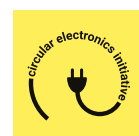


The Landscape of Circular Electronics Towards 2035

TREND REPORT

JANUARY 2024

DELLTechnologies



Circular Electronics Towards 2035

The electronics sector is confronted with major challenges. These include addressing electronic waste and pivoting towards sustainable business models. This trend report offers a comprehensive overview of various developments poised to influence the realm of circular electronics by 2035. It examines broader societal shifts, technological advancements, and changes in consumer mindsets.

The intent of this report is to provide a bird's eye perspective and ensure that new ideas, initiatives and products strike the right balance between what organizations *can*, *want* and *should* do, given the state of the world today. The report is written from a European perspective with a global outlook.

This report was commissioned by Circular Electronics Initiative (CEI), funded by Dell Technologies and produced by Kairos Future.

Please be aware that this report, although commissioned by CEI and financially supported by Dell Technologies, may not necessarily align with the perspectives of CEI or Dell. The report is the creation of Kairos Future with the primary aim of sparking meaningful discussions within the IT sector.

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Introduction:

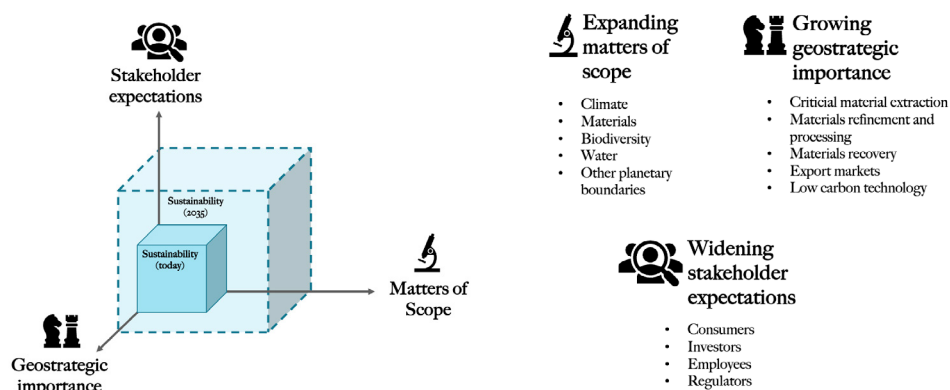
Expanding Sustainability

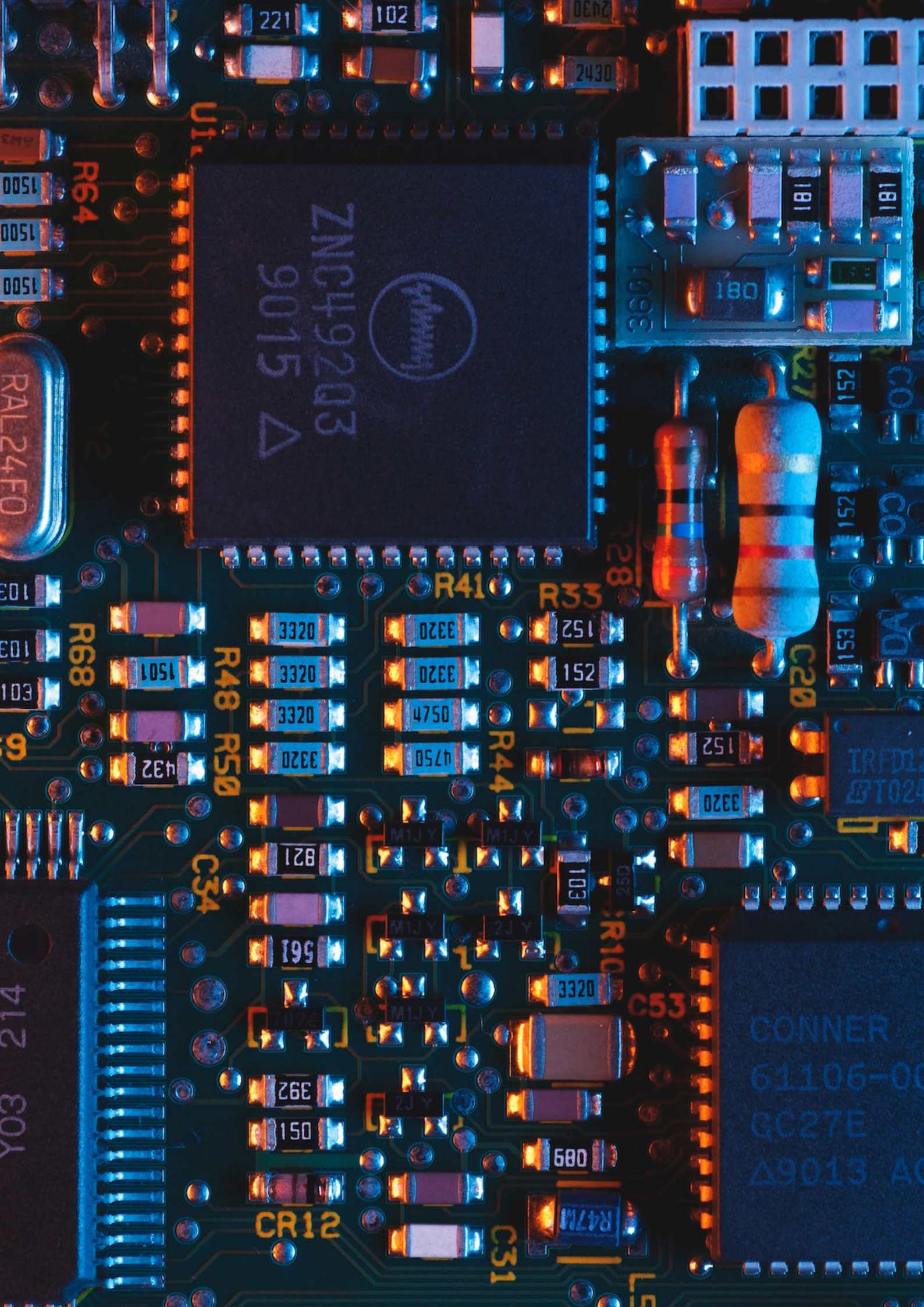
This trend report provides an overview of various developments that will likely all influence the landscape in which circular electronics will be embedded by 2035. It captures broad societal transformations, as well as technological advancements and mindset changes in citizens.

