



CIRCULAR ECONOMY

FOR A SUSTAINABLE FUTURE

How organizations can empower consumers
and transition to a circular economy

EXECUTIVE SUMMARY

The circular economy, which aims to move economic and production processes away from linear take-make-waste to more circular and regenerative processes, can significantly contribute to sustainable development and reduce the pressure on finite resources. In this report, we look at consumer awareness, behaviors, expectations, and roadblocks as they relate to the circular economy.

Consumer awareness about the problem of waste is high and consumers are keen to adopt mindful practices such as reducing consumption, reusing and keeping products in use for longer, and recycling. They are also keen to support organizations that engage in circular practices and are willing to reward such companies while simultaneously adopting certain circular practices themselves, most of which are limited to the post-use phase of the product lifecycle (segregating waste, giving away/donating products, etc.). However, consumers face significant motivational and practical roadblocks to adopting circular practices. For instance, we found marked reticence to renting or leasing products. Consumers also face roadblocks related to cost, convenience, access, and lack of information which prevent them from taking circular actions.

Consumer products and retail as well as automotive companies must therefore do more not only to encourage and enable consumers to practice circularity, but also to manage their own operations through a circular lens. Today, while most consumers expect organizations to take steps towards circularity, many feel that organizations are

not doing enough to those ends. Moreover, organizations, in their own maturity assessment towards circular practices, reveal that they have not invested adequately in circular initiatives within their value chain.

Our findings identify the necessary and urgent actions organizations must take to enable the circular economy. Organizations must radically rethink their business models to define alternative revenue channels that are not solely driven by product sales while also embracing circular design principles in their production processes. Organizations should also rethink their value chains and try to “close the loop” wherever possible through greater collaboration within their ecosystem as well as externally with governments, academics, think tanks, etc. In addition, organizations must continue to leverage emerging technologies such as internet of things (IoT), blockchain, and AI, which can significantly aid in tracking and tracing product and material flows within their supply chains, while building the organizational foundations for a circular mindset through skill building and culture change for employees, greater governance, and leadership accountability. Lastly, companies must continue to encourage greater consumer adoption of circularity by providing more information, building trust and awareness, and shifting consumer mindsets. In the long term, the circular economy stands to benefit organizations, consumers, the environment and society at large and it is imperative that companies take actions today to enable it.

INTRODUCTION

More than 100 billion tons of resources enter the economy every year – everything from metals, minerals, and fossil fuels to organic materials derived from plants and animals. However, less than 10% of these resources are ever recycled. Use of resources has tripled since 1970 and is set to double again by 2050. If this continues, we will need the resources of an extra planet to support our current usage sustainably.¹ Getting access to raw materials is becoming increasingly difficult and organizations already face supply chain issues with rising container prices and increased costs of transportation, all of which are destined to increase if current production processes remain in place. The increasing demand for critical raw materials destabilizes prices and markets, and increases the risk of supply rupture. This is fundamentally unsustainable and imperils countries' development and production processes.² The European Union has identified the circular economy as a pivotal strategy to address material criticality issues.³

Not only does the overuse of finite resources lead to their depletion and damage to the natural world, but rampant consumption is exacerbating the devastating effects of climate change. The *atmospheric levels of CO₂* are today at their highest point in hundreds of thousands of years.⁴ The Intergovernmental Panel on Climate Change (IPCC) 2021 report, in no uncertain terms, urgently calls for greater efforts to mitigate the wide-ranging impacts of climate change.⁵

A study from the Ellen MacArthur Foundation suggests that efforts to combat climate change have thus far focused mainly on the critical role of renewable

energy and energy-efficiency measures. However, meeting climate targets also requires tackling emissions associated with production; those that arise from the management of land, construction, food production, and the manufacture of vehicles, electronic products, clothes, packaging, and other goods we use every day. The circular economy concept offers a systemic, cost-effective approach to tackling this challenge.⁶

It is more urgent than ever, therefore, to shift from linear, "take-make-waste" models to a "closed loop" circular economy, where waste and pollution are minimized; products and materials are kept in use for longer; and natural systems are allowed to regenerate. As Alejandra Vazquez Langle, global sustainability director at Grupo Bimbo, a Mexican food-processing multinational, comments:

"We need to balance the needs we have for raw materials and resources in the industry with the impacts we have as an industry, and circularity is critical to this balance. Reduction in use of raw materials and water and other resources will reduce our environmental footprint and also create economic opportunities with reduced raw-materials costs and greater reuse. At Grupo Bimbo, as of 2020, we have been able to shift 90% of our packaging to be recyclable, 91% of our total operational waste is recycled, reused 82% of treated water in general services and we have been able to reduce the use of plastic by more than 290,000 kgs in 2020. We believe that sustainability is part of the business and helps us achieve our purpose of nourishing a better world."

Understanding the circular economy

The Ellen MacArthur Foundation defines the circular economy as “a systemic approach to economic development designed to benefit businesses, society, and the environment.” In contrast to the “take-make-waste” linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources.⁷ Examples of circular economy practices include reducing purchases, buying products that are recyclable or made with recycled materials, buying used or refurbished products instead of brand-new ones, repairing and reusing products instead of replacing them, and recycling products instead of throwing them away.

Figure 1 Defining circular economy



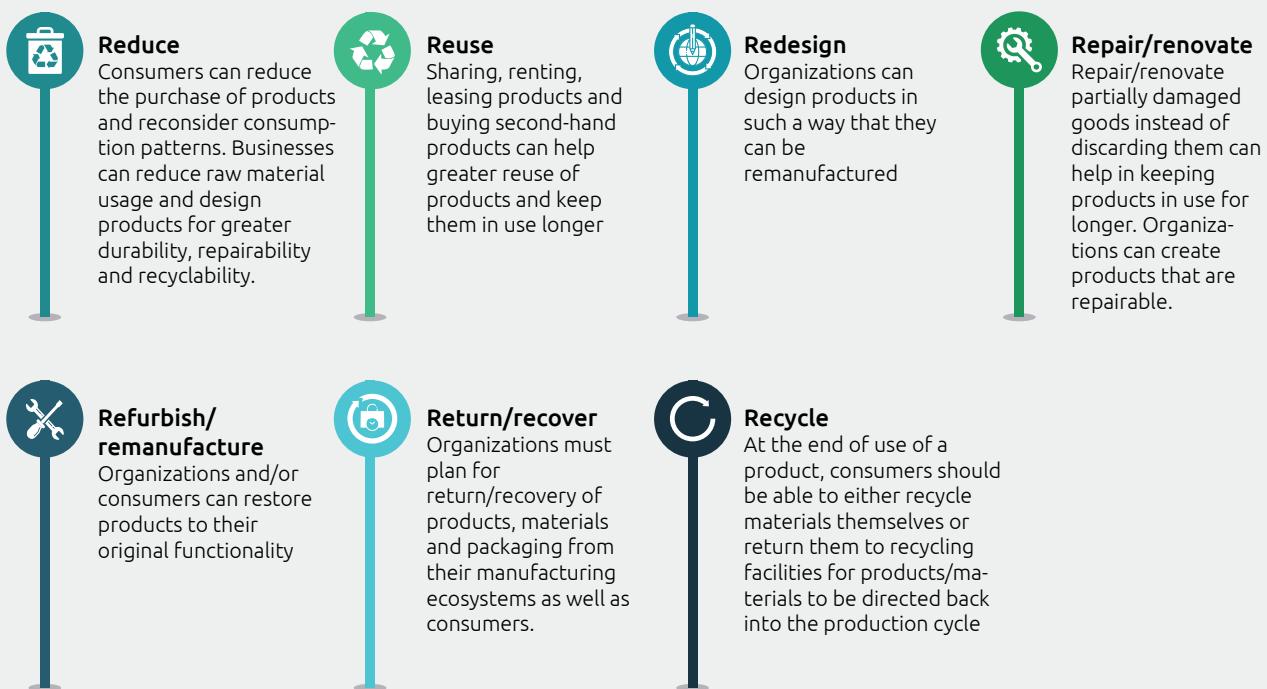
Source: Ellen MacArthur Foundation.

The Ellen MacArthur Foundation's circular economy model distinguishes between biological and technical cycles:

- In biological cycles, food and biologically based materials (e.g., cotton or wood) feed back into the system through processes such as composting and anaerobic digestion. These cycles regenerate living systems (e.g., soil), which provide renewable resources for the economy.
- Technical cycles recover and restore products, components, and materials through strategies including reuse, repair, remanufacture, or (as a last resort) recycling.⁸

A circular economy framework encompasses many stages and processes. The primary ones are highlighted below; something we also highlighted in our sustainability in consumer products and retail research.⁹ The below figure highlights the broad framework that can help organizations understand and assess their current impact and identify opportunities to embrace circular economy principles.

Figure 2 Framework for enabling a circular economy



Source: Ellen MacArthur Foundation.



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ALEJANDRA VAZQUEZ LANGLE

Global sustainability director, Grupo Bimbo

The circular economy is clearly beneficial to sustainability efforts, but it also offers economic benefits to organizations. At Dutch multinational Philips, green products and solutions contributed 71% of total revenue in 2020, while 15% came from circular economy products and solutions. Revenue in these two areas has been growing significantly in recent years, with an increase of 6% from 2019 for green products and 15% for circular products and solutions (circular products are those that meet specific circular economy requirements).¹⁰ According to the European Commission, greater efficiency throughout the supply chain could reduce the need for new raw materials by up to 24% by 2030, with annual savings for European industry estimated at €630 billion.¹¹

Wulf-Peter Schmidt, director of sustainability, advanced regulations and product conformity, Europe at Ford, agrees with this principle: *"Of course, there are all sorts of environmental benefits linked to the circular model. But, economically as well, the use of secondary materials brings benefits in terms of reduced use of resources thereby reducing market and supply pressures."*

It is clear that the opportunity for investment in the circular economy is huge; many financial companies and investors have already recognized this. As Anna Tari, president and CEO of the Circular Economy Institute, comments: *"Large global companies now have to share their ESG targets and timelines with shareholders and other stakeholders, just as they would release their financial results. In this light, the market, both from the consumer-demand side and from the shareholder side, is systemically demanding that companies become sustainable and circular. This is a transition to an entirely new economic model and a shift that everyone is invited to join. Those missing out on this opportunity will likely face economic hardship and will probably not be as competitive."*

Moreover, consumers are increasingly demanding more sustainable practices from the brands with which they interact, and expect to see positive outcomes for the planet through their purchases. As our study on sustainability in consumer products and retail suggests, nearly 80% of consumers want to contribute to saving the planet for future generations. Consumers have a significant role to play in enabling circularity for organizations with their purchase, use, and post-use decisions.

To understand consumer awareness, demands, and behaviors as they relate to circularity practices for major consumer-facing industries, and to understand what organizations can and should do to promote greater circularity, we conducted an extensive study, including:

- A survey of nearly 8,000 consumers across the US, the UK, France, Germany, Italy, Spain, the Netherlands, Sweden, Norway, India, China, Japan, Australia, and Singapore covering major consumer-facing industries such as automotive, consumer products, and retail (including food, personal- and household-care products, fashion and clothing, furniture, consumer electronics, and white goods).
- In-depth interviews with academics, industry experts, startups, and think tanks that work in the field of circular economy (more details on the research methodology are available at the end of the report).

Drawing on this extensive research, our report focuses on a few key themes:

- The awareness and behaviors of consumers around circular practices
- The roadblocks to greater consumer adoption of circularity
- Consumer perception of organizational lack of action on circular initiatives
- Steps organizations can take to transition to a circular economy model.



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WULF-PETER SCHMIDT

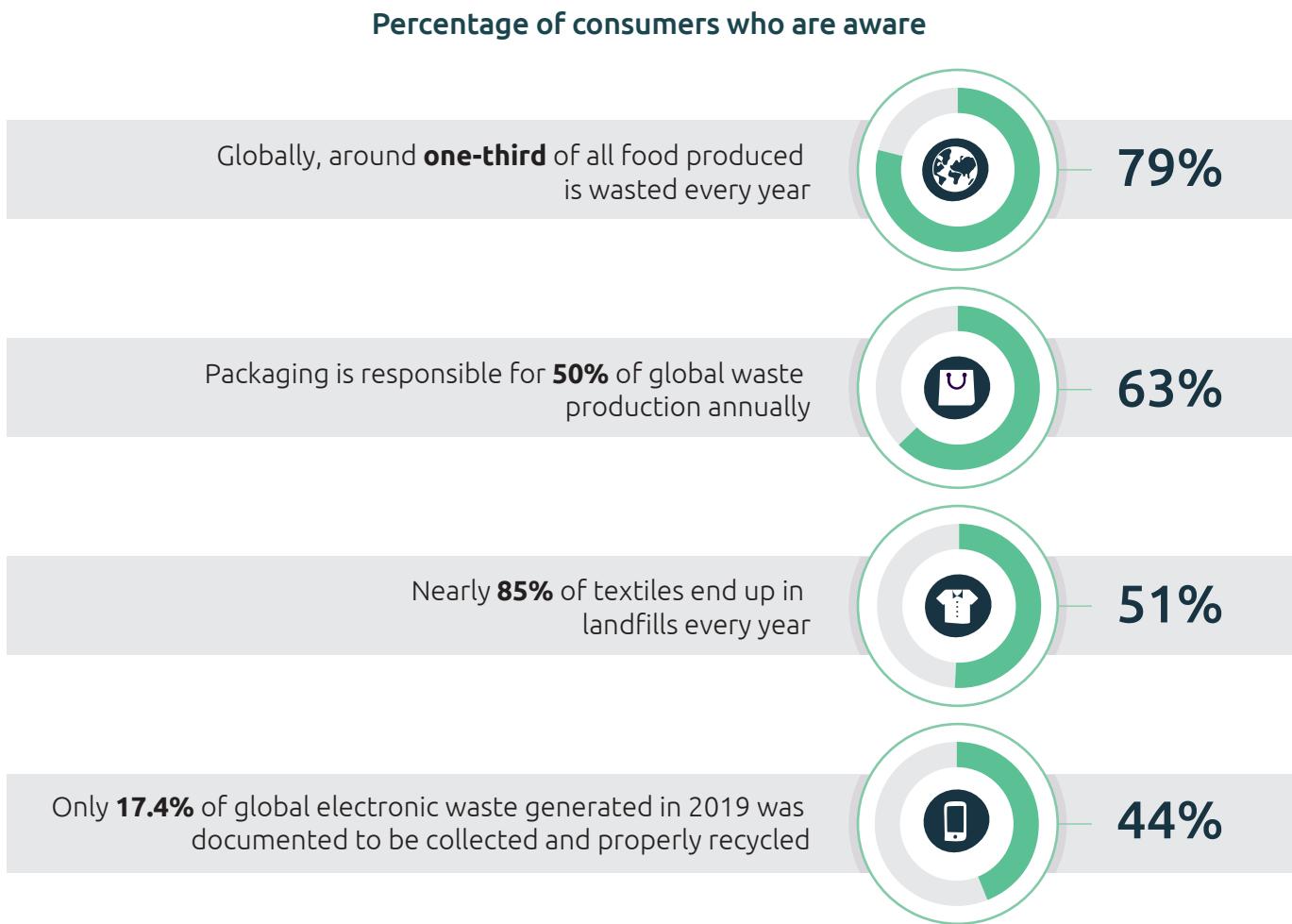
Director of sustainability, advanced regulations and product conformity, Europe at Ford

1. Consumers call for action on waste

Consumer-awareness levels are highest around food and plastic waste

Our research shows that consumers are aware of and concerned about issues of waste and resource depletion. Awareness levels are especially high for food and plastic waste. Close to eight in ten (79%) consumers say they are aware that one-third of food produced globally is wasted every year, while 63% are aware of the enormity of the global plastic waste problem (see Figure 3). However, consumers are less aware of the problem of fashion and e-waste. Among the countries covered in our survey, consumers in France reported the highest levels of awareness on food, plastic, and textile waste issues (further details on country-wise awareness levels can be found in the Appendix).

Figure 3 Consumers are highly aware of the enormity of the food and plastic waste problem



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers; UN Environment Programme, "Worldwide food waste.;" Our World in Data, "Plastic Pollution.;" World Economic Forum, "These facts show how unsustainable the fashion industry is.;" United Nations Institute for Training and Research, "Global e-waste surging: up 21 per cent in 5 years."

Close to two-thirds (64%) of consumers are also aware of the environmental issues associated with electric vehicle (EV) battery production and disposal (such as the use of rare metals and the hazards of improper EV battery disposal). Respondents in India, Spain, and Germany reported the highest levels of awareness on this issue.

Consumers are keen to adopt mindful consumption practices

We also found that consumers are keen to adopt circular practices (see Figure 4). Further, 79% of consumers cite contributing to reducing waste creation as a reason for taking circular actions. Key areas of consumer interest are:

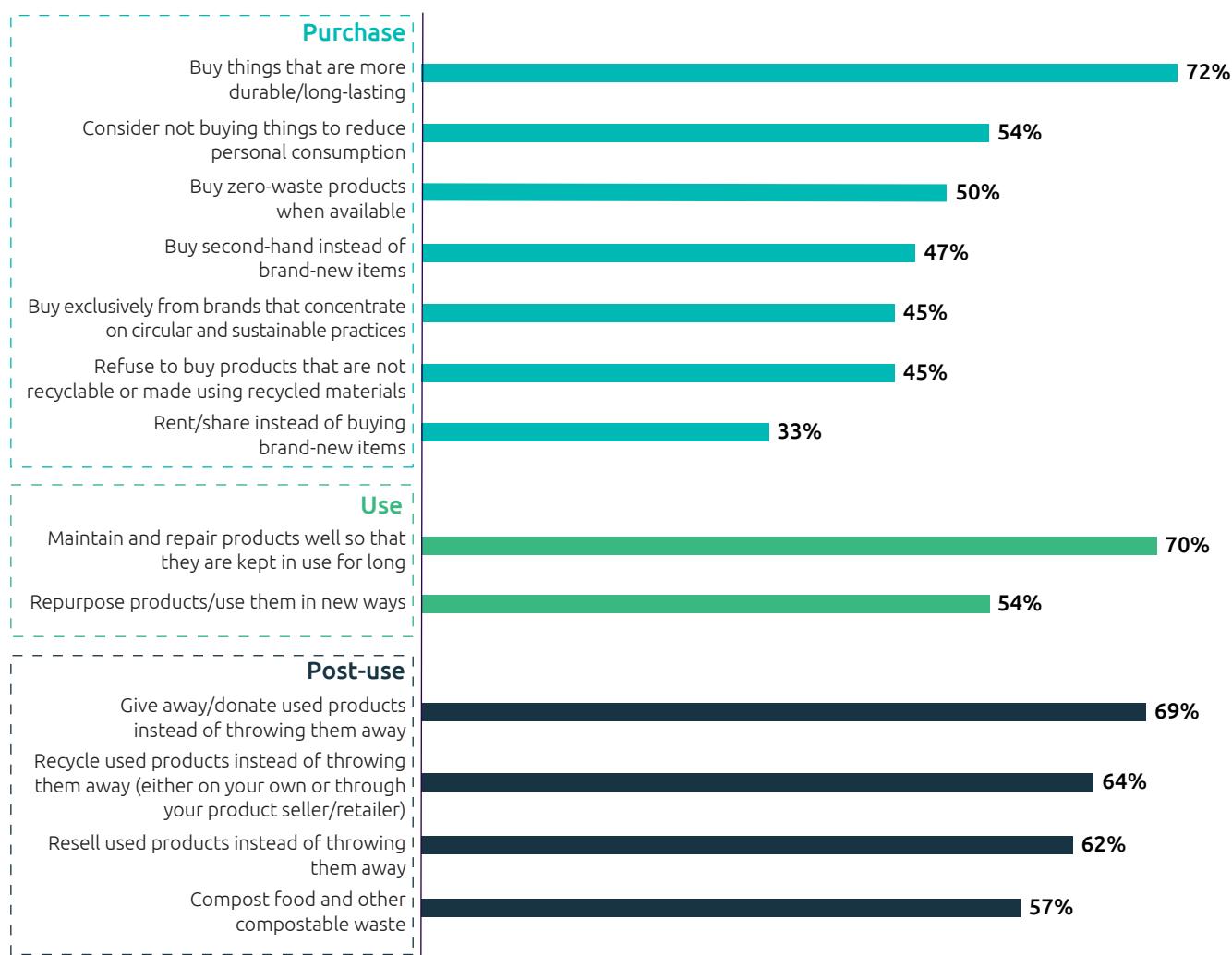
- **Reducing consumption:** 54% of consumers are keen to reduce their overall consumption by purchasing less.
- **Buying better-quality products:** 72% are interested in purchasing more durable products, and 50% are interested in purchasing zero-waste products.

- **Extending product life:** 70% are interested in maintaining and repairing products to increase useful product life, and 54% would like to repurpose and reuse old products.
- **Responsible product disposal:** 69% are interested in giving away or donating used products, 64% are interested in recycling, and 62% are interested in reselling used products.

Interest in circular practices correlates with the ease with which consumers can adopt them. Renting, for instance, is among the actions that consumers say they are least interested in. It is also the most difficult action to take according to consumers; 45% of respondents say that it is difficult for them to rent products, compared to 30% who say it is difficult for them to recycle.

