AVOIDING BLIND SPOTS: PROMOTING CIRCULAR & FAIR BUSINESS MODELS

CIRCLE ECONOMY

EEB European Environmenta Bureau

Fair Trade ADVOCACY OFFICE

EXECUTIVE SUMMARY

Growing inequality, the climate breakdown and diminishing resources are challenging our planet and society. These challenges require major systemic change in the logic of value creation, with the aim of shaping new, more responsible business models. The circular economy is widely presented as an alternative model of production and consumption that can keep materials, products and components flowing at their highest value through our economic system. A circular approach may therefore help businesses create value by disconnecting profit from production volume through slowing, narrowing and/or cycling resources as well as reducing waste and consumption of virgin materials.

This research provides clarity into some of the potentially harmful side effects of the linear value chain and business models which are unaddressed or underexplored when promoting circular business models. The report dives into three specific business model archetypes within the textiles and electronics sectors that can be considered to slow or close loops when designed to promote circularity. These cases include reverse cycles of repair and maintenance, resale and services such as rental and subscriptions (Product-as-a-Service, here referred to as PaaS) both in the textiles and electronics sectors.

Mapping risks and blindspots of circular business models and their value chains. The potential negative impacts of the selected circular business models, the sourcing and manufacturing processes they rely on, were identified in relation to environmental, social, market and governance dimensions through desk research, literature review, interviews and stakeholder consultations. Further, related best practices with mitigating effects have been researched and proposed throughout the recommendations.

Promoting circular and fair business models

Recommendations in this report focus on addressing the blindspots of circular business models. They are not intended to solve all blindspots related to linear supply chains, as this is beyond the scope of this report. However, while not all risks should be addressed directly by circular policies or strategies per se, there is an impending need to ensure that these strategies and policies are aligned with other sustainability frameworks. This would ensure that circular business models are promoted in a fair and just manner.

The recommendations are mainly targeted towards policy makers, including the EU institutions and member states, as well as businesses, public procurers and civil society across Europe.

- **Ensure that circular business models displace linear ones** by setting absolute social and environmental impact targets, avoiding rebound effects and developing comprehensive policy frameworks to incentivise circular businesses. Businesses should make circular products and services their core offering and avoid misleading communications if they are predominantly linear.
- **Enforce social performance up and downstream in value chains** by integrating social and environmental due diligence, both including through the EU level initiative on due diligence and private sector initiatives.
- **Ensure design for value retention** by incentivising circular design and banning design for obsolescence, as well as including procurement criteria that relate to product design.
- **Ensure equal access to circular products and services** by pursuing true pricing mechanisms. Businesses should be able and willing to offer circular products and services in the default (non-premium) product ranges. Tangible actions to develop economic incentives and fiscal reform remain absent in circular economy policies.
- **Enable both circular and socially responsible procurement** by simultaneously pursuing environmental and social impact criteria, as well as training procurement staff. Public procurers should engage in long-term relationships with the suppliers, and businesses should equally engage in circular and socially responsible procurement.
- **Optimise reverse logistics and value retention processes** by amplifying research and development funds to ensure the environmental footprint of these activities does not offset material savings achieved. Businesses should foster value retention at a local level and can improve the financial viability of these models by incorporating internal processes such as life cycle budgeting.

RISKS & BLINDSPOTS

Relevant for textiles value chain
Relevant for electronics value chain

GOVERNANCE

- Unequal distribution of power, wealth and profits amongst workers
- Male dominated leadership and gender pay gap
- Free-trade paradigm

ENVIRONMENTAL

- Use of critical and rare materials
- Dependency on fossil-based raw materials
- Water and land use and pollution for sourcing
- Hazardous materials and human toxicity risks in sourcing and manufacturing facilities
- Energy use and emissions of manufacturing activities
- Water use and pollution of manufacturing activities
- Increased logistics
- Shorter active service life of products due to high utilisation rates and lack of proper care
- Improper disposal and low recovery rates

SOCIAL

- Precarious, informal, unsafe work, lack of minimum wage and social protection
- Labour conditions in retail and warehouses
- Unequal access to circular products and services
- Increased demand for informal labour abroad

MARKET

- Unclear displacement and increasing consumption
- Cannibalisation between circular business models
- Quality assurance of secondary products in PaaS and resale models

- **Terminate the logic of exploiting natural and human capital for economic growth and ensure a just transition to the circular economy** by focusing on public wellbeing over growth, and investing in human capital development. Businesses should shift their profit-maximising rationale to a mission-driven one, as well as considering alternative forms of governance, such as worker cooperatives, to shift power balances.
- **Use transparency and disclosure to enable both circularity and ethics** by enabling standardised and harmonised information flows through for example product passports, while ensuring higher levels of transparency are required in key issues such as due diligence.

