent, the industry will have to face its negative impacts and implement a Circular Economy, whether it likes it or not.

The fashion sector sees two very different models coexisting: on the one hand, brands whose success is based on the frantic renewal of collections and on the other hand, brands whose business model is based on second hand, customization and/or quality of clothes. The fashion sector is still not very circular since only 1% of clothes are recycled into new clothes. If we see some interesting pilot projects sprouting here and there, these projects remain anecdotal compared to the annual production of the industry. Changing consumer buying habits, as in the Electronics sector, is key here and must go hand in hand with exercising much more restrictive legislation to promote a Circular Economy and put an end to a linear model with significant environmental impacts.

Consumers must change their consumption habits

If companies have a major role to play in developing circular solutions, consumers must also accept to change their consumption habits by realizing the negative impacts they imply. **All actors must move at the same time to participate in the establishment of a new economy that is more respectful of the environment around us.**

This change in consumption habits must be done quickly in view of the urgency of the situation, whether we are talking about the decline of biodiversity or climate change. Consumers must make their voices heard, accompany the change of companies, even accelerate it by showing them that the demand is real.

01

The time of Circular Economy has come

The time of Circular Economy has come

Many definitions, one goal: promoting a performant product lifecycle while protecting the environment and ensuring people's welfare

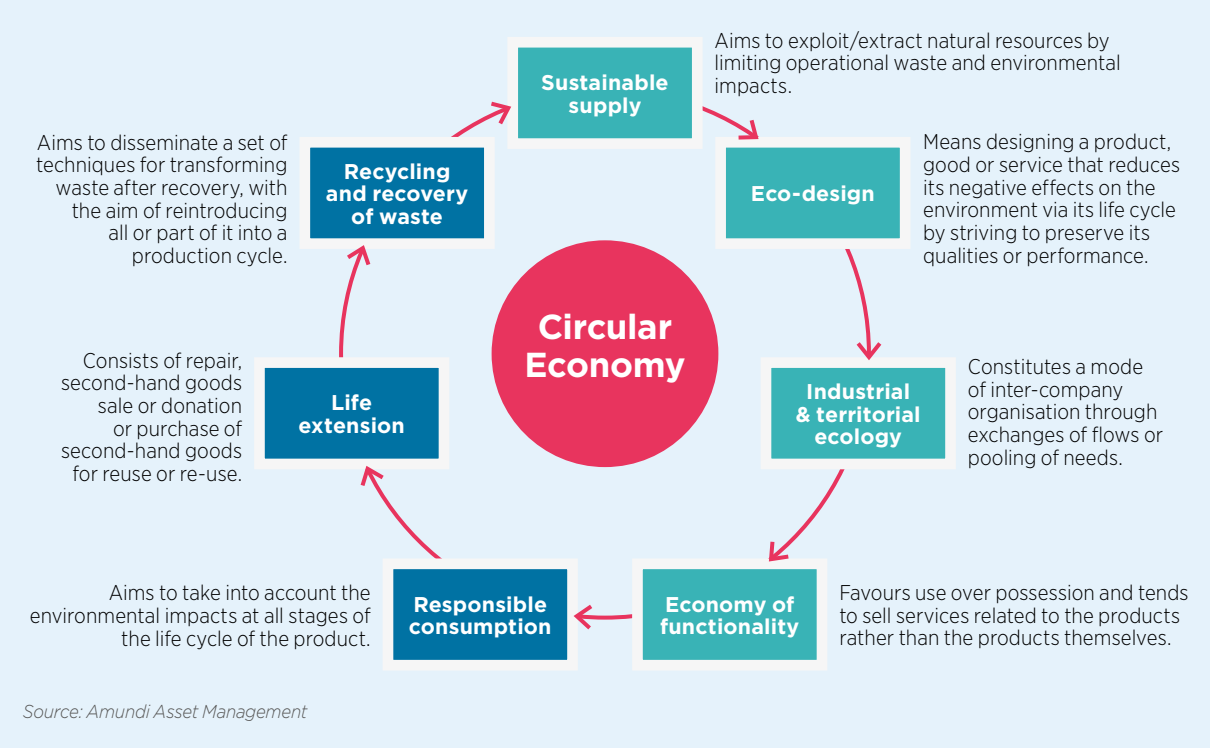
At Amundi, we consider that the Circular Economy is a change of economic model that allows to produce sustainable consumer goods, while protecting nature - by giving it time to regenerate - and ensuring the well-being of individuals.

This new economic model translates into:

- A better management and use of natural resources;
- Goods designed and produced to last;
- Consumers who are informed about the environmental impacts of what they buy and who consume sensibly, and
- A more efficient system for processing end-of-life products from which more secondary raw materials can be obtained.

Each stage of the production of a product or a consumer good must therefore be reviewed in the light of this definition.

Figure 1: The Circular Economy proposes a new economic model where each stage of the production needs to be rethought



Source: Amundi Asset Management

The concept of Circular Economy is constantly evolving and there is no universal definition. The definition we have chosen at Amundi is based on studies by Ademe, the Ellen MacArthur Foundation and the European Commission.

Each of these organizations propose different visions of the Circular Economy and put forward distinct characteristics of it. However, they agree on the need to limit the impact of human activities on nature.

Ademe has a systemic vision of the Circular Economy since, for it, it is above all a matter of inventing a new economic model whose primary objective is to reduce the environmental impact of the goods and products that human societies use while allowing them to increase their well-being.

The Ellen MacArthur Foundation, on the other hand, has a vision centered on the protection of nature and focuses on the fact that the Circular Economy must be restorative and regenerative by design, by limiting the production of waste and/or recycling it to make new products.

The European Commission, on the other hand, has an economic vision and is interested in maintaining the market value of products throughout their life, especially through the market value of recycled materials that are integrated into new products.

"The Circular Economy can be defined as an economic system of exchange and production that, at all stages of the product life cycle (goods and services), aims to increase the efficiency of resource use and decrease the impact on the environment while developing the well-being of individuals." **Ademe**

"A Circular Economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.[1]" **Ellen MacArthur Foundation (UK)**

"In a Circular Economy, the value of products and materials is maintained for as long as possible. Waste and resource use are minimised, and when a product reaches the end of its life, it is used again to create further value.[2]" **European Commission**

Understanding why we must shift from a linear to a circular model is key for our future. Hard law is being introduced in many countries, especially in the EU and is going to change the way companies can produce and sell their goods over the next decades. **We live in a world with finite materials and natural resources and we cannot keep wasting them as we do with the linear model because either we will face shortages in natural resources or we will put too much pressure on the environment, without which humans cannot live as we all depend on nature services.** Besides, production of goods and land management represent 40% of CO_2 emissions and Circular Economy, in particular through eliminating waste, reusing products and components and recirculating materials, can contribute to limit global warming to 1.5°C by 2100, in accordance with the Paris Agreement.

Why our economic model must be changed now?

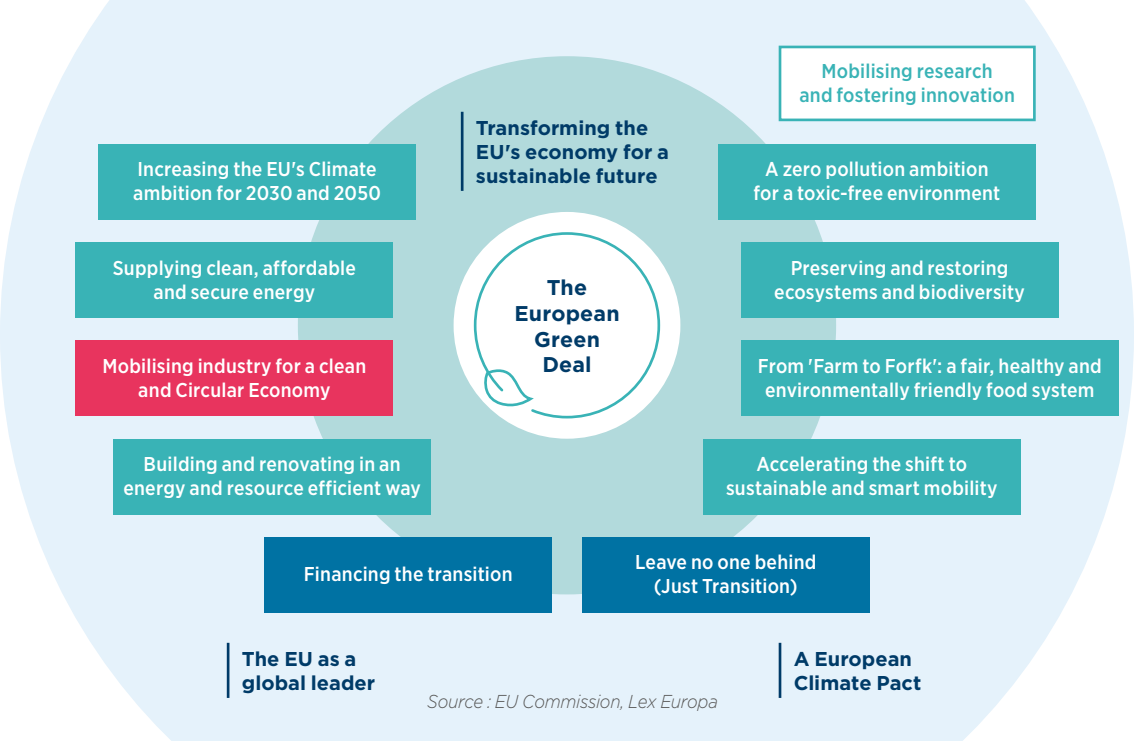
Legislation is pushing to establish a Circular Economy, especially in Europe

The European Union (EU) is committed to being a carbon neutral continent by 2050 and to decoupling economic growth from resource use. This commitment stems from a simple fact: climate change and environmental degradation are an existential threat to Europe and the world. **The EU needs to accelerate the transition towards a regenerative growth model that allows nature to be restored, needs to maintain its resource consumption within planetary boundaries, and therefore manages to reduce its CO_2 footprint and double its circular material use rate by 2030.**

In order to achieve this commitment, the EU has embarked on a major economic overhaul, entitled "The European Green Deal" and based on the following elements:

5. https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy
6. https://ec.europa.eu/growth/industry/sustainability/circular-economy_en

Figure 2: Circular Economy is one of the pillars of the EU Green Deal for a sustainable future



Source : EU Commission, Lex Europa

One of the key elements of this economic transformation is based on mobilizing the industry for a clean and Circular Economy, through the New Circular Economy Action Plan adopted in March 2020.

The objectives of this new action plan are:

- **Designing sustainable products:** make sustainable products the norm in the EU, which means that products will have to last longer, be easily reused, repaired and recycled and at the same time made, as much as possible, of secondary raw materials;
- **Empowering consumers and public buyers** through better disclosure on the sustainability characteristics of the products;
- **Implementing circularity in production processes** by focusing on the seven resource-intensive sectors and where the benefit from circularity is the most important, through an improved recycling rate allowing an increase in the quantity and the quality of secondary raw materials.

This action plan focuses in particular on seven resource-intensive sectors, which are Electronics and ICT, Batteries and vehicles, Packaging, Plastics, Textiles, Construction and buildings, Food, water and nutrients.

The New Circular Economy Action Plan marks a turning point in the definition of Circular Economy. The 2015 European Circular Economy Roadmap focused specifically on recycling and waste treatment. The 2020 New Circular Economy Action Plan is no longer only about waste treatment or recycling but is defined as a whole new model in which every step of the production process needs to be rethought. Recycling is only one pillar of Circular Economy at the same level as eco-design or life extension, etc.

This shift is illustrated by the fact that in February 2021 the European Parliament voted in favor of establishing a "right to repair" – which means that all new washing machines, hairdryers, refrigerators and displays – including televisions – sold in EU countries must be repairable for up to 10 years. Similar requirements were made in November 2019 for smartphones, laptops and other consumer electronics.

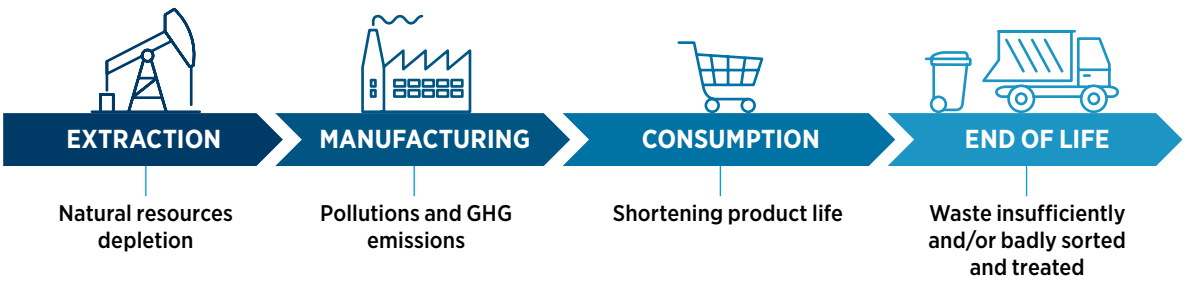
Consequently, the goal is clear: sustainability is the key word and all means can be used, such as eco-design, life extension, economy of functionality or recycling.

Creating a Circular Economy is a necessity as we live in a world with finite materials and natural resources while our linear model runs as if we had infinite resources and that we could keep taking and throwing away again and again.

We live in a world with finite materials even though we do not behave accordingly

The linear economic model we know today consists of extraction, production, consumption and disposal. Since the 19th century, economic growth has been based on an ever-increasing extraction of natural resources, a growing production of standardized goods, an ever-increasing consumption and renewal of these goods, and their disposal at the end of the race.

Figure 3: Our economy favours a linear model, which is not sustainable with the increasing consumption of populations



Source : Amundi Asset Management

The extraction of natural resources includes both non-renewable resources, such as mineral raw materials and fossil fuels, as well as renewable resources such as air, water, soil or fauna and flora.

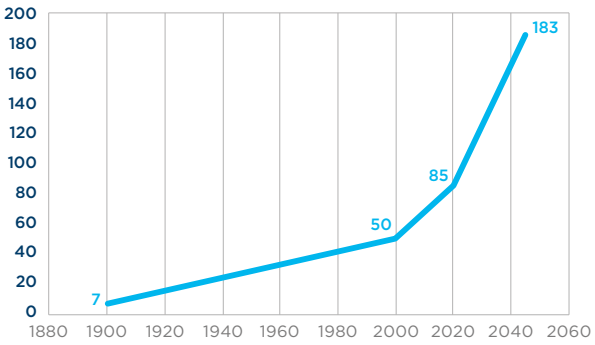
The demographic and economic explosion of the 20th century and the advent of mass consumption with cheap and easily replaceable products have put too much pressure on our environment and are now sounding the death knell of this linear economy.

Indeed, **this linear economy has overlooked two important points: our natural reserves are limited and nature needs time to regenerate and make new resources available.**

According to the Organization for Economic Co-operation and Development (OECD), the world population is expected to reach 9 billion people by 2050 and the global economy is expected to quadruple, resulting in an increasing demand for energy and natural resources.

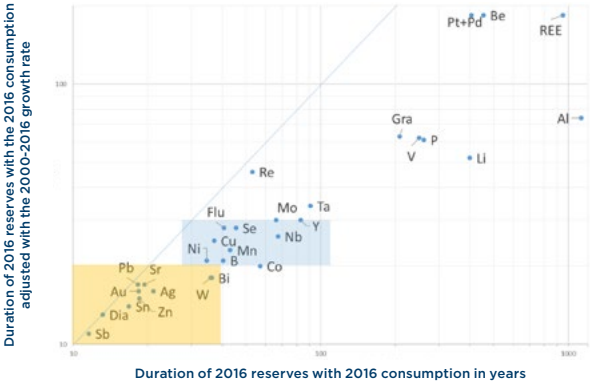
In 1900, we consumed 7 Gt of raw materials worldwide, in 2000, we consumed 50 Gt (Krausmann, 2009) and in 2020, 85 Gt. Projections suggest 183 Gt in 2050 (UNEP, 2016). Our planet will not be able to respond to such an explosion of demand.