Figure 4 Consumer interest in circular practices

Percentage of respondents who are interested in taking the following actions



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

54%

Share of consumers who are keen to reduce their overall consumption by purchasing less

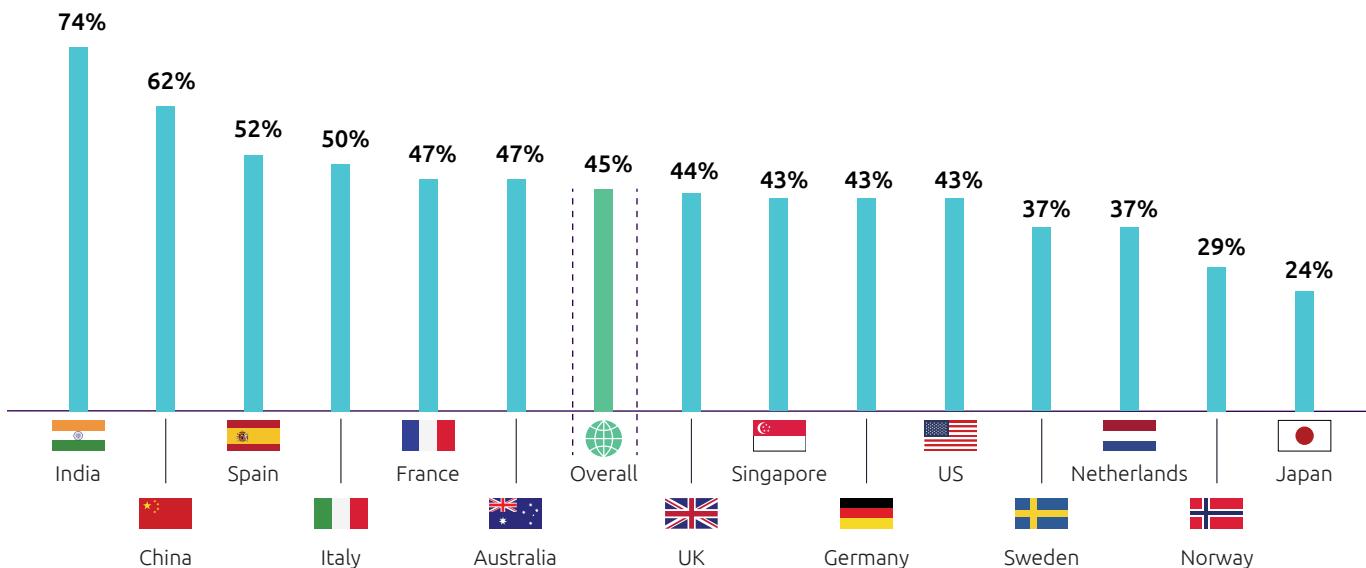
70%

Share of consumers who are interested in repairing products to increase useful product life

Further, as Figure 4 shows, as many as 45% of consumers say they are keen to buy exclusively from brands that concentrate on circular and sustainable practices. This interest is particularly pronounced in India and China as we see in Figure 5 below.

Figure 5 Consumer interest in buying exclusively from brands that practice circularity

Percentage of respondents who say they are interested in buying exclusively from brands that concentrate on circular and sustainable practices



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Consumer interest in circularity is translating into action

Consumers are pivoting towards companies that engage in circular practices

Consumer concerns regarding waste and resource depletion are prompting changes in purchase preferences. We found that consumers are shifting their spending towards companies that practice circularity. This is especially so in areas where consumer awareness is highest – i.e., around food and plastic waste. For instance, 44% of consumers have increased their spending in the last 12 months on food and beverage companies that focus on practices such as reducing, reusing, and recycling waste, and 40% have done so for personal- and household-care products.

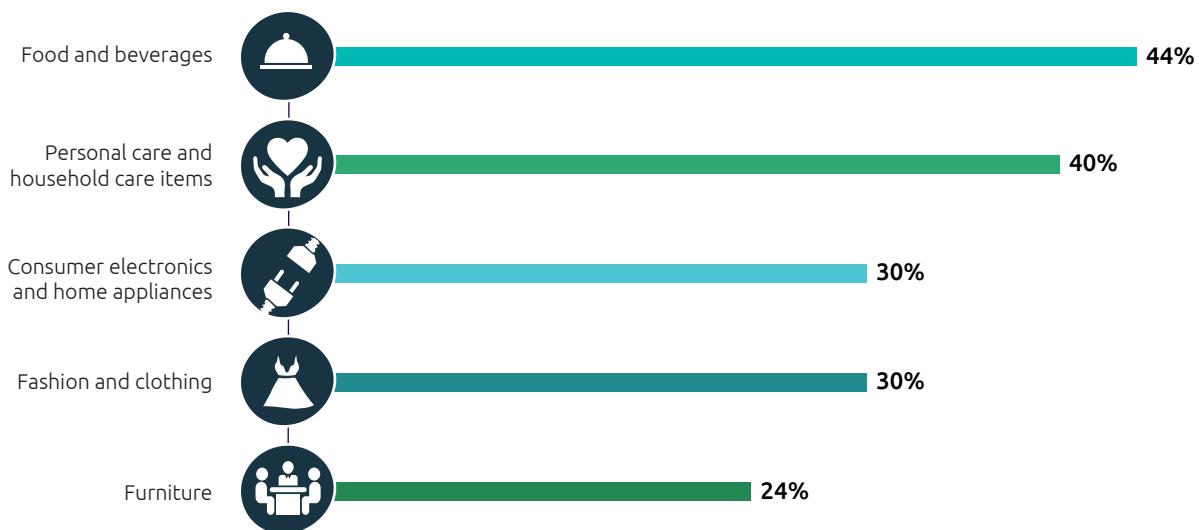
In contrast, the shift in spending is lower in areas where consumers are less aware of the impact of the industry on the environment. For instance, only 30% have increased their spending on fashion and clothing companies that practice circularity, and only 24% have done so for furniture companies (see Figure 6). The lower shifts in spending can also be attributed to the lower frequency of purchases of consumer electronics, fashion, and furniture products, compared to products in the food and beverages and personal- and household-care categories.

44%

Share of consumers who say they have increased their spending in the last 12 months on food and beverage companies that focus on practices such as reducing, reusing, and recycling waste

Figure 6 Consumer awareness is translating to increasing spending on companies focused on circular practices

Percentage of consumers who said that their spending increased in the last 12 months for companies that engage in practices such as reducing, reusing, and recycling waste (by product category)



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Consumers are adopting day-to-day circular practices

Consumers are already incorporating elements of circular practices into their everyday lives. For instance, circularity impacts product choices: 41% say they regularly buy food products that use minimal packaging, 37% say they are moving away from fast fashion, and 31% say they regularly buy electronic products based on their repairability. Circularly is also a factor in the way consumers use products; for instance, 48% say they reuse plastic bottles, and 35% say they repair electronic products instead of replacing them. Finally, when it comes to disposing of products, 58% say they segregate and dispose of food and packaging waste (see Figure 7).

37%

Share of consumers who say they are moving away from fast fashion

Figure 7

Actions that consumers are regularly (i.e., more than 50% of the time) taking across product purchase, use, and post-use

Product category	Purchase	Use	Post-use
 Food and beverages	41% Buy food that uses minimal or no packaging*	45% Consume food beyond best-before date if it has not gone bad	58% Segregate and dispose of waste
 Personal and household care	40% Buy products that use minimal packaging**	48% Reuse plastic bottles	53% Segregate and dispose of waste
 Fashion and clothing	37% Move away from fast fashion	34% Repair/repurpose rather than replace	46% Give away/donate used products
 Consumer electronics	31% Buy products based on repairability	35% Repair rather than replace	37% Deposit used products at recycling centers
 Furniture	24% Buy modular furniture so that it can be repurposed	33% Repair rather than replace	34% Give away/donate/deposit used products at recycling centers
 Automotive	24% Research environmental/sustainability factors of a vehicle	42% Ensure regular maintenance	75% Sell used vehicles or trade in used vehicles for a new one

Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

*food that can be bought loose or in refillable containers

**refills instead of new bottles

However, consumer adoption of circular practices is primarily focused on the post-use phase. In each of the consumer product categories that we explored – food and beverages, fashion and clothing, furniture, and consumer electronics – the circular actions that consumers are taking are most frequently related to responsible product disposal (see Figure 7).

While responsible disposal is a key aspect of the circular economy, more needs to be done to ensure that waste is not created in the first place. Dr. David Greenfield, a circular economy specialist and managing director at Tech-Takeback, a UK-based non-profit that provides services to extend the life of electrical products, stresses this aspect:

"One of the things that many people don't understand when it comes to waste management is that you have already

missed the opportunity to do the best thing because you are dealing with something that shouldn't be there in the first place. When it comes to different material streams, textiles, food, and electronics have the biggest impact by far from a carbon footprint perspective. More education is required to

help consumers understand the impact of the waste that they generate, and how they can minimize that waste by reusing or by avoiding that waste in the first place. That's where the narrative needs to change significantly."

There is increasing focus on the need for repair-friendly laws to extend the lifespan of products

There is growing recognition of the need for regulations that tackle the problem of planned obsolescence and promote product repair and reuse. Below, we look at regulatory approaches towards addressing these issues.

1. Provision of spares and repair documentation to extend product lifespan

- “Right to repair” regulations came into effect in the EU in March 2021 as part of the EU’s Circular Economy Action Plan. The regulations require manufacturers of washing machines, dishwashers, refrigerators, and televisions to provide spare parts and repair documentation to professional third-party repairers (as opposed to providing them only to authorized service providers), and to continue to provide such support for 7–10 years.¹² The European Commission is also working on extending such requirements to smartphone device vendors and requiring them to provide parts and support for five years.¹³
- The UK has also implemented “right to repair” rules along the same lines as above.¹⁴
- In the US, Massachusetts passed a law in 2012 requiring carmakers to provide independent mechanics with access to diagnostic tools in cars. In addition, in July 2021, US President Joe Biden signed an executive order that directs the Federal Trade Commission (FTC) to issue regulations that make device and equipment repairs easier.¹⁵

2. Product labels to help consumers make informed choices

- France implemented a law in January 2021 that mandates the display of a “repairability index” on electrical and electronic equipment. The law covers five product categories: smartphones, laptops, televisions, washing machines, and lawn mowers. The index is computed based on five criteria: availability of repair documentation, availability of spare parts, price of spare parts, ease of disassembly, and a fifth criteria that is product specific (for instance, software aspects in the case of smartphones). Based on these criteria, manufacturers are required to assign their products a score between 0 and 10, and to display the scores prominently at the point of purchase, next to the price of a product. From January 2024 onwards, France plans to replace the repairability index with a broader “durability index,” with repairability as one of its components.¹⁶
- Spain is also working on introducing a repairability index.¹⁷

3. Financial incentives to make repairs more affordable

- In Austria, the city of Vienna has established a system of repair vouchers – consumers can use the vouchers to cover up to 50% of the cost of a repair, capped at €100.¹⁸
- Austria, Sweden, and the Netherlands have reduced VAT rates for repairs for various products.¹⁹
- France plans to introduce a repair fund in 2022 to subsidize repairs. This will be part of its existing Extended Producer Responsibility (EPR) scheme that requires manufacturers to contribute towards covering the disposal costs for their products. The new repair fund will require them to also contribute towards the cost of repairs.²⁰



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DR. DAVID GREENFIELD

Circular economy specialist and managing director at Tech-Takeback, UK

2. There are roadblocks in the consumer journey towards greater circularity

A section of consumers expressed lack of interest in taking certain circular-aligned actions

Our consumer-survey findings reveal that, while consumers are theoretically willing to, and often do, practice certain methods of reducing, reusing, and recycling waste, especially those related to their consumption of food and personal-care products, they are less interested in taking certain other actions:

- In the **product purchase phase**, leasing/renting were the actions in which consumers showed least interest, as compared to other actions such as researching the environmental components of the product, or buying products that are made using recycled materials or materials that are recyclable:
 - 52% of consumers are averse to renting/leasing furniture.
 - 49% are averse to renting fashion and clothing items (see Figure 8).

Figure 8 Percentage of consumers averse to renting products

Percentage of consumers who said, “I never do this, and I have no interest in doing this” to the following actions – by sector



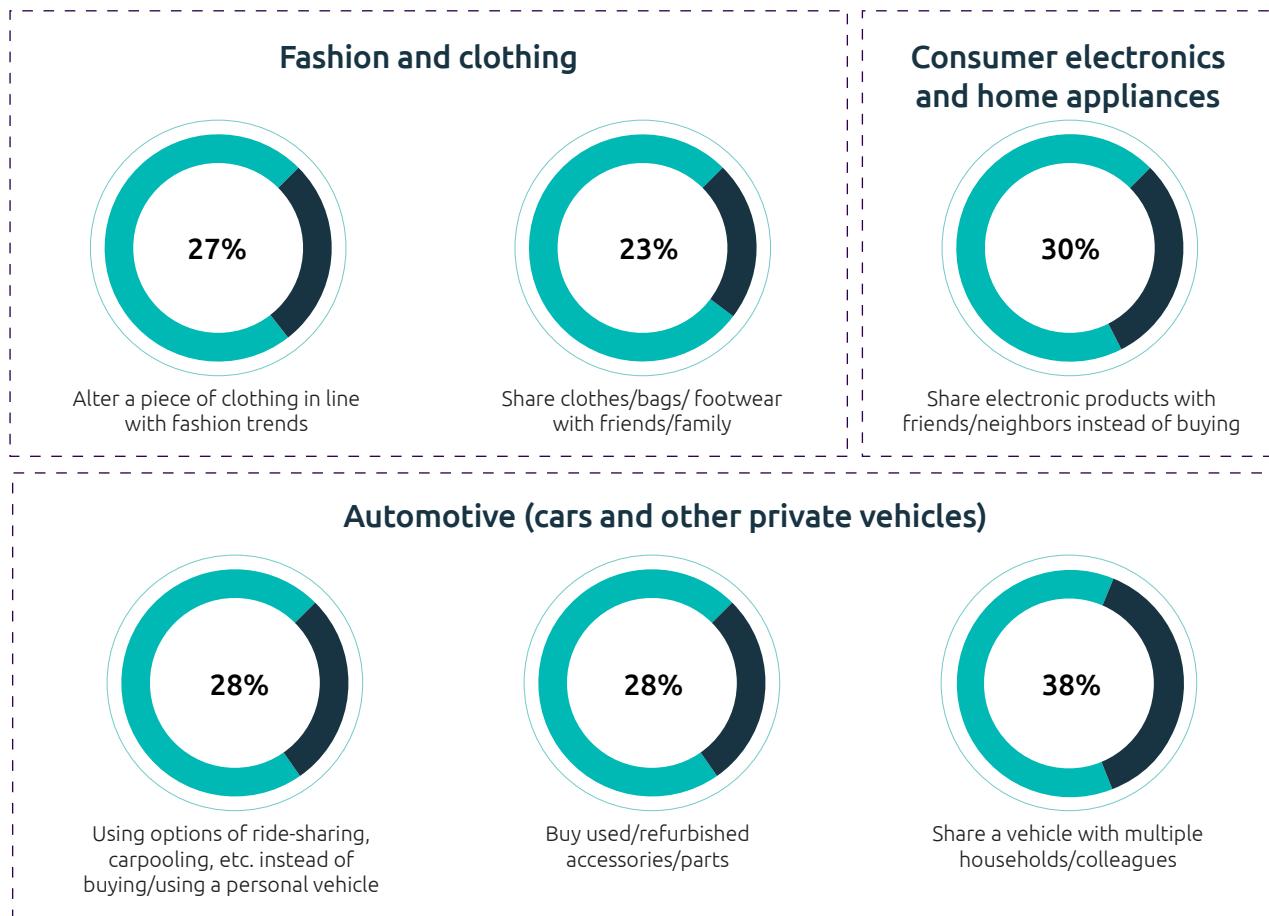
Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

- In the **use phase**, the actions that consumers were least interested in taking, varied by sector (see Figure 9). However, sharing of products was highlighted as an action that attracted little interest across sectors.

49%

Share of consumers that are averse to renting fashion and clothing items

Figure 9 Percentage of consumers who said "I never do this and have no interest in doing this" in the use phase



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Elis Joudalova, partnerships and market growth manager at OLIO, a food-sharing startup, and a circular economy and food waste advisor, comments:

"When it comes to alternative ownership models such as renting or leasing everyday products, the majority of consumers are still unsure how it really works and are reluctant to change their consumption behaviors. Organizations need to start collaborating more to provide new circular ownership options at a larger scale which will make the products and services much cheaper and more convenient. Clearly communicating the benefits of these new models will convince more people to try them and shift their current mindsets. The time could really not be more right for this much needed change."



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ELIS JOUDALOVA

Partnerships and market growth manager at OLIO, a food-sharing startup, and a circular economy and food waste advisor

- In the **post-use phase**, the action in which consumers were least interested was returning used products to retailers/manufacturers, possibly owing to lack of convenience. Shared below are the percentages of consumers who said they do not return said products to their retailers/manufacturers and have no interest in doing so:
 - 40% of consumers for used furniture
 - 37% of consumers for used clothes/bags/footwear
 - 31% of consumers for used electronic items.

Consumers express a lack of comfort with using second-hand products

In recent years, peer-to-peer online marketplaces for second-hand goods have emerged across various product categories. In addition to eBay and Facebook Marketplace, these include startups such as Vinted and thredUP for used clothing and fashion products,²¹ and multi-category used product platforms such as Mercari and Carousell.²² However, despite the interest in second-hand retail overall, our research shows that the adoption of second-hand products is being held back by a lack of consumer comfort in using such products.

As Figure 10 shows, only 45% of consumers, for instance, say they are comfortable with using second-hand clothing, and only 34% are comfortable with using second-hand footwear. More consumers are comfortable using second-hand cars (62%) and furniture (58%). Consumer comfort in using second-hand cars is reflected in the size of the second-hand car market. In Germany, for instance, the size of the second-hand car market is more than twice the size of the new car market,²³ while in India the second-hand car market is 50% larger than the new car market.²⁴ The lower comfort in using second-hand footwear, clothes and baby products could be attributed to how personally these items are used as compared to items such as furniture. Close to half (49%) of consumers, for instance, said that they do not buy used products because they are concerned about hygiene.

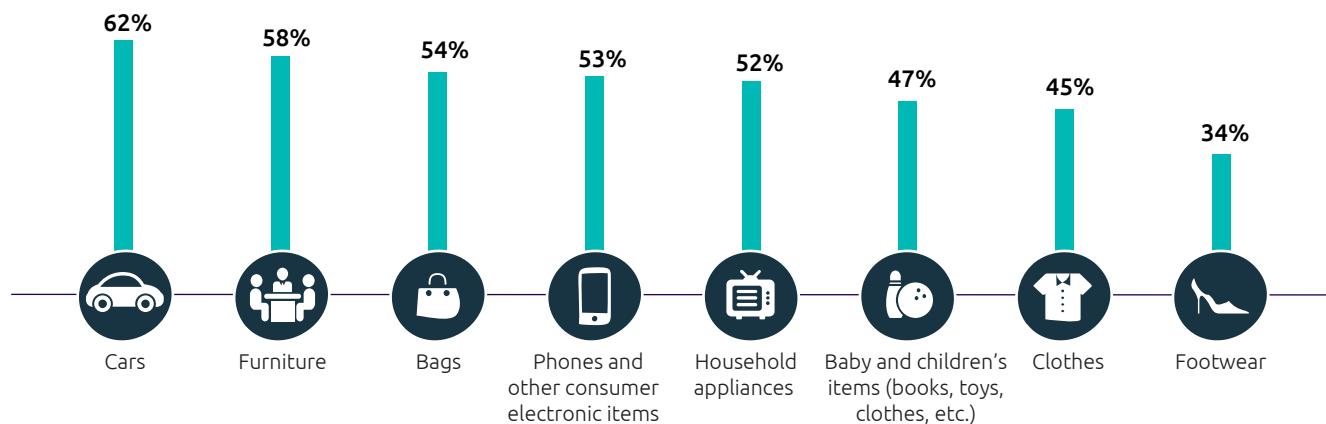
45%

Share of consumers that are comfortable with using second-hand clothing

Figure 10

Fewer than one in two consumers are comfortable with using pre-used/second-hand/shared clothes, baby items, and footwear

Percentage of consumers who are comfortable with using second-hand/pre-used/shared products



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

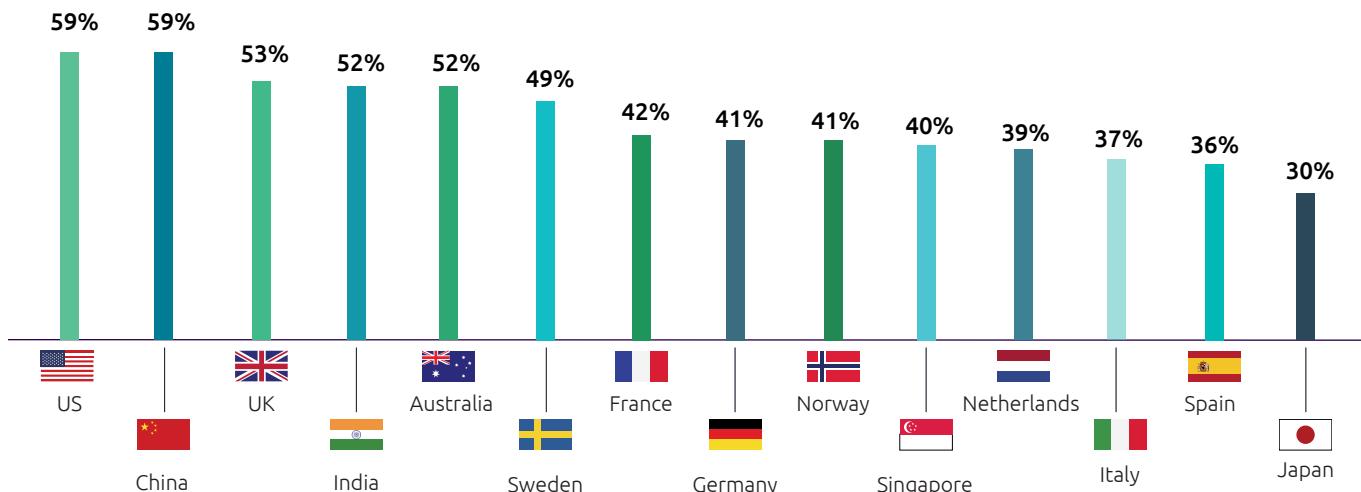
Because clothes are a huge producer of waste on the planet, we further explored consumer willingness to buy second-hand clothes, by country (see Figure 11):

- The US and China expressed the highest degree of comfort (59%).
- Japan showed the least degree of comfort in buying pre-used clothes (30%).