Central to grasp is the role of sustainability in the general discourse. The model below illustrates an attempt to capture this evolving landscape of sustainability. As we advance, three main forces stand out:

- **Stakeholder expectations:** everyone from regulators to citizens have rising sustainability expectations.
- **Matters of scope:** sustainability scopes are broadened to encompass a wider array of issues - from emissions to biodiversity to social aspects.
- **Geostrategic importance:** the green transition is associated with hardened geopolitical dynamics as it challenges global power relations.

What sustainability will come to encompass in 2035 is likely to be growing along these three axes. This reflects a holistic view of sustainability that is becoming integral to strategic business considerations, and much more complex to handle. Considering these dynamics, this report attempts to zoom out on the forces that might constitute the future playing field for circular electronics.





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Summary of the Trends

TREND 1: SUSTAINABILITY MERGES WITH GEOPOLITICS

In the 2020s, sustainability has become deeply intertwined with geopolitics and national security, driven by initiatives like the European Green Deal and hastened by increased geopolitical turbulence. This convergence challenges the transition to a low-carbon society with high costs and dependency on foreign resources, prompting a shift in business strategies where sustainability is now a key strategic and financial focus for all organizations.

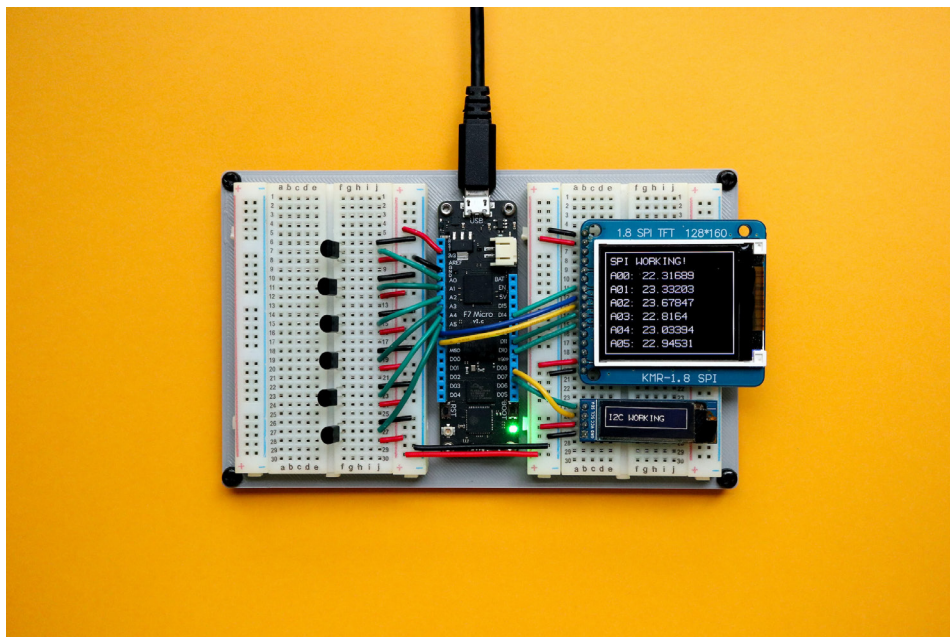
TREND 2: THE EU AS A REGULATOR IS GROWING MORE IMPORTANT

In recent years, the European Union has grown in global influence, particularly through its regulatory power, a phenomenon known as "The Brussels Effect." The EU's strong stance on sustainability regulations, requires companies operating in Europe to adopt practices like mandatory sustainability reporting, leading to significant systemic improvements. This signals a continued emphasis on green industries and the importance of monitoring EU policies for future direction.