Figure 4: The Earth's natural resources will be insufficient to cope with the explosion in consumption



Indeed, according to scientific experts, **at this pace of extraction, some raw materials will no longer be available in the next 50 years.** In 2017, Ademe published a research paper saying that the "burn-rate" indicator - which is the ratio between the known reserves (R) at a given time and the mine production (P) at that same time – was about to be reached for some materials and consequently that the number of years of available production for those materials are limited.

Figure 5: The number of years of available production for some materials is at risk



Source: Metal depletion: should we be worried, Ademe, 2017.

The figure above shows, for some minerals, on the x-axis the R/P ratio calculated for 2016 and on the y-axis the same R/P ratio but this time assuming that the growth in the consumption rate of mineral materials is not constant but continues to increase steadily and similarly to the period 2000-2016.

The mineral elements identified in the orange zone are those that could be in short supply in the next 20 years if demand continues to grow in the same way as between 2000 and 2016 and in the absence of new exploitable deposits (vs. between 10 and 40 years if we consider that future consumption is similar to that of 2016). The mineral elements concerned are antimony (Sb), diatimites (Dia), tin (Sn), zinc (Zn), gold (Au), silver (Ag), lead (Pb), strontium (Sr), wadalite (W).

The mineral elements identified in the blue zone are the minerals that we could run out of between 20 and 30 years. The mineral elements concerned are nickel (Ni), boron (B), bismuth (Bi), copper (Cu), manganese (Mn), cobalt (Co), selenium (Se), niobium (Nb), molybdenum (Mo), etc.

The metal with the lowest R/P ratio is antimony (Sb) with a shortage expected in 12 years. Antimony is increasingly used in lead-acid batteries for cars and as a flame retardant in plastics to replace bromine. At the other end of the spectrum, supply predictions for rare earths (REE), beryllium (Be), platinum (Pt) and palladium (Pd) exceed 200 years based on current known reserves.

The supply of certain minerals could therefore become a problem in the coming years.

RESOURCE DEPLETION OR SHORTAGE?

It is important to distinguish between resource depletion and shortage.

Resource depletion occurs when a resource is disappearing completely from the Earth's surface and cannot be renewed. In the case of mineral resources, resource depletion is unlikely: our knowledge of mineral reserves is still limited to the superficial part of the earth's crust and mining exploration allows the regular discovery of new deposits. The reserves exist but the question is whether exploitation of these reserves is possible, technically and economically. If we need to go deeper in the earth's crust, the balance between the efforts (technical, human and financial) and the mineral use might be negative.

If exploitation is not possible for technical or profitability reasons, we may then face a shortage situation. This shortage may be temporary (or not): the increase in the price of an ore or the discovery of new techniques may make the exploitation of certain deposits profitable. The shortage is therefore linked to market conditions rather than to the existence of the ore in nature.

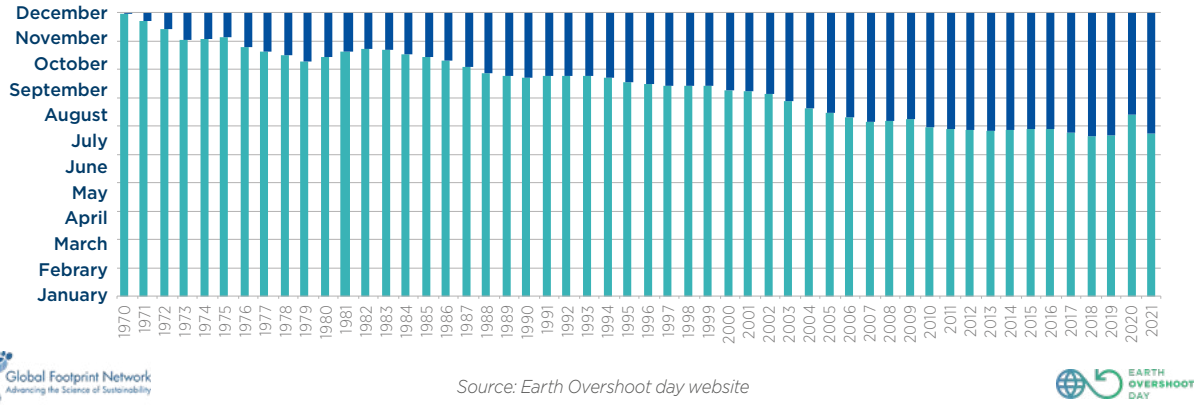
The same is true for renewable natural resources. **The depletion of natural resources is pointed out every year by an NGO, The Global Footprint Network - which calculates the Earth Overshoot Day, which marks when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year.** This is indeed the depletion of renewable resources, since we consume resources without giving them time to renew themselves, constantly reducing the available stock on Earth. The example of fishing illustrates this phenomenon very well: the industrial fishing carried out for several decades has led to 75% of fishery resources being fully exploited, already overexploited or heavily overexploited. This overexploitation leads to a decline in fish

resources, as the fish do not have the time to reproduce quickly enough to counterbalance the effects of fishing. To stem this decline in fish stocks, moratoriums are imposed or bans are imposed when certain species are considered to be on the verge of extinction (this is the case for the whale, which has been a protected species since 1986). However, some specialists consider that it is too late for some species to be saved.

Since 1970, the world is in an ecological deficit. In 2019, Earth Overshoot Day[7] was on July 29th, which means that 1.7 Earth planets were needed to support humanity's annual demand on the ecosystem versus only one planet in 1970. Since 2001, this date is moving on average 3 days earlier per year[8]. **Should the global population reach 9.6 billion by 2050, the equivalent of almost three planets could be required to provide the natural resources needed to sustain current lifestyles.**

Figure 6a: Almost 2 Earths were needed to support humanity's annual demand in 2019

Figure 6b: The Earth Overshoot Day is 3 days earlier each year since 2001



Global Footprint Network
Advancing the Science of Sustainability

Source: Earth Overshoot day website

EARTH OVERSHOOT DAY

Therefore, the linear model of producing more and more and throwing away large amounts of waste, without any recycling, is in contradiction with the planetary limits. The consumer society has finally given rise to a society of waste.

Global waste production was estimated to be 1.3 billion tonnes per year in 2012 vs 2.01 in 2018 (+55%) and is expected to grow to 3.40 billion tonnes by 2050 under a business-as-usual scenario (+160%)[9]. This high increase will come mainly from developing countries and continents (Asia and Africa).

Amongst these wastes, some are recyclables, such as paper, cardboard, plastic, metal and glass: they represent from 16% of waste streams in low income countries to 50% in high-income countries. Despite this high recyclable rate, only one-third of waste in the high-income countries is recovered through recycling and composting.

As of 2018, it is estimated that globally about 37% of waste is disposed of in some type of landfill, 33% is openly dumped, 19% undergoes materials recovery through recycling and composted and 11% is treated through modern incineration.

7. The date when humanity's demand for ecological resources and services exceeds what Earth can regenerate in that year in a given year.
8. If we exclude 2020 for which the Earth Overshoot Day was on August, 29th because of the sudden stoip due to covid-19.
9. https://openknowledge.worldbank.org/handle/10986/30317

While developed countries have been emphasizing sorting and recycling for the past decade and therefore have better recycling and recyclability rates than developing countries, the results are not so great. In 2016, in Europe, about 60% of discarded materials were either put in a landfill or incinerated while only 40% were recycled or reused.

Thus, despite an improvement in recycling rates in Europe over the last ten to twenty years, recycling of certain materials is still low: the recycling rate of electrical and electronic waste and plastics was just over 40% in 2016. In addition, manufacturers make very little use of recycled materials in their products: **on average only 12% of material resources used in the EU in 2016 came from recycled products and recovered materials** - thus saving extraction of primary raw materials.

Facing these disappointing figures, it is urgent to review the way we produce in order to ensure better product recyclability, right from the design stage, but also better sorting and a better recycling rate. This will allow the development of a real market for secondary raw materials, thus limiting the environmental impact of manufacturing production, and in particular the carbon footprint.

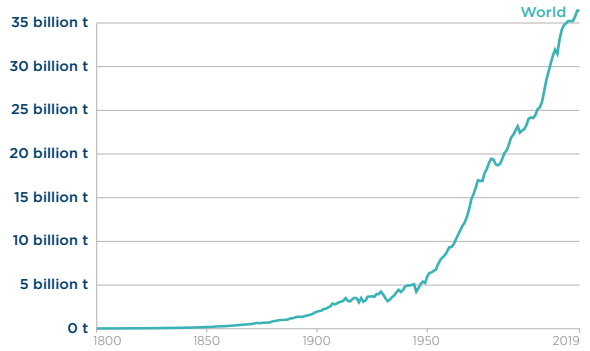
Indeed, the manufacturing and transport of products contribute strongly to global warming, even though the carbon budget we have at our disposal is limited if we want to limit global warming to 1.5°C in 2100, in accordance with the Paris Agreement. Respecting this carbon budget implies a reduction of global CO_2 emissions, either through products that consume less energy and natural resources or through a decrease in our production and consumption of goods.

The Circular Economy can be a great tool to limit global warming.

Circular Economy: a tool to fight against climate change

The industrial revolution, from 1850, marks the beginning of the increase of CO_2 emissions in the atmosphere. This increase will not stop, even if it may stop during certain economic crises (the two world wars, the oil shocks of the 1970s, the covid crisis in 2020, etc.). **Between 1950 and 2020, CO_2 emissions in the atmosphere have increased from 6 billion tons to 36 billion tons, i.e. a multiplication by 6 in 60 years (and a multiplication by 18 compared to 1900)!**

Figure 7: GHG emissions have been multiplied by 6 between 1950 and 2020



Note: CO_2 emissions are measured on a production basis, meaning they do not adjust for emissions embedded in traded goods.
Source: Our world in Data website.

This increase in CO_2 emissions into the atmosphere is directly linked to human activities and in particular to industrial and manufacturing production, the third most emitting sector according to the International Energy Agency (IEA).

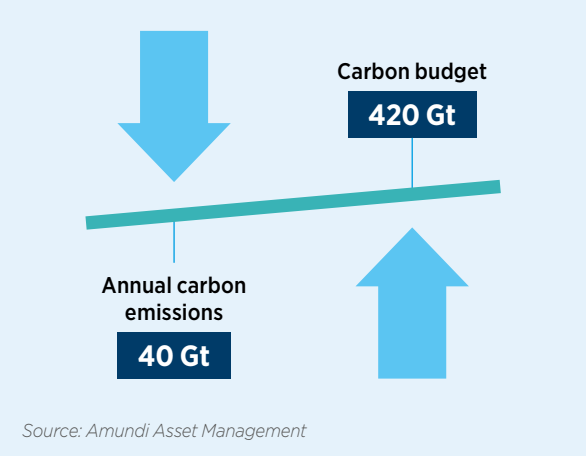
The industrial and consumption choices we have made and continue to make, the linearity of our economy based on the principle "extract, produce, consume, throw away" explain this increase in CO_2 emissions and global warming.

In order to limit global warming to 1.5°C, the International Panel on Climate Change (IPCC) has defined the carbon budget that we can still spend in its latest report: "As of January 1, 2018, we had 420 gigatonnes of CO_2 remaining in our "budget" if we want to have a 67% chance of remaining under the 1.5° temperature increase by 2100"[10] ... while, as said earlier, we emit about 40 gigatonnes of CO_2 every year, which means that our CO_2 budget associated with 1.5 °C of warming will be exhausted by the end of the 2020's if emissions remain on the current level of the late 2010s.

10. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf
11. Rapport GIEC 2018.

Beyond 2°C, scientists estimate that the consequences for the planet's habitability will be major.[11]

Figure 8: We only have 10 years of carbon budget left if we keep emitting similarly to the last years



Source: Amundi Asset Management

This is why we need to cut drastically our CO_2 emissions and for doing so, we need to imagine a new economic model in which producing and consuming is less emissive.

The Circular Economy, by making possible to limit the extraction of natural resources, by limiting production thanks to the extension of the lifespan of products and by allowing better recycling of materials, can play a major role in achieving the climate objectives.

Decarbonisation of energy is necessary, but insufficient to meet climate goals as 45% of CO_2 emissions are directly linked to the production of goods and the management of land. Consequently, a thorough transformation is needed in the way we produce and use goods. Besides, as seen earlier, the demand in goods and food will increase in the next decades because of the population growth and will have major consequences in terms of CO_2 emissions if we do business as usual.

A study by the Ellen MacArthur Foundation[12] disclosed in 2019 demonstrates that applying Circular Economy strategies in just five key areas (cement, aluminium, steel, plastics, and food) can eliminate more than 40% of the remaining emissions from the production of goods – 3.7 billions tonnes of CO_2 equivalent in 2050 – which equals to cutting current emissions from all transport to zero.

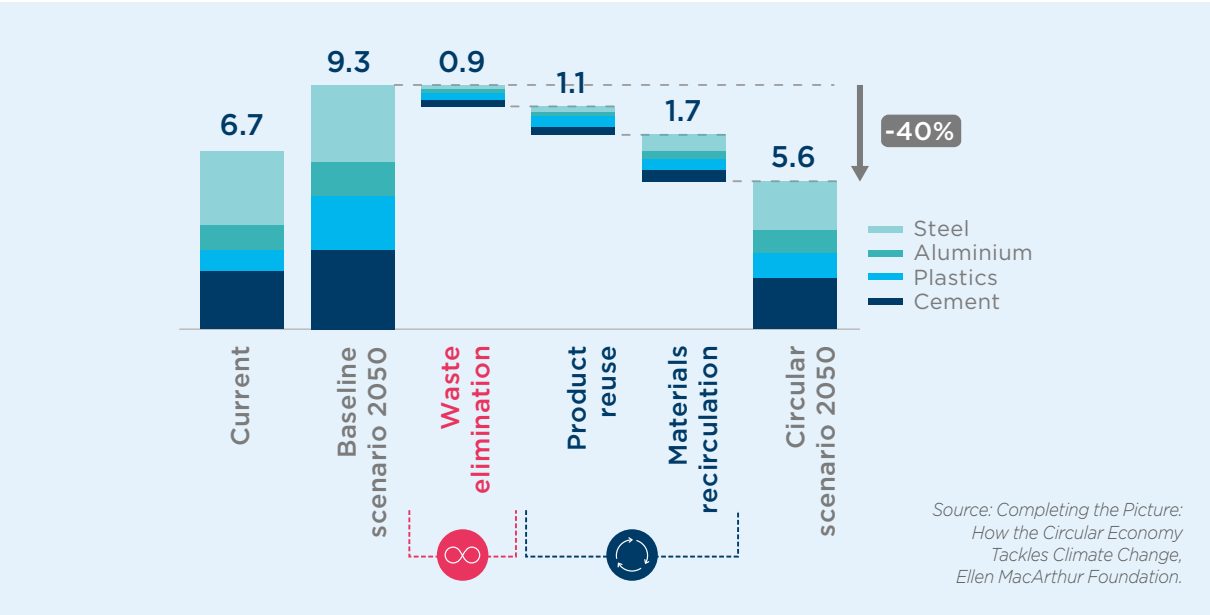
The paper says that "in industry, this transformation can be achieved by substantially increasing the use rates of assets, such as buildings and vehicles, and recycling the materials used to make them. This reduces the demand for virgin steel, aluminium, cement, and plastics, and the emissions associated with their production. In the food system, using regenerative agriculture practices and designing out waste along the whole value chain serve to sequester carbon in the soil and avoid emissions related to uneaten food and unused by-products".