Figure 11

Only three in ten consumers are comfortable with using pre-used/second-hand clothes in Japan

Percentage of consumers who are comfortable with using second-hand/pre-used/shared clothing items



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

When we asked respondents, what would make them more comfortable with using second-hand or shared products, the top-ranked options were information on past ownership; quality guarantees from sellers; and product warranties.

Providing reassurance to consumers regarding the quality of used products will be key to driving the adoption of circular practices related to sharing and reuse. Successful trials conducted by US-based reusable packaging platform, Loop, which is part of recycling company TerraCycle, demonstrate that, when provided with such reassurance, consumers are willing to shift their mindsets. Loop partners with leading brands to provide consumers with mainstream products in returnable and refillable packaging. Consumers can buy the products online and used packaging is collected by Loop and professionally cleaned for reuse. Loop has been growing in popularity and its sales surged even in 2020, when consumers were generally more concerned about the use of reusable items owing to the pandemic. More than half (52%) of consumers in our research, for instance, cite concerns related to COVID-19 as a reason for not taking actions such as buying used products or renting/sharing products.

Heather Crawford, global VP of marketing and e-commerce at TerraCycle, comments: *"Consumers are understandably anxious in this new world, but they still want to make purposeful purchases. If you can meet shoppers where they are — which is, right now, at home and online — and also establish trust in the safety and hygiene of the reuse system, even in a difficult situation, what we're seeing is that consumers still really embrace it."*²⁵

Circular adoption by consumers is constrained due to issues of convenience, access, and cost

While there is some way to go before consumers shift towards greater circularity, this could be facilitated by more effective provision of information on and access to circular practices. Our survey revealed that:

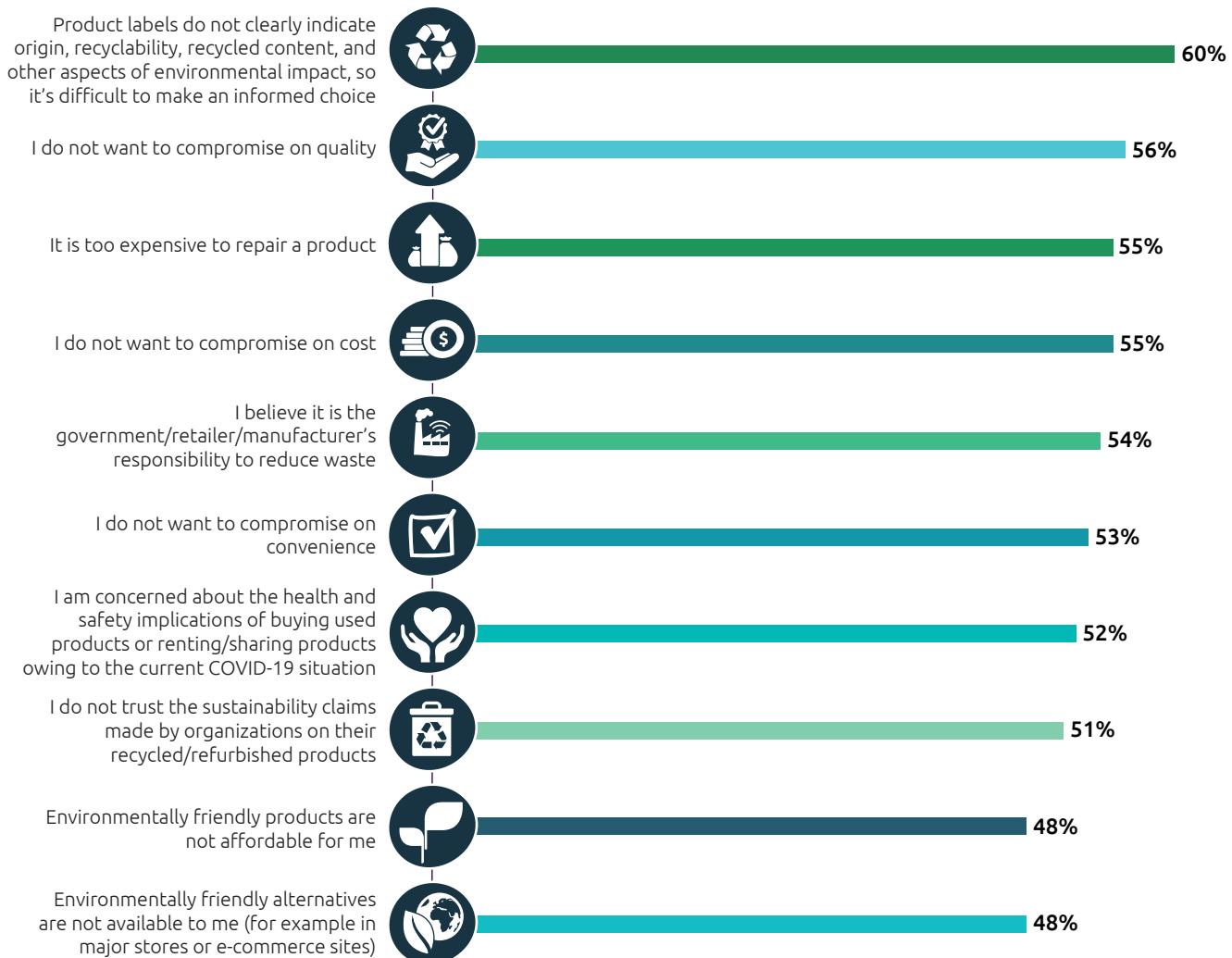
- Three in five (60%) consumers cite a lack of sufficient information (on origin, recyclability, recycled content, etc.) in product labeling as a reason for not taking circular actions.
- 55% say that it is too expensive to repair products and 48% say that environmentally friendly alternatives are not affordable.
- 53% of consumers cite their unwillingness to compromise on convenience as a reason for not taking some actions.
- 48% say that environmentally friendly alternatives are not available to them in major stores or online (see Figure 12).

60%

Share of consumers that cite lack of sufficient information in product labelling as a reason for not taking circular actions

Figure 12 Three in five consumers cite lack of adequate product labeling as a reason for not taking circular actions

Percentage of consumers who agree with the following statements about their reasons for not taking circular actions



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Today, convenience is a huge motivator for consumers. Wayne Visser, fellow, Cambridge Institute for Sustainability Leadership (CISL), comments: *"More than 90% of our businesses are designed without a view to re-entry of materials back into nature or the production cycle. For example, if we think about recycling from a consumer perspective, it might be inconvenient for some consumers to have to separate out their trash. To counter this, in some parts of the UK, there is now just one recyclables bin (instead of multiple separate bins to separate plastic, glass, paper, etc.). So, either it's going to landfill or it's recyclable and then certain technologies are deployed to conduct the sorting. If we add too much to the inconvenience for the customer, the practices are unlikely to work."*

When we explored the question of convenience by age group, we found that 64% of consumers aged 31–35 were unwilling to compromise on convenience. This fell to 45% for consumers in the 60+ age category (see Figure 13). This could be explained by the fact that a lot more people in the younger age group are accustomed to the use of digital devices and online shopping and, as a result, have higher expectations around personal convenience.



“More than 90% of our businesses are designed without a view to re-entry of materials back into nature or the production cycle. For example, if we think about recycling from a consumer perspective, it might be inconvenient for some consumers to have to separate out their trash. To counter this, in some parts of the UK, there is now just one recyclables bin (instead of multiple separate bins to separate plastic, glass, paper, etc.). So, either it's going to landfill or it's recyclable and then certain technologies are deployed to conduct the sorting. If we add too much to the inconvenience for the customer, the practices are unlikely to work.”

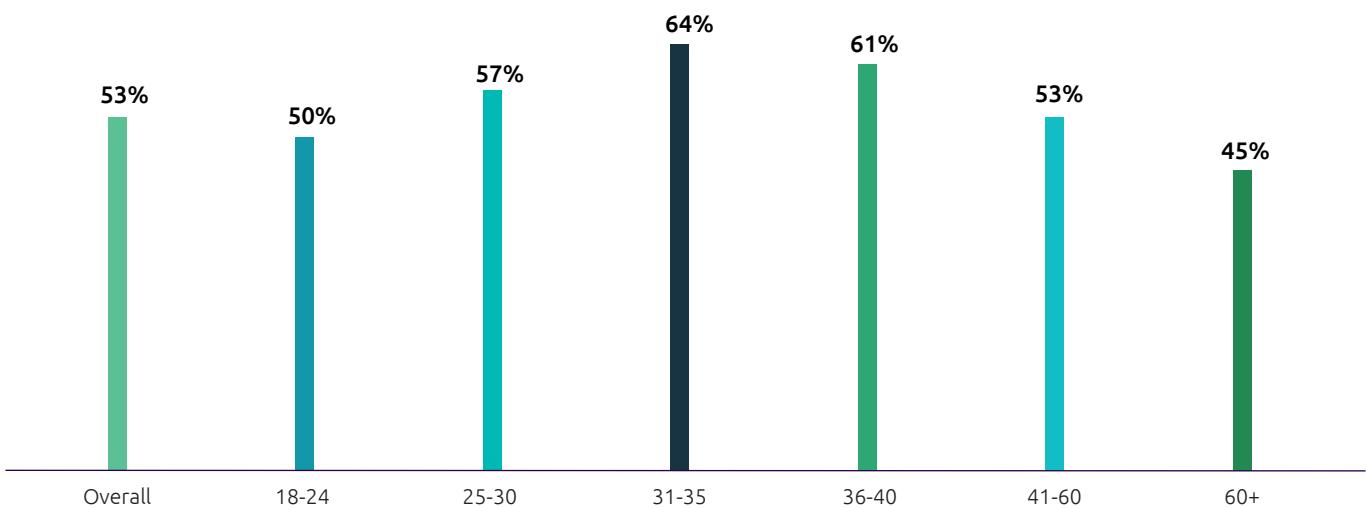
WAYNE VISSER

Fellow, Cambridge Institute for Sustainability Leadership (CISL)

Figure 13

Over 60% of consumers aged 31–35 say that they do not take circular actions because they are unwilling to compromise on convenience

Percentage of consumers who agreed to the statement: “I do not want to compromise on convenience” – by age group

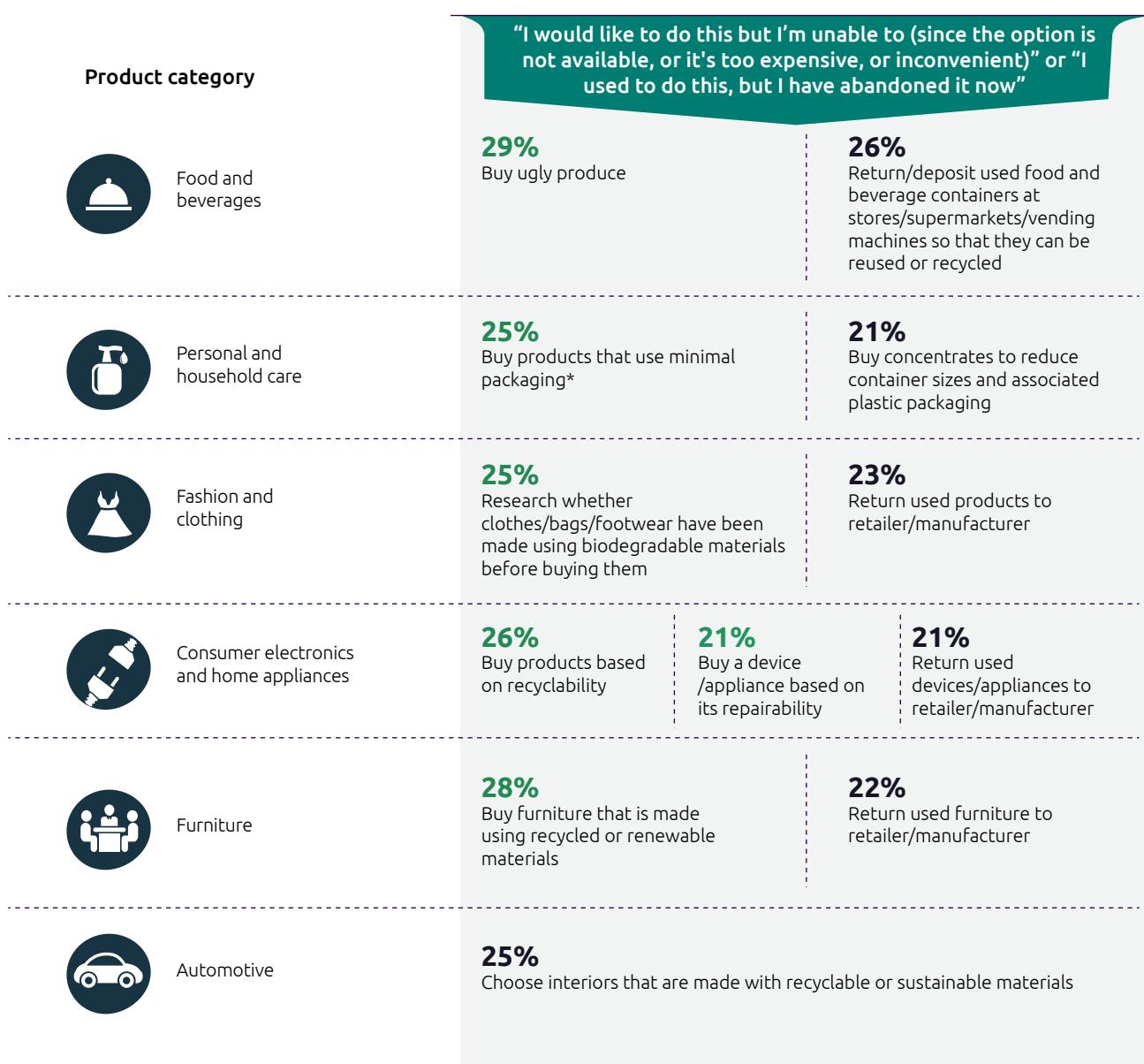


Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Moreover, 20% of consumers across sectors say they want to take some actions but are unable to do so since the option is not available, or it's too expensive, or inconvenient, or that they used to take some actions which they have now abandoned for similar reasons. Figure 14 shows key areas where consumers face these roadblocks. There is a clear call for action for organizations to enable circular practices for consumers, given the interest from one in five consumers across sectors who want to take such actions but aren't able to do so.

Figure 14

Percentage of consumers who selected either “I would like to do this but I’m unable to (since the option is not available, or it’s too expensive, or inconvenient)” or “I used to do this, but I have abandoned it now”



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

*refills instead of new bottles.

25%

Share of consumers who would like to buy products that use minimal packaging or used to do this but have abandoned it now

While not all consumers may want to take all circular economy-related actions in equal measure, there should be more options available for consumers to act. We look at examples below of how circular practices can be made more convenient for consumers:

- To reduce the use of single-use plastics, UK retailers Tesco and Asda are trialing a refilling service that allows consumers to buy products in reusable packaging. However, unlike traditional refilling formats, consumers are not required to bring in their own containers. Instead, they can buy products in pre-filled containers that can be returned once they are used. To ensure that the products are also affordable, they are priced the same as the packaged options, barring a 20 pence refundable deposit. Asda has also committed to ensuring that products that are sold in loose and unwrapped formats will not cost more than packaged options.²⁶
- While clothing brand Patagonia has been offering used items for sale via its Worn Wear program since 2017, it has gone a step further and made it even easier for customers to buy used alternatives to new products. Next to every online product listing, Patagonia provides customers with the option to browse through and purchase used alternatives from the Worn Wear online store, along with information on the positive environmental impact of doing so.²⁷

- Unilever is tackling the problem of food waste by making it easier for consumers to buy surplus food from retailers. Through its partnership with Too Good To Go – an app that connects retailers and customers in order to combat food waste – Unilever enables retailers to post information regarding surplus food products at reduced prices on the app; customers can view available products on a map and purchase them.²⁸

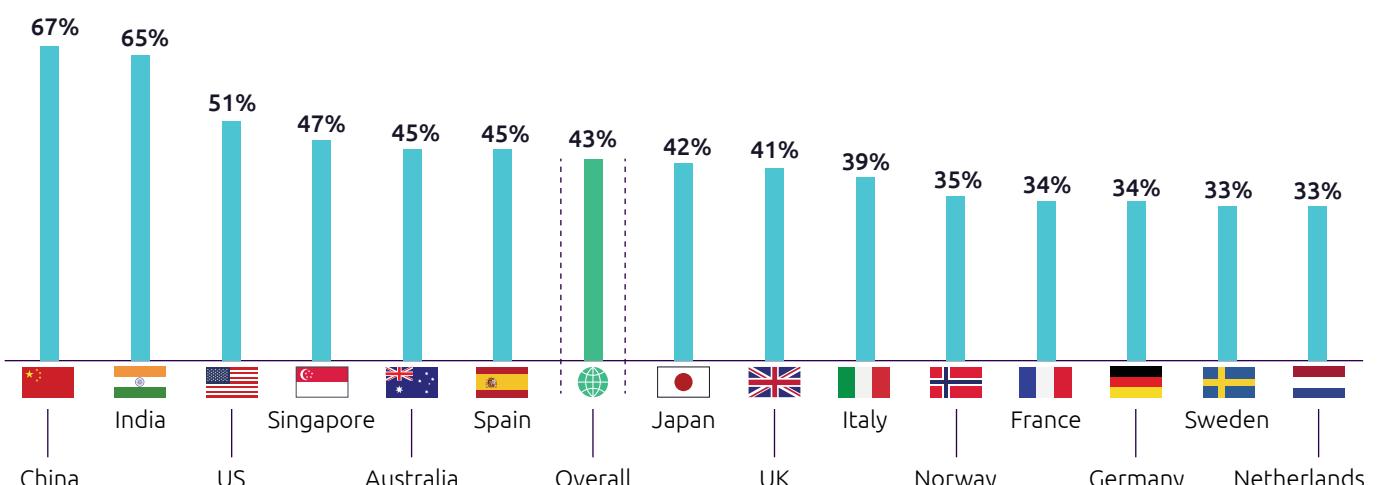
Consumers lack the information to go circular

Lack of information is a critical roadblock in the customer journey towards circularity. Our research shows that, while consumers are aware and concerned about the problem of waste, they are not always aware of how their own consumption choices contribute to these problems. More than four in ten (43%) of consumers in our survey said that they were not aware of how their current ways of buying, using, and disposing of products impact the environment (see Figure 15).