TREND 3: TRACKING, TRACING AND TRANSPARENCY ON THE RISE

The move towards a sustainable and circular society is accelerating supply chain transparency, with regulations like the European Corporate Sustainability Reporting Directive mandating extensive sustainability disclosures. Enhanced by digital innovations such as IoT and blockchain, this trend is shaping a future where detailed product tracking and consumer information sharing become essential aspects of circular business practices.





TREND 4: DESPITE SETBACKS, THE CIRCULAR ECONOMY IS ADVANCING

Despite a decline in global circularity from 9,1% in 2018 to 7,2% in 2023, Europe shows progress in circular practices, particularly in electronics with advancements in modular design and the growing reparability movement. Additionally, the second-hand market is rapidly expanding, fueled by an increasing consumer focus on sustainable and conscientious consumption.

TREND 5: EVERYTHING IS BECOMING ELECTRONICS

The increasing integration of electronics into everyday items, driven by advancements in semiconductors and batteries, is leading to greater efficiency while, at the same time, resulting in more usage and potential e-waste generation. Innovations in circular business models, which encourage longer usage and upgradability, offer alternatives. However, to truly achieve circular electronics, more brands need to adopt business models focused on refurbishment, recirculation, and materials recovery.

TREND 6: OWNERSHIP IS GETTING SERIOUS COMPETITION

The concept of ownership is increasingly facing competition from subscription, leasing, sharing, and renting models across various industries, including media, cars, and IT equipment. This shift, facilitated by digital technologies, offers flexibility and convenience, aligning with modern lifestyles and reducing the burdens of maintenance and disposal. However, it also raises critical questions about responsibility for product reuse, repurposing, and material recirculation, challenging traditional notions of ownership and user accountability.



TREND 7: AI WILL HELP SPEED UP THE TRANSITION

The rise of generative AI, exemplified by ChatGPT, is significantly boosting efficiency in tasks like writing and programming, potentially accelerating innovation across various sectors. Multimodal AI capabilities, understanding both text and images, are poised to overcome challenges in electronics materials recovery by improving sorting and disassembly processes. Advancements in AI are making robots more adaptable and versatile, promising major improvements in material recovery efficiency in the next decade.

TREND 8: CONSUMERS DEMAND SUSTAINABLE COMFORT AND COMFORTABLE SUSTAINABILITY

Consumers, particularly younger generations, are showing a growing preference for sustainable brands with clearer morals and values. Yet their purchasing decisions often prioritize comfort and convenience, leading to a demand for “comfortable sustainability” where eco-friendly products must also align with modern convenience and functionality standards. This complex choice landscape is key for organizations to better understand.





UNCERTAINTY 1: WILL GOVERNMENTS KEEP AMBITIOUS TARGETS AS TIMES GET TOUGH?

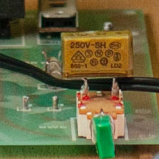
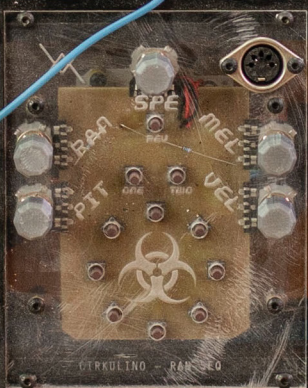
The transition away from fossil fuels faces challenges due to high costs and the need for strong political commitment. This transition is most evident in the European Union, but has shown signs of uncertainty in other places, where climate commitments are being delayed. These potential policy reversals create an uncertain business environment, raising questions about whether short-term economic gains will overshadow ambitious climate targets.

UNCERTAINTY 2: WILL AN UNCERTAIN ECONOMIC OUTLOOK EMBED CIRCULAR HABITS?

As 2024 begins, Europe and other regions face high interest rates, sluggish growth, and tight monetary policies, creating a cautious economic climate. Conflicts further add to this uncertainty, affecting supply chains and raw material prices. This environment may foster a long-term cautious approach to consumption, potentially reviving practices like product repairs and aligning with sustainability trends. The question remains whether these responsible consumption habits will persist or fade as economic conditions improve and purchasing power is restored.