The paper explains that **three main factors can help reduce CO_2 emissions** due to good manufacturing for the four key materials production, which are steel, aluminium, plastics and cement:

- **Waste elimination** can help reduce 0.9 bn tonnes of CO_2 per year (-9.6%): this is possible through material efficient designs for buildings, industrialised construction processes and ligthweighting designs for vehicles. This allows to reduce the amount of material input in products and assets, and reduce waste generation during construction;
- **Product reuse** can help reduce 1.1 bn tonnes of CO_2 per year (-12%): new business-models such as renting, sharing and pay-per-use can increase the use of products and extend the products' longevity through reuse, refurbishment and remanufacturing. That way, the need for new products and end-of-life treatments decrease. The need for virgin materials, such as steel, plastics, cement and aluminium decrease as well so do the CO_2 emissions;
- **Materials recirculation** can help reduce 1.7 bn tonnes of CO_2 per year (-18%): new business-models that consist in collecting, sorting and recycling activities help reduce the CO_2 emissions as well. The increase of recycling rates allow to decrease the demand in virgin materials, which helps reducing emissions from production and end-of-life incineration by using less energy-intensigve facilities compared to the production of virgin materials.

12. https://circulareconomy.europa.eu/platform/sites/default/files/emf_completing_the_picture.pdf

Figure 9: We can reduce our GHG emissions by 40% with the Circular Economy



Source: Completing the Picture: How the Circular Economy Tackles Climate Change, Ellen MacArthur Foundation.

Our planet boundaries and climate change force us to review our economic linear model and to replace it by a circular model that will allow to extract less materials from Earth, to better use the products we have at our disposal and to better recycle them. As identified by the EU Green Deal and the New Circular Economy Action Plan, our industry must change.

In the second part of this report, we will analyze how four sectors - Electronics and ICT, Batteries and vehicles, Textiles and Construction and buildings - are facing the new challenges of the Circular Economy and how they are trying to implement it.

Ready, set, go: 4 sectors in the race to the Circular Economy

Launch of an engagement campaign on Circular Economy to better assess companies' maturity on the subject

In 2020, we launched a three-year engagement with four out of the seven most intensive resources sectors identified by the EU:

- Batteries and vehicles;
- Construction and buildings;
- Electronics and ICT;
- Textiles.

About 30 companies based all over the world (USA, Europe, Asia mainly) answered positively to our proposal to engage about Circular Economy.

In order to assess companies, we have developed a proprietary evaluation tool based on four questions:

- How key is the Circular Economy in the governance bodies and in the company's strategy?
- How ambitious are the company's commitments on the Circular Economy?
- How is the Circular Economy implemented in the day-to-day business?
- How is the company trying to make its products last longer?

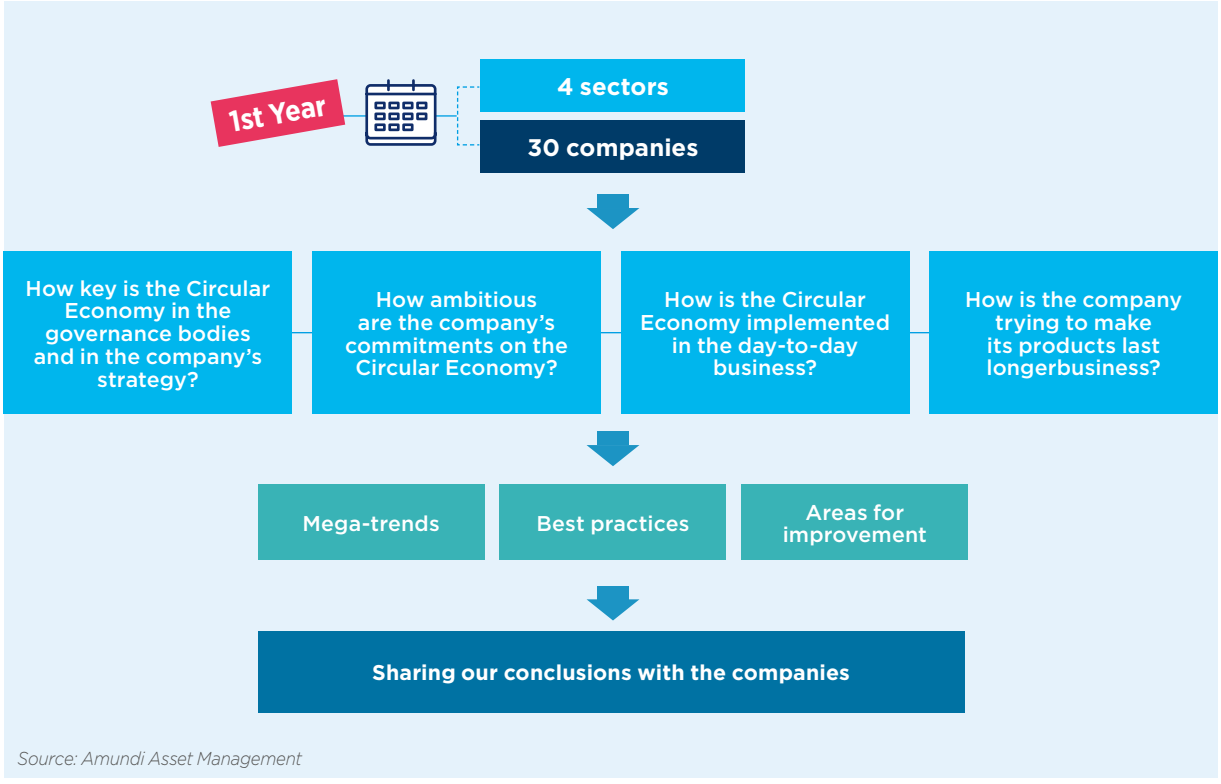
This tool has allowed to assess all companies and to compare them within their sector to highlight mega trends, define best practices and identify areas of improvement.

We have shared the results of this first year of engagement with companies and provided them recommendations. These recommendations will be the foundation of our engagements in the next two years.

Figure 10: A three-year engagement campaign on Circular Economy

Source: Amundi Asset Management

Figure 11: Our Circular Economy campaign process for the first year



Source: Amundi Asset Management

02

The automotive sector: ready to step up a gear

The automotive sector: ready to step up a gear

The automotive sector has known a deep transformation over the last two decades. First, because t**he EU legislation has pushed automakers to better treat end-of-life vehicles by imposing high recycling, reusing and recovering rates.** Secondly, because **the fight against climate change and the rise of electrification are questioning the whole business-model and thus, companies have to reinvent themselves.**

We will see that **because of these two reasons, the sector is quite in advance on Circular Economy and that the subject is well taken into account in their business strategy.** Besides, design – as being a crucial step for the sector – has already moved to eco-design by taking into account environmental considerations to facilitate the reuse or the disassembling of cars. However, we do think that if companies have built strong foundations that could allow them to expand Circular Economy faster, companies need to develop partnerships with suppliers so that solutions are co-designed if they want to make it real.

Two main drivers : more stringent legislation and climate change

According to the Ellen MacArthur Foundation[13], "the automobile industry lends itself to the Circular Economy, as it requires a large quantity of high value components and materials. Vehicles are built to last and designed for easy repair. That is why it is also the perfect product for reuse, remanufacturing and recycling throughout multiple use cycles". Indeed, the automobile sector is a heavy consumer of natural resources and is responsible for approximately 80% of all rubber consumption, 25% of all aluminum and 15% of all steel consumption[14]. On average, cars contain 1.4 tonnes of material. Because of this heavy consumption of natural resources and since the potential of circularity is high, the automobile industry and its value chain have been identified by the EU Circular Economy Action Plan in March 2020 as a key sector to put in place Circular Economy strategies. As part of the plan, the European Commission will amend the rules on end-of life vehicle to foster more circular business models and on eco-design to better integrate end-of life treatment. It is also considering rules on mandatory recycled content for materials and components and will require recycling efficiency to improve.

The European Union has long regulated the use of resources by automobile manufacturers. In 2000, the directive on End-of Life Vehicles[15] (which is currently being reviewed) aimed at reducing the waste arising from end-of-life vehicles and achieving reuse, recycling and recovery targets. Another piece of European legislation[16] - specifically on reusability, recyclability and recoverability - states that new vehicles may only be sold if they can be reused and/or recycled to a minimum of 85% by mass or reused and/or recovered to a minimum of 95% by mass. These two European directives explain to a large extent why the industry has embraced the principles of the Circular Economy - reduce, reuse and recycle - since the 2000's.

Another important incentive for the automobile industry to adopt the Circular Economy business models is the climate emergency. **To limit global warming to 1.5° C, the industry needs to reduce its carbon emissions by around 50% in absolute carbon emissions by 2030[17].** A number of Original Equipment Manufacturers (OEMs) in our panel have set targets to become carbon neutral.

13. www.ellenmacarthurfoundation.org

14. www.wbcsd.org

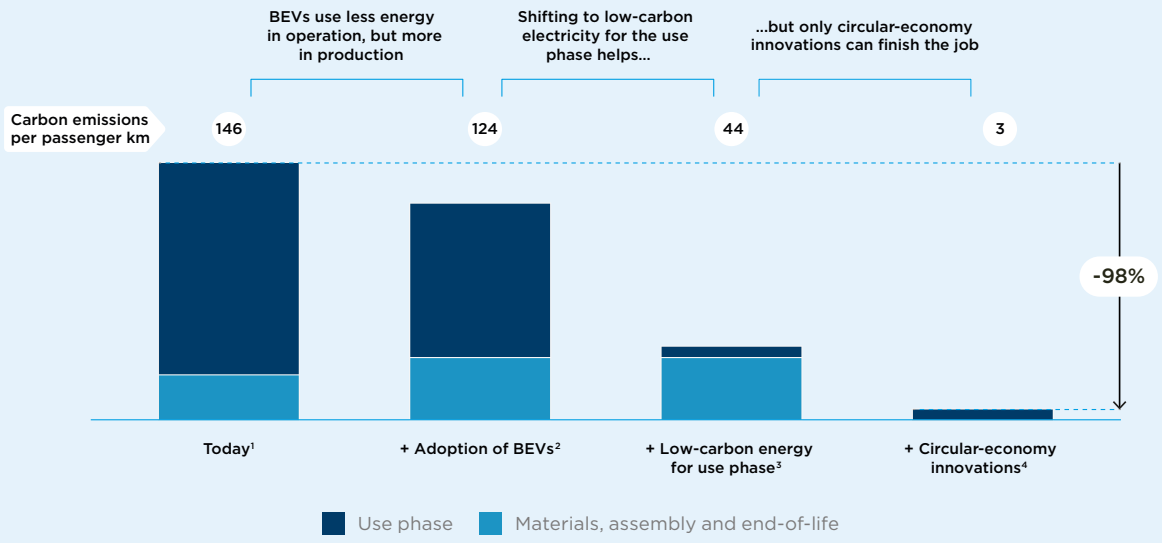
15. Directive 2000/53/CE on end-of life vehicles.

16. Directive 2005/64/EC on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability.

17. Accenture and World Economic Forum, Raising ambitions : a new roadmap for the automotive Circular Economy (December 2020).

The room for improvement is quite big and requires rethinking the production process. Indeed, currently, 20% of the industry GHG emissions are directly attributable to manufacturing. A McKinsey & Co[18] analysis forecasts that 60% of the total automobile lifecycle emissions will be attributable to materials and manufacturing in 2040. This is mainly due to the considerable carbon footprint of electric vehicle batteries that are fast developing. The remaining 40% will result from logistics, disposal and use[19]. In other words, the industry will have to significantly reduce its impact during the manufacturing phase. **Both circularity and electrification will be necessary to the sector's decarbonisation but electrification will make circularity even more important for the industry - the industry will need to find new market opportunities once batteries are used.**

Figure 12: Decarbonising the car also means implementing a Circular Economy[20]



1. ICEV hatchback (level 1) with 1.70t weight (incl. repair components), 0.90t steel, 0.15t aluminium, 0.29t plastics, 200,000 life-cycle km and average occupancy of 1.5.

2. BEV hatchback (level 1) with 1.90t weight (incl. repair components), 0.70t steel, 0.19t aluminium, 0.32t plastics, 0.32t EV battery, 250,000 life-cycle km and average occupancy of 1.5.

3. Requires decarbonization of electricity grid with additional renewable energy as per consumption requirement by BEVs.

4. Circular-economy innovations consider level 4 circular BEV (fully circular).

Source: Raising ambitions : a new roadmap for the automotvie Circular Economy, Accenture and World Economic Forum, 2020.

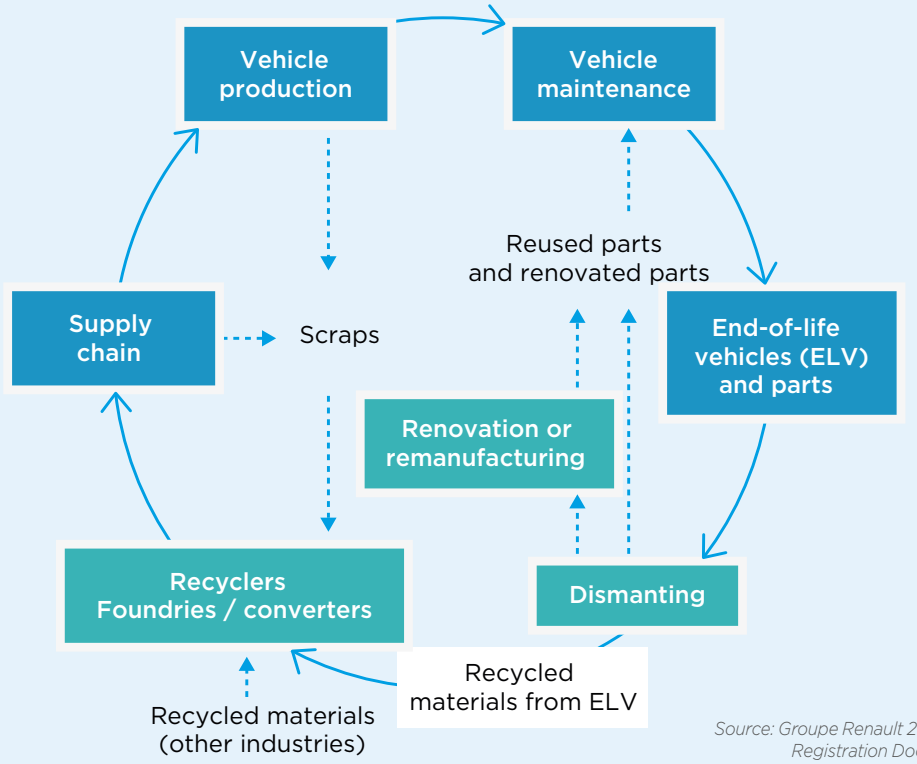
Across the value chain and as shows figure 12, circularity covers for instance the sourcing of recycled and reusable products, the eco-design, the extension of product life (repair and remanufacturing), the setting up of material closed-loops and the end-of-life of vehicles. Circularity also implies the development of car sharing capacities. For electric vehicles, this also means offering a second life for batteries – which contain precious metals – for storing renewable energy for instance.

18. MacKinsey study mentioned in the Accenture and World Economic Forum, Raising ambitions : a new roadmap for the automotive Circular Economy (December 2020).

19. https://www.weforum.org/projects/the-circular-cars-initiative

20. Accenture and World Economic Forum ; Raising ambitions : a new roadmap for the automotive Circular Economy (December 2020).