Figure 15

More than four in ten (43%) consumers are unaware of the environmental impact of their consumption choices

Percentage of respondents who say they were not aware of how their current ways of buying, using, and disposing of products impact the environment – by country



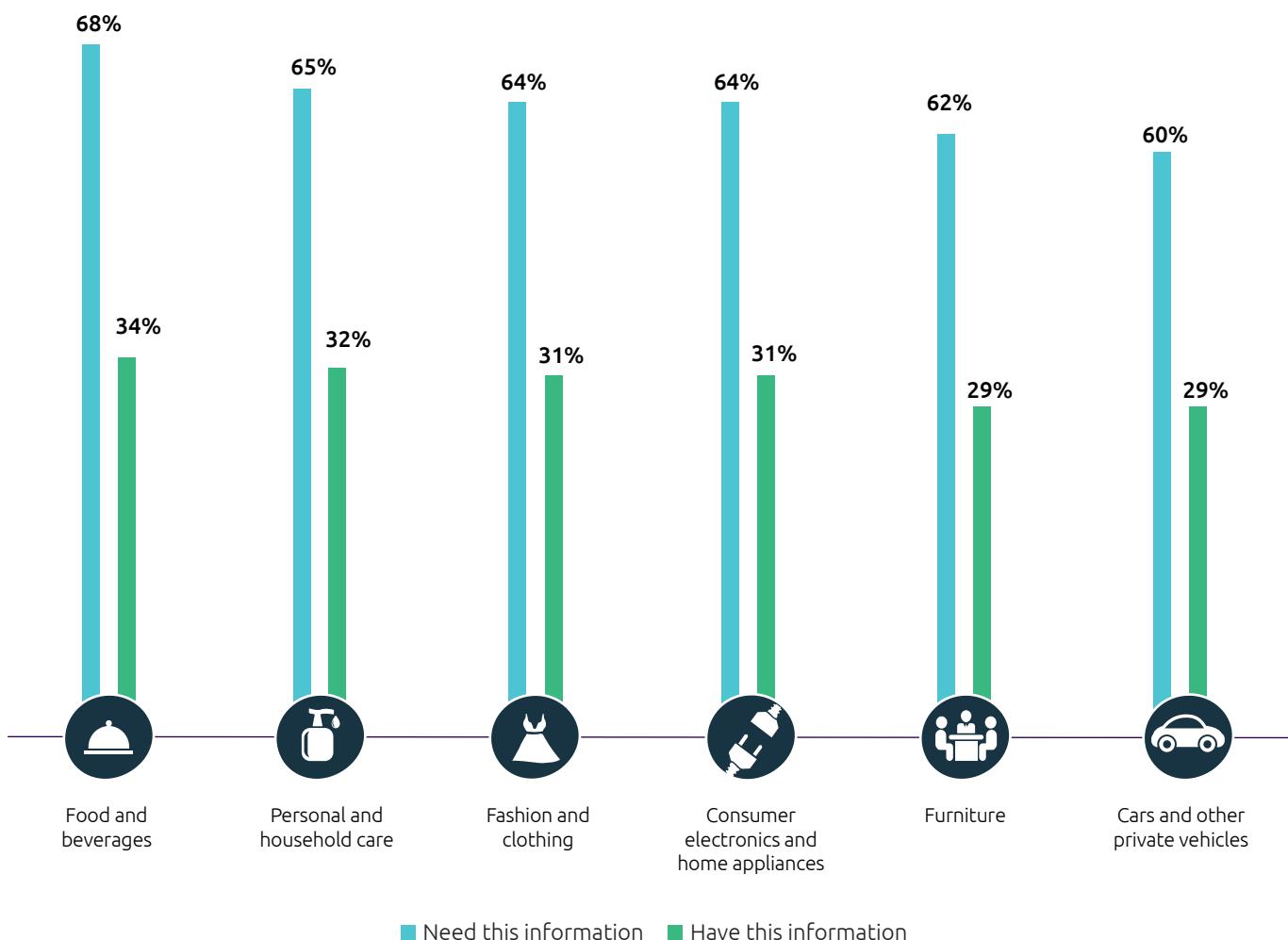
Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Further, more than six in ten consumers across sectors require information about the amount of waste generated when a product is being produced in order to make better choices, but fewer than one in three have access to it in most sectors (see Figure 16).

Figure 16

More than six in ten consumers require more information about the amount of waste generated when a product is produced

The amount of waste generated when a product is produced (e.g., amount of water used, or non-renewable/virgin materials used, etc.)



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Companies seem to be slightly better at providing information about the recyclability of their products, and the recyclable materials used, although the gap persists between the percentage of consumers who say they need information and those that receive it (see Figure 17). It is clear that organizations are not meeting the information requirements of consumers and missing an opportunity to create a more dedicated and loyal consumer base for their respective brands.

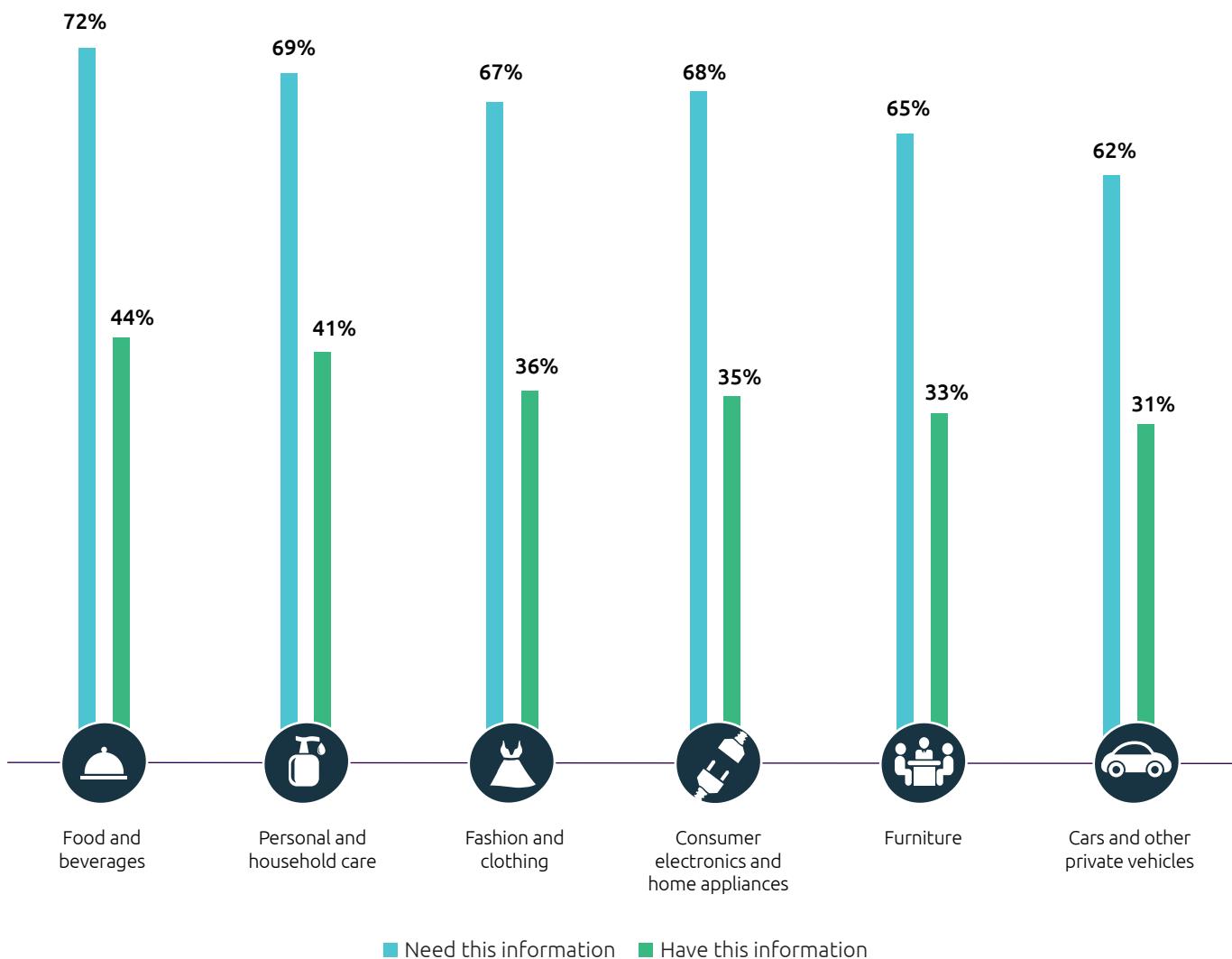
68%

Share of consumers that need information on the amount of waste generated when food and beverages are produced

Figure 17

Fewer than one in two consumers share that they have information about the recyclability of products/product packaging or the percentage of recycled materials used

The recyclability of a product/packaging or the percentage of recycled materials used to make it



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.



Who are the circular economy champion consumers?

- Our analysis shows that 29% of consumers engage in circular practices regularly and are guided by high awareness. We call this cohort “circular economy champions.”
- In contrast, a cohort that constitutes 30% of our survey have low awareness and take little to no actions on circular economy. We called them “circular economy beginners.”

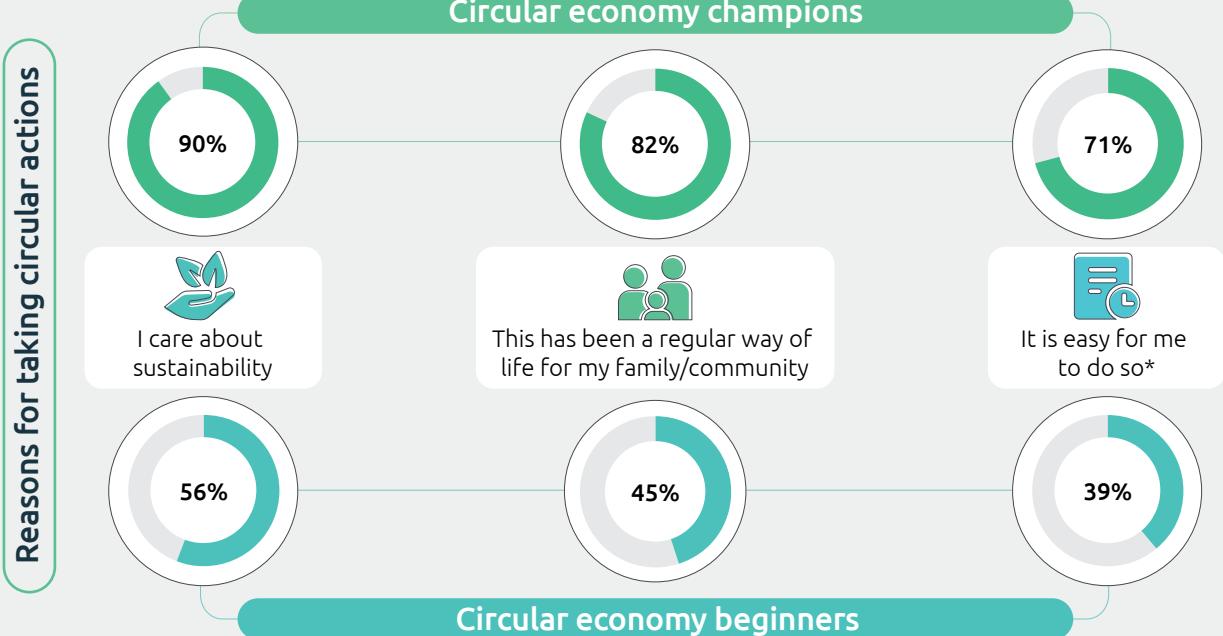
How are circular economy champions different from their beginner peers?

Circular economy champions live in urban areas, have higher incomes and education levels, and are more likely to be employed in full-time jobs



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=2,282 circular economy champions and 2,347 circular economy beginners.

Circular economy champions are driven by considerations of sustainability, culture, and convenience



***i.e., I have access to repair services, stores for used/refurbished products, recycling centers etc.**

Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=2,282 circular economy champions and 2,347 circular economy beginners.

Circular economy champions have more information to drive circular action



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=2,282 circular economy champions and 2,347 circular economy beginners.

3. Consumers don't believe that organizations are doing enough about circularity, organizations agree

Consumers expect organizations to take active steps towards circular economy

Consumers expect organizations to take concrete actions towards greater circularity:

- 67% of consumers expect organizations to be responsible when advertising products and to not encourage excess consumption.

Patagonia, for instance, has long encouraged consumers to buy less. During the Black Friday shopping season in 2011, the brand launched an ad campaign with the tagline "Don't Buy This Jacket," asking consumers to think twice before buying garments including its bestselling fleece jacket.²⁹ More recently, during Black Friday 2020, Patagonia launched its "Buy Less, Demand More" campaign encouraging consumers to reduce purchases and to instead demand more from brands so that products can last longer (such as demanding sustainably sourced materials, greater durability, and more repair options).³⁰

Similarly, other brands such as sustainable footwear brand Allbirds have also taken a stand against consumerism and waste. Allbirds launched a campaign called "Break tradition, not the planet" during Black Friday 2020. Instead of reducing prices during Black Friday, the brand increased prices by \$1 across all its products, with the proceeds (matched with a donation from Allbirds) donated towards environmental causes.³¹

- 59% of consumers expect organizations to offer incentives for consumers who actively practice recycling, reusing, and other circular practices and 65% expect them to simplify recycling processes (see Figure 18). UK-based mobile carrier giffgaff provides cash incentives for consumers to trade-in used phones that are then refurbished and resold. For phones that are too damaged and cannot be refurbished, the company helps consumers find their nearest recycling point.³²

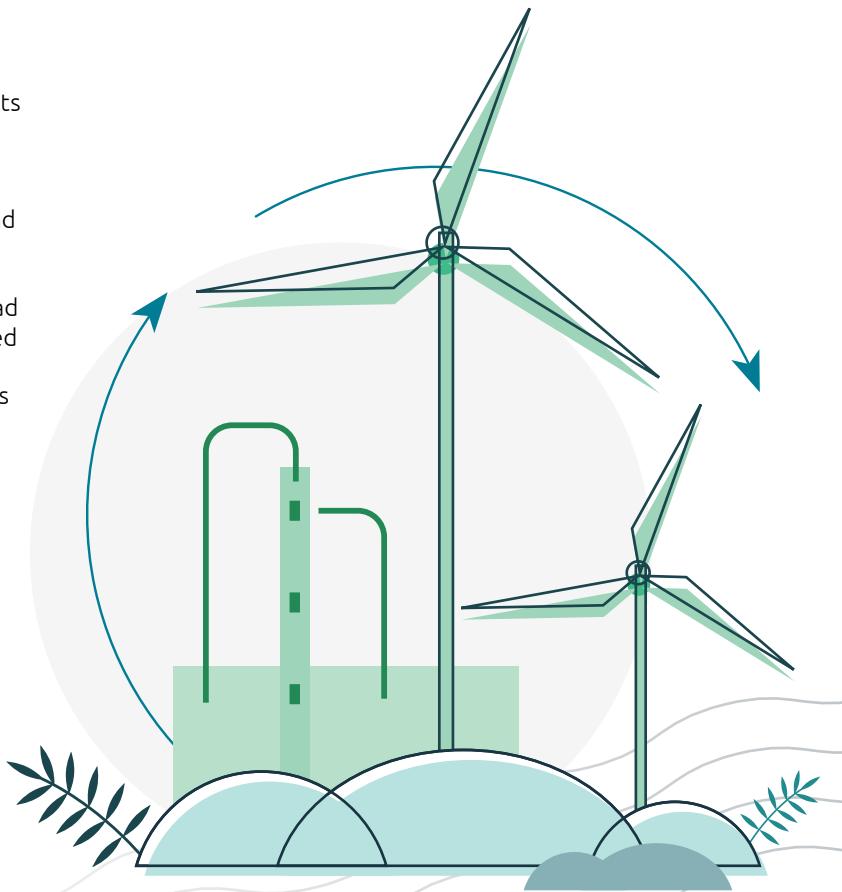
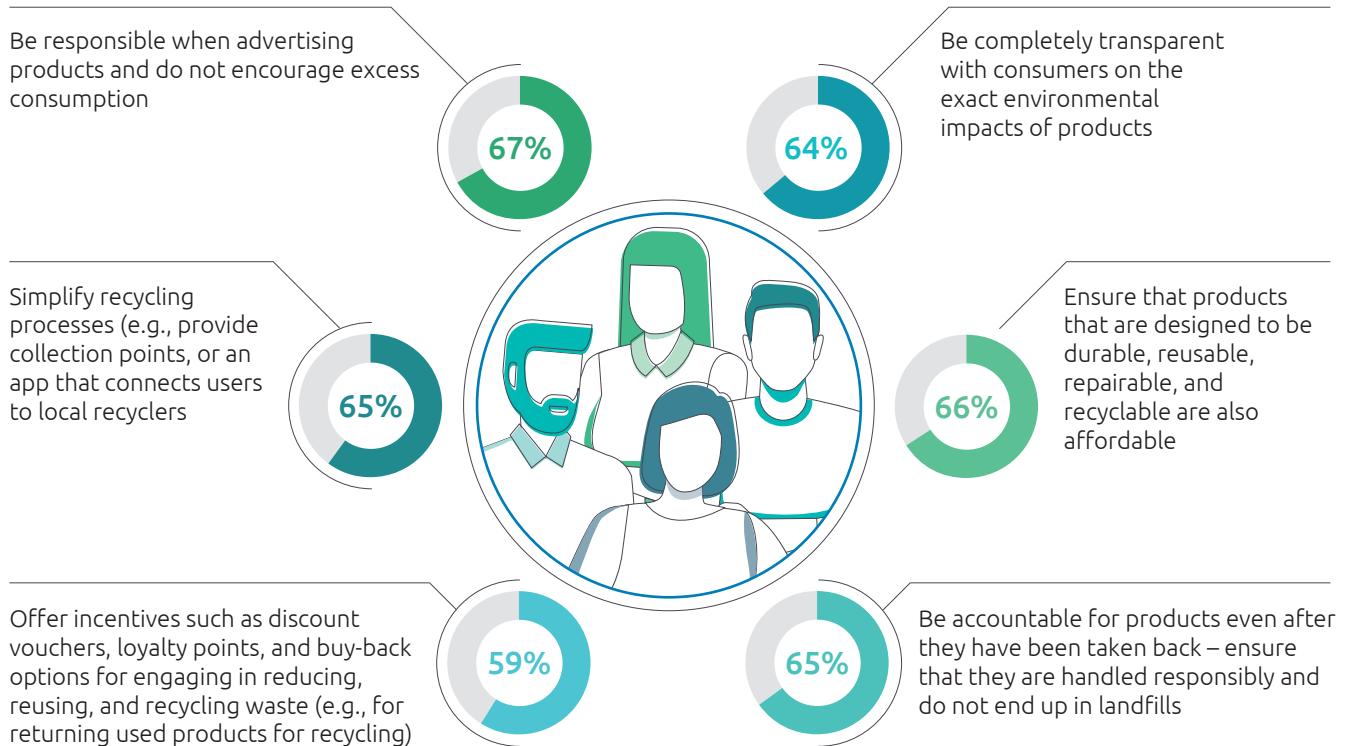


Figure 18 Close to seven in ten consumers expect organizations to not encourage excess consumption

Percentage of consumers who expect organizations to do the following



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Consumers also have specific expectations from organizations across sectors:

- 70% of consumers expect organizations to help consumers differentiate between terms such as "best before," "consume by," and "expiry date" to reduce waste of consumable food.
- 64% of consumers expect clothing manufacturers to abandon use of environmentally damaging materials.
- 68% of consumers expect organizations to provide assurance that existing data from used devices such as smartphones and laptops has been safely cleared when they are taken back.
- 62% of consumers expect automotive companies to design cars in such a way that various interior components can be replaced instead of having to replace the whole car.

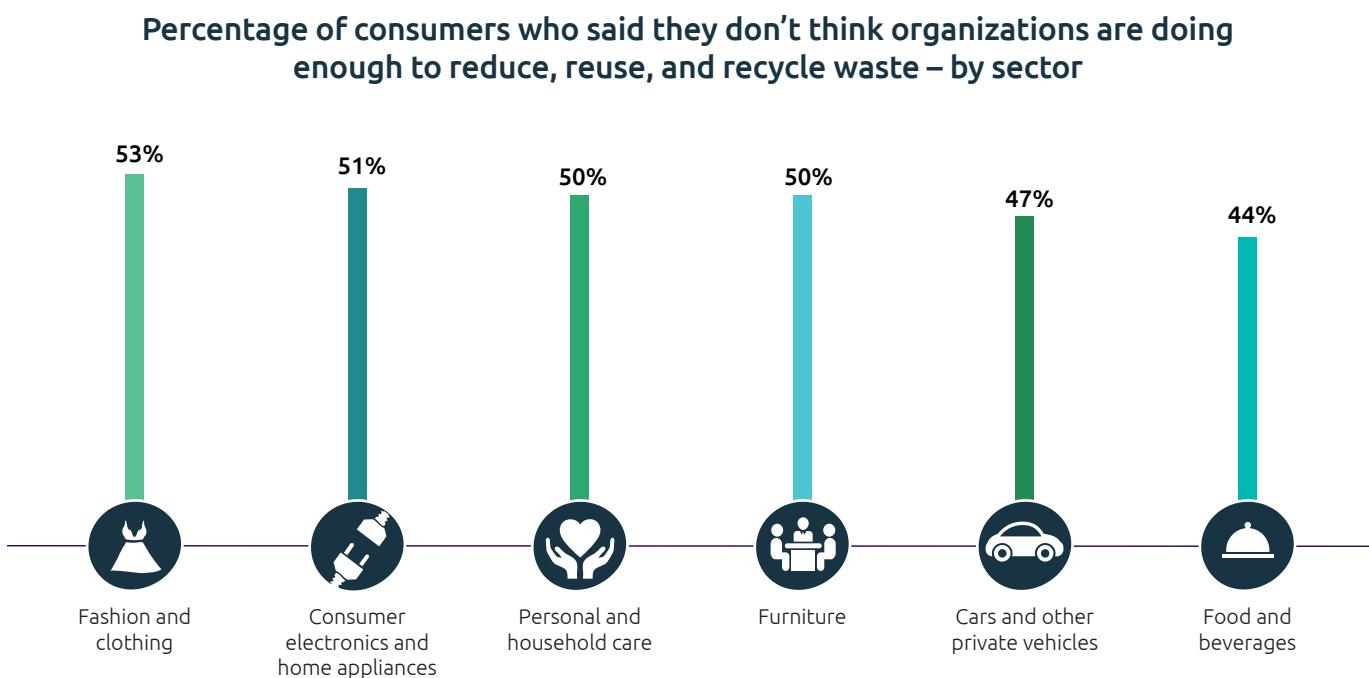
- 61% of consumers expect automotive companies to convert petrol/diesel vehicles to electric vehicles, where possible.