Trend 1:

Sustainability Merges With Geopolitics

The 2020s have marked a significant shift where sustainability, once a standalone environmental concern, has now become deeply intertwined with geopolitics, sovereignty, and national security. This trend is exemplified by the European Green Deal, which not only injects substantial funding for the sustainable transition but also sets the stage for stringent regulations, symbolizing a major policy shift and the start of a new era.

This era is witnessing a re-industrialization movement, pivoting towards a green paradigm. Despite renewable and low-carbon energy sources currently occupying a minor portion of the global energy mix, wars coupled with broader geopolitical instability, has quickened the pace of green investments and fortified the political will to pursue them.



The transition to a low-carbon, circular society, while essential, is proving to be slow and costly, impacting households and companies globally. The shift from cheap, energy-dense fossil fuels to sustainable alternatives high up-front costs brings significant financial strain. The dependence on foreign materials and the strategy of urban mining – the recovery and reuse of existing materials – are gaining paramount importance. These are now seen not just in terms of environmental impact but as crucial elements of national and economic security.

As sustainability merges with issues of war, geopolitics, and national security, its implications extend far beyond environmental impact. This convergence is driving a rapid evolution in technology, fostering new viable business models, and necessitating the development of supporting infrastructure for a circular economy. Consequently, energy and material efficiency are emerging as strategic imperatives for almost all companies.

In this context, businesses are compelled to reevaluate their approach to sustainability. It is no longer a mere public relations issue or a competitive edge but a core strategic consideration. This is reflected in the changing role of Chief Sustainability Officers, who are increasingly moving closer to finance and strategy.



Trend 2:

The EU as a Regulator is Growing More Important

The European Union's role as a regulator is rising¹. Legal scholar Anu Bradford called the EU's outsized influence on global regulation "The Brussels Effect". Effectively, this means that European regulations impact not only Europe, but the rest of the world as well.

The union seized the opportunity to champion global regulations on several key sustainability areas, including circularity and sustainable finance (including ESG). This means that any company operating in the EU will need to follow EU requirements, including for example mandatory sustainability reporting (more on that below). And while this seems like a small step, requiring all major corporations to engage with carbon accounting, for example, sets the stage for major systemic improvements. If emissions and materials are not properly quantified and accounted for, little can happen.

The EU's initiatives really took off in 2020 with the European Green Deal and has since even pushed the United States to follow suit with the Inflation Reduction Act in 2022. This piece of legislation was the historically most ambitious in the US and confirms the general direction of EU and US policies going forward. Through these ambitious financing and regulatory packages, they are both betting on green industries. And while we are likely to see some confrontations as each seek to protect and develop their own industries, the general trend is clear.

In other words, keeping an eye on what the EU is doing from a political and regulatory perspective might not only be clever but necessary to keep up. Although EU parliamentary elections and US Presidential in 2024 may readjust the course, the overall direction is likely to remain stable.

1 Ioanna Hadjiyianni, The European Union as a Global Regulatory Power, Oxford Journal of Legal Studies, Volume 41, Issue 1, 2021





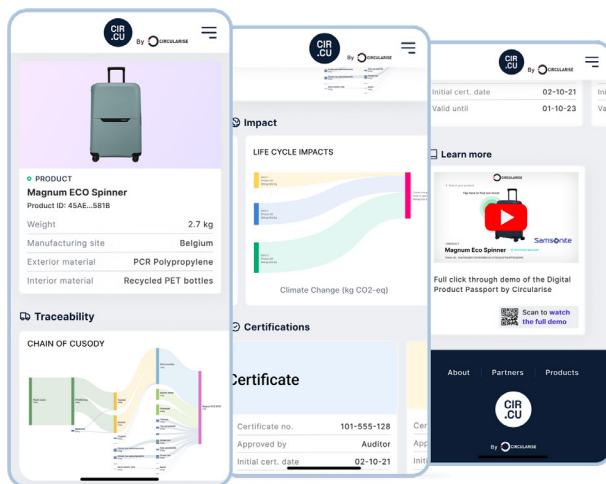
The Brussels Effect refers to the phenomenon where the European Union (EU) sets regulatory standards across various industries that are then adopted globally. Companies outside the EU often find it more practical to adhere to these regulations to maintain access to the EU market. The EU's stringent regulations in areas like environmental protection, data privacy, and consumer rights make it a global regulatory leader. The concept was coined by legal scholar Anu Bradford.



Trend 3:

Tracking, Tracing and Transparency on the Rise

The premise of circular society requires relatively high levels of transparency in supply chains. This is the general direction we seem to be moving towards. The European Corporate Sustainability Reporting Directive (CSRD) is a prime example of these growing transparency requirements. For medium and large companies, disclosure of many types of sustainability data, including various scopes of greenhouse gas emissions, is becoming mandatory. The CSRD also requires claims about environmental performance to be backed by life-cycle analyses.