Circle Economy is an impact organisation that connects and empowers a global community to create the conditions for transformation towards the circular economy. Our mission is to accelerate the transition through practical and scalable insights and solutions that address humanity's greatest challenges.

The Circular Jobs Initiative is a knowledge centre that aims to ensure the transition to the circular economy is positive for work and workers. We are committed to promoting this mission by working with employers, workers, governments, multilateral organisations, education institutions and research organisations to shape this future.

EEB
European Environmental Bureau

The EEB is the largest and most inclusive network of environmental citizens' groups in Europe. Our 150 members from 35 countries cooperate across a uniquely broad range of issues. Together, we advocate for progressive policies to create a better environment in the European Union and beyond.

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Fair Trade
ADVOCACY OFFICE

The Fair Trade Advocacy Office (FTAO) is a not-for-profit foundation that speaks out on behalf of the Fair Trade Movement for Fair Trade and Trade Justice with the aim to improve the livelihoods of marginalised producers and workers in the South. At EU level, the FTAO aims at promoting EU policies that reflect Fair Trade movement values. Based in Brussels, the FTAO is a joint initiative of Fairtrade International, the World Fair Trade Organization and the World Fair Trade Organization-Europe.

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INTRODUCTION

Growing inequality, the climate breakdown and diminishing resources are challenging our planet and society. These challenges require major systemic change in the logic of value creation with the aim of shaping new, more responsible business models.[1] The circular economy is widely presented as an alternative model of production and consumption. It may enable the dissociation between resource use and welfare creation, thereby creating opportunities for sustainable development while developing new markets and increasing business resilience within planetary boundaries.

Promising steps are being made towards circularity. Last March, the European Commission launched its new Circular Economy Action Plan and established strong ties between it and the European Green Deal.[2] The European Green Deal expects to foster new business models as well as, amongst other efforts, putting in place a 'sustainable products' policy to support circular design of products being placed on the European market.[3]

Industries are also exploring circular business models. Trends show that markets for circular apparel business models are significantly growing. In the textiles industry in 2019, it was reported that resale is expected to almost double its size by 2023, and the online rental is growing at an 11% annual rate, both outpacing the growth of traditional retail.[4] Nevertheless, textile waste has also grown massively over the past decade. For instance, in the Netherlands between 2012 and 2018, textile waste generated grew 20%, similarly to figures pointing at 27% in the US.[5],[6]

The electronics sector shows a similar trend. The market for second-hand mobile phones witnessed an average 50% annual growth, while the rental market is expected to double by 2025.[7],[8] However, the active service life of electronic products is in decline, and e-waste remains one of the fastest growing waste streams in the world, with an annual growth rate of 4% in 2016.[9],[10]

The positive environmental impact of circular business models has been studied and validated for certain products and services,11 while still showing modest environmental gains in other ones, for example in product-service systems in the way they are sometimes implemented, lacking more structural design changes.[12],[13] However, there is still a broader lack of understanding and consensus on their social impact. Tellingly, non-academic reports consistently show more optimistic levels of job creation than academic literature.[14] Furthermore, although digitalisation is often identified as a core enabler of the circular economy, it is also expected to displace many jobs - the World Economic Forum describes a looming double distribution to employment from a global recession following Covid-19 crisis and the automation of jobs.[15]

The evidence base for both environmentally and socially positive impacts, as well as risks and hotspots of these new business models needs to be consolidated and nuanced, so as to develop circular business models that deliver the most desirable environmental and social outcomes and minimise the negative impacts. As such, circular business models can contribute to an environmentally safe and socially just space for humanity.[16]