Organizations such as Patagonia and personal care brand Dr. Bronner's are among those showing the way when it comes to self-regulation. The companies have been working together, along with others, on developing regenerative organic standards that not only ensure that the materials used in their products (e.g., a fiber or a soap ingredient) were grown sustainably, but also ensuring that they were grown using regenerative methods (i.e., giving back more to the soil than they take).³³

However, consumers don't believe that organizations are doing enough, across sectors

Close to half (49%) of consumers across sectors believe that organizations are not doing enough to reduce, reuse, and recycle waste (see Figure 19). Consumers are slightly more optimistic about the automotive and food and beverages sectors, where a lower percentage believe that organizations have not adopted sufficient circularity practices.

Figure 19 Consumers believe organizations should do more to reduce, reuse, and recycle waste



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Fashion and clothing, one of the sectors where the majority of consumers believe that organizations are not doing enough, also sees variation by country:

- 63% of consumers in France believe that fashion and clothing organizations are not doing enough to reduce, reuse, and recycle waste – the highest among the countries in our survey. France is the only country in the EU to have a law on Extended Producer Responsibility (EPR) for the handling of textile waste (the law was enacted in 2007).³⁴ This has likely raised consumer awareness in France regarding the need for clothing brands to take more action. Other countries are also planning to enact similar laws – Sweden, for instance, plans to introduce an EPR law for textiles in 2022,³⁵ and Netherlands plans to do so in 2023.³⁶

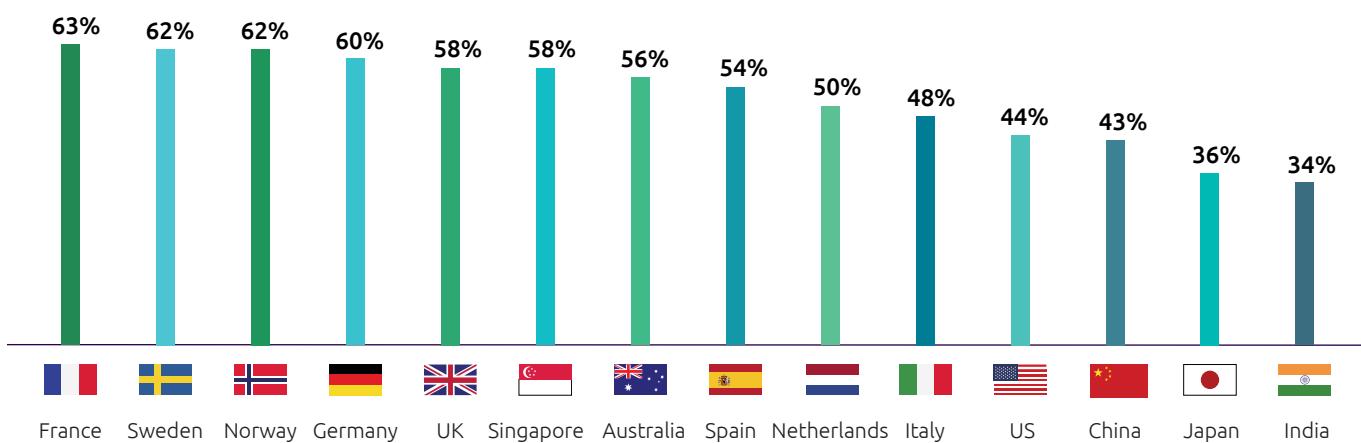
- Japan and India are more optimistic and only about one-third of consumers in these countries believe that fashion and clothing organizations are not doing enough (see Figure 20).

Experts highlight some particular challenges to the industry. For example, as we heard from Anne Dansey, principal policy advisor to the Victoria State Government, Australia: *"The problem with the fast fashion industry is that it is so global. If a product gets produced in Turkey and then reaches Australia, then it makes it very hard to return it to its place of origin. So, there needs to be a way that the company in Australia can take responsibility for it, for example, by ensuring that they set up a depot where they can take the product back."*

Figure 20

Six in ten consumers in France don't think fashion and clothing organizations are doing enough to reduce, reuse, and recycle waste

Percentage of consumers who said they don't think fashion and clothing organizations are doing enough to reduce, reuse, and recycle waste – by country



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

Organizations are failing to take bold actions towards circularity

Across sectors, organizations are failing to implement circular economy initiatives actively. Even where we do see some action, it is concentrated towards end-of-life and recycling-related actions, which as we have established before should be a measure of last resort.

- As we found in our report on sustainability in the consumer products and retail sector, it is important for organizations to consider not only design criteria but also the ways in which a product will be used and disposed of. However, very few organizations are focusing on circular economy initiatives to achieve this – or have significant plans to do so. Our research shows that:
 - Only 18% of organizations in the consumer products and retail sector have invested in circular economy initiatives.
 - Only 35% plan to invest in this area in the next three years, signaling that more needs to be done.³⁷
- If we think about consumer electronics, our sustainable IT research also shows that current recycling levels are very low: 89% of organizations we surveyed recycle less than 10% of their IT hardware.³⁸ We can estimate that if organizations are not able to recycle their own IT hardware, they may have limited mechanisms in place for consumer electronics to be recycled in the end of life.

- In our research on sustainability in the automotive sector, we found that the circular economy has the potential to offer significant economic benefits and make electric vehicles (EVs) more sustainable. However, currently, only 32% of the automotive sector's supply chain contributes to the circular economy.³⁹

- At the same time, the automotive sector appears to be more advanced in circularity than other sectors. As our auto-sustainability research suggests, the most commonly deployed sustainability initiative in the sector is “supporting and promoting a circular economy,” and it is being deployed by 52% of the companies we surveyed.⁴⁰

18%

Share of organizations in the consumer products and retail sector that have invested in circular economy initiatives

Advances in the auto sector around end-of-life management of vehicles and parts

The automotive industry has progressed in the end-of-life reuse and recycling of vehicles and parts. In the EU, 93% of parts and materials from scrapped passenger cars and light goods vehicles were reused and recovered, and 87% of parts and materials were reused and recycled in 2018.⁴¹ Renault, for instance, has developed a network of over 330 salvage organizations in France, through its subsidiary Renault Environment, to recycle parts and materials. Renault cars currently sold in Europe contain on average 36% recycled materials and 10–20% recycled plastics.⁴²

New areas that the automotive industry is working on include EV battery reuse and recycling. Volkswagen, for instance, has set up a pilot plant in Salzgitter, Germany, for the recycling of EV batteries. Batteries are first evaluated to see if they can be given a second life (for instance, as mobile energy storage systems), and those that can no longer be used are recycled.⁴³

Other examples of initiatives focused on providing a second life to EV batteries include BMW's battery storage farm in Leipzig, Germany, which can house up to 700 used EV batteries. These second-life EV batteries are used to provide storage capacity to support local wind energy generation and grid balancing.⁴⁴

Giving EV batteries a second life is a growing concern for automotive OEMs: 36% of OEMs are implementing partnerships with utilities and suppliers to provide a second life to EV batteries.⁴⁵

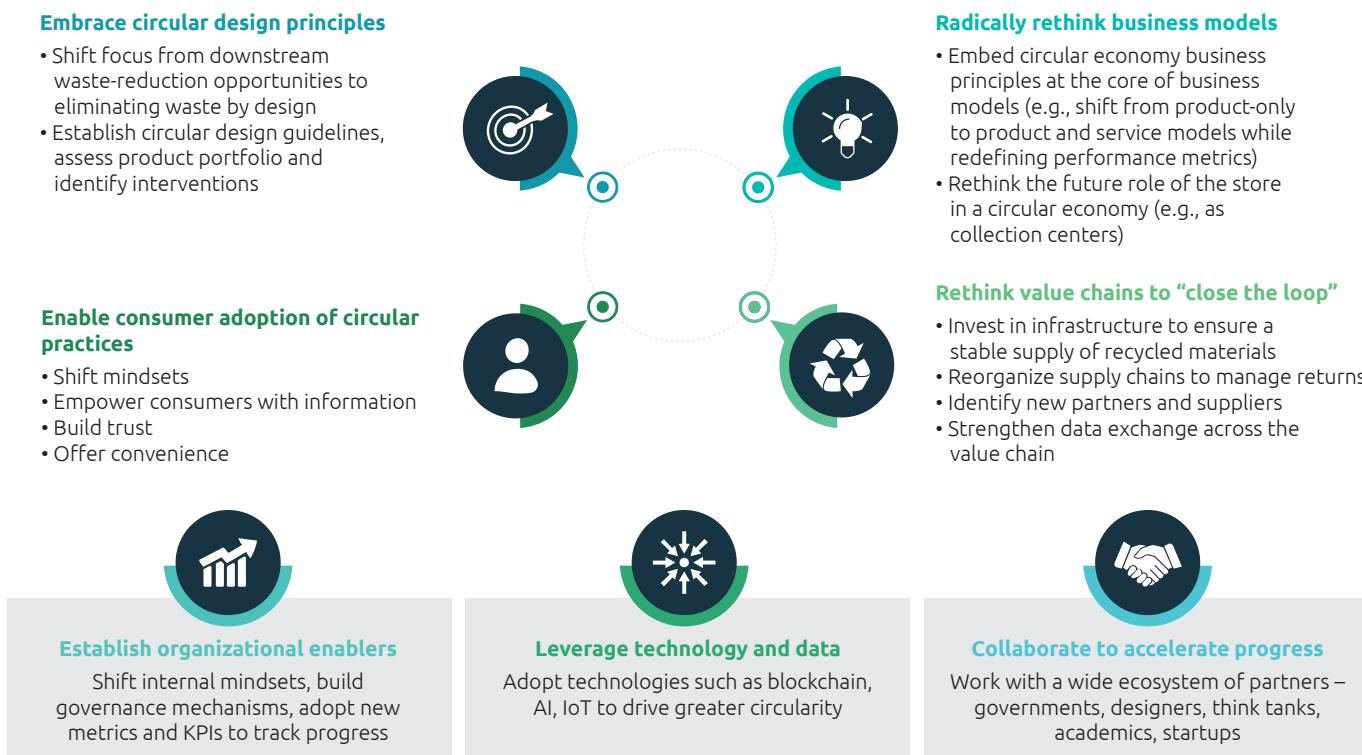
The overall relatively low adoption of circular economy initiatives across industries could be attributable to the initial level of investment required and the perceived cost of implementing circularity. However, as indicated above, in the long term there are significant gains to be made from circularity, and organizations need to embed those projections into their planning and implementation.



4. Recommendations for organizations to accelerate their journey towards a circular model

Based on our research, as well as in-depth interviews with industry executives, startups, regulators, academics, and think tanks we have identified key actions that organizations need to take in order to implement and scale circular economy initiatives within their organizations (see Figure 21).

Figure 21 How can organizations transition towards a circular model?



Source: Capgemini Research Institute analysis.

Embrace circular design principles

Our discussions with circular economy experts revealed that organizations tend to focus on downstream opportunities, such as recycling, when incorporating circular economy initiatives into their operations. However, this approach delivers only limited benefits from an environmental standpoint. Recycling can only help manage waste that has already been created, but an estimated 80% of the environmental impacts associated with a product are owing to decisions made at the design stage.⁴⁶ For true systemic change to take place, waste needs to be eliminated by design.

We discuss the key steps involved in the transition to a circular product portfolio below.

- 1. Establish circular design guidelines.** As a first step, organizations should develop a set of design principles that are aligned with the three goals of a circular economy model – i.e., designing out waste and pollution; keeping products and materials in use; and regenerating natural systems.⁴⁷ Key elements to consider:
 - Reducing the amount of material used
 - Reducing the use of virgin materials and increasing recycled content
 - Using materials that are renewable or recyclable; where recyclable materials are used, ensuring that they can be feasibly and profitably recycled in the markets where they will be disposed – i.e., ensuring that the required recycling infrastructure exists or can be feasibly built, and avoiding materials that are hard to recycle
 - Designing for reuse by ensuring products are durable and repairable
 - Using modular designs and standardized components that allow for easy disassembly, repair, and upgrading.

IKEA, for instance, has set targets to design all its products to be 100% circular and to use only renewable or recycled materials in its products by 2030.⁴⁸ As part of this goal, IKEA has developed a set of circular principles to guide product design. Emphasizing the need for this, Lena Pripp-Kovac, chief sustainability officer, Inter IKEA Group, says: “*Designing products to be repurposed, repaired, reused, resold, or, as the last resort, recycled from the very beginning is not always easy, but an essential element in enabling a transformation toward a circular economy, and bringing IKEA toward fulfilling our ambitious climate and circularity goals.*”

Regulations are progressively requiring a rethink of product design. As we saw earlier, policy makers are increasingly turning their attention towards repair-friendly laws that will impact how organizations approach product design. In addition, regulations are increasingly mandating the amount of recycled content required in products or packaging.

Australia, for instance, has set a target of 50% recycled content on average in packaging by 2025.⁵⁰ In the automotive sector, the European Commission has proposed regulations that will require auto OEMs to consider the impacts of EV batteries across their entire lifecycle, and not only at the end-of-life stage. The proposed regulations cover aspects such as targets for minimum levels of recycled content in EV batteries (for cobalt, lead, lithium, and nickel), which will impact the design of EV batteries.⁵¹

- 2. Assess product portfolio.** Next, organizations should evaluate the extent to which existing products meet circular design guidelines. In doing so, they should consider the environmental impacts of design decisions across the product lifecycle and identify those decisions that have the highest impact on environmental footprint. Based on this assessment, they can identify the focus areas for interventions needed to meet circular design guidelines.

Sportswear brand PUMA was among the earliest to assess the environmental impact of its operations and make them publicly available as part of an Environmental Profit and Loss (EP&L) account in 2011. As part of the exercise, PUMA assessed water use, land use, greenhouse-gas emissions, air pollution, and waste generated by its operations and supply chain. The assessment revealed that 57% of the overall environmental impact of its operations was associated with the production of raw materials such as leather, cotton, and rubber – with leather being the biggest contributor to PUMA’s environmental footprint.⁵² As a result, PUMA began focusing on reducing its use of leather and looking for alternative materials.⁵³

- 3. Build capabilities.** Organizations will also need to equip design teams with new skillsets. US-based apparel brand The North Face offers a program to train its designers in circular design principles. The program, called Design Residency, trains designers to make products that are more repairable, reusable, or recyclable. The program has also resulted in a set of standards for repair and upcycling that enables the organization’s planning teams to standardize processes.⁵⁴

- 4. Iterate and evolve guidelines.** Finally, as IKEA’s experience with designing for circularity shows, organizations should be prepared to follow an iterative approach, learning and fine-tuning as they progress. IKEA first developed a set of circular design guidelines in 2017, and is now on its third iteration, introducing updates that reflect the learnings it has accumulated along its journey towards circularity.⁵⁵



Radically rethink business models

One of the fundamental aspects of the circular economy is the capacity to reduce the overall use and consumption of finite resources. Organizations, therefore, must rethink their business models from a circularity perspective. A circular business model is built on the rationale of how an organization creates, delivers, and captures value with and within closed material loops.⁵⁶ In this type of business model, the idea is to utilize the economic value retained in products after use in the production of new offerings.⁵⁷

Some fundamental questions that organizations across sectors need to ask while undergoing circular business model transformation are:

- How can we develop products that reduce waste in the production cycle?
- How can we plan for asset recovery during the production process, as well as post end-user consumption?
- How can we move towards reduced end-user consumption and greater sharing?
- How can we think about economic profitability without progressively greater consumption of finite resources?
- How can organizations apply design thinking and innovation to their business models to give better environmental outcomes?

A specific step that organizations can take towards a circular business model is to move from product-based models to service models. Companies can combine their traditional product sales models with renting/leasing models, where consumers rent/lease products instead of purchasing them. While these models have existed at scale for some time in certain sectors, such as automotive, they could be expanded in others, such as clothing. Not just for consumers, but the renting/leasing model could also be extended to business use where manufacturers share sparsely used equipment, machinery, and materials to optimize resources and reduce consumption. There are several benefits that a service-based business model offers in the context of circularity, especially from the perspective of material use:

- Since products remain in the ownership of the service company in a renting model, this presents incentives for companies to design more durable products that can be kept in circulation for longer. While this would increase initial investment costs, it could also enable savings on servicing and replacement costs in the longer term.
- The fact that the servicing company retains ownership also offers opportunities for a more professional and efficient end-of-life handling once products are no longer suitable for reuse. The rental companies could become large suppliers of textile waste to the collection and recycling industries. Given the homogeneity of the product in this case, the products would be easier to recycle, and would be a greater source of recycled materials as compared to the consumer market.⁵⁸

However, when contemplating a shift to service-based models such as renting and leasing, organizations will need to bear in mind that such models may also perpetuate the problem of waste by prompting increased consumption. A shift towards a service-based business model will therefore need to be accompanied by a shift in the metrics used to measure business performance. In the fashion industry, for instance, traditional metrics focused on throughput and volume will need to be replaced with metrics such as sales/garment or service revenues/customer in order to ultimately deliver positive outcomes for circularity.

Finally, as we saw earlier, there is some skepticism regarding renting/leasing on the part of the consumer. To unleash the benefits of a sharing economy as a business model, organizations need to work towards mindset shifts of consumers, something we cover later in this section.

In addition to the shift to service-based models, organizations could also look at other avenues to reinvent their business models. With the pandemic, a significant segment of store-based operations have moved online, which allows for organizations to rethink the role of the store. For instance, organizations should consider dedicating parts of their physical stores for the sale of refurbished products,

to provide repair services, to offer classes and workshops on circular practices (as we discuss later in the example of IKEA's Learning Lab), and to act as collection points for consumers to return used products and packaging for reuse and recycling. This could be incorporated as part of emerging business models to allow for greater flexibility in store-related operations.

Rethink value chains to “close the loop”

In addition to designing circular products and developing circular business models, organizations will need to fundamentally rethink their supply chains in order to close the materials and products loop. As Anna Tari, president and CEO at Circular Economy Institute says: *“The key change in the value chain in a circular economy is that it becomes a closed-loop chain, meaning that all products go back into the cycle, making ‘reverse logistics’ an essential pillar that rarely exists in the current economy. Building this pillar or finding partners to aid the recovery of materials and products to bring them back into the cycle is going to be the next big thing for companies to implement and consider.”*

Organizations will need to:

- **Reorganize supply chains to manage online returns.**

The growth in online returns is also fueling the problem of waste. Estimates indicate that in the US alone consumers returned merchandise worth \$428 billion in 2020, accounting for approximately 10.6% of overall retail sales in that year. The share of online returns was even higher at 18% of online sales. Further, online returns more than doubled during 2020 as the pandemic forced more consumers to purchase online. Top categories of returned products included auto parts, apparel, and home improvement products.⁵⁹ The high percentage of returns is linked to consumers' tendency to buy multiple versions of the same product (apparel or footwear in multiple sizes or colors for instance) with the intention of returning items that are not suitable – a practice referred to as “bracketing.”

Returns exacerbate the problem of waste. In the US, 5 billion pounds of waste are estimated to be generated every year due to returns,⁶⁰ and a significant proportion of returns end up in landfills despite being in good condition (only about 20% of returned products in the US are estimated to be defective).⁶¹ In the UK, less than half of returned products go back on sale as it's often cheaper for retailers to landfill them.⁶² However, regulations such as EPR laws are increasingly requiring that organizations act on this issue.

Returns also add to retailers' overall costs – estimates indicate that for every \$1 billion in sales, an average retailer incurs \$106 million due to merchandise returns.⁶³ In the UK, returns are estimated to cost retailers £60 billion a year – a third of which comes from online shopping.⁶⁴

Organizations should therefore revisit their network design choices and identify opportunities to minimize waste and reduce costs in the reverse logistics process. We look at two key aspects of this:

1. Routing returns to locations where they can be processed more effectively from an environmental and cost standpoint. For instance, instead of routing returns to distribution centers, organizations should consider using stores as aggregation points instead. In the US, office supplies retailer Staples has partnered with reverse logistics solution provider Happy Returns to offer customers in-store returns for online purchases. Happy Returns operates a network of in-store drop-off points called “Return Bars” where customers can return purchases without any packaging or paperwork.⁶⁵ Solutions such as these allow for returns to be aggregated, reducing the cost and carbon impact of shipping all returns to distribution centers.
2. Setting up the necessary infrastructure and processes to prepare returns for resale, reuse, or recycling, depending on product condition. The North Face, for instance, has partnered with the Renewal Workshop – a startup that provides professional cleaning and repair services for damaged, returned, or used clothes. Returned products are sent from The North Face's distribution centers to The Renewal Workshop's factory where they are cleaned and repaired as needed. Refurbished clothing is then resold on The North Face's re-commerce platform – The North Face Renewed.⁶⁶



The key change in the value chain in a circular economy is that it becomes a closed-loop chain, meaning that all products go back into the cycle, making ‘reverse logistics’ an essential pillar that rarely exists in the current economy. Building this pillar or finding partners to aid the recovery of materials and products to bring them back into the cycle is going to be the next big thing for companies to implement and consider.”