An example of how a blockchain enabled digital product passport could look like from a consumer perspective. In this case for a luggage manufacturer.

Credits: Circularise



Similarly, tracking and tracing of materials is taking shape. The Ecodesign Sustainable Products Regulation (ESPR) by the European Union will strengthen the possibilities for environmental criteria in procurements and introduce digital products passports¹ – a major step in ensuring materials can be circulated and more efficiently used. Most importantly, it creates a vast array of information and data about materials, flows and processes that all can be subsequently innovated upon – problems are notoriously best solved when there is hard data about them.

Although regulations are driving the development of increased tracking and transparency, it is worth remembering that consumer demands are also a contributor. Especially since advances in digital technologies that have matured over the past years have made visualization more compelling – a selling point in some cases. IoT solutions with cheaper radio-frequency identification (RFID) tags on products enables wireless and seamless tracing, while the slow but increased use of blockchain in supply chain management is making products easier to trace among different actors across supply chains².

All in all, collecting more data on products themselves along with choosing to share some of that information with customers is likely to be an important step forward for companies engaging in circular practices. Additionally, offering personalized insights on product materials, packaging, and carbon footprint meets rising customer demands for transparency and supports their conscious-driven decision-making - all while being easy to access and use.

1 <https://gs1.se/en/digital-product-passports>

2 Charles et al., A critical analysis of the integration of blockchain and artificial intelligence for supply chain. *Annals of Operations Research*, 1-41.



Trend 4:

Despite Setbacks, the Circular Economy is Advancing

In the sphere of circularity everything seems lined up for success: a growing global focus on climate and sustainability with favorable political headwinds, a burgeoning infrastructure and innovation landscape, a strong consumer base demanding circular products and open for reused products, technological solutions making a circular economy possible...

And yet, according to [Circle Economy](#) who perform a yearly quantification of the global material flows, the world has gone from being 9,1% circular in 2018 to 7,2% in 2023¹. Globally then, we are moving in the wrong direction though this coincides with global population and infrastructure growth. The decline should, however, not thwart the progress made in bringing up the materials circulation issue on a higher agenda.



The world's largest facility for sorting plastic packaging was inaugurated in 2023, in Motala, Sweden. Site Zero doubles plastic recycling compared to the previous facility, which was already one of the most efficient in Europe. Up to 95% of all packaging received will be able to be sent for recycling in the near future.

Credits: Svensk Plaståtervinning

1 The Circularity Gap Report, Circle Economy, 2023

However, since the first numbers from Circle Economy were published in 2018, a lot has happened, particularly in Europe. In electronics, for example, manufacturers like Fairphone, Framework and Dell Technologies² have gotten better at making modular devices which are now more attractive, as the processing power of modern devices is good enough to last much longer. Lately, longer software and security updates have also been a growing trend. Combined with strong consumer movements in repairability which is increasingly enshrined into law, people are more than ever able to obtain original parts and repair their devices.

What's more encouraging is the general growth of the global second-hand products market. Transparency Market Research expects it to grow annually by 13,6%³ as more shops, both online and physical, are mixing new with used products. With personal and environmental wellness growing as a status symbol⁴, consuming less and better seems to be not only fueling the growth of the second-hand market, but also its segmentation into various levels of luxury⁵.

7,2%

According to Circle Economy, only 7,2% of the 100 billion tonnes of virgin materials extracted from the Earth every year find their way back into the economy¹.

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- 2 <https://www.dell.com/sv-se/dt/video-collateral/concept-luna-a-vision-for-sustainable-pc-design.htm#>
 - 3 Transparency Market Research, Second-hand Products Market Outlook 2031
 - 4 GlobeScan, Healthy & Sustainable Living Report 2023
 - 5 Imarc, Secondhand Luxury Goods Market Report 2024-2032



Trend 5:

Everything is Becoming Electronics

A trip back to the early 2000s would likely remind us of all the objects in our lives that used to *not* be electronics – much less smart electronics. Watches, bikes, furniture, glasses and even cars. With booming semiconductor and microchips industries, there have been incentives for producers to integrate smart functions into an ever-growing number of objects. Even plain packaging is commonly equipped with chips of some kind, generally RFID.



The Fairphone Easy subscription is a prime example of a circular business model that emphasizes long term ownership while providing upgradeability through the life of the product. Users get growing discounts for every additional year they keep the same device.