Figure 13: Group Renault's vision of circularity[21]



Source: Groupe Renault 2020 Universal Registration Document, 2020

The Circular Economy model can reduce manufacturing costs (commodity prices can be very volatile), strengthen customer loyalty and increase operational efficiency. For example, collaboration with suppliers for sustainable raw material management, efficient "waste" management and product life extension should help the OEMs stay ahead of ever more stringent regulation and customer expectations.

Circular strategies are running well

Most, if not all companies, are clearly addressing resource consumption and the need for more circular business models and strategies. Decoupling growth from resource consumption is part of the companies' business models and the companies understand the opportunities offered by circularity. It is fair to say that Circular Economy is embedded into companies' overall strategies rather than simply their sustainability strategy. As mentioned before, regulation and the sheer amount of materials used by auto manufacturers are clear drivers for circularity.

An example of these Circular Economy strategies is **that all companies in our panel** have told us that they either **have a board member in charge of Circular Economy, or a sustainability committee which remit encompasses the issue.** However, more disclosure on the governance of circularity should be provided. For example, no company appears to have Circular Economy key performance indicators as targets in its variable remuneration schemes. This kind of mechanism could incentivize companies and managements to develop stronger strategies and deliver on those strategies.

21. Groupe Renault 2020 Universal Registration Document p.171.

Regarding the Circular Economy strategy itself, we note that the vast majority of companies have set themselves quantifiable targets, be they on the minimization of waste or on the proportion of recycled materials in new cars (of up to 30% recycled and/or natural material for one of the players).

The most advanced auto manufacturers are seizing the opportunities offered by the concept, in particular to show publically that it is financially worthy. For instance, one manufacturer discloses an economic assessment of its circular activities in terms of cost savings and generated revenues. In line with its efforts to manufacture vehicles with 30% of recycled polypropylene and polyamide (rather than the virgin materials), the company saved EUR 10 million in 2019 and reduced production costs accordingly. It also reports on having generated EUR 221 million from its remanufactured parts offer, repair & return services and end-of-life vehicle dismantling. Another example is that of Renault which circular activities enabled it to generate a turnover of EUR562 million in 2019. Renault has also announced that its historical Flins factory will become the first European center/factory dedicated to Circular Economy between 2021 and 2024. The Re-FACTORY will refit, and recycle vehicles. Renault intends to set a "competitive industrial model based on the potential for value creation generated by the vehicle throughout its life".

Finally, we can say that Circular Economy strategies are well implemented for the main actors of the sector by the definition of quantitative targets – both on minimization of waste and integration of recycled materiels and eco-design processes. The responsible consumption is partly taken into account by the electrification. However, **on the subject of responsible consumption, we would welcome more defined strategies and transparency on the companies car sharing activities as companies remain too weak on their dedicated strategy.** Leaders in this area are able to complete their commercial and expand their customer base. One of the companies in the panel has set clear quantifiable targets (1 million users in 2020) for the development of its car sharing fleet and well positioned to reap the benefits of this new market. In a world where we must reduce our CO_2 consumption, we do think that it is not impossible to think that car sharing activities are going to go up over the next decades.

Eco-design is a pre-requisite

Eco-design is widely taken into account in the sector and is well integrated in companies' operational strategies. The need to recycle 85% of the vehicle's mass at end-of-life and to recover 95% of this (in Europe) has certainly helped. Indeed the ELV directive states "that the requirements for dismantling, reuse and recycling of end-of-life vehicles should be integrated in the design and production of new vehicles" and "that producers should ensure that vehicles are designed and manufactured in such a way as to allow the quantified targets for reuse, recycling and recovery to be achieved".

All companies in the panel systematically carry out product life-cycle assessments and strive to reduce their environmental impacts from raw material sourcing to disposal. Indeed eco-design serves a number of other purposes in the industry such as the reduction of vehicle mass, fuel consumption and pollutant emissions. Eco-design also ensures that resource use is minimized at the design stage. For instance one of the companies in the panel plans to bring the share of recycled materials in the weight of new vehicles to 30% in 2030. Besides, and as mentioned before, recycled products reduce production costs. However not all companies disclose such recycled materials targets.

We consider that auto manufacturers should increase transparency on the use of recycled and renewable contents. Disclosure should be increased both in terms of current performance and targets. One company in the panel uses environmental certificates that provide information about vehicles components made of recycled materials and renewable raw materials. Some companies also seek to reduce the number of plastics used to make sorting easier and to facilitate the dismantling of powertrains to ease remanufacturing.

For implementing a fully Circular Economy strategy, companies need the full support of their supply chain so that they can reduce waste generation and increase recycled and renewable contents.

Circularity requires strong partnerships, especially with suppliers

Achieving circularity requires companies to obtain the full support of their suppliers and partners. Auto manufacturers cannot deal with the challenges of Circular Economy on their own and innovation must also come from the supply chains to ensure access to technology as well as Research & Development. Collaboration is needed across the value chain. One of the companies in our panel, for instance, prides itself on having set up its own circular ecosystem to recycle and reuse materials. It operates a joint venture specializing in end-of-life vehicle dismantling and second life parts. The joint venture collects end-of-life vehicles from car dealers, insurers, garages and individuals. Cars are dismantled and then reintroduced into the supply chain for the production of new vehicles. As for spare parts, they are reused for vehicle repairs in the company's post-sales network through a fully-owned subsidiary. Remanufactured parts are then sold at a reduced price (-40% in average) and have the same guarantees in terms of qualities and warranties. The system set up by the manufacturer is totally integrated as the company has heavily invested through partnerships and holdings in the development of recycling channels to secure materials supplies and reduce its impact on resources.

Strong practices also include working with suppliers to implement environmental improvements across the supply chain. For instance, it is with the help of suppliers that automobile manufacturers can increase the proportion of secondary and renewable materials in their vehicles. Some companies have defined secondary materials targets for important materials and included these targets in their supplier selection processes. One company aims to systematically involve suppliers to meet its environmental objectives by selecting them based on their suggestions to enable the group to meet its Circular Economy targets. Long-term strategic partnerships that encourage suppliers to invest in their own circular transition can help the automobile manufacturers achieve their own goals. Finally, closing material loops cannot be done without the support of suppliers and business partners.

We consider that companies should further develop the eco-system of their circular activities. They can do it either in developing themselves the solutions they need internally or by helping suppliers to develop and reach the level of circularity they want. To improve, the automobile sector needs to drive the whole eco-system it works with. As of today, we consider that companies of the automobile sector are in advance regarding Circular Economy and that they are building the foundations for the instauration of a real Circular Economy. However, we do think that Circular Economy needs to be expanded faster, especially with suppliers so that solutions are operationally put in place.

Conclusion

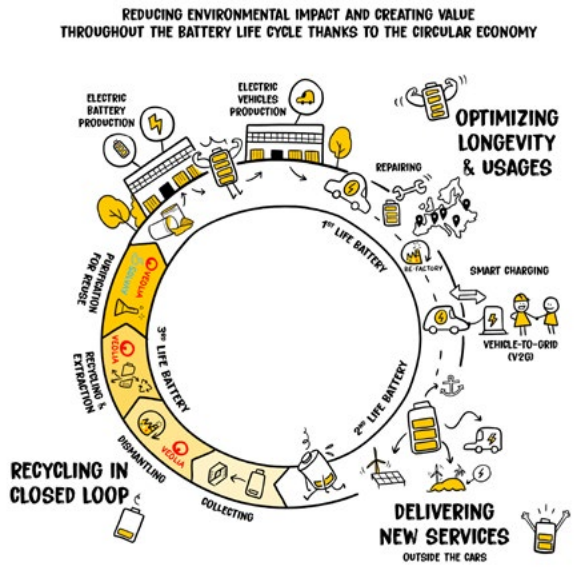
Companies have clearly integrated the principles of the Circular Economy in their strategies and practices. It makes business sense for them to do so. Eco-design is in their DNA. As some companies intend to become carbon neutral, others have the ambition to become a circular business to optimize the efficient use of resources over their lifecycle and maximize their value.

Circular Economy already shapes the automobile industry, but improvements in the governance would be welcome with identified board or executive management members. The latter should also be incentivized to foster the principles. In more general terms, disclosure, in particular disclosure of quantifiable key performance indicators should be enhanced so that progress can be monitored over time. Finally, business opportunities and the development of car sharing activities should be pursued, especially with the help of the whole eco-system and more specifically with suppliers.

CASE STUDY

Closing the loop for the batteries of electric cars by Renault

Figure 14: Reducing environmental impacts by implementing circularity for the electric batteries



Source: Groupe Renault 2020 Universal Registration Document, 2020

Raw materials account for 50% of the price of an EV battery which itself account for 40% of the price of an electric vehicle. Lithium-ion batteries are currently favored by manufacturers because of their performance and discharge qualities. They are made of different materials including lithium, cobalt, nickel and aluminum which are finite resources. The number of electric vehicles is expected to grow from 10 million in 2020 to 100 million in 2030[22] and the supply of these materials is becoming strategic. Renault seeks to optimize the use of electric batteries before recycling them.

After their life in electric vehicles (8 to 10 or 15 years), batteries still have around 60%-75% of their previous charge-storing capacity[23]. Renault then uses their remaining capacities in stationary storage and mobile applications. That's the second life of electric batteries for which Renault has developed a number of industrial partnerships. Batteries can be repurposed to store renewable energy and release it in the form of electricity when needed. In 2018, the company announced the launch of its Advanced Battery Storage[24] project using electric vehicle batteries which is set to reach 70 MWh. Renault is also developing mobile applications for the second life of its batteries.

When batteries reach the end of their life, they are recycled and Renault has set up a partnership with Veolia and Solvay which will extract and purify the strategic metals. The goal is to reuse at least 95% of the cobalt nickel and lithium in new batteries. The loop will be closed!

22. https://www.renaultgroup.com/en/news-on-air/top-stories-2/groupe-renault-veolia-and-solvay-todays-batteries-will-be-tomorrows/

23. HSBC, More than just emissions September 2020.

24. https://en.media.renaultgroup.com/news/groupe-renault-veolia-solvay-join-forces-to-recycle-end-of-life-ev-battery-metals-in-a-closed-loop-1564-989c5.html

Table of best practices

The automotive sector

	Strategy	Commitments	Designing & preparing for a CE	End-of-life
Company 1	CE strategy strongly integrated i n business model with commercial opportunities developed in re-manufactured parts as well as investments in recycling ventures. Member of Ellen McArthur Foundation.	Very strong and clear commitment with clear targets and objectives : – Bring the share of recycled materials in the mass of new vehicles produced to 33% by 2030. – Reduce by 30% the quantity of non-recycled waste per vehicle produced on the group's manufacturing sites between 2013 and 2023.	First CE plant in Europe entirely dedicated to the Circular Economy (an industrial and commercial ecosystem to develop CE innovation and foster the reconditioning of second-hand vehicles for example.	—
Company 2	—	Extensive disclosure on CE ambitions: – Build vehicles with 30% of recycled or bio-sourced materials and hence control material purchasing costs. – 100% of waste recovery in local loops of the Circular Economy. – Select suppliers on their ability to enable the group to meet its CE targets by 2035.	Strong strategy on car sharing solutions with quantified commitment to develop them.	For high voltage batteries, the group is implementing specific business models to extend as much as possible the life duration of the batteries in its vehicles or in other applications (stationary storage etc).
Company 3	Board member with CE responsibilities identified.	—	Communication and transparency efforts with the use of environmental certificates that are public and provide information on the vehicle components made of recycled materials and renewable raw materials.	—
Company 4	Board member with CE responsibilities identified.	—	One of the strongest car-sharing ecosystem to increase the use of driving services, parking, vehicle charging as well as multimodal transport.	—
Company 5	Member of the Ellen MacArthur Foundation.	Clear, quantifiable targets: – vehicles to contain at least 25% of recycled or bio-based plastics, – 25% recycled aluminum and – 40% recycled steel by 2025.	—	—
Company 6	—	—	—	—
Company 7	—	—	—	—

03

The construction sectors: road work ahead

The construction sectors: road work ahead

As one of the main contributor in terms of waste and in terms of CO_2 emissions, the construction sectors is well aware of the necessity to reinvent itself. Besides, the sector faces strict legislations at the EU level and more specifically in France. However, the sector struggles to review its whole business-model with Circular Economy lenses while the solutions are only at an embryonic stage and that the waste issue is not yet solved. Implementing a Circular Economy requires a complete change of culture of all actors and partnerships within the construction sectors, its suppliers, its clients and the State are key to make it real.

The regulatory pressure is increasingly heavy for the sector at EU and national levels

The construction sectors uses a vast amount of resources and accounts for 30% to 50% of all extracted material. Besides, it is responsible for over 35% of the EU's total waste generation while the overall rate of recovery of building waste varies from 48% to 64%[25]. This rate varies greatly depending on the activity: 60 to 80% for demolition, 10 to 30% for rehabilitation, 40% to 60% for new construction.

In order to reach a sustainable development and be climate neutral by 2050, the EU has defined a new strategy in 2020, the *European Green Deal*. This new strategy is based on policies that strongly promote the implementation of a Circular Economy, especially the *New Circular Action Plan* (CEAR) and the *European taxonomy*.

In the CEAR, the construction sectors have been identified specifically as one of the seven priority sectors with the highest potential for Circular Economy[26] as greater material efficiency could save 80% of the 5-12% of GHG emissions due to the construction sectors.

The CEAR wants to promote circularity principles throughout the lifecycle of buildings by:

- Improving the sustainability performance of construction products (revision of the Construction Product Regulation and possible introduction of recycled content requirement);
- Improving durability and adaptability through building design and digital logbooks;
- Integrating life cycle assessment in public procurement and maybe including carbon reduction targets;
- Revising material recovery targets in EU for construction and demolition waste;
- Promoting initiatives to reduce soil sealing and use of excavated soils.

WHAT IS THE RENOVATION WAVE?

The Renovation wave is part of the Green Deal, which sets the objective of climate-neutrality by 2050 at EU level. Though responsible for over 35% of greenhouse gas emissions (GHG), only 1% of buildings is renovated each year. Consequently, a much faster rate of renovation is needed. In consideration of these figures, the European Commission published its Renovation Wave Strategy, in 2020, aiming at improving renovation rates by 2030 through renovating 35 million buildings and creating up to 160 000 additional green jobs in the construction sectors.

The EU has defined 3 priorities:

- Tackling energy poverty and worst performing buildings;
- Renovation of public buildings such as schools, hospitals and public administrations;
- Decarbonisation of heating and cooling.

The communication is a far-reaching document, adopting a comprehensive approach to building renovation, outlining a wide range of policies, measures, and tools to overcome barriers and mobilize all actors.

25. *https://www.ecologie.gouv.fr/dechets-du-batiment*
26. *https://ec.europa.eu/environment/strategy/circular-economy-action-plan_fr#:~:text=The%20European%20Commission%20adopted%20the,(CEAP)%20in%20March%202020.&text=It%20targets%20how%20products%20are,for%20as%20long%20as%20possible.*

In view of the regulations set up in the EU, the built environment industry has no other option than to implement circularity at a higher speed to meet EU rules and expectations.

It is two other European regulations and their follow-up amendments that are geared towards construction sectors: the Waste Framework and the Landfill Directives. The Circular Economy subject was mainly taken through the waste angle in the early 2000's as waste is a key issue for the sector and highly contributing to the CO_2 emissions. Indeed, in 2019, CO_2 emissions increased to 9.95 $GtCO_2$, 38% of which accounted for the building and construction sectors. The International Energy Agency (IEA) has estimated that direct building CO_2 emissions need to fall by 50% by 2030 equating 6% per year in order to reach net-zero[27].