ANNA TARI

President and CEO, Circular Economy Institute

- **Invest in infrastructure to ensure a steady supply of recycled materials.** In order to develop circular products, organizations will need to ensure that they have access to a steady supply of sustainable materials (i.e., materials that are renewable, recycled, or recyclable). However, gaining access to recycled materials can be a challenge, given the lack of adequate recycling infrastructure and the small scale at which recycling companies typically operate. Organizations will need to invest in building this infrastructure and collaboration will be critical, given the size of the necessary investments. Unilever North America, for instance, is investing \$15 million in a private-equity fund that aims to build circular supply systems by boosting the growth of companies in the recycling value chain. The investment will provide Unilever with access to recycled plastics processed by the companies, helping it to move closer to its goal of halving its use of virgin plastic by 2025.⁶⁷

- **Identify new partners to develop circular products and business models.** Organizations will also need to identify new partners to support the development of circular products and innovative models such as take-back schemes, rentals, and repairs. Clothing brands such as Patagonia, lululemon, and Levi's, for instance, have partnered with Trove – a US-based resale services provider – to set up their recommerce platforms.⁶⁸ US-based footwear and lifestyle brand Timberland, on the other hand, has partnered with tire manufacturer Omni to create footwear lines from used tires, which are specifically designed to be recycled into footwear.⁶⁹

In the automotive sector, closing the materials loop for electric vehicle (EV) batteries will be critical to ensure stable access to battery materials such as lithium, cobalt, and nickel, and to address growing concerns regarding the environmental impacts of EV batteries. Renault, for instance, has partnered with chemical company Solvay and waste management services provider Veolia to develop a closed-loop recycling system for EV battery metals in Europe. The partnership enables Renault to leverage Solvay's expertise in the chemical extraction of metals from EV batteries, and Veolia's expertise in dismantling and recycling lithium-ion batteries.⁷⁰

Circular Economy Institute's Anna Tari adds:

"The rethinking of value chains is one of the most critical steps that a company can take. Once a business has identified the top inputs and outputs that are contributing to their environmental impact, they should then consider economic opportunities. Sometimes, this leads to a change of providers or sparks a search for partners who have expertise in specific domains. For instance, a company's move to a rental model might mean that a logistics partner helps the company take back products into their organization. This scenario may also require the business to find an optimal storage and warehouse strategy to ensure they are managing what comes in and out of inventory."

- **Enable transparency and strengthen collaboration and data exchange with value-chain partners.** Data will be key to enabling the shift to circular supply chains. However, our previous research has shown that only 14% of organizations are engaged in highly collaborative data-sharing models with their supply-chain partners.⁷¹ Natasha Franck, founder and CEO at US-based start-up EON, which provides technology to enable circular commerce in the fashion industry, says:

"Today, there's no communication between a brand that is making a product and a recycler. They view themselves as belonging to different industries. But, for a circular model, those industries need to work together. There needs to be data exchange between a brand and a recycler, so that they can act as a system. A successful system relies on successful communication."



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NATASHA FRANCK

Founder and CEO at US-based fashion technology start-up EON

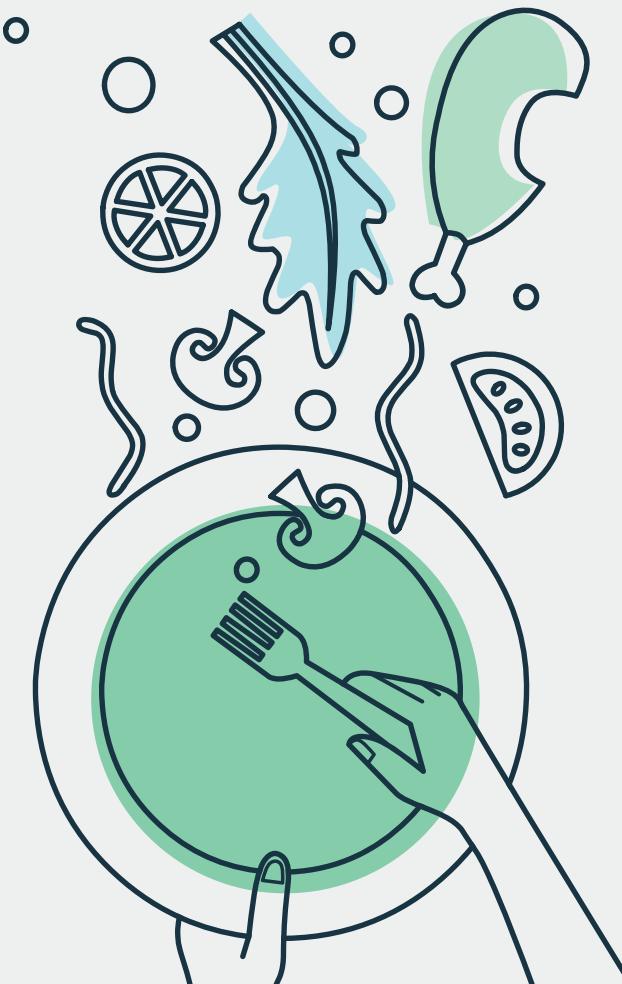
Tackling waste across food supply chains

Food that is lost or wasted results in close to \$940 billion in economic losses annually, consumes significant resources (around a quarter of the water used in agriculture and cropland the size of China), accounts for 8% of global GHG emissions, and worsens the problem of food insecurity.⁷² Redesigning food systems with circular principles in mind is therefore critical and will require strong collaboration across the food supply chain.

Tesco, for instance, has taken a range of measures to reduce food waste across its supply chain as part of its “farm to fork” approach. Some of these include:

1. Preventing food loss at the farm level by absorbing surplus produce (generated due to harvest gluts or overproduction for instance) and selling them at reduced prices.
2. Equipping growers to better measure and control food waste.
3. Linking farmers and food processors to ensure that imperfect produce can be turned into ready-made meals or other food products instead of being wasted.
4. Enabling redistribution of excess food from farms to communities in need by partnering with charities.⁷³

Similar programs are embedded at Kellogg’s to ensure that imperfect produce is utilized, and surplus food is redistributed.⁷⁴ Tesco and Kellogg’s are also part of a global consortium of public and private sector organizations called Champions 12.3 that aims to accelerate progress towards food waste reduction and have set targets in line with the UN Sustainability Development Goals (SDG) Target 12.3 that aims to halve global food loss and waste by 2030.⁷⁵ Working closely with suppliers and redesigning supply chains will be key to achieving these targets and reducing the impact of food production on land and resources.



Enable consumer adoption of circular practices

The success of circular business models hinges on wider consumer adoption of circular products and practices. Organizations will need to take concerted steps to build greater awareness of the need for circularity; empower consumers with the information they need to make better choices; build trust; and make circular practices more convenient. We look at each of these aspects below.

- 1. Shift mindsets.** As we saw earlier, there is a level of discomfort among consumers, driven by concerns around hygiene and quality, regarding the use of shared or second-hand products. And as we saw earlier with the example of Loop, providing reassurance to consumers regarding product quality and hygiene can help address these concerns and shift mindsets about used products (including refillable packaging, as in the Loop example).

In addition to providing reassurance, organizations should also ensure that they are responsible in their advertising and communications and do not encourage over-consumption. As we saw earlier, brands such as Patagonia are actively encouraging consumers to reduce their purchases.

Finally, shifting mindsets will also require removing harmful products from shelves so that consumers are nudged in the right direction. Hugo Byrnes, vice president of product integrity at Dutch grocery retailer, Ahold Delhaize, highlights this: *"I think we should shift our thinking from consumer choice to edited choice, where we help the consumer make better decisions on their purchases by simply not offering harmful products. For instance, in many countries we have moved from battery-caged eggs to free-range eggs, ahead of legal requirements. We, as organizations, need to help consumers, and this can be done for products across other industries, too."*

- 2. Empower consumers with information.** Organizations will need to empower consumers with information that can help them make better choices. Key measures to consider:

- Educate consumers on the negative environmental impact of their consumption habits and preferences.** In the grocery sector, for instance, consumers' preference for well-stocked shelves forces retailers to stock more than they can sell, which results in waste. David Roos, former quality assurance director at Aldi, highlights this issue and the need for consumer education: *"Consumers always expect maximum availability of products throughout*

the day, but that drives food waste because you're trying to ensure that there is product availability always. I think there's a culture shift that needs to happen within the industry and within consumers: re-educating consumers that not everything can always be available."

thredUP – a US-based online platform for buying and selling second-hand clothes – provides a tool to enable consumers to calculate the environmental impact of their clothing-related consumption habits (such as the volume and frequency of purchases and returns, brand preferences, laundry, and post-use disposal habits).⁷⁶ Being presented with such information can lead consumers to break habits that are damaging to the environment.

- Educate consumers on the positive impact of engaging in circular practices.** In addition to educating consumers about the negative impact of their consumption habits, organizations should also educate them about the positive impact of switching to circular habits. For instance, PUMA launched a collection of shoes and apparel made with recycled plastic in collaboration with First Mile, an organization that supports self-employed refuse collectors in Taiwan, Honduras, and Haiti. The collaboration resulted in the removal of 40 tons of plastic waste from landfills and oceans while generating income opportunities for collectors.⁷⁷ Awareness of the benefits – both environmental and societal – of purchasing circular products or adopting circular practices, can motivate customers to change their attitudes and preferences.
- Adopt a clearer labeling system to help consumers make the right choices.** Organizations will also need to provide better information on product labels, so that consumers can more easily select products that are more environmentally friendly. Regulations can play a key role in propelling changes in purchase preferences; France, for instance, has introduced regulation for a Repairability Index that came into effect in January 2021. The regulation requires manufacturers of electronic products to display an index that indicates how repairable a product is.⁷⁸

Elis Joudalova, partnerships and market growth manager at OLIO, a food-sharing startup, and a circular economy and food waste advisor, stresses the need for regulations that can help consumers reduce food waste:

"50% of global food waste happens in our homes, so there is a need to make it easier for consumers to manage it. Ultimately there need to be some key enabling conditions in the form of legislation, regulations, and incentives. One of the main issues is the confusion and difference in regulations around food date labeling across countries. Some countries are quite strict and use 'Use By' dates on many kinds of foods excessively, while others hardly have them at all and predominantly use 'Best Before' dates (e.g., Nordics). The same goes for rules around commercial composting of organic household waste which largely differ across cities and countries. It would be very helpful and impactful to have a standardized and unified approach. Setting up these basic key enabling conditions should be part of national and regional food and waste strategies."

- **Provide guidance.** In addition, organizations should proactively guide consumers in following a more circular lifestyle. At its store in Greenwich, UK, IKEA runs a Learning Lab program that offers workshops and activities around upcycling and reuse. The lab offers classes on sewing and furniture repair, among other subjects.⁷⁹

Sahar Mansoor, founder and CEO of Bare Necessities, a zero-waste personal care and home care brand in India, highlights the need for consumer education: *"It's not easy for everyone to adopt sustainable practices, so we focus a lot on customer education. We believe that as much as we are a product company, we are also in the business of changing mindsets around sustainability. So, we conduct talks, workshops, and monthly webinars, and provide engaging content on our social media platforms. We also offer two online courses and an activity book for children. The idea is to help make information on sustainability really accessible and to help change mindsets around sustainability at a deeper level so that it becomes the default option."*



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HUGO BYRNES

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SAHAR MANSOOR

Founder and CEO of Bare Necessities, a zero-waste personal care and home care brand in India

3. **Build trust.** Our research shows that just over half of consumers (51%) do not trust the sustainability claims made by organizations in relation to their recycled/refurbished products, with the trust deficit particularly high in India and China (see Figure 22). Building trust will, therefore, be key to driving the adoption of circular products and practices; transparency is a key element of this. Our research also shows that 64% of consumers expect organizations to be completely transparent about

the environmental impacts of their products. Celine Barral, chief sustainability officer at French food products brand Bonduelle, and former director at Danone, emphasizes this: *“People are highly aware and educated now, so it’s really key to be transparent and not oversell anything. It is ok to show vulnerability and affirm that ‘Yes, this is still in progress, we know we are not there yet, but this is the plan.’ Consumers are ready to value such a stance and don’t accept exaggerated claims anymore.”*

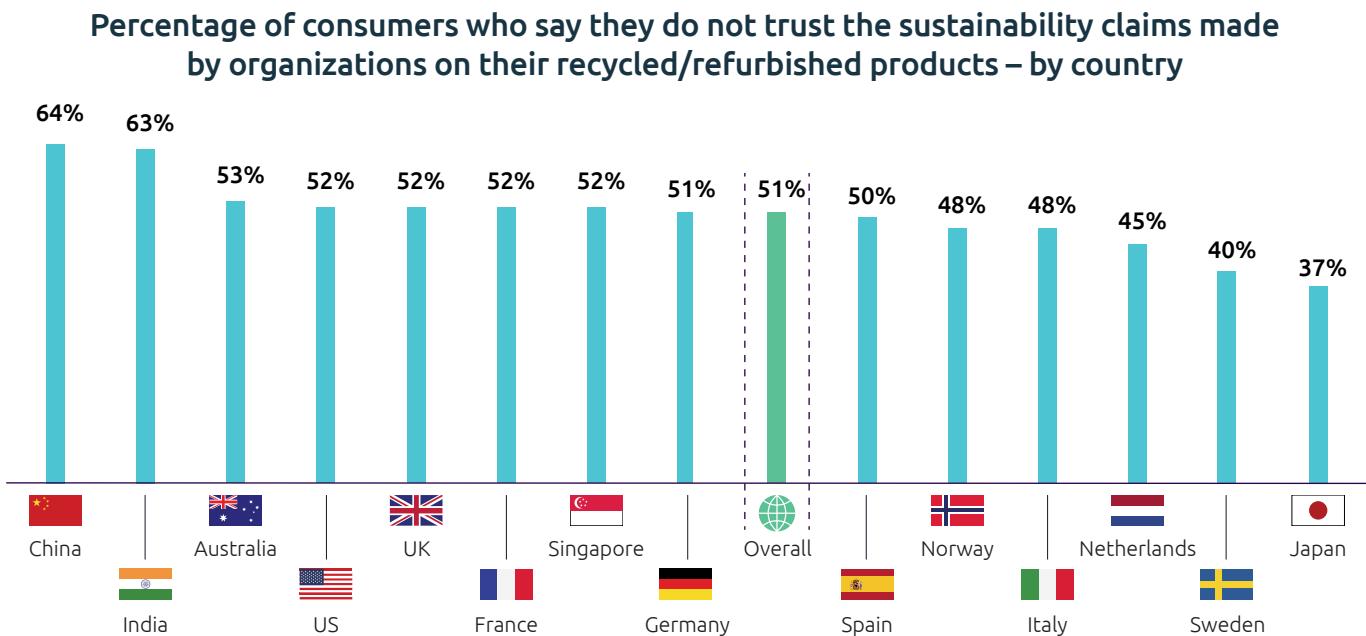


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CELINE BARRAL

Chief sustainability officer at French food products brand Bonduelle, and former director at Danone

Figure 22 More than half (51%) of consumers globally do not trust the sustainability claims made by organizations



Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

- Offer convenience.** Convenience will be key to driving consumer adoption of circular practices. Organizations will need to ensure that consumers can access circular products and engage in circular practices as easily as possible. This means ensuring that circular product alternatives are readily available in stores or online; providing take-back schemes for used products; simplifying recycling processes (e.g., providing collection points, or an app that connects users to local recyclers); and ensuring that consumers can easily follow through on disposal instructions (e.g., for compostable packaging, providing information on/access to composting facilities).

In addition to redesigning their products, business models and supply chains, and driving consumer adoption, organizations will also need to establish organizational enablers, leverage technology and data, and build collaborative ecosystems to support their journey towards circularity. We look at each of these aspects below.

Establish organizational enablers to support the transition towards circularity

Key elements of enabling organizational transformation towards greater circularity:

- **Mindset shifts.** In order to shift from linear to circular business models, organizations will need to orient themselves towards thinking systemically – i.e., developing the ability to see the interconnected nature of the problems that need to be solved in order to achieve circularity. UK-based sustainability non-profit Forum for the Future, for instance, offers training programs on systemic thinking at its School of System Change. The program aims to equip executives with the skills needed to think systemically and act as change agents within their organizations.⁸⁰
- **Governance structures.** Organizations will also need to establish mechanisms to systematically manage their transition towards circularity. This will require building leadership accountability for circular actions by setting clear goals and targets, and setting up appropriate governance structures. Renault's "Renault Environment" subsidiary, for instance, coordinates circular activities across the group's operations via three other subsidiaries that each look at specific aspects of circularity. The three subsidiaries include INDRA (focused on end-of-life vehicle recycling), Boone Conemor (manages metal scrap at Renault sites), and GAIA (manages interactions with parts and material suppliers for recycling subsidiaries such as production sites and repair shops).⁸¹

- **New metrics and key performance indicators.** Organizations will also need to adopt new metrics and indicators to track their progress towards circularity: for instance, metrics to track material use (e.g., overall reduction of resources used, percentage of non-renewable, renewable, and recycled materials used), recovery (e.g., volume of material collected for recycling), and reuse (e.g., percentage of recycled materials that are reused). In addition, organizations should leverage emerging tools and reporting frameworks to monitor their progress towards circularity. Some of these include:

- “Circulytics” – a tool developed by the Ellen MacArthur Foundation that helps organizations assess their performance against circular indicators.⁸²
- Circular Transition Indicators (CTI) – a framework developed by the World Business Council for Sustainable Development – a consortium of global companies.⁸³
- “GRI 306: Waste 2020” – a circular economy reporting standard developed by the Global Reporting Initiative, an international standards organization.⁸⁴

Dr. Patrick Schröder, senior research fellow at Chatham House, a think-tank focused on the study of international affairs, highlights this aspect: *“There are a number of tools that are being developed to help organizations measure their circularity. At the international level, ISO is working on a global standard on circularity, which will be especially relevant for organizations that have global supply chains. These are important frameworks and supporting tools that are being developed for companies to benchmark where they are, how to set targets and how to implement the relevant circular activities to reduce their environmental impact.”*



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DR. PATRICK SCHRÖDER
Senior research fellow, Chatham House

Use technology and data to further circular economy strategy

The use of digital technologies can benefit many circular initiatives:

- Technologies such as **robotics, sensor technologies, and machine learning**, which allow higher efficiency and circularity in processing of materials and manufacturing of products.
- Technologies such as **blockchain, internet of things (IoT), and digital twins**, which allow tracking and tracing of products and components; value-chain optimization; development of products as a service; and increase reuse, repair, and refurbishment.
- Platforms, apps, and websites that connect consumers and producers and allow sharing and waste reduction.⁸⁵
- **Augmented reality and virtual reality (AR/VR)** can also be used to avoid the creation of waste. Sephora’s “Virtual Artist” AR tool, for instance, helps customers try on make-up before purchasing them.⁸⁶

Dr. David Greenfield, a circular economy specialist from the UK, comments: *“Technology is overlooked in many cases when thinking about circular economy initiatives. There are already a number of AI and machine-learning systems coming in to aid the separation of materials for better quality. We’re also starting to see robotics coming in. Apple is now using robots to disassemble iPhones. These are the technologies that actually can capture some of the materials that are required to then be recirculated – however, to deliver climate change goals, we need to accelerate the transition and use AI and robotics for collection activities as well.”*



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DR. DAVID GREENFIELD

Circular economy specialist and managing director at Tech-Takeback, UK

Below, we look at two areas where technology can play a critical role within a circular economy – i.e., in tracking material and product flows and in enabling waste management.

1. Tracking material and product flows.

Technologies for tracking and tracing of materials and products flows include:

- **Radio Frequency Identification (RFID).** RFID can help track material flows to enable value recovery through the implementation of “re-strategies” such as reuse, repair and remanufacture. In addition, networked RFID systems help connect products tagged with an RFID chip to an information network, providing complete information about the product’s lifecycle to all networked partners.⁸⁷

Ahrend, a Netherlands-based international furniture company, uses RFID scanners to provide information to customers on the status and value of the furniture, with a focus on optimizing lifecycle management and an aim of maximizing reusable furniture and raw materials and minimizing value destruction.⁸⁸

- **Digital watermarks.** Companies have also been experimenting with other ways of tracking and tracing products. P&G is experimenting with digital watermarks; the concept is that these watermarks can be read by consumers, enabling them to sort their waste more efficiently and minimize contamination.⁸⁹

– **Blockchain.** Circularise – a Netherlands-based startup – offers a blockchain platform for tracking a material from source to product. The platform operates under a Traceability-as-a-Service model and enables the tracing of raw materials, and in particular those used in lithium-ion batteries. This platform allows consumers and manufacturers to trace the recycled materials back to the source and guarantees customers a circular product.⁹⁰

– **IoT.** Another technology that is essential for product tracing and tracking would be internet of things (IoT). By automatically and remotely monitoring the efficiency of a resource during extraction, production, and at the end of its use cycle, all parts of the value chain can become more efficient through the use of IoT. When the user decides to discard a product, IoT can aid in the asset retrieval, so that it can be recycled into its components. With efficient reverse logistics, goods gain a second life; fewer biological nutrients are extracted from the environment; and the looping or cascading of assets is enabled.⁹¹ These technologies will also enable more circular design of products.