Credits: Fairphone



Much of this has also to do with the rapid expansion of the battery industry, which has enabled more power delivery for longer in smaller formats. In turn, it seems to confirm the consequences of Jevons paradox¹ yet again: as we increase efficiency, we tend to increase overall usage. From there, more power allows for more computing which can then be utilized to build better and new functions. In the realm of bikes for example, brands such as VanMoof can now sell not only the bike itself, but also a subscription to a bike retrieval service in case of theft². Ray-ban's collaboration with Meta enables them to sell a pair of glasses that also include the functionalities of headphones, camera and phone calls³.

If bikes and glasses, along with many more products, are becoming electronics it also means that we can expect e-waste to keep growing. On the other hand, if access to the technology is what people are fundamentally interested in, then there are many possibilities for brands to experiment with new business models. A prominent example is Fairphone's business experiments with their "Easy" model. For every additional year a user keeps the phone without getting a new one, the costs diminish significantly. And because the phone is upgradeable, this means users can enjoy a fully modern device, at much lower costs over time.

Unless most of brands implement different business models to ensure their refurbishment and recirculation or, at least, materials recovery, the path to circular electronics will encounter significant hurdles going forward. Leasing solutions and subscription models are both examples that can improve business incentives.

1 The Jevons paradox occurs when technology or policy increases the efficiency with which a resource is used, but the falling cost of use generates increases in demand enough that resource use is increased, rather than reduced.

2 <https://www.vanmoof.com/peace-of-mind>

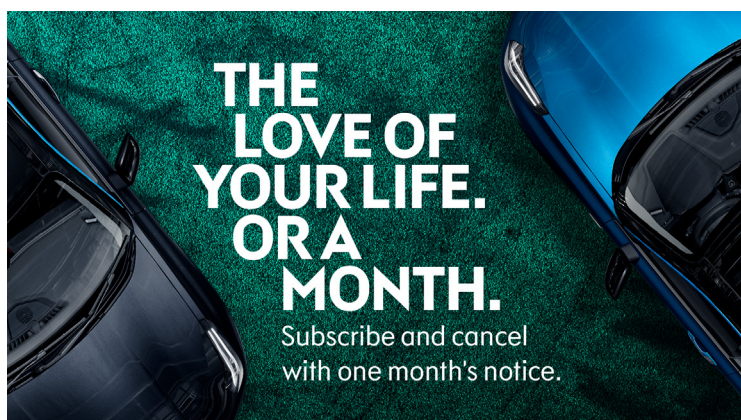
3 <https://www.theverge.com/23922425/ray-ban-meta-smart-glasses-review>



Trend 6:

Ownership is Getting Serious Competition

A wall full of DVDs was not an uncommon sight back in 2005. Since then, we have gradually transferred most of our media into the digital realm and along with it, our ownership of it. Music, games, and even cars¹? Many car companies – aside from selling actual cars – also propose their cars as subscriptions, in which case they are no longer selling a car but rather a mobility service. Pay monthly, get everything included, never worry about repairs and about having to sell it back – all this with a notice period of three months. The XaaS (“as-a-Service”) models from the software industry are seemingly growing among physical products as well.



Carmaker Lynk & Co advertising their car-subscription emphasizing the flexibility their model offers consumers.

Credits: Lynk & Co

1 Vehicle-as-a-Service: From vehicle ownership to usage-based subscription models, Deloitte, 2021



Perhaps the rise of subscription, leasing, sharing and renting models is responding to more flexible and diverse lifestyles where simplicity is key. They are also made significantly easier by digital technologies that can keep track of usage, repairs and other crucial information to improve services. The company Ihopa has for example been building community lockers stacked with modern top-of-the-line electronics that homeowners' associations can collectively purchase to reduce overall ownership, which users can then access with their phones².

Even the corporate world is looking to make the change. Globally, the B2B leasing market for IT equipment is growing and is expected to keep doing so. More and more businesses are opting to rent or lease to meet different needs, both short and long term. With increasing and more widespread e-waste recycling fees, it is also getting more convenient for companies to eliminate the cost of having to dispose of devices at their end of life³.

Letting go of product ownership in favor of this servicification in the eyes of some is surrendering to a cycle of endless payments and dependency on external services. For others, however, it represents a step towards convenience, sustainability, and freedom from the burdens of maintenance and storage. Perhaps one of the services we can soon be expecting is tracking and tracing to products after they're returned for reuse or recycling, with the hope that companies become better at repurposing their own products.

As ownership evolves with time and technology, important questions need to be answered. Who actually owns the product? Does the owner or the user have responsibility to ensure products get reused and repurposed, and materials recirculated?