This research provides clarity in some of the potentially harmful side effects of the linear value chain and business models which are unaddressed or underexplored when promoting circular business models. The report does not address all types of circular business models, but rather dives deeper into three cases of business model archetypes that can be considered to slow or close loops when designed to promote circularity. These cases include reverse cycles of repair and maintenance, resale and services such as rental and subscriptions (Product-as-a-Service). Refurbishment and remanufacturing cycles are only discussed in connection with resale models. Recycling is not included in the scope of this research, as this is the least preferred option following the waste hierarchy in comparison with prevention and reuse, and its blindspots have been studied more widely than other recovery models.[17],[18] Bioeconomy models are also out of scope for this research.

METHOD

The research focuses on the textiles and electronics value chains. Two value chains with both opportunities and risks and, whereas still predominantly linear, both sectors show growing implementation of circular business models.

The blindspots, potential negative impacts, of the selected circular business model archetypes, the sourcing and manufacturing processes they rely on, as well as related best practices with mitigating effects, were identified in relation to environmental, social, market and governance dimensions through desk research and literature review.

Blindspots and risks categories:

- **Governance blindspots** relate to the impact created by the way organisations are managed, as well as the structure of the system they are embedded in.

- **Market blindspots** relate to the interplay between market players and related supply and demand, as well as dynamics influencing this interplay.

- **Social blindspots** relate to the impact of activities in the social sphere, and can therefore range from impact on work and livelihoods to access and inclusion issues.

- **Environmental blindspots** relate to the environmental impact of activities, whether in relation to greenhouse gas emissions, resource use, toxicity or biodiversity.

Blindspots were reviewed, validated and complemented through six interviews with businesses applying one of the three circular business models in scope in the electronics or textiles sector. The best practices and recommendations were developed in collaboration with a group of 40 stakeholders at a workshop, and dialogue with experts on these three focus areas, as outlined in the Annex.

THREE CIRCULAR BUSINESS MODELS

Business models portray how value is proposed, created, delivered and captured by businesses. Circular businesses aim to do this by keeping materials, products and components at their highest value.[19] A circular approach may therefore help businesses create value by disconnecting profit from production volume through slowing, narrowing and/or cycling resources as well as reducing waste and consumption of virgin materials.[20]

Business models can narrow resource loops through extending a product's value through remanufacturing, or by providing access and performance models, providing access to maintenance and repair services, designing products for longer lifetimes, whereas slowing resource loops happens through encouraging sufficiency. Resource loops can be also closed by extending the value of resources through the collection, reuse and recycling of products and materials, through implementing industrial symbiosis.[21] All three business models in scope narrow loops.

REPAIR AND MAINTENANCE

This business model includes services related to extending a product's useful life through maintenance, repair, fixing or replacement of defective components or by selling a durable product through warranty.[22] Its success hinges on a focus on repairability at the product design phase.

Repair and maintenance may also propose a creative opportunity to alter and reshape a previously existing product. While this is only applicable to certain sectors, visible mending is a traditional activity in cultures such as the Japanese and there has been a rising interest in Western societies to implement in industry sectors such as ceramics and textiles.[23] Repair cafes and DIY repair workshops widespread within the EU also foster these creative opportunities. These models then propose an opportunity for the consumer to become more engaged with their product, increasing the awareness of a product's material and emotional value.

The main benefit of repair and maintenance is the elimination or reduction of the phases of the product that are responsible for most of its lifecycle emissions. The location of lifecycle emissions vary greatly per product. For electronic products, for example, 10% to 30% of lifecycle emissions of vacuum cleaners take place in non-use phases, whereas this mounts to 50% to 90% for smartphones.[24] Furthermore, doubling the lifetime of consumer goods, in combination with 50% use of recycled content and 25% increased material efficiency, may lead to the creation of more than 50,000 jobs in Finland and Sweden, more than 100,000 in the Netherlands, more than 200,000 in Spain and more than 300,000 in France.[25]

While repair and maintenance used to be common practice a few decades ago, the availability of low-priced and low-quality new consumer goods, rapidly changing consumption trends and the high cost of repair service offerings have massively reduced this.[26],[27],[28]