Natasha Franck, the CEO of EON, a fashion technology company, explains how EON is building a “circular system of commerce that creates new systems, incentives, and business models essential for retail’s transition into a circular model for commerce”: *“We do this by digitizing and giving every physical garment a digital identity, such that that garment can be identified, managed, and stewarded through a sustainable, transparent, and circular lifecycle from the moment it’s produced through use, reuse, and its next life.”*

2. Waste management. Waste management, which in itself is a huge part of circularity, can benefit from the use of digital technologies such as:

- Robotics, for identifying and sorting recyclables and critical materials through image mapping, computer vision, and other AI vision systems
- AI and machine learning for classification and pattern recognition in the waste-management context, improving sorting efficiency
- Cloud computing and data analytics to optimize waste-related workflows and analyze and use critical data to identify patterns and build trends and better waste-management solutions.⁹²

Wayne Visser of the CISL explains the huge opportunities that exist for better waste management through digital technologies: *"If you look at the automotive industry and you look at all the plastics, there's a company called MBA Polymers, which, a number of years ago, cracked the code on how you take the mixed waste plastic from cars and put it through a recycling or a reconstitution process, so that it comes out the other end as plastics that can once again be used in cars. Zen Robotics has robots that sort plastic and they already claim to have 98% accuracy of sorting mixed waste. Circularise, a Dutch company, works especially with the plastics industry essentially to track the plastics value chain right from the start to the end and to put a blockchain in place so that, at every step, you know exactly what the plastic is made of, what's in it, and how to recycle it. They also use artificial DNA to help with the traceability. Digital twins can also help to design alternative models in detail and see what the impacts will be on material flows and so on."*

The use of digital technologies also requires a fundamental rethink of how data can be used, and data-management systems improved to promote circular practices.

Finally, it is also important to practice circularity in the use of technologies themselves as they, too, can have a large carbon footprint and need to be managed and assessed carefully. In our AI for climate action report, we suggested ways in which organizations can account for and take measures to combat the negative impact of AI on climate action.⁹³

Collaborate to accelerate the transition to a circular economy

Given the complex, interconnected nature of the challenges involved in the transition to a circular economy, collaboration will be critical. Organizations should actively seek to work with a wide ecosystem of partners, including competitors,

policymakers, startups, universities, and think tanks, in order to accelerate the transition to a circular model. We highlight some examples of collaborative models that organizations should consider either joining or starting:

- **Industry coalitions.** Industry associations and coalitions can play a key role in establishing a common industry-wide approach to addressing the challenges involved in the transition to a circular economy. The Sustainable Apparel Coalition, a global alliance of organizations in the apparel industry, for instance, has developed the Higg Index, a standardized methodology for the measurement of sustainability across the apparel value chain. The coalition has also set up Policy Hub, an initiative to put forward policy proposals to support the shift to circular practices within the apparel industry.⁹⁴

- **National and regional initiatives.** Participation in national and regional initiatives can help organizations enhance their contributions and accelerate their own shift to circular practices. The Plastics Pact, for instance, is a program initiated by the Ellen MacArthur Foundation that aims to tackle the problem of plastic waste through local or regional initiatives. Several countries, including France, the Netherlands, the UK, and the US are signatories to the pact and have developed national programs to shift to a circular economy for plastics. In each country, the program is led by a local organization that brings together a wide range of stakeholders across the plastics value chain. Programs have also been established to drive coordination and collaboration at a regional level. These include regional pacts in Europe (covering the European Economic Area or EEA) and in Australia, New Zealand, and the Pacific Island Nations (ANZPAC).⁹⁵

- **Cross-industry initiatives.** The Flexible Plastic Fund is a collaborative initiative that was set up in the UK in May 2021 by five consumer goods brands: Mars, Mondelēz International, Nestlé, PepsiCo, and Unilever. The fund brings together manufacturers, retailers, and recyclers with the aim of incentivizing the recycling of flexible plastics such as plastic bags, pouches, and wrappers, that have very low recycling rates currently.⁹⁶

- **Collaboration with startups.** Organizations should also look at partnering with startups to move closer to their circularity goals. French food and beverage brand Danone, for instance, has set up a fund – Danone Manifesto Ventures – to invest in food technology startups. The fund has invested in Phenix – a startup focused on combating food waste. Phenix has developed a mobile app to reduce food waste, and also provides training and support to organizations to help them adopt zero-waste strategies.⁹⁷

Government actions to boost collaboration and accelerate the transition to a circular economy

European Union:

In February 2021, the European Commission, together with the United Nations Environment Programme (UNEP), launched the Global Alliance on Circular Economy and Resource Efficiency (GACERE). The alliance aims to drive international collaboration on the transition to a circular economy.⁹⁵ The EU is also providing funding for circular economy through a range of initiatives such as European Structural and Investment Funds, Horizon 2020 and the LIFE Programme.⁹⁹

UK:

The UK government has launched the National Interdisciplinary Circular Economy Research (NICER) program to accelerate the UK's shift to a circular economy. The program involves 34 universities and 200 industry partners and is supported by a £30 million investment from the UK government's Strategic Priorities Fund. It covers research on material reuse in textiles, construction, metals, and chemicals.¹⁰⁰

Australia:

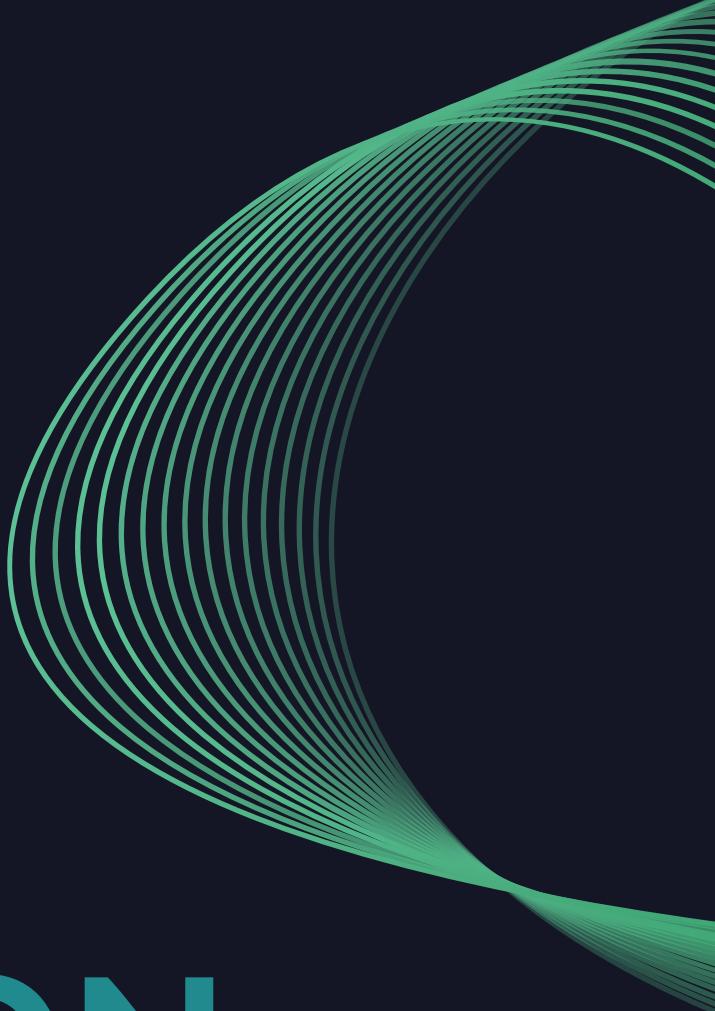
In Australia, the government of Victoria has set up the Circular Economy Business Innovation Centre (CEBIC) to help businesses transition to a circular economy through grants, investments and sharing of best practices.¹⁰¹ Highlighting the need for such initiatives, Anne Dansey, principal policy advisor to the Victoria State Government in Australia, says: *"Our Circular Economy Business Innovation Center looks at ways to turn waste material into value-added products. We do this through research partnerships with industry. Embracing circular business models can be difficult due to the high cost of research and development. So, you do need to have government facilitation of those research processes."*



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ANNE DANSEY

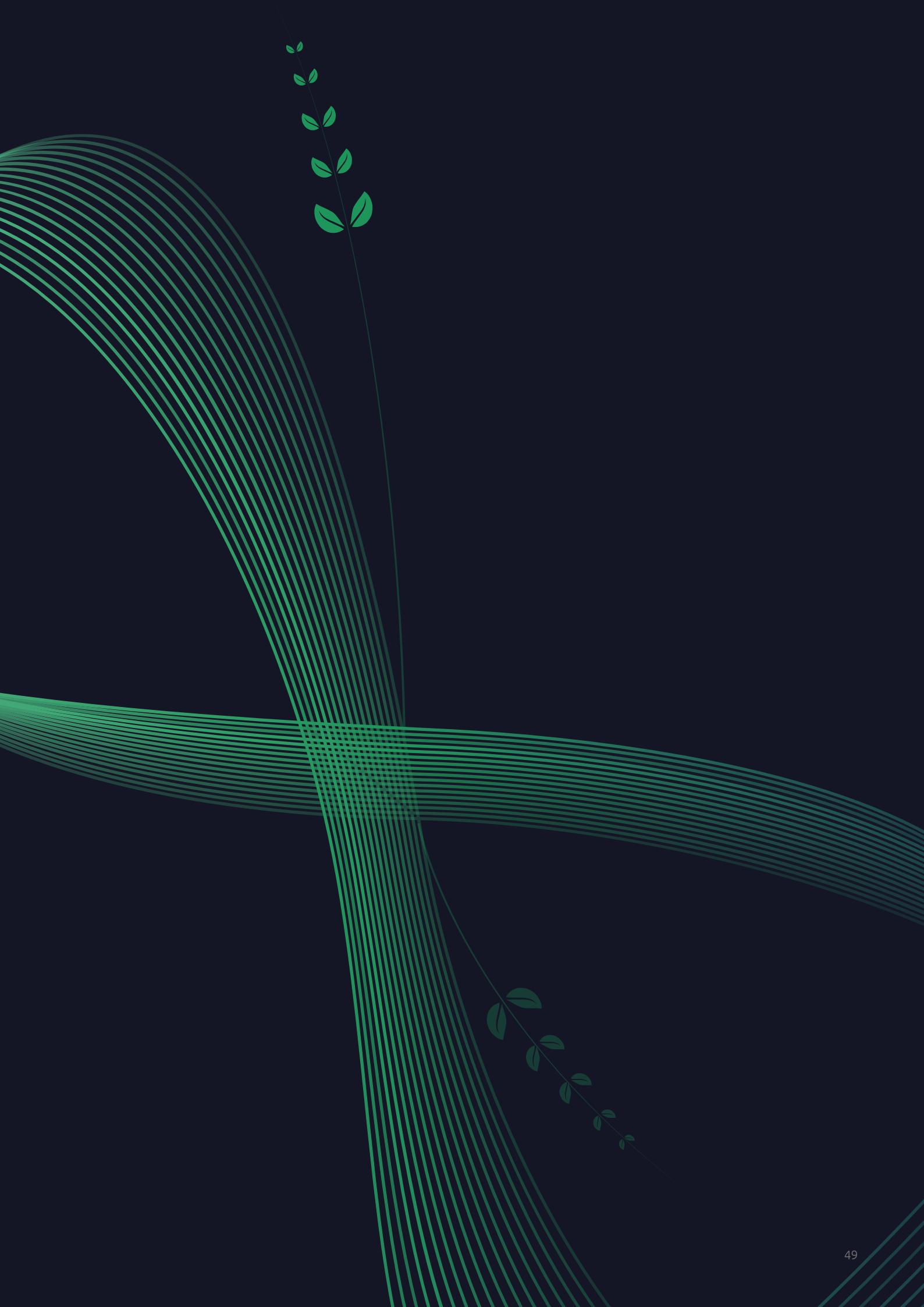
Principal policy advisor to the Victoria State Government, Australia



CONCLUSION

The circular economy provides opportunities and benefits to organizations and reduces the heavy reliance on finite resources, as well as reducing the detrimental environmental and climate impacts that large-scale production and consumption have unleashed. Consumers are aware of and interested in taking part in many circular economy initiatives. However, they are held back significantly by lack of access, cost barriers, and convenience issues. In addition, while consumers have made some progress towards circular initiatives, they are reluctant to adopt certain circular practices (especially sharing/renting/leasing or buying second-hand). It is also clear that organizations today aren't doing enough to invest in circular economy initiatives, something with which consumers agree.

It is imperative that organizations start urgently rethinking their economic and business models, as well as their production systems; investing in emerging technologies; and reimaging their value chains to design their products for greater circularity. Organizations must also work towards building consumer awareness and mindset shifts, so that consumers are also excited and actively take part in circular initiatives. Lastly, regulations and legal mandates will go a long way in enabling cross-border circular initiatives. Therefore, organizations must not only work with lawmakers and regulators but also academics, think tanks, their suppliers and third-party vendors, and clients, as well as innovative startups, to propel the progress and maturity of circular initiatives.

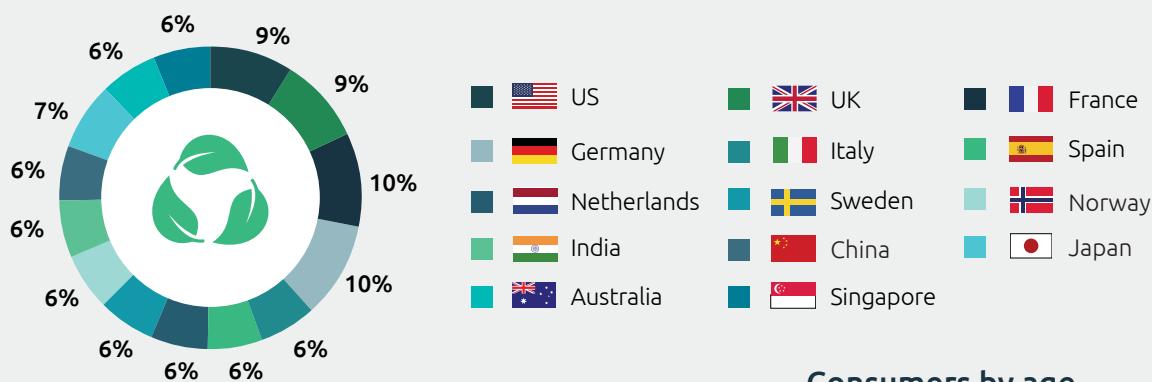


Research Methodology

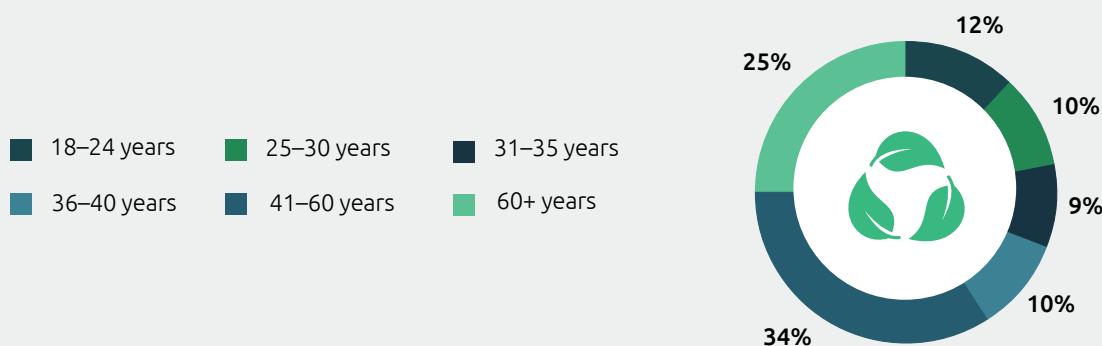
We surveyed close to 8,000 consumers globally to understand their interest in and acceptance of circular practices, and their expectations from organizations from the consumer products and retail (including food, personal- and household-care products, fashion and clothing, furniture, consumer electronics, and white goods), and automotive sectors.

We also conducted in-depth interviews with 20 experts from industry, academia, startups, and think tanks that are working in the field of circular economy.

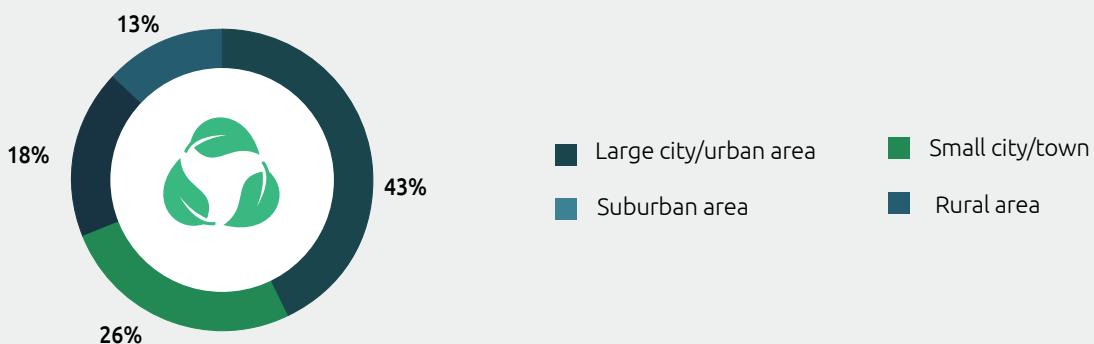
Consumers by country



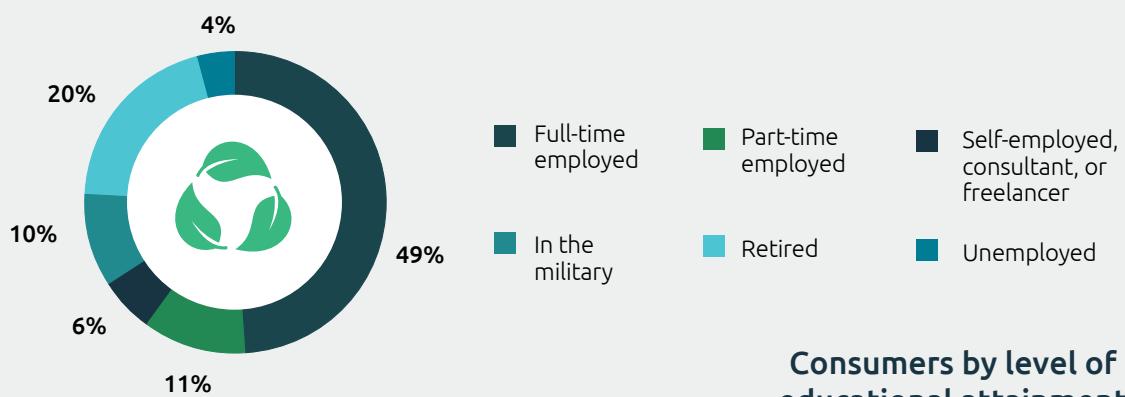
Consumers by age



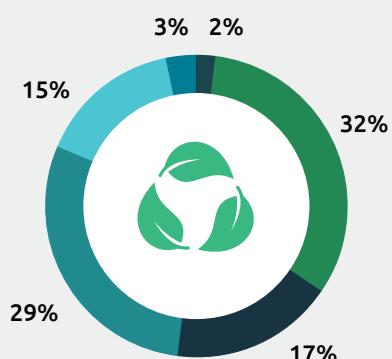
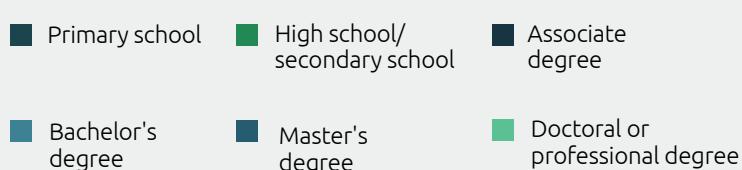
Consumers by location



Consumers by employment status



Consumers by level of educational attainment



Consumers by pre-tax annual household income

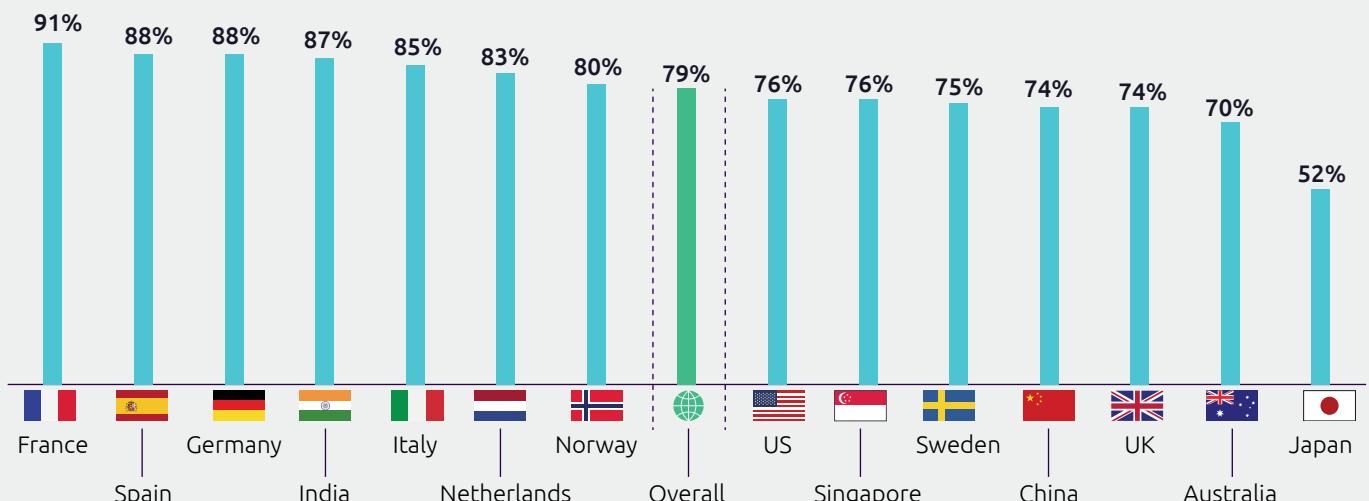


Source: Capgemini Research Institute, circular economy survey, August–September 2021, N=7,819 consumers.