2 <https://www.ihopa.com/>

3 <https://www.eea.europa.eu/en/analysis/indicators/waste-recycling-in-europe>



Trend 7:

AI Will Help Speed Up the Transition

Around a year after the release of ChatGPT, the effects have been remarkable: with approximately 1,5 billion visits per month, the chatbot showed the world what generative AI can do *today*. Early experiments have shown efficiency gains for writing tasks around 60%¹ and over 120%² for programming tasks. More accessible coding also means potentially much higher innovation rates in all fields that involved computer assisted tasks (think collection, sorting, etc).

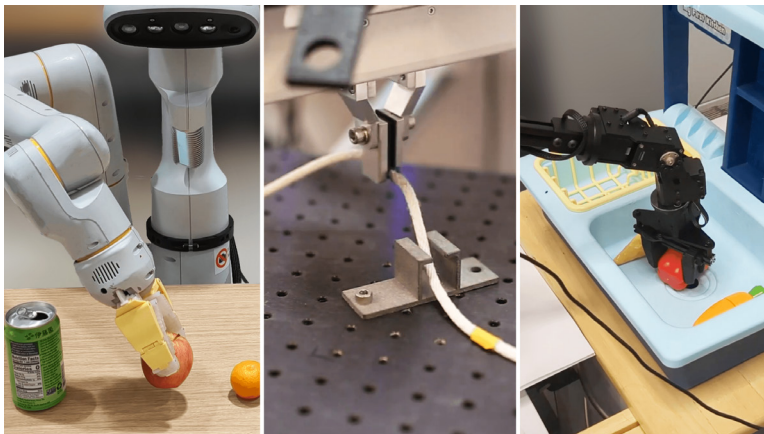


Figure 5: With DeepMind's RT-2-X models, robots can now much more easily understand instructions, such as "move near". This holds promising implementation for tasks associated with circularity: sorting, repairing, collecting, etc.

Credits: Google DeepMind

1 Experimental Evidence on the Productivity Effects of Generative Artificial Intelligence, Noy & Zhang, 2023

2 <https://github.blog/2022-09-07-research-quantifying-github-copilots-impact-on-developer-productivity-and-happiness/>



Not only can the latest AI models write and code, but they are also multimodal. This effectively means they can understand more than text material – namely images. That’s where things get interesting. One of the biggest barriers to electronics materials recovery is that it is a costly and time-consuming process to separate and disassemble - and that some many different models of electronics exist - on top of a severe lack of standardization. More advanced AI models can massively improve this task.

In recent experiments, researchers at DeepMind have showcased that newer AI models can help make robots generalists³. Previously, robots (often robotic arms) were thought to be excellent at performing specialist tasks but, when single parameters change, they needed to be retrained. This may now be in the past, as these models can help cross-training and make robots more adaptable to more easily understand new instructions. Combined with state-of-the-art computer vision from models like OpenAI’s GPT4, robots could very quickly help us massively improve the sorting and disassembly processes for materials recovery.

DeepMind’s GNoME model (Graph Networks for Materials Exploration) has potential to discover and develop novel materials at previously unattained speeds. The next 10 years are likely to see major improvements in this frontier.

Generative AI technologies have, in a very short time, showed that major efficiency boosts can be gained and hold promising applications in circularity and general sustainability improvements. They will, however, also require us to significantly improve our capacity to detect and handle both misinformation and disinformation.

3 <https://deepmind.google/discover/blog/scaling-up-learning-across-many-different-robot-types/>



Trend 8:

Consumers Demand Sustainable Comfort and Comfortable Sustainability

Despite growing awareness and concern about the impacts of their purchases, particularly among younger generations, there remains a significant gap between environmental aspirations and consumer actions.

On one hand, consumers are voicing a strong preference for sustainable products and practices. This shift is more pronounced among younger generations, who are notably more eco-conscious and attracted to brands that prioritize environmental responsibility¹, such as Houdini, and Fairphone. These brands have successfully harnessed the growing demand for products that align with a sustainable ethos and moral compass that reflect a set of core values.

However, this inclination towards sustainability is often tempered by a desire for comfort and convenience. Factors, such as price, brand loyalty, product ecosystems, personal health and fitness, and specific features like battery life often take precedence in actual purchasing decisions. This reveals a more complex consumer mindset where sustainability is valued, but not at the expense of personal comfort and ease of use.

In reality, oftentimes consumers are happy to embrace environmentally sound products when it is easy, but their commitment to sustainability does not always extend to actions that require significant effort or compromise on comfort. The concept of “comfortable sustainability” emerges here, indicating a preference for eco-friendly options that do not disrupt the convenience and functionality consumers have grown accustomed to.