As France wants to become a leader in Sustainability, it is also targeting the buildings and construction sectors through its latest law "Anti-waste law for a Circular Economy", adopted in 2020[28]. Thus starting from January 2023 at the latest "polluter-pays system" (pps) will be put in place and will be applied to construction products and materials whether for households or professionals.

The changes brought are of consequence for the construction sectors notably the polluter-pays system. Below the changes brought by the Anti-waste law[29] to the waste issue and the polluter-pays system:

Figure 15: The new rules from the Anti-Waste law

ANTI-WASTE LAW: 6 NEW RULES

Defining new targets and sanctions	Implementing an Extended Producer Responsibility	Ensuring traceability of collected waste	Producing more recyclable products and integrating recycled content	Promoting second life for waste	Creating waste collection centers for professionals
Waste quantifiable targets are defined and must be reached by the Producer's Responsability Organization (PRO).	EPR is extended to construction products and materials from the building sector.	The PRO must ensure traceability of collected waste within EPR schemes. If waste is exported, PRO must report nature, qualtify and destination to the French Ministry of Environement.	Every 5 years producers are subject to pps* to draw a prevention and eco-design action for their products to contain more recycled material and ARE more recyclable.	Manufacturers of construction products & materials (concrete, windows, etc.) mus organize dedicated streams and ensure the second life of their waste products from 1st January 2023 at the latest.	The number of collection centers is to be discussed with the building sector and ADEME. Free recovery of waste materials form professionals if sorted is a possibility.

**pps = polluter pays system – Source: Amundi Asset Management.*

This regulation is strongly affecting the way the sector approaches the implementation of a Circular Economy by giving a high priority to the waste treatment to the detriment of the other pillars. We will see in the following section how the sector is moving towards a more Circular Economy.

We have engaged with seven companies, all Europeans, in the first year of this 3-year to last engagement: three in the construction & engineering sector, four in the construction materials sector and one in the building products sector.

27. https://www.unep.org/news-and-stories/press-release/building-sector-emissions-hit-record-high-low-carbon-pandemic
28. https://www.ecologie.gouv.fr/loi-anti-gaspillage-economie-circulaire-1
29. https://www.ecologie.gouv.fr/sites/default/files/en_DP%20PJL.pdf

As a foreword, it must be outlined that the construction industry is a fragmented one hence our use of the terminology construction sectors throughout this document. The companies with whom we spoke belonged to one of the three sectors composing the industry in connection to materials and their use:

- The building products sector: glass, insulation…
- The construction materials sector: cement, concrete, aggregates…
- The construction & engineering sector: buildings, infrastructures projects…

For the sake of simplification, the first two sectors will be considered as providers of products and materials to the latter listed in view of constructing buildings or infrastructures.

The construction sectors is struggling to reinvent itself to implement a circular business-model

Circular Economy can be considered as a new concept and as all new concept, it needs time to be fully implemented. If many companies consider that the subject of implementing a Circular Economy is covered, we still see several obstacles to a full implementation.

Circular Economy is not yet "fully grasped" by the top management and by the Board. Indeed, less than two companies out of seven admit that this subject was discussed at Board level in the previous years. The Circular Economy topic is very often embedded in the Corporate Social Responsibility Strategy and considered as a sub-part of it and not handled as a specific matter. Thus, though Circular Economy appears in most materiality matrixes, it is not recorded as high priority. In the best case, a Board member is in charge of Sustainability and consequently of Circular Economy.

When a subject is not overseen by the top management, it makes it difficult to implement it globally.

Besides, Circular Economy is not something that can be added or taken out. Integrating Circular Economy in a company strategy implies to completely rethink-model every single step of the process: design, manufacturing, selling, end of life and consumer ownership. This can hardly be done by adding a new offer on top of the old ones.

This missing overview by top management level is also true amongst business lines and employees as training on Circular Economy does not seem to be part of the industry regimen. Only two companies out of seven have mentioned they have specific trainings on the subject. However, none of them has a training strategy on this subject or was able to report key indicators performance (i.e.: number of employees trained, number of hours, etc).

At least two other reasons can be mentioned to explain the difficulty to implement a Circular Economy in the construction sectors: the need for a complete change of culture and the heavy financial investments that are required to do so. As said earlier, implementing Circular Economy means to review the whole business model and consequently can be seen as taking risks by the top management who might prefer to keep doing what has been working for years rather than anticipating. Besides, switching to a Circular Economy also implies to invest very importantly in Research & Development and to bet on new products and/or new consumers that are still embryonic as of today.

We do understand the obstacles to the implementation of a Circular Economy. However, we strongly believe that actors that understand the challenges we will face over the next decades in terms of climate change and limitations of access to new materials and start anticipating their answer from today will be the winners tomorrow. The efforts that the other actors will need to implement in order to face these challenges if they start later on will be harder and they will need to do them in a shorter amount of time.

For doing so, **companies need to take Circular Economy out of the Sustainability strategy to make it a pillar of the overall business strategy.** Companies need to define what Circular Economy means for every single step of their process: extraction of raw materials, manufacturing of primary products, production, use, end of life, re-use, recycling, etc. They also need to define ambitions, quantitative targets, deadlines and KPIs in order to be able to follow the rightful implementation. In this process, training is key: if employees or managers are not convinced by the necessity and the usefulness of switching from a linear to a circular model, the new circular model will fail to be implemented.

Waste management is a major focal point over other pillars of Circular Economy because of legislation

Legislations on waste all over the world, and more specifically in Europe, started at the end of the 20th century, that is to say way before the concept of Circular Economy was popular. This explains why sometimes the Circular Economy is reduced to waste treatment while it is way more than just that and why companies focus on this issue particularly.

Indeed, companies want to meet legislations first and start by giving a regulatory answer on waste before turning the table over to implement a Circular Economy, which requires rethinking the whole business-model.

This is confirmed by our engagement as **all companies have implemented processes to comply with the law but also KPIs on waste while the other pillars of a Circular Economy are left behind.** As an example, one of the companies we have engaged with is in the top 5 actors of the waste treatment globally. This shows how the waste treatment is key for the sector but is also a good example of how companies can make their business-model change when they want to integrate better a pillar of Circular Economy.

However, even on this subject, we see that **progress can be made, especially on recyclability and reuse of materials.** The construction sectors take care of their waste with extensive use of landfill, which is no longer considered as enough, as shown by the Anti-waste law adopted by France lastly. This law requires the sector to be better structured by implementing an Extended Producer Responsibility and by asking them to better recycle and improving the quantity of recycled content integrated into new products. Indeed, even though recyclability and reuse are keys for the industry, they are mainly applied to new materials or products and are mostly linked to material scarcity.

Likewise, **circular designs are mostly applied to new range of products or materials and concern only a very small part of the products offer.**

We do understand that waste is a key priority for the sector because of legislation. However, we do believe that as the legislation is getting stricter and Circular Economy is becoming a must have, companies need to review their whole process from the beginning, that is to say from the design. This implies to invest more in eco-design and in R&D in order to improve the recyclability of the products and ensure that recycled content can be integrated in a bigger proportion. The design phase is key, including in terms of waste treatment and recyclability: if the company puts on the market products the waste sector does not know how to recycle or how to disassembly, the company will pay an increased tax as the Extended Producer Responsibility is put in place. As of today, we strongly believe that building design (also called deconstruction) cannot be uncorrelated from the disassembly phase.

In order to improve the circularity of the construction sectors, we first encourage companies to proceed to a lifecycle analysis (LCA) for their key products, representing a high percentage of their revenue. A LCA allows to highlight where the highest impacts of the products are and then to find solutions to reduce these impacts. Besides, a LCA can also show that using recycled content can decrease the environmental impacts of the product significantly and play a role in accepting to integrate more recycled content into new products.

We also encourage companies to promote digitalization and follow the EU Building Information Modelling (BIM) guidelines[30]. BIM or the digital mock-up of a building allows simulation to be made on the supply of materials and the waste they will generate and then make trade-offs. BIM offers a global vision of a project impact on the environment and as such the means to optimize them. RIM - or Resource Information Modeling – assesses the materials used depending on their capacity to be recycled or reused. It also offers data traceability that can be updated throughout the equipment life. With a detailed database of a building components and quantities, it becomes possible to anticipate deconstruction, associated costs as well as the possibilities of recycling and reusing channels to activate.

We encourage companies to think from the design phase about deconstruction rather than demolition. Deconstruction requires to be planned way in advance so that materials than can be reused are identified and rightfully taken out and put in an upgrade process so that they can be either recycled or reused directly for another project. Demolition does not imply any requirement of the sort as it consists in razing a building with no intention to increase the waste sorting. These new business-models can only emerge from the ground with the partnership of suppliers and clients.

30. http://www.eubim.eu/

Partnerships are being established but they need to go faster and deeper

We think that companies have a key role to play and are at the crossroads of many actors: regulators, suppliers and clients and consequently can influence them positively.

All companies are involved to some degree in on-going legislation and discuss regulations with officials regarding sustainability and the Circular Economy. For some companies, regulations are viewed as potential business opportunities.

Collaboration is key to **all the companies we spoke to. Indeed, all the companies in the panel do take part to collaborative initiatives whether sector-focused or cross-sectors ones aimed at innovation and promotion of Circular Economy.** These initiatives can be local or international such as WBCSD, World Green Building Council, GCCA or Sekoya[31], a cross-sector French carbon and climate platform bringing together major groups, SMEs and start-ups to propose low-carbon technical solutions around various themes including Circular Economy. If companies are part of working-groups on sustainability, none of them is fully dedicated to the Circular Economy theme. The subject is always a sub-part of a wider subject. This could change in the next few years because of the increasing and more stringent legislation.

We encourage companies from a common sector to team up so that they can better define what a Circular Economy means for their activities and speak with a common voice with regard to clients and customers, think of how the change can be implemented operationally, share their best practices and the obstacles they face, building up tools that can be used, etc. One good example of working-groups that is working quite well on another thematic is the Responsible Minerals Initiative[32], initiative that was born due to the increasing issue and legislation, first in the USA and then in Europe, to structure the actions of companies. This initiative gave birth in 2018 to a Conflict Minerals Reporting Template (CMRT), which is free, standardized reporting template that facilitates the transfer of information through the supply chain regarding the mineral country of origin and the smelters and refiners being used. The template also helps new smelters to undergo an audit via the RMI's Responsible Minerals Assurance Process. A similar working-group proposing a think tank and delivering tools could hugely help the subject to be better taken into account by companies.

We also encourage partnerships with suppliers on circularity, as they are not the norm amongst most of the companies we engaged with despite being essential to achieving a Circular Economy throughout their value chain. Indeed to fully integrate circularity as a business model and make it work, it has to be disseminated within the ecosystem wherein the companies evolve.

Educating clients is also an important step as many companies we engaged with face customers' reluctance when it comes to use recycled or reusable materials over new ones. This kind of reluctance is a hurdle for an efficient implementation of Circular Economy. All companies stated that customers – other than institutional ones - in their majority choose new materials over recycled or reused ones though companies indicate promoting recycled materials. We consider that companies can help moving the lines by explaining their R&D process, the tests they realize to ensure the same level of quality and safety with products integrating recycled content as with the virgin ones and play the game of transparency with their clients.

31. https://www.sekoyacarboneclimat.com/
32. http://www.responsibleminerals initiative.org/

JAPAN, THE NEXT EXAMPLE TO BE FOLLOWED IN TERMS OF ECOLOGICAL CITIES?

Circularity is not a new concept for Japan as we find the idea of it in the Japanese term "mottaina", which could be translated as "waste not, want not". While Japan is already known for its high recycling rate, the Circular Economy concept has grown steadily in the last few years.

For example, Japan hosted the World Circular Economic Forum in Yokohama in 2018 and launched its **Regional and Circular Ecological Sphere policy** later on (R-CES). This policy aims to reduce the environmental footprint of cities, at every stage: from the construction of building to the recycling of household waste.

R-CES aims to organize communities and space so that both material and carbon are transported in a way that minimizes waste depending on the industry or resource in question. For durable goods, like cement, they can be transported on a long distance so that they can be well recycled while for degradable goods, like food, they need to remain in a small area. By planning these scales, cities can organize themselves to minimize carbon emissions and improve the local economy.

Japan is a good example of how cities can be rethought and redesigned but additional elements need to be added so that the redesign is complete, such as mobility and how to better renovate buildings to reuse or recycle most of it.

Conclusion

This first year of engagement proves that the construction sectors have come a long way but progress still needs to be made. **Carrying out circularity for most companies mean significant changes to their business models as well as specific and significant investments.** Companies will need to better understand the concept of Circular Economy and how it applies to their activities, especially with the increasing legislation in Europe. They will need to review their business-models, to train their staff and their suppliers and clients so that the switch is unanimous and implemented by all. As many other sectors facing Circular Economy, construction companies will need to innovate and to go further than business as usual if they want to be identified as the winners for tomorrow.

This is particularly true for construction as its impacts will not stop rising considering the growing pace of urbanization: the UN World Urbanization Prospects estimates that by 2050 68% of the world's population will leave in urban areas – an increase from 54% in 2016[33]. By 2050, the OECD[34] projects GHG emissions to increase by 50% primarily due to a 70% growth in energy-related CO_2 emissions.

We have sent our feedbacks to the companies and gave to each of them specific guidelines and recommendations we would like to see launched in the next few years. We will follow carefully the fate of these recommendations in the next two years, duration of our engagement.

33. https://ourworldindata.org/urbanization#what-share-of-people-will-live-in-urban-areas-in-the-future

34. https://www.oecd.org/env/indicators-modelling-outlooks/oecdenvironmentaloutlookto2050theconsequencesofinaction-keyfactsandfigures.htm

Table of best practices

The construction sectors

	Strategy	Commitments	Designing & preparing for a CE	End-of-life
Company 8	—	Through its dedicated platform proposing eco-variant to customers 79% of waste oil worldwide in 2019.	Development of a range of research related to aggregates & asphalt mixes.	—
Company 9	—	—	—	In US 20% of raw materials are recycled.
Company 10	—	Taking part to French or European projects recyclability projects or setting their own (Woop2Loop/ etc.).	Wide range of eco-designed products with application of LFA system.	—
Company 11	—	Set up the platform for low carbon solutions including CE.	—	Promoting disassembly through a specialized subsidiary to enable recovery of materials thus ensuring they can be recycled as efficiently as possible at the end of its life-span.
Company 12	—	Convincing customers through intensive communication to use recycled materials.	—	Use of recycled concrete/ aggregates.
Company 13	—	Use of PSA referential to assess portfolio as well as customers convincing in fairs and other events etc.	—	—
Company 14	—	Promoting Intra-preneurship with CE in mind through helping employees develop CE solutions and materials. Act also within an initiative it co-founded and dedicated to circularity.	—	—

04

The Electronics and ICT sector: designing a new matrix

The Electronics and ICT sector: designing a new matrix

Since the 1980's, the electronics industry has grown dramatically and has benefited substantially from the linear economy by regularly offering new and better products, pushing consumers to renew their computer equipment (computers, smartphones, tablets, etc.) at an ever-increasing frequency. The extraction of materials, especially rare earths, the programmed obsolescence and the low recycling rate have become the industry norm.

How can the sector integrate the Circular Economy concept into its business model?

The European Union and France have decided to legislate on the Circular Economy in order to force the sector to review its practices, in particular by integrating "a right to reparability". Companies still need to translate these obligations into their strategy and have, in our opinion, two tools at their disposal: eco-design and product as a service.

The increasing volume of e-waste leads the EU to tightening the legislation

In the context of the 2020 European New Circular Economy Plan, the Electronics & ICT industry has been identified as one of the seven intensive-resources sector that need to implement a Circular Economy given its environmental impact and circularity potential.