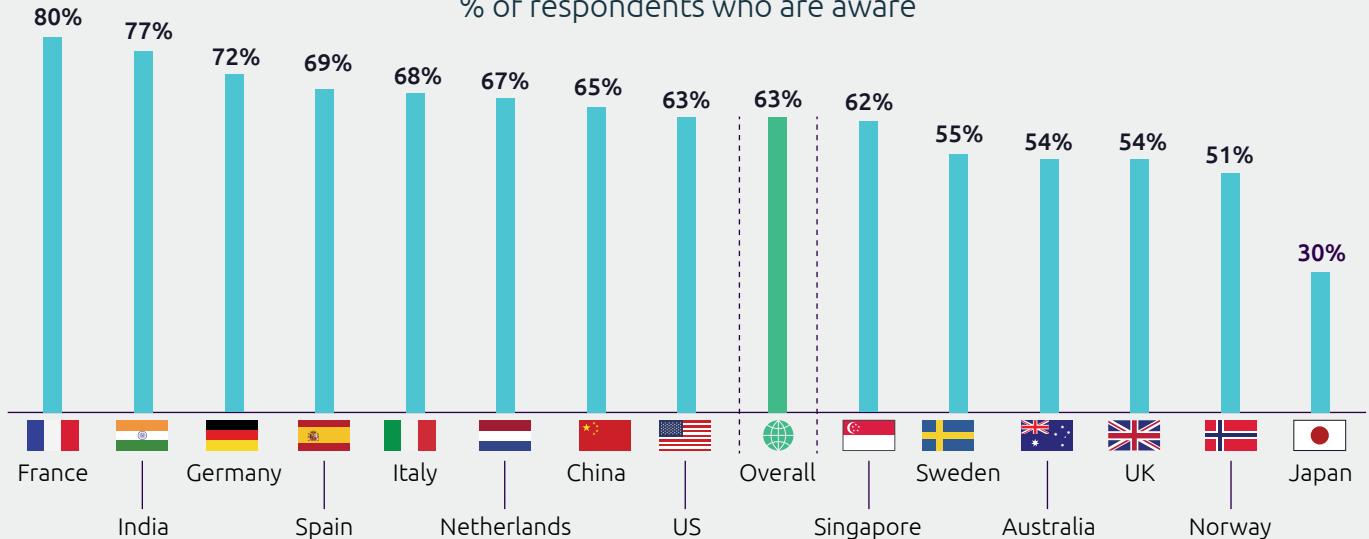
The study findings reflect the views of the people who responded to our online questionnaire for this research and are aimed at providing directional guidance. Please refer to the methodology for details of respondents and get in touch with a Capgemini expert to understand specific implications.

Appendix

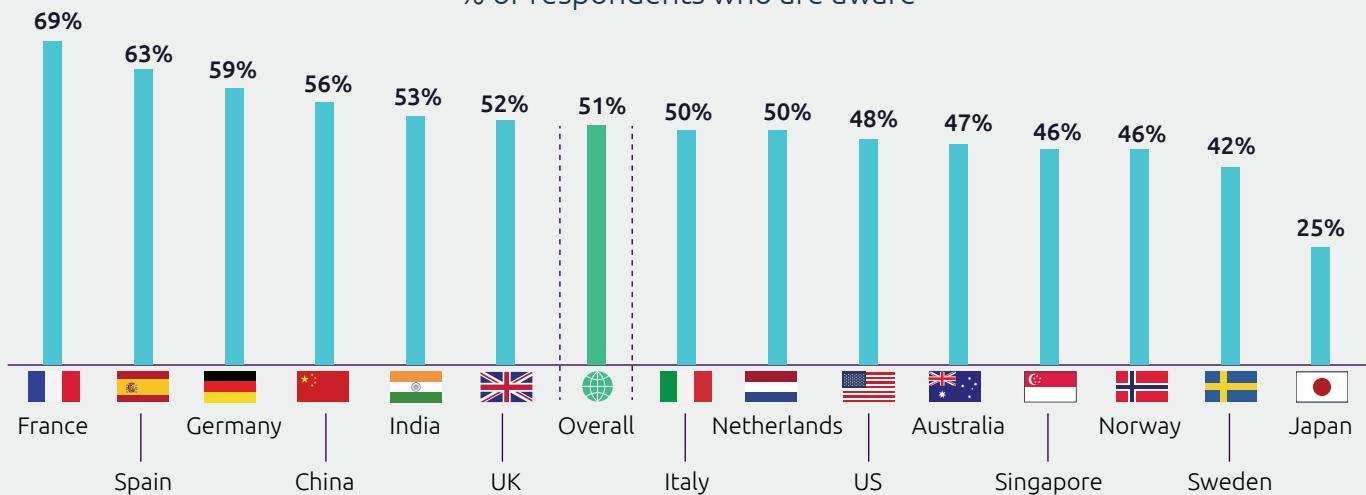
Globally, around one-third of all food produced is wasted every year
 % of respondents who are aware



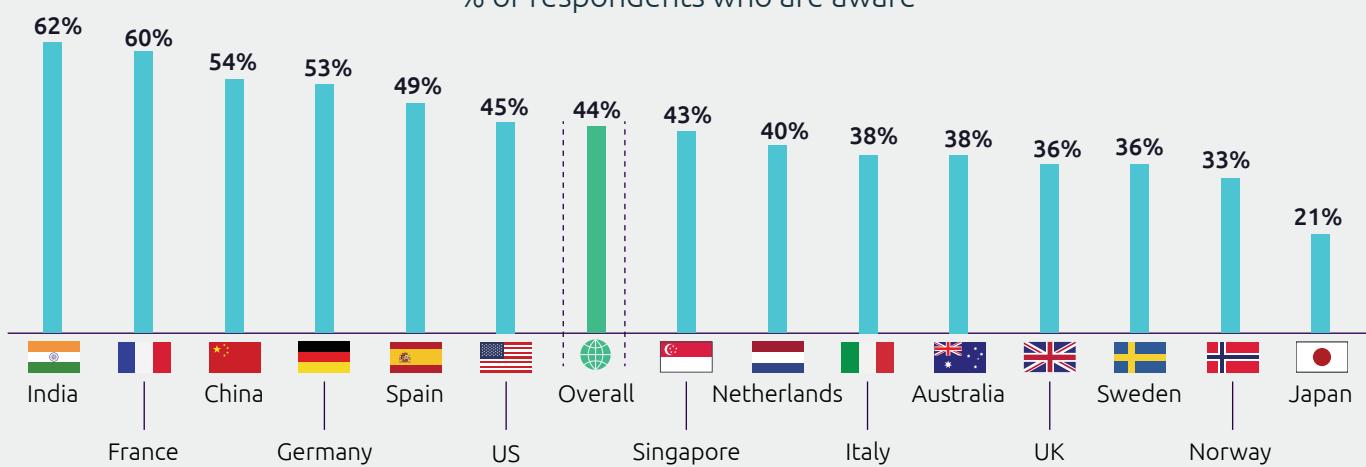
Packaging is responsible for 50% of global waste production annually
 % of respondents who are aware



Nearly 85% of textiles end up in landfills every year
 % of respondents who are aware



Only 17.4% of global electronic waste generated in 2019 was documented to be collected and properly recycled
 % of respondents who are aware



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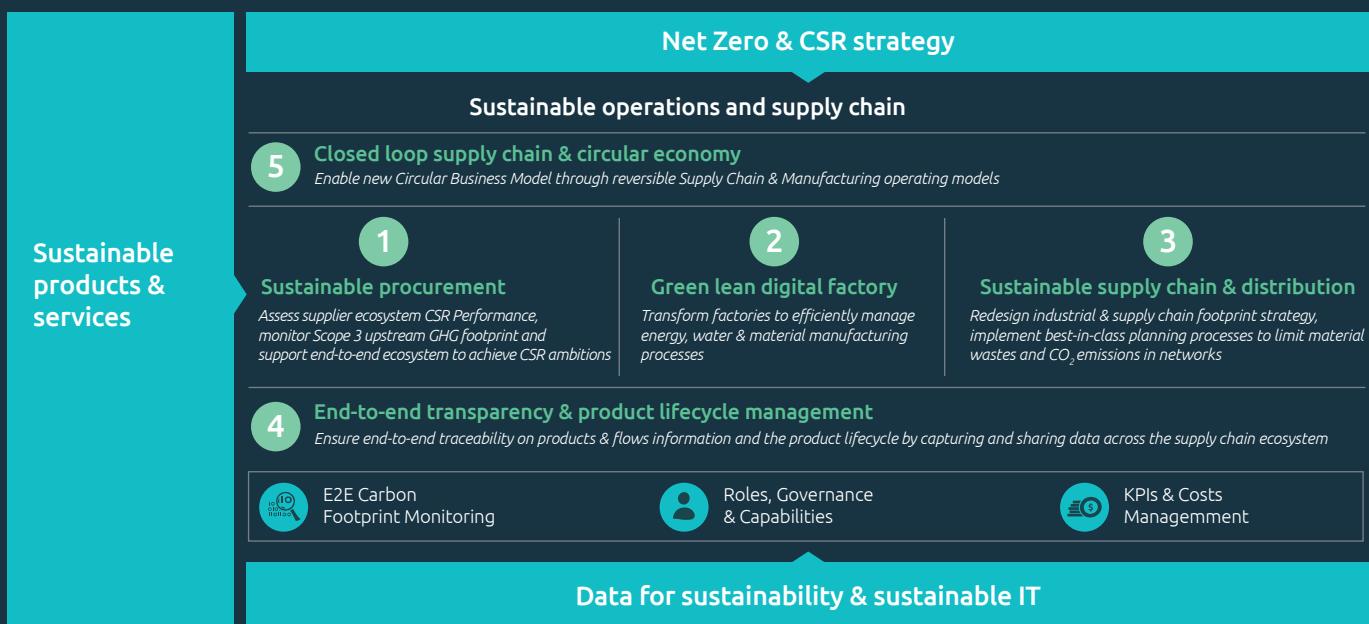
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About the Authors



Courtney Holm

Vice President, Sustainability Solutions at
Capgemini Invent
Courtney.holm@capgemini.com

Courtney Holm is Capgemini Invent UK's Vice President of Sustainability Solutions. Her role is to shape the way Capgemini Invent UK creates long term, sustainable value for clients, enabling them with fresh perspectives and digital solutions so that they can play a transformative role in addressing planetary, people and systems challenges.



Katja van Beaumont

Vice President, Consumer Products, Retail,
Distribution, Capgemini The Netherland,
Katja.van.Beaumont@capgemini.com

Katja is a thought-leader at Capgemini in the Consumer Products and Retail industry. With over 20 years of experience in delivering transformational business initiatives enabled by technology, she is a visionary leader, elevating aspirations and bringing about a lasting positive impact for all stakeholders.



Marc Rietra

Vice President, Consumer Products, Retail,
Distribution, Capgemini The Netherland,
marc.rietra@capgemini.com

Marc is a thought-leader at Capgemini in the Consumer Products, Retail & Distribution industry. With over 20 years of experience in delivering transformational initiatives he has been leading customers to success, always bringing in a unique vision ensuring meaning and long-term value creation.



Markus Winkler

Executive Vice President, Global Automotive,
Capgemini Group
markus.winkler@capgemini.com

Markus Winkler is Executive Vice President and in the leadership team of the Global Automotive Industry. Markus works with teams across the world, helping Automotive clients shape their mobility strategies and implement what's next in the rapidly changing automotive industry. Markus is a recognized expert in digital transformation and has gained wide ranging experience in delivering major international business and technology transformation programs in the automotive industry. His experience has a key focus on customer first, connected services, and digital excellence gained by working with some of the world's most innovative and recognizable brands, helping to define the future of the automotive industry.



Jean-Marie Lapeyre

Chief Technology & Innovation Officer, Global
Automotive Industry
jean-marie.lapeyre@capgemini.com

Mathematician and Computer Scientist by training, Jean-Marie initiated his executive career in the industry in 2002 as CTO of the French Tax Authority. He started in the automotive industry early 2007 and, until joining Capgemini in spring 2021, held various senior positions with GM for 10 years, then PSA, driving global enterprise technology and security programmes. Now he is an architect of Capgemini's Software-Defined Transformation in the Automotive Industry.



Tim Bridges

Global Sector Lead,
Consumer Products, Retail, Distribution, Capgemini
timothy.bridges@capgemini.com

Tim leads Capgemini's Consumer Products, Retail, Distribution & Transportation (CPRDT) global sector practice, a portfolio that includes major global retail, fashion, restaurant, consumer products, transportation, and distribution brands such as McDonald's, Coca-Cola, Meijer, Office Depot, Domino's, and Unilever.



Lindsey Mazza
Global Retail Lead
lindsey.mazza@capgemini.com

Lindsey is a retail thought leader and subject matter expert, who specializes in shopper-centric, unified-channel commerce and innovation. With nearly 20 years of extensive experience in retail transformations, she's served some of the world's largest retailers in analytics-enabled integrated planning and execution, from consumer demand to receipt. Lindsey is the creator and co-lead for Capgemini's Retail Planner solution and is the Global Retail Lead at Capgemini.



Kara Pecknold
Executive Design Director, Global Lead for Sustainability
Kara.pecknold@frogdesign.com

Kara is an Executive Design Director and Sustainability lead at frog who is passionate about the dynamic opportunities for impact found at the intersection of people, planet, services and systems.



Jean-Baptiste Perrin
Vice President, Invent for Society
Global Leader, Capgemini Invent
jean-baptiste.perrin@capgemini.com

Jean-Baptiste leads Capgemini Invent's social impact business initiative: Invent for Society. With a strong background in public sector and sustainable development, he is also a Vice-President within Citizen Services at Capgemini Invent France, leads sustainable projects and develops business synergies with our most recent acquisitions including social impact agency, Purpose.



Dr. James Robey
Global Head of Environmental Sustainability,
Capgemini
james.robey@capgemini.com

Dr James Robey has led the sustainability agenda at Capgemini since 2008, creating and driving a broad ranging program to reduce the Group's own environmental impacts whilst identifying opportunities to support Capgemini's clients with their own sustainability challenges. In addition, he teaches at a number of leading universities on the topic of Sustainable Business.



Jerome Buvat
Global Head of Research and Head of Capgemini Research Institute
jerome.buvat@capgemini.com

Jerome is head of the Capgemini Research Institute. He works closely with industry leaders and academics to help organizations understand the nature and impact of digital disruption.



Subrahmanyam KVJ
Director, Capgemini Research Institute
suhrahmanyam.kvj@capgemini.com

Subrahmanyam is a director at the Capgemini Research Institute. He loves exploring the impact of technology on business and consumer behavior across industries in a world being eaten by software.



Roopa Nambiar
Senior Manager, Capgemini Research Institute
roopa.a.nambiar@capgemini.com

Roopa is a senior manager at the Capgemini Research Institute. She leads research projects on key business, technology and consumer trends and their impact on large organizations.



Amrita Sengupta
Senior Manager, Capgemini Research Institute
amrita.a.sengupta@capgemini.com

Amrita is a senior manager at the Capgemini Research Institute. She tracks the patterns of digital disruptions across industries and its impact on businesses and society.

The authors would like to especially thank Shahul Nath and Pritam Subba for their contribution to this research. In addition, the authors would like to thank Patricia Noble Gonzalez, Charlie Weibel, Julien Bourdinier, Kees Jacobs, Daniel Davenport, Sven Dahlmeier, Clément Chenut, Sol Salinas, Sheila Patel, Andy Heppelle, Óscar Domínguez, Sabine Reuss, Vidhya Krishnaswamy, Qingping Liu, Kiri Trier, Mark Ruston, Sebastian Tschödrich, Pascal Feillard, Walid Negm, Jean-Luc Chabaudie, Andy Howard, Rob Pears, Idun Aune, Greg McDougall, Josieke Moens, Tej Vakta, Chu Yan, Celine Zu, Roshan Batheri, Vidhya Srinivasan, Emmanuel Lochon, Ruth-Anne Peters, Anna Katarina Bromberg Segal, Joy Bhattacharjee, Annie Hughes, Priyabrata Ghosal, and Manish Saha for their contribution to this research.

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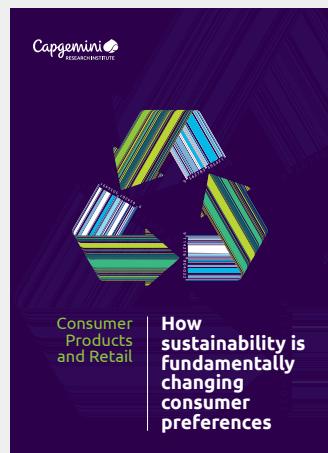
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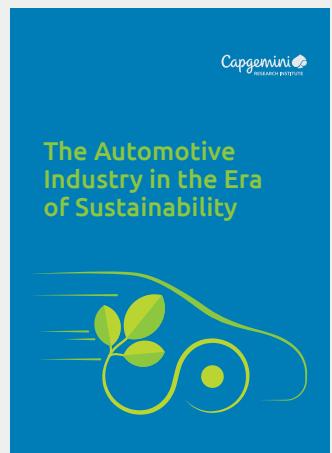
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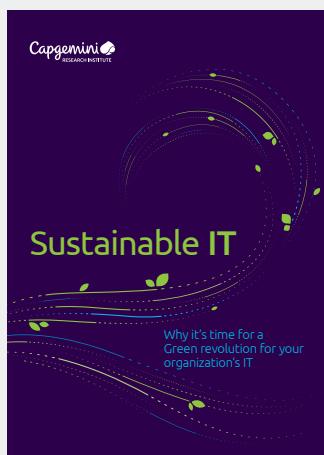
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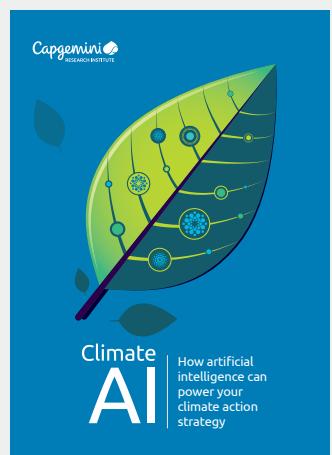
The Automotive Industry in the
Era of Sustainability



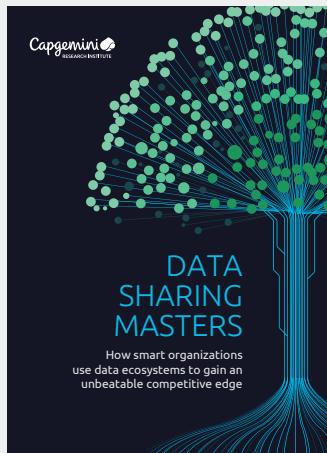
Sustainable Operations



Sustainable IT



Climate AI



How data ecosystem lead to competitive advantage



The data powered enterprise



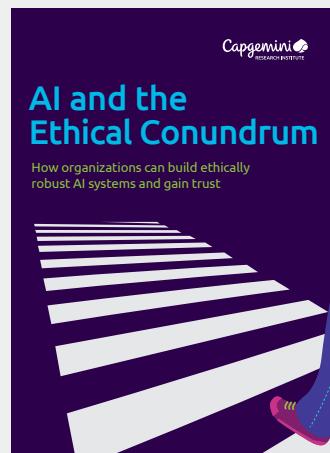
Scaling innovation



Software in automotive



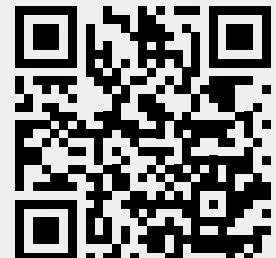
Smart stores



AI and the ethical conundrum

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