Interestingly, the push towards more sustainable practices in the realm of consumer goods is often driven top-down by companies and government regulation, rather than being a grassroots, consumer-led movement (although they exist, they are not of comparable scales)². Circularity regulations simply have to meet

1 GlobeScan Healthy & Sustainable Living Report 2023

2 European Commission Behavioural Study on Consumers' Engagement in the Circular Economy, 2018



the level of convenience that consumers have come to expect from modern products and services.

This tendency is particularly evident in the electronics industry. While there is an appreciation for the concept of circular electronics, the actual consumer adoption of such practices continues to be slow³. The preference for convenience, and especially, brand ecosystem still appear to trump other criteria.



3 Overcoming the Eight Barriers to Making Green Mainstream, BCG, 2023

Uncertainty 1:

Will Governments Keep Ambitious Targets as Times get Tough?

As discussed in *trend 1: sustainability merges with geopolitics*, the transition away from fossil fuels is costly. Transforming the infrastructure to accommodate new sources of energy, new forms of mobility, improved grids and energy efficiency require both serious investments and a strong political willpower.

At the time of writing, ambitions seem clearest in the European Union (see *trend 2*) but could show signs of weakness elsewhere. In the United States, uncertainty regarding climate ambitions looms over the 2024 Presidential election outcome¹. In the United Kingdom, Rishi Sunak delayed UK climate commitments by postponing the ban on sale of new petrol and diesel cars².

What looks like course reversals and political U-turns could contribute to fostering a more uncertain environment for businesses and reduce commercial incentives to develop business models in line with climate targets.

As Europe enters a period of slow growth, will short term economic gains become more widespread, or will ambitious climate targets prevail?

1 Donald Trump would gut Joe Biden's landmark IRA climate law if elected, Financial Times, 2023

2 Analysis: UK government's climate U-turns put legally binding targets in jeopardy, Carbon Brief, 2023



Uncertainty 2:

Will an Uncertain Economic Outlook Embed Circular Habits?

In Europe and many parts of the world, interest rates remain high as 2024 begins and multiple central banks have signaled that growth will be sluggish with tighter monetary policy for possibly years to come¹. Inflation, while trending downwards and showing hints of positive recovery, has left many citizens worldwide with more cautious spending habits.

Similarly, military conflicts have again become a closer reality for many. In addition to bringing a sense of instability, conflicts often lead to volatility of raw materials access and availability, as well as resulting in overall supply chains disruptions, which ultimately affect pricing – further stressing the need for financial resilience.

These are economic outlooks for the short to medium term. As we head towards 2035, the trend may reverse though it is also possible that harder economic times will have imprinted on the collective mindset and lead to an overall more cautious approach. Practices that have been historically associated with more economic hardship – such as product repairs – could see a rise in popularity again as they find synergies with the rising popularity of sustainability and desire to reduce individual consumption.

Hopes for more local tourism following the COVID pandemic travel restrictions were quickly eclipsed by “revenge travel” as plane flights soared after months of lockdown². But perhaps the story will be different for products’ consumption. As more people experience the need to consume more responsibly, will the habit be shaken off or prevail as purchasing power is regained?

1 Europe Outlook 2024, Economist Intelligence Unit, 2023

2 Post-COVID ‘revenge travel’ has gone big. And the revenge is sweet, Euronews, 2023





Methods

Trend bank analysis: Our approach involved leveraging Kairos Future proprietary trend bank, a comprehensive database that aggregates and analyzes current market trends, consumer behaviors, and industry innovations. This allowed us to identify key patterns and emerging trends within the sector.

Survey: We conducted a survey targeting members of the [Circular Electronics Initiative](#) network. This survey was designed to understand future industry developments from within the network to capture a holistic view of the sector.

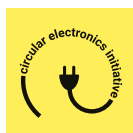
Coordination meetings: Regular meetings were held throughout the project to ensure alignment with our objectives and to discuss preliminary findings, both internal and external. These meetings included team members from different departments and organisations to provide multidisciplinary insights and to maintain the quality and relevance of our research.

AI-assisted research: To supplement our primary research, we employed Dcipher Analytics tools for in depth research and case examples. We employ the toolbox to identify trends and patterns in large and unstructured text data.





Kairos Future is an international consulting and research company that helps companies understand and shape their future. Through trend analysis, innovation, strategy, and software support for AI-driven analytics, we help our clients turn big picture insights into concrete action. Founded in 1993, Kairos Future is headquartered in Stockholm and has offices and partners around the world.



Circular Electronics Initiative is an international network with 29 member organizations. The purpose is to encourage society to use electronic goods sustainably. Part of the core activities is to inspire decision-makers, businesses, and consumers to use and manage electronics in a more circular way.



Dell Technologies helps organizations and individuals build their digital future and transform how they work, live and play. The company provides customers with the industry's broadest and most innovative technology and services portfolio for the data era.