IN TEXTILES

In this sector, the business model has historically materialised through independent repair services and stores, mainly in tasks viewed by the citizen as complicated, such as changing a zipper.[29]

When it is integrated to a clothing manufacturer or retailer's business model, it usually comprises a value-added activity to first sales. They can be either held as in-store activities, such as for Nudie Jeans, repairing more than 60,000 denim pieces last year; or as a pop-up activity, such as Patagonia's WornWear on-the-road activities.[30],[31]

The companies that implement repair activities as an integrated value offering usually sell the garments with a lifetime warranty and free repairs. Other models show that high-quality repairs can be offered by companies at an additional cost to the consumer. This has been implemented by other outdoor companies and denim brands.

More recent trends also show the reappearance of consumer and citizen trends linked to do-it-yourself activities, such as neighbourhood clothing repair cafés,[32],[33] collaborations between brands and service providers to offer DIY repair guidelines such as Patagonia and iFixit, or visible mending kits by Golden Joinery in the Netherlands.[34]

IN ELECTRONICS

The practice of repairing electronics is widespread but faces many barriers. Repairability may be determined by the design of a product, its modularity, the availability of spare parts and repair information or diagnostics.[35]

Socio-economic factors may play a role such as the cost of spare parts or the repair service as well as the time needed to repair a product. Repairs may be carried out by users or using repair services offered by manufacturers or independent actors. The Mobilcirkeln® initiative by GIAB and Swedish insurance companies for example, provides a service that ensures that repairable products are dutifully repaired and replaceable components are reused, before the product is fully disposed of as faulty.[36] Social initiatives, such as repair cafes, also play a role in overcoming barriers to repair and engaging people in the activity of repair.

The interaction of software and hardware has also complicated the repair of some products. For example, the lack of availability of software updates can render functioning hardware obsolete. There are also legal barriers to repair – such as copyright and patent laws that prevent the disassembly and use of non-OEM spare parts as well as editing software.[37],[38]

RESALE

The resale model consists of reselling products for the same purpose which they were originally designed and produced for, hence extending its useful life. They involve transferring ownership from one user to another.[39] For these models to comprehensively contribute to the circular economy, they should keep resources in the system for two or more consumption cycles, hence, ensuring product durability is key.[40] This durability will be very much in line with decisions taken at the design stages of the product, informing amongst others material and manufacturing quality and expected lifetime, which may be influenced by decisions related to programmed or perceived obsolescence.[41] Collection schemes, take-back management, sorting operations, cleaning and refurbishment activities also become essential to this business model.

Resale can be organised by the same organisation that owns the first sales of these products, incentivised by a third private or not-for-profit organisation or driven by a peer-to-peer model, facilitated through third party online or physical platforms.

As this model may allow for keeping resources in the system for longer without the need for remanufacturing or refurbishment and hence may have a lower environmental footprint than repair and maintenance or PaaS systems. They also may support market access for a different consumer segment, as prices are significantly lower than for first sales, allowing consumers to access familiar products that otherwise would be unreachable.[42] Many resale models, such as reuse centres, have policies in place for increased access to jobs to groups with a distance to the labour market.[43]

IN TEXTILES

Resale business models for clothing and textiles vary greatly in size, offering and structure. They can either include a refurbishment and remanufacturing stage or directly resell the goods in the state they are collected.

Resale of municipally collected textiles in Europe is usually driven by commercial and charitable collectors that drop-off the textiles to a textile sorter, which separates the rewearable and resellable garments from the non-rewearables. These are then usually sold locally or to international markets. In the Netherlands, 84% of what gets collected through this mode gets sold abroad, mostly to Eastern European or African countries. Other third-party resale models are offered by online platforms encouraging consumers to send-in their clothing for it to be resold on the platform, while gaining credits or discounts to buy other second-hand garments on that same website. ThredUP and The Next Closet are examples of these and usually entail for them to inspect, photograph, list and ship the garment that is resold on the platform.

Resale can also happen by the companies making the first sales themselves. These are own-brand operated business models, and usually incorporate a cleaning and refurbishing stage that can either be handled internally, such as Eileen Fisher with their Renew programme, or may be done by a business partner, such as The North Face Renewed working in partnership with The Renewal Workshop.