For many years, the sector has been experiencing strong growth resulting into one of the fast growing waste stream, so called e-waste. Compounding the issue is e-waste's low recycling rate. **In 2019, only 17%[35] of global e-waste was collected and properly recycled,** which means that 44 million metric tonnes of e-waste, was either placed in landfill, burned or illegally traded and treated in a sub-standard way. Poor treatment of waste has three major consequences: pollution of the environment, health deterioration for the people handling this waste, high CO_2 emissions.

E-waste contains many substances that are harmful for the environment if not dealt properly and consequently can pollute water sources and food chains. For instance, circuit boards or cathode ray tubes from old TVs contain lead, chromium or mercury, which, if they are not well decontaminated, could pollute soils heavily.

Besides, in many countries where informal e-waste processing takes place with the aim of recovering valuable metals such as copper and gold, workers –including women and children- are exposed to toxic substances during the melting process which is carried out at dumping grounds.

Last but not least, according to the World Economic Forum, the manufacture of a tonne of laptops could emit 10 tonnes of CO_2, mostly during the production process rather the product lifetime. That is why establishing low carbon manufacturing processes by using refurbished or recycled component is so important to limit carbon emissions.

In the European Union, it is estimated that less than 40%[36] of electronic waste is recycled and in order to improve the situation, the Commission is set to introduce a 'Circular Electronics Initiative' to establish a level-playing field where products sold in the EU are designed in such a way that they contain more recycled materials and have longer lifespans.

35. https://weee-forum.org/publications-papers/
36. https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rt130&plugin=1

THE VOLUME OF E-WASTE WE HAVE TO DEAL WITH TODAY STEM FROM THREE SINGULAR ASPECTS:

1. **Early obsolescence** has been observed in some, if not many, products made by the electronics and ICT industry, contributing to robust sales but at the same time generating a huge stream of waste.
2. **Difficulty for e-waste to be repaired** because of poor design with welded or glued components that stain other key parts when the device is opened.
3. **Difficulty to reach a high recycling rate** due to technical issues or due to health and environmental standards that not all recycling utilities can develop.

Source: Amundi Asset Management

Implementing a Circular Economy could help solve these three issues, causing as of today a high quantity of e-waste. Indeed, improving product durability and reparability are at the heart of the Circular Economy process and remains likely the best lever the industry has at its disposal, not only to reduce the amount of e-waste generated by electronics devices but also to reduce the need for newly mined mineral resources and incremental carbon emissions.

This is the reason why the EU is revising its legislation to make it more stringent.

In its New Circular Economy Action Plan, **the EU Commission has highlighted 5 research focuses:**

- **Implementation of an Eco-design Directive** so that devices are designed for energy efficiency and durability, reparability, upgradability, maintenance, reuse and recycling.
- Defining the sector as a priority for implementing the **"right to repair"**;
- Introducing measures on chargers for mobile phones an similar devices (common charger) allowing to **decouple the purchase of chargers from the purchase of new devices;**
- **Improving the collection and treatment of e-waste,** including exploring options for an EU-wide take back scheme to return or sell back electronic devices;
- Reviewing EU rules on restrictions of hazardous substances in electrical and electronic equipment.

A key initiative of the European Commission regarding Circular Economy for the electronics industry was taken in Q1 2021 when the New Eco-design regulation entered into force. This new legislation widens the 2009 Ecodesign Directive beyond energy-related products, in particular by promoting circularity, which current eco-certification standards have fallen short of. Thus, in the EPEAT label[37], upgradeability and reparability are not required criteria to obtain the label while they definitely have a role to play in making products more eco-friendly. As of today, the Ecodesign regulation is only applicable for displays (including TVs) and servers but aims to include the broadest possible range of products, such as smartphones and laptops, which are still being discussed.

The new Ecodesign rules will be underpinned by new obligations for manufacturers and especially a new "Right to repair", which consists for companies in:

- making most spare parts and repair manuals available to professional repairers for several years after retiring the product from the market;
- ensuring the delivery of the spare parts within 15 working days. Spare parts can be replaced with the use of commonly available tools and without permanent damage to the product;
- making the latest available version of the firmware available at a 'fair' cost;
- ensuring that joining, fastening or sealing techniques do not prevent the disassembly for repair or reuse purposes of a number of components (data storage devices, memory, etc.).

37. The EPEAT ecolabel is a leading global ecolabel covering products and services from the technology sector.

So far, we note that the regulation does not address the pricing of spare parts, often considered as a key barrier for products to be repaired in practice. Notwithstanding the different product categories or markets served, we believe these guidelines serve as a good practice baseline and we have been using them to assess the companies' current practices around eco-design and communication around product longevity toward customers.

WHAT IS THE FRENCH REPARABILITY INDEX?

France has already imposed a reparability index since January, 1st 2021

France became the first country to use an official reparability index since January 2021. The display of the reparability index is now mandatory at the point of sale for five categories of products : smartphones, laptops, televisions, washing machines and lawnmowers.

This reparability index is a score out of 10 that informs the consumer on the level of reparability of the product. Buying a product with a good reparability index means buying a product easy to repair and consequently reducing the risk to buy a new one in case of failure. It also means protecting the environment as reparability prevents from extracting new materials, producing new products, increase CO_2 emissions, etc.

The reparability index is based on four main criteria:

- The availability of advice on use and maintenance
- The availability of technical documentation
- The disassembly of the product
- The availability and price of spare parts.

Interestingly, the index takes into account the price of spare parts, unlike what is done by the EU.

During our 2020 Circular Economy Engagement Campaign, we interviewed and assessed the Circular Economy practices of seven companies in the sector. These companies, based either in North America or Asia, are operating globally and importantly operate in Europe. Hereafter are developed the main observations and recommendations at the end of this first year of campaign.

Board and Management need to show stronger leadership on Circular Economy

Half of the analyzed companies confirm they do discuss Circular Economy as one of the strategic issues the company needs to handle at Board meetings at least once a year. However, including for these companies, we note that **Circular Economy is too often assimilated to sustainability generally rather than being addressed as a strategic topic in itself.** This does not enable companies to address the entire spectrum of opportunities offered by the establishment of a circular model. This amalgam is quite common as sustainability is not a subject Boards discuss very often, as it is seen as an add-in and not as a way to rethink the whole business-model of the company. Besides, Board members expertise on sustainability – and even more on Circular Economy – is uneven.

If the top level of the company is not completely familiar with the concept of Circular Economy, we praise the fact that **all companies under analysis have some type of commitments linked to Circular Economy, including commitments to increase sustainably sourced materials or collection of used products.** However, we regret that companies do not have a global approach on Circular Economy that would question more deeply the company business-model. Indeed, companies tend to focus only on some pillars of the Circular Economy and forget the other pillars more complicated to implement. Thus, it is difficult for investors to understand how these commitments add up and how the company's trajectory toward a circular business model would look like from here.

Typically, when it comes to the development of closed-loop products, which arguably will require technologies not yet operating at scale today, very few of the analyzed companies have managed to make clear commitments at this juncture. **We acknowledge that true Circular Economy is not yet possible but stronger commitments on growing a CE compliant product ranges would help the industry to move forward and invest in areas that still require development.**

Besides, companies very often lack relevant KPIs to evaluate progress, which does not help to make the subject concrete.

In order to switch from a linear to a circular business-model, we first encourage companies to train Board members and top managers to sustainability and more specifically to the potential of Circular Economy. Top managers need to understand that the shift needs to be done as soon as possible in order to comply with new legislations but also to meet consumers' demand and new behavior and, above all, to address the environmental challenge.

In a second step, we encourage the top management to review its global strategy in light of the circular model. This will include taking into account every single pillar of the Circular Economy, from sustainable procurement to a higher recycling rate, and not only the easiest ones. This new strategy must be expanded to all departments of the company and inspire a new mindset.

Last but not least, we strongly **encourage companies to develop a system of metrics that can guide their decision-making when moving toward Circular Economy and help them communicate with investors** on their trajectory and progress over time. For doing so, companies can rely on the Circular Transition Indicators[38] developed by 25 companies in one of the World Business Council for Sustainable Development (WBSCD)'s work stream.

We also acknowledge that the lack of economic incentives have prevented further inroads so far. Again, situation seems poised to improve as the European Commission wants to reward products based on their different sustainability performance, including by linking high performance levels to incentives.

Eco-design is key for the sector but unequally addressed: strengths in energy efficiency, work in progress for material cycling

Eco-design is a fast-developing area, where product differences clearly exist. **Energy efficiency appears to be have been the key focus of both R&D and communication toward customers** up until now. Life Cycle Analysis are usually carried out but not always publicly disclosed.

Use of recycled materials is very often explored and deployed in many products. These materials typically include plastics such as polypropylene (PP), polystyrene (PS) and acrylonitrile butadiene styrene (ABS), as well as metals such as steel, aluminum and copper for some products. They are the materials used in large quantity and for which there exists a value chain that can deliver high quality recycled material.

In the companies analyzed, partnerships with suppliers around eco-design initiatives are interesting but their scope could be extended further notably to build reverse supply chains. **Closed-loop is usually still limited in scope to one component made of one material.** In a few instances, companies who established a closed-loop component value chain have naturally strong supplier relationships and this correlates with good performance overall.

To tackle efficiently that issue in terms of action and communication toward stakeholders, our recommendation is two-fold : companies **need to build up a well-developed closed loop system for some products, like can be found in the multi-function printers industry (see later in this section). In doing so, they can promote some of the product range as being aligned with Circular Economy as waste will be minimized through parts reuse and recycling of old materials into new parts. Another way of demonstrating a company's actions toward Circular Economy is to calculate**

38. https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Circular-transition-indicators

and publish the cycled resource percentage of one of its product range, using a methodology such as the WBCSD Circular Transition Indicators (CTI) methodology. Initial figures from companies using the methodology suggest a global average of 8% circularity for electronics products, so any figure above that average can be seen as progressive and reflect positively on the company.

DIVERSITY OF BUSINESS LINES COMES WITH BOTH CEILINGS AND OPPORTUNITIES

Companies with several businesses lines will often find it challenging to achieve a high percentage of revenues dedicated to Circular Economy product lines, given how unique each value chain is and how complex it is to transform them to a circular regime.

Nonetheless, large, vertically integrated and diversified companies should not be written off because of the large transformation potential they hold. They can become an enabler towards a circular model shift in the markets where they operate.

For these companies, the question of which Circular Economy revenue metric to show to investors remains acute. In their case, we tend to emphasize collaboration with their peers, suppliers and other stakeholders to assess how their commitment can translate into a positive outcome that will benefit all players within a given value chain or ecosystem.

CIRCULAR TRANSITION INDICATORS FOR ASSESSMENT AND COMPARABILITY

Companies can start by using the Circular Transition Indicators, disclosed by the WBCSD. The indicators developed aim to instore a common language for circularity so that companies can measure their circular performance and understand the associated linear risks and circular opportunities. The 8 indicators are divided in 3 categories: Close the loop, Optimize the loop and Value the loop.

Close the Loop
- % circular inflow
- % circular outflow
- % water circularity
- % renewable energy

Optimize the Loop
- % critical material
- % recovery type
- Onsite water circulation

Value the Loop
- Circular material productivity
- CTI revenue

This methodological guide explains how to calculate the indicators and can help companies to better assess circularity in their business lines and put figures on it.

Product as a Service (PaaS) is a step in the right direction

Three companies in our panel had a well-developed PaaS or leasing offer. We found that PaaS was well developed, that is the most usual way of contracting a device, for B2B in Multifunction Printers and Enterprise PCs. Benefits of the PaaS/leasing model are not only from a pure business perspective but also beneficial to the stakeholders: value can be maximized by relocation of equipment to another organization that has lower specification requirements, while repair, refurbishment or recycling should be ensured. It should also allow better traceability of materials, and help the establishment of closed-loop value chains. LCAs show a 25-30% impact reduction of PaaS vs transactional sales in terms of GHG emissions and resource efficiency. Thus, PaaS is a strong contributor to the much needed reduction of e-waste.

Based on our findings, we recommend companies to explore product ranges that can lend themselves to the PaaS business model. Nonetheless, we acknowledge that to bring this model to the B2C market is likely to be a challenge in light of low barriers (costs) for product change or upgrade and likely preference of consumers to retain ownership of their electronic device.

Conclusion

Companies are timidly starting to integrate the Circular Economy into their business processes and innovations. This integration must intensify and gain speed in order to be extended to all products. The Circular Economy must become a compass for the company in order to radically break with the economic model that is dominant today. For this, the highest management bodies - Board of Directors and Executive Management - must be trained and give a clear line.

Companies in the sector must also develop further eco-design and improve the collection and recycling rate in order to ensure a supply of raw materials while limiting the need to extract virgin materials. Companies must also develop product leasing, thus limiting the number of new products brought to market and thus the environmental footprint, while maintaining revenues through new services.

We are aware of the change in business model that this requires for companies based on the principle of "always more, always faster" but we are convinced that the companies that will integrate Circular Economy into their strategy will be the winners of tomorrow's economy.

CASE STUDY

Running a refurbished product line for multi function printers

Ricoh illustrates how a company can build new business opportunities while extending the life of its products.

What is the benefit of having a refurbished product line in Ricoh's offer?

Ricoh corporate clients are increasingly willing to minimize their carbon emissions, both for their direct and indirect operations. Since 2012, Ricoh's GreenLine offer has been providing refurbished copiers: an environmentally responsible service by significantly reducing CO_2 emissions through the reuse or recycling of parts and components. On some models, more than 95% of the existing parts and components by weight on the original model are reused or recycled.

How comes Ricoh, headquartered in Japan, had to set up a refurbishment center in France?

In Japan, Ricoh has established reverse supply chains and industrial processes since three decades. The company deployed similar supply chains close to its European end market. Relying on local procurement, logistics and workforce allows better efficiency (i.e.: reduced transportation time and lower associated carbon emissions).

Ricoh transformed its French factory, initially dedicated to the assembly of new photocopiers, to a European recycling center. This factory produces the Greenline range - that consists in refurbished products. Since 2012, more than 25,000 devices have been produced and more than 600 people are employed, a large third of whom (225 people) is directly involved in the repair, recycling and refurbishment of office products (multifunction printers, cartridges, spare parts, etc.), thus contributing fully to a Circular Economy.

How can Circular Economy deliver both an environmental and a social positive impact?

Standardization and industrialization of the processes and the recycling methods throughout Europe was the groundwork that allowed refurbished product range to become economically viable. Today, the GreenLine offering and its production process meet the most demanding environmental management and remanufacturing standards (ISO 9001, ISO 14 001, ISO 50001, etc.).

Besides, since January 2021, Ricoh Industrie France became the first French company officially certified "Service France Garanti" for a refurbishment service. This new certificate guarantees that at least 90% of the people involved in the realization of a service are subject to an employment contract under French law hence showing a contribution to local economy.

Table of best practices

The electronics and ICT sector

	Strategy	Commitments	Designing & preparing for a CE	End-of-life
Company 15	Definition of time-bound and measurable social impact goals, signed off by the Chair/CEO.	Implementation of a program through which for every product sold, the company will recycle or reuse one equivalent product by 2030.	—	Partnerships with recycling actors to come up with more accurate measures of product categories for devices recycled.
Company 16	—	Commitment to reach 100% recyclable surface devices by 2030. Achieve zero waste for company's direct operations, products and packaging by 2030.	Implementation of the WBCSD Circular Transition Indicators (CTI) methodology to measure the circularity of its Surface products.	—
Company 17	Review of KPIs on Circular Economy and of the progress of CE initiatives by the ESG Committee (chaired by the President of the company).	—	—	—
Company 18	—	—	Implementation of a recycling facility in Japan that manufactures a high number of recycled machines each year (about 10,000) and recycles a high number of units of parts per year (about 500,000) and specific reporting.	Collection of used products that are fully recycled or reused by the company (more than 200,000 units in Japan).
Company 19	Appointment of a Global CE Project leadership role was appointed to the European operation (given new regulations and local demand).	—	—	—
Company 20	—	—	—	—
Company 21	—	—	—	—

05

The fashion industry: making circular the "new look" of fashion

The fashion industry: making circular the "new look" of fashion

Over the past two decades, a concept called 'fast fashion' inherently changed the fashion industry. **Between 2000 and 2014, clothing production has doubled while 50% of it is discarded within the year.** In addition, 73% of our clothes are landfilled and only 1% is recycled into new clothes effectively. The impacts of fast fashion are detrimental to both the environment and society and the industry is in need of a circular makeover.

How can companies in the sector integrate the Circular Economy when their business-model today is based on sales, low prices and a fast turnaround of styles?

Fashion is one of the few sectors for which hard legislation is almost non-existent regarding the Circular Economy. Indeed, awareness of the sector's environmental impacts are recent and legislation has so far mainly focused on working conditions in the supply chain, especially following the Rana Plaza collapse in 2013 in Bangladesh. The sector must completely rethink its business model in order to drastically reduce its environmental footprint. To do so, Boards of Directors and Executive Management must define a clear strategy and above all review the way clothes are designed, sold and made for last, while managing and strengthening chemical safety.

Environmental impacts and consumer pressure are pushing the sector to become more circular

Fashion is currently a linear system that puts pressure on resources, pollutes the environment, degrades ecosystems and leaves circular economic opportunities untapped resulting in significant amounts of waste that are very little treated. Thinking of new business-models is becoming mandatory, even though the legislative pressure is nearly absent for this sector, unlike the other sectors of our engagement campaign (construction, TMT and autos).

The environmental impacts of the fashion industry are less known by the general public than the ones from other industries, such as the oil & gas or the transportation sectors. However, the fashion industry is a 1.3 trillion dollar industry that employs more than 300 million people along the value chain and has seen a strong increase in its environmental impacts over the last two decades with the rise in fast fashion.

Indeed, a growing middle class has increased per capita sales coupled with the rise of 'fast fashion', fashion brands characterized by quicker turnaround of new designs at lower prices with one reporting observing a fast fashion company having 52 "micro-seasons" in the calendar year[39]. Consequently, in the last 15 years, clothing production has doubled to reach more than 100 billon units a year vs 50 billon units in 2000.

39. Cline, Elizabeth. "Overdressed: The Shockingly High Cost of Cheap Fashion" August 27 2013.

THE CONSEQUENCES ON THE ENVIRONMENT OF THE HIGH INCREASE OF UNITS ARE NUMEROUS

Water related issues

Textile production (including cotton farming) uses 93 billion cubic meters of water annually exacerbating water issues in water scarce regions[41].

Industrial pollution related issues

On hazardous waste, textile production discharges high volumes of water containing hazardous chemicals. Globally, 20% of industrial water pollution globally is attributable to the dyeing and treatment of textiles[45].

Emissions related issues

In 2015, GHG emissions from textile production totaled 1.2 billion tons of CO_2e[42] which is more than international flights and maritime shipping combined[43]. If the sector continues on its current path it could use more than 26% of the carbon budget associated with a 2 degree pathway[44].

Oil related issues

Polyester clothing is plastic meaning it is made out of oil. The textile industry uses 98 million tons of oil per year, which is expected to increase to 300 million by 2050 at the current rate[40], increasing CO_2 emissions

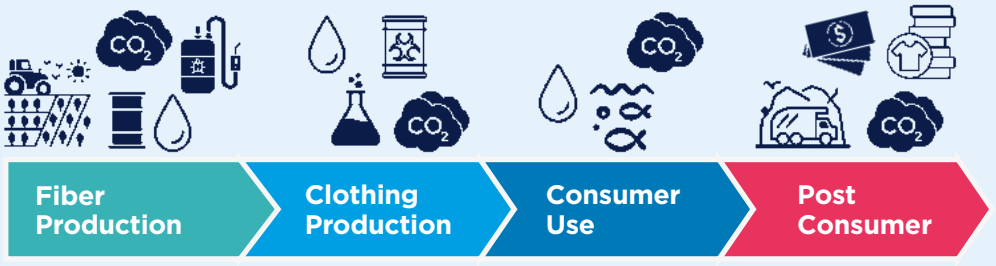
Microfibers related issues

The textile industry has been identified as a major contributor to the issue of plastic entering the ocean, which is a growing concern for the environment and human health. It has been estimated that every year around half a million tons of plastic and micro fibers shed during washing including polyester, nylon and acrylic which ultimately end up in the ocean[46]. In a business as usual scenario, the amount of fibers entering the ocean between 2015 and 2050 could accumulate to over 22 million tons which is about two thirds of the plastic based fibers currently used to produce garments annually[47].

Source : Amundi Asset Management

40. Ellen MacArthur, A New Textile Economy, 2017.
41. Ellen MacArthur, A New Textiles Economy, 2017.
42. Ellen MacArthur, A New Textiles Economy, 2017.
43. International Energy Agency, Energy, Climate Change & Environment: 2016 insights (2016), p.113.
44. Compared to the IEA 2°C pathway 2050 which allows for 15.3 giga tons of CO_2 equivalent.
45. Ellen MacArthur, A New Textiles Economy, 2017.
46. O'Connor, M.C., Inside the lonely fight against the biggest environmental problem you've never heard of, The Guardian (27 October 2014); International Union for Conservation of Nature, Primary microplastics in the oceans: A global evaluation of sources (2017), pp.20–21.
47. Ellen MacArthur, 2017.

Figure 16: The Fashion Industry's Linear Model is Highly Polluting

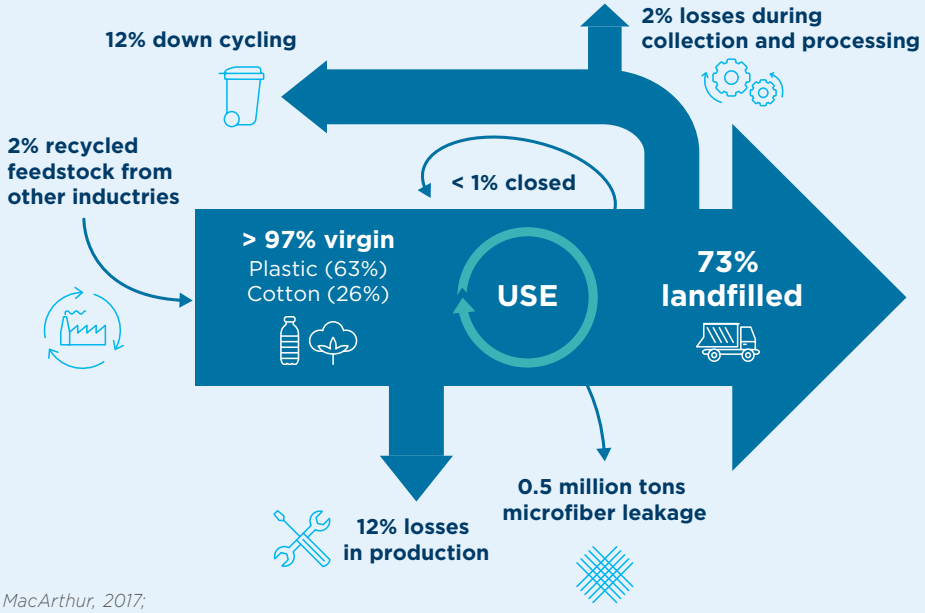


Source: Amundi Asset Management

Poor methods of clothing disposal came to general attention in 2018 when Burberry confessed that it incinerated its 30 M€ unsold stock. While this one company in particular received significant media attention, the method is still widely used in the industry to this day. While consumers were shocked by the practice, the reality is that consumers have a part to play in the way they buy, use and dispose of.

The environmental impacts of the fast fashion industry are exacerbated by the linear system in which the industry operates. More than 50% of fast fashion produced is disposed in under a year[48]. As seen in the figure below[49], 73% of clothes are landfilled while less than 1% of material used to produce clothing is recycled into new clothing, representing a loss of more than USD 100 billion worth of materials each year[50].

Figure 17: 73% of old clothes are landfilled while only 1% is recycled into new clothings



Source: Ellen MacArthur, 2017; Amundi Asset Management

48. McKinsey & Company, Style that's sustainable: A new fastfashion formula (2016).
49. EllenMacArthur, 2017.
50. EllenMacArthur, 2017.

When clothes are recycled, most of the inputs (12%) are down cycled or converted into a product for other industries of lesser value such as insulation material, wiping cloths, or mattress stuffing. While this extends their lifetime, they are difficult to re-use after representing the materials final use before disposal.

Some countries have high collection rates for reuse and recycling - Germany has a 75% collection rate for textiles[51] - but much of this collected clothing is exported to countries with no collection infrastructure of their own, meaning the clothing ultimately ends up in landfills or is burned.

Consequently, **when making new clothes, more than 97% of the materials are virgin materials while more than two-third of clothes are landfilled.** This is no longer possible when we think of the high environmental impacts, the limitations of raw materials, the costs and the social and ethics issues. It is time to implement the concept of Circular Economy in the fashion industry.

In order to do so, it is important to know what a Circular Economy means exactly for this industry.

Reinventing the way the fashion industry works to create a circular system

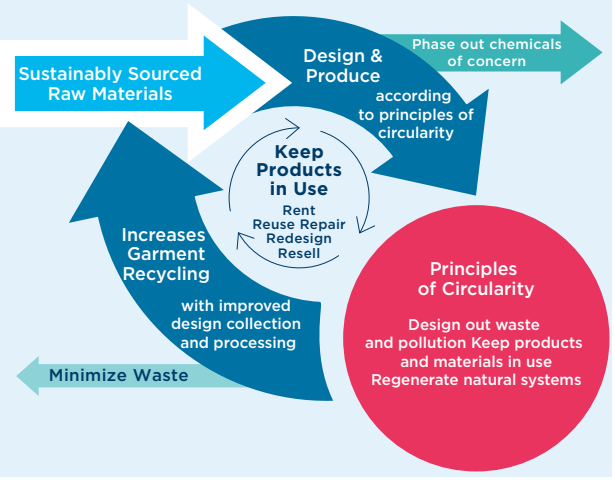
There is no one circular model but rather a variety of systems that work together to create a comprehensive circular strategy.

According to the Ellen MacArthur Foundation, one of the preeminent research institutions on plastic and the Circular Economy, **the Circular Economy for fashion has three key principles:**

- **Design out waste and pollution:** Design products without the negative impacts including GHG emissions, hazardous substances, pollution, and excessive water consumption;
- **Keep products and materials in use:** Design products for durability, reuse, remanufacturing, and recycling to keep products, components, and materials circulating into the economy. Circular systems will ideally make effective use of biologically based materials and encourage multiple uses before nutrients are eventually biodegraded;
- **Regenerate natural systems:** Avoid the use of non-renewable resources and preserve or enhance renewable ones such as by using nutrients to support soil regeneration or using renewable energy as opposed to fossil fuels.

A circular business model can present opportunities for the industry. If the fashion industry were to address the environmental and societal impact of the current industry status quo currently the overall benefit to the world economy has been estimated to be about EUR 160 billion in 2030[52].

Figure 18: A Circular System: Many Systems that Work Together



Source: Ellen MacArthur, 2017; Amundi Asset Management

A Circular Economy for fashion is not simply adjusting activities to reduce negative impacts. It requires a systemic shift to build long-term resilience, generate business and economic opportunities and provide environmental and societal benefits.

Based on our engagement campaign, we have identified three actions companies need to implement if they want develop Circular Economy in their process that we develop hereunder.

51. Fachverband Textilrecycling, Konsum, Bedarf und Wiederverwendung von Bekleidung und Textilien in Deutschland (2016), p.37; Ellen MacArthur, 2017.
52. Pulse of fashion industry report.

Defining a clear strategy on Circular Economy

While half of the analyzed companies do discuss Circular Economy at the board level, the topic is often strongly assimilated into sustainability overall, rather than being addressed as a distinct strategic topic. Consequently, **the Circular Economy is not thought of as a business strategy that will influence or modify deeply the business-model of the company but rather than an addition of myriad of small actions.** This does not enable companies to address the entire spectrum of opportunities offered by a circular model.

This is why **we encourage companies to better define what the key priorities are for them in terms of Circular Economy and to define a clear direction.** This will also help them to better identify their priorities, their commitments and their ambitions as we observed these are often too ambiguous in the companies. For example, all companies we engaged with had some type of commitments to increase sustainably sourced materials, which is good news. However, many of these commitments are shrouded in imprecise and unregulated terms such as "sustainable polyester" or "responsibly sourced materials". The use of ambiguous vocabulary is suspicious and more likely green washing than concrete and ambitious actions.

We acknowledge that a true Circular Economy is not yet completely possible but we encourage companies to better define the vocabulary they use. Stronger and true commitments will inspire increased investment in areas that still require development, such as fully cradle-to-cradle products, which no company had clear commitments on.

In order to do so, **we recommend companies implement more comprehensive training linked to Circular Economy that enable all levels of staff from top management to those in more operational roles to be empowered** with the skills and knowledge to better implement Circular Economy into all areas of the business. This can include people working in all types of roles including but not limited to sourcing, product development, marketing, omni-channel distribution, in store customer experience.

Rethinking the lifecycle of clothes: from design to waste treatment

Durability, Reparability and Longevity: the core foundation of a circular model

A Circular Economy in the fashion industry means to extending the life of clothes. **Clothing utilization rates have decreased by 36% compared to 15 years ago.** By helping clothing find a second (and third?) life, companies can address clothing waste and gain additional margins per item ultimately decreasing the production of new clothing.

Increasing durability, reparability and longevity is essential to make clothes last and it will involve actors across the entire value chain from manufacturers and brands to consumers. This includes manufacturing clothes made to last, marketing clothes as items to wear beyond a short micro season, and convincing consumers to help play a role in finding a second home for items they are not longer using.

Durability is essential to the Circular Economy but has historically only been an obvious characteristic for certain types of clothing such as outerwear and high performance sportswear. However, **promoting durability should be key for all product types and does not mean reduced revenues.** Patagonia has adopted a clear strategy around durability and has still seen significant growths in sales revenues. During the Covid-19 pandemic, many companies selling quality basics have seen sales soar[53]. Promoting product durability can help brands foster a closer relationship between a brand and a customer. Furthermore, warranties to promote durability can also incentivize customers to repair clothing and consequently help foster stronger customer loyalty and better access to customer data.

53. https://www.nytimes.com/interactive/2020/08/06/magazine/fashion-sweatpants.html

Reparability is thus also key to maximizing the longevity of a piece of clothing. Brands can promote reparability to consumers by offering reparability services to maximize longevity or personalization services to see damaged or worn products in a new and refreshed light. Repair or personalization programs can also incentivize increased foot traffic into stores and encourage new purchases while maximizing longevity of previous ones.

Unfortunately, we observed during our engagement campaign, that **very few companies have entered the life extension market for their products.** Only one company is really thinking about solutions to "refresh" purchased items with personalization and patch solutions for breaks or tears which demonstrates a massive gap in the sector regarding circular thinking.

To maximize longevity, companies can also promote product life extension by getting involved with the second hand market if a product no longer matches a consumer's needs. **Strong relationships between a brand and a customer better connect to second hand clothing markets, while enabling companies to earn additional margins off the second hand life of a product**. Luxury has historically been a more attractive market for second hand products, but new companies such as ThredUp who compete with fast fashion players on both price, variety, and brand selection are changing the game.

We only observed one company in our study who was beginning to take an active role in the second hand markets of products, but we think there could be more potential for this in the future

Other **business models that promote longevity can also be a growth opportunity for companies.** For example, clothing rental models which address demand for 'new' clothes while decreasing new clothing production, also have additional elements to their value proposition. Rental models can provide additional boutique services such as stylist services to customers and can benefit from increased customer data on key metrics such as sizing, comfort and styling concerns. Also, as switching costs are higher, subscription rental services can also encourage repeat business foster greater customer loyalty.

Consequently, **we encourage companies to broaden their business strategies to include new business models that help foster a Circular Economy.** In the first year of engagement we observed that the exploration into new Circular Economy linked business models was at the nascent stage for most companies. While it is up to companies to determine how to fit these new business models into their overall sustainability strategy we do see this as an area of great potential for fashion companies. Regardless, these new business models are popping up (often by rapidly scaling start-ups). They have the potential to destabilise the linear business-models used by large players of the sector posing a risk for large companies unless they come to the market with similar business models and services.

Encourage more effective clothing recycling through notably eco-design

Currently only 1% of textiles produced for clothing are recycled into new clothes and 87% of material used for clothing production is landfilled or incinerated after its final use. In addition to the environmental impacts, the low rates of recycling for clothing represent a lost opportunity of more than USD 100 billion annually. Increased recycling rates could help address high costs for landfilling and incineration.

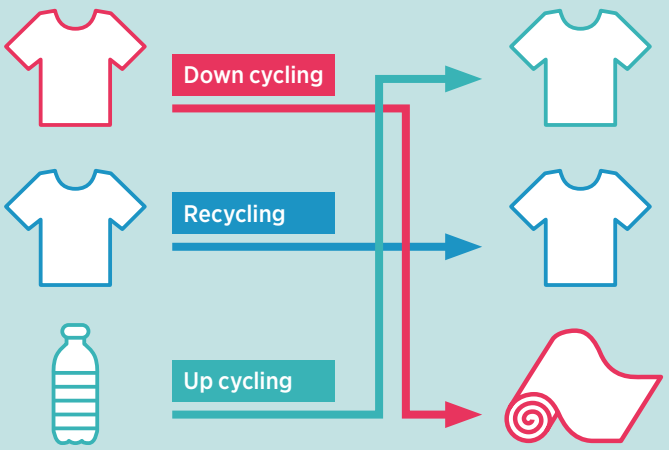
During our engagement campaign, we observed that very few companies had any clear strategy about managing the end of life of their own products. **While numerous companies had some sort of garment collection system, only one comprehensively reported on what precisely happened to the garments that were collected and, more specifically, how many were being made into new clothes or resold on a secondary market.** One other company of note was beginning to think through a more circular strategy for collection of own items (where the company has certainty over the inputs and assembly) to make them into new products, thus creates a potentially perfectly circular system. This is the most promising circular strategy we observed as it means companies are directly trying to create a circular model, managing the impacts of their own clothing.

We do believe that robust collection infrastructure is necessarily to enable a circular model. **Companies must start taking responsibility for the end of life of their clothing but do so in a way that helps, not hinders a Circular Economy.** Clothing collection

presents an opportunity for companies to source valuable CE compliant feedstock to make (and re-sell) products; however, there remains a disconnect between collection systems and recycling channels. In Europe and the US, nearly 70% of clothes collected are considered reusable[54], but only 20% of these clothes are actually resold in domestic markets[55].

Many companies are developing collection systems but they are often more of a marketing ploy and the company does little to actually manage the end use of these products (beyond outsourcing the collection to a third party and not taking an active role in the end of life of the product).

WHAT IS THE DIFFERENCE BETWEEN UP CYCLING, RECYCLING AND DOWN CYCLING?



There are three main obstacles to recyclability as of today: first, recyclability of the product is not taken into account in the designing process; second, designers use several materials for one piece of clothing making the disassembly more difficult; third, there is still a lack of transparency on material specifications between the various actors of the industry. Because of these main obstacles, the current reality of clothing recycling is not feasible in a closed loop system.

We can classify the recycling process into three kind of recyclings: up-cycling, recycling or down-cycling.

- Upcycling means transforming products into something of higher value (such as plastic bottles to new clothing).
- Recycling means converting waste material to a new item of approximately the same value.
- Down-cycling is material that is often recycled into lower value applications. For clothing, this often means cleaning cloths, insulation material and mattress stuffing. While this extends the life of these textiles, they are ultimately still discarded.

The ultimate goal in a circular fashion system is to take clothing feedstock and convert it to equal or greater value clothing. Currently only 2% of inputs for clothing production comes from recycled materials, most of this is made from recycled PET bottles and not from actual clothing. While this is a positive step for the industry, it is not completely circular. Furthermore, it could prevent the food & beverage industry from incorporating their own plastic back into their own system and suppress the market to incentivize clothing to clothing recycling.

Source: Amundi Asset Management

54. Ellen MacArthur
55. Rodgers, L., Where do your old clothes go?, BBC (11 February 2015), http://www.bbc.co.uk/news/magazine-30227025
56. http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm
57. Ellen MacArthur, 2017

Developing effective clothing collection that feeds into a circular model will also help companies to reduce potential regulatory risks. Some governments are considering Extended Producer Responsibility policies where producers of a product are given the responsibility (whether financial or physical) to manage the treatment and disposal of post consumer products. **While policies so far are not yet focused on the fashion sector, one day they could. Companies that are already managing the end of life impacts of their products are well prepared for possible legislation[56].**

We know that recycling clothing is great in theory but difficult in practice, mainly because garments are not designed for recyclability. This is why we encourage product developers to consider the recyclability of clothing when designing products. Clothing needs to be designed for end of life in addition to functionality, style, etc.

There are multiple ways of doing so. First, **designers need to design for disassembly, which means considering the breakdown and recyclability of all components from threads to buttons.** Second, **we encourage designers to use as much as possible one single material or a well-defined blend that is known to be recyclable.** The fashion industry uses a wide variety of materials and blends brought to the market for both cost and durability reasons, which makes it difficult for recyclers to capture the full material value of clothes they receive[57]. Third, we think that brands overall need to be transparent about their material specifications and guidelines are needed between designers, buyers, textile mills, and recycling facilities to ensure alignment. This will help increase the recyclability rate.

Maintaining and strengthening chemical safety

Chemicals in the fashion production enable a wide variety of colors, water and stain resistance, and increased durability. However, many of these chemicals have significant potential adverse affects in production, use, and after use phases. **Every year 43 million tons of chemicals are used to produce textiles and are used throughout the production process** from fibre production to dyeing, treating and finishing[58]. These chemicals remain within the garment both intentionally and unintentionally which raises concerns about the impacts they can have on the environment[59]. These chemicals can complicate a circular model as in the first life of a product these chemicals might be within safe limits, these chemicals can accumulate when garments are recycled reaching unsafe levels.

Unfortunately, the industry is characterized by very low transparency over chemical use making the true scale of chemical pollution and its associated impacts difficult to evaluate.

In our study, overall companies demonstrated strong concern and consequently seemingly strong management of chemical safety but concrete actions and reporting are still lacking. First, while companies commit to and abide by chemical safety standards such as EU REACH[60] and ZDHC[61]. This is a strong step but much more is needed. Companies often have their own restricted substances list (RSLs) but a lack of standardization makes it difficult for supplies to abide by a uniform list and in fact eliminate all chemicals of concern. Standardization also means increasing commitments to chemical safety certifications that ensure chemical compliance with a Circular Economy[62].

Sadly, no companies in our study demonstrated commitments to these certifications. While understandably difficult, certifications allow for full disclosure of materials used in a product, which is essential to enable a Circular Economy.

Second, companies need to increase collaboration and collective action to build up chemical safety standards for a Circular Economy. **Chemicals that are considered safe for use in production does not mean they are safe for use in a circular system where the levels of chemicals can augment significantly if garments are broken down and rebuilt in the recycling process.** Further innovation is needed to create momentum and scale for new, safer chemical alternative. Collaboration is needed between brands to help push for innovation but also collaboration is needed between all actor across the value chain including mills, factories, and chemical producers so that standards and ambitions are aligned.

58. For every kilogram of fabric, an estimated 0.58kg of various chemicals are used. Between 0.35 and 1.5kg of chemicals go into the production of 1kg of cotton textile (see Bluesign, Environmental Health & Safety (EHS) guidelines for brands and retailers (2011)).

59. Greenpeace, Dirty laundry: Unravelling the corporate connections to toxic water pollution in China (2011), p.70.

60. Mandatory EU Chemical Safety Regulation.

61. Zero Discharge of Hazardous Chemicals. Voluntary commitment to achieve greater transparency on chemical use in supply chains and commit to zero discharge of hazardous chemicals https://www.roadmaptozero.com/?locale=en.

62. Certifications include Bluesign, Cradle to Cradle, Oeko Tex Eco Passport.

Conclusion

In order to limit the environmental impacts of the fashion industry, three key words must now be applied to all clothing production: durability, reparability and longevity. Fast fashion has dedicated itself to low quality clothes that consumers do not even take the time to repair but prefer to throw away to buy new ones, thus leading to an extremely limited life span of the garment, all this at low prices. **The "new" fashion should be the opposite: raw materials should be carefully selected to ensure the smallest environmental footprint (water, pesticides, etc.), design and quality thought so that the garment can be repaired and live as long as possible but also be disassembled easily as to facilitate the recycling of materials and thus ensure the manufacture of new clothes.**

If the big established companies of the sector have difficulty in innovating and integrating the Circular Economy, **we see many start-ups entering the Circular Economy game.** These start-ups are experiencing dazzling success and are beginning to overshadow the major companies by competing with them, including by taking customers from them and by making the notion of "second hand" fashionable again –under the name "vintage". The major brands are aware of this new competition and are trying to get in on the action, in particular by taking shares in these start-ups (Kering at Vestiaire Collective or Cocoon). **However, the change in business model is still too discreet to speak of a real revolution. The European Union's New Circular Economy Action Plan and the change in consumer mentality are however signs of hope.**

CASE STUDY

▸ adidas

Adidas was one of the top performers in our study but there were a few particular points that made the Adidas case so interesting. Adidas has a clear strategy specifically on the Circular Economy. Discussed at board level, they have three clear strategy loops representing different avenues and opportunities of CE (scaling polyester loop, R&D loop, and regenerative loop). Adidas has clear goals around circular polyester and aims to replace all virgin polyester with recycled products where a solution exists. By the end of 2020, 60% of all polyester used for apparel and footwear ranges were recycled polyester demonstrating that circular thinking is already starting to scale.

What made the Adidas case so unique?

Concerning the end of life of their products, Adidas is aiming to implement a global product take back program to all key cities and markets where they will incentivize customers to bring in old Adidas clothes (in exchange for vouchers) so that the clothes can be re-made into new products. The Adidas strategy is to take back their own clothes - where they have certainty over the inputs and assembly - to make them into new products, thus creating a perfectly circular system.

What was so unique was their vision for this takeback program. Other companies in the study had much larger clothing collection programs, but the Adidas strategy is less about marketing and more circular in strategy. Being sure of the quality of the products will help Adidas transform old products into new products which is difficult if they know the exact inputs including fabric and chemical composition. While the global take back program is being implemented incrementally (as it takes time to scale), in the long term this could mean the difference between a marketing ploy and a real Circular Economy.

Going forward, are there any recommendations for Adidas?

While Adidas is proactive in advancing the Circular Economy, they currently have limited programs around promoting longevity and reparability of products. Quality is a key element to sportswear and there could be opportunities to more clearly integrate longevity and reparability into the value proposition of Adidas products. Furthermore, while they have ambitious goals concerning the Circular Economy, some of these goals could use more granularity. For example, while it is understandable that Adidas cannot yet commit to making certain products circular if there is currently no viable solution, it would be helpful to have a sense of what percent of the products do not have a solution at present.

Table of best practices

The fashion industry

	Strategy	Commitments	Designing & preparing for a CE	End-of-life
Company 22	Formalized, top down commitments and strategies around Circular Economy with twice yearly sustainability performance reports to board of directors.	—	Active member in numerous initiatives including key work with major CE linked groups. Strong supplier relationships that include more business opportunities for more sustainable suppliers Significant investment in new technological solutions.	Robust garment collection strategies with reporting on what happens to garments collected. Some engagement with customers on garment care to prolong the life of the product including repair services in certain markets.
Company 23	All managers have sustainability KPIs linked to bonuses. Sustainability committee oversees group's sustainability strategy and CE is one of the main pillars for their 2025 targets.	Finishing up 2020 volume based material targets and moving towards product based targets which is significantly stronger as material mixes and products are not necessarily circular even if separate materials are "responsibly" sourced.	—	—
Company 24	—	—	Strong supplier partnerships including a core group of strategic suppliers that have a long working relationship with the company. Supplier trainings linked to Circular Economy including best practice guidance for suppliers. Scope 3 reduction targets for suppliers on water, energy, and waste.	Clear strategy to manage the end of life of own products with global take back program of own products in development where inputs are known so it can be re-made into new products.
Company 25	—	—	—	Clear repair/personalization strategy to help clients refresh items and extend longevity. While only a pilot so far it offers great potential
Company 26	—	—	Centralized logistics that presents an opportunity to accelerate circular strategies across supply chain	—
Company 27	—	—	—	—
Company 28	—	—	—	—

06

Conclusion

Conclusion

The need to combat climate change will profoundly change our society in the coming years and will change the business models of companies. Companies will have to integrate new constraints to limit the environmental impacts of their activities. They will therefore have to identify and assess their environmental impacts in order to find remedial solutions or imagine new ways of doing business.

The Circular Economy can be one of the answers to limit negative environmental impacts. By focusing on the use of goods and not on the good itself and by improving the environmental profile of products - thanks to the economy of functionality, the extension of the lifespan, eco-design, etc. - the Circular Economy makes it possible to reduce our consumption of raw materials and goods and thus to limit our impact on Nature and on global warming.

The commitment we have carried out with four sectors and nearly thirty companies confirms that the Circular Economy is a relevant and necessary response for all sectors. However, the answers to be provided are diverse and some pillars may be more prevalent in some sectors.

The level of knowledge of the Circular Economy remains very variable depending on the sector. **The companies interviewed still too often reduce the Circular Economy to waste management alone.** Companies still need to complete their knowledge of this concept, especially in order to integrate it from their R&D and thus consider the whole life cycle of the product from its creation to its treatment as waste, including the possibility of extending its life span (simplification of repair, dismantling, etc.).

The implementation of the concept in the four sectors studied also varies from one sector to another. **We found that B-to-B companies (Auto, Electronics and ICT, Fashion) are ahead in comparison with the construction sectors.** The reasons are different: twenty-year-old regulations for the automotive sector and a rethinking of the business model (switch from internal combustion engines to electric), increasing regulations and repeated scandals that have led to court sentences for certain practices for the Electronics and ICT sector, and increased ecological awareness for the fashion sector. The construction sectors remains behind because the renewal rate of its products is much lower than for the three other sectors and it has to manage an ageing building stock which has not been designed with the principles of the Circular Economy. The integration of the Circular Economy is more difficult in a sector where goods last several decades than for products that are manufactured and renewed almost annually.

However, **our study has shown that the integration of the Circular Economy by companies has accelerated over the last five years.** European regulation is obviously playing an important role which should not be denied since the Circular Economy is one of the pillars of the New Green Deal promoted by the EU to reduce its CO_2 emissions by 55% by 2030 and become a carbon neutral continent by 2050. However, **companies will have to confirm that their good intentions and the pilot projects they put forward are turned into action and deployed on a large scale.**

See you in two years' time to make sure that the companies' promises are implemented and evaluated again!

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