IN ELECTRONICS

The growth rate of resale business models for consumer electronics is increasing. The used smartphone market is forecasted to be four to five times bigger than the overall smartphone market. It is expected that the practice of reselling smartphones could well accelerate through 2020 as both consumers and suppliers are increasingly embracing the practice of selling or acquiring second-hand smartphones.[44]

Many electronic products can be resold with gross profit margins - including tablets, computers, camera's, cases and accessories, parts, headphones, watches, IT equipment, video games, home technology.[45]

Technological developments are opening up new possibilities that can help keep electronic products longer in use. Some businesses are able to automate the assessment of electronic devices, and can therefore refurbish on a more industrial scale, which reduces costs.

But while ICT remanufacturing is growing, there is still a considerable difference between the efficiency and sophistication of the manufacturing of new products, compared to the treatment of used assets. Resale, remanufacturing and refurbishment remains a largely manual process, where labour costs are high and the amount of time that can be invested in each device is limited. Hence, these cannot compete with the relatively cheap costs of producing new electronics.[46,47]

PRODUCT AS A SERVICE (PAAS)

The PaaS model entails the customer paying for access to products and for the additional services provided in return for a recurring or one-off service fee.[48] One-time rental, subscription and leasing models are all considered within the broader PaaS concept. PaaS is considered a type of collaborative consumption model, whereas people coordinate, acquire and distribute a resource for compensation.[49]

While leasing or renting in itself may not be intrinsically circular, there are a number of interconnected benefits that could be associated with this model. When it is stimulating and coupled with the resale or leasing of refurbished units or components, as well as better design of the equipment or product, it could lead to an extended product life while lowering resource consumption.[50] A higher utilisation rate as a result of shared products can moreover decrease greenhouse gas emissions and lower material use.[51]

In the PaaS model, ownership of, and responsibility over the product remains with the service provider or the manufacturer, who therefore holds the ability to increase resource efficiency and to prolong the lifetime of the product. In the best case scenario, this could lead to offering high-quality, durable products that can be easily upgraded, repaired, refurbished or taken back at the end of their useful life.[52] It could also provide an opportunity to improve collection and handling at end-of-use.

These models can lead to an increase in customer engagement and retention by providing the user with strong service contracts and packaged solutions for maintenance, repair, recycling and other additional services. They also may have the ability to generate stable, long-term revenue, compared to a traditional sales business model.

Nevertheless, the social and environmental benefits of this model depend highly on the decisions made for its implementation. For example, the type of work relationship fostered through the implementation of PaaS models should be closely monitored, as the outsourcing of repair, refurbishment or other pre-processing activities may pose a risk to the quality of work linked to gig or platform workers.[53]

IN TEXTILES

Clothing as a Service usually entails business model archetypes that either offer one-off rentals or subscription models. This model has proven to work effectively for occasional wear such as formal wear or wedding gowns; for sports and outdoor equipment, such as skiing gear or camping tents or backpacks; and for maternity and baby wear.

Platforms of brands offering online rentals and subscriptions are more and more powered by service providers such as the French white label service provider for brands, Lizee, and US based service provider CaaStle.

There are also blended models which offer both stand alone rentals as well as subscription through membership models such as the Dutch physical and online clothing library, LENA, the Swedish Klädoteket, or the Danish children online clothing rental Circos (previously known as Vigga).[54]

Other textiles commonly offered as a service include linen and home textiles for the hospitality industry [55], [56] as well as office textiles and uniforms for private or public sector organisations.[57],[58]

IN ELECTRONICS

Electronics as a service models are bound to more expensive products, as well as products that are more vulnerable to breaking, or with fast upgrading cycles, all of which makes consumers more likely to choose for the PaaS business model.[59] One of the most popular examples for this model is the leasing of printers, which has been used for over 25 years now. Ricoh is one of the businesses that describes environmental benefits from this way of working.[60]

In the electronics sector, PaaS could provide the right set of circumstances to recover several critical raw materials, as ownership of the materials remains with the producers. Whereas 100% recycling rates are as yet not realistic for smartphones, take back programmes for old phones have already proven their success and reduced the need for mining scarce metals.[61],[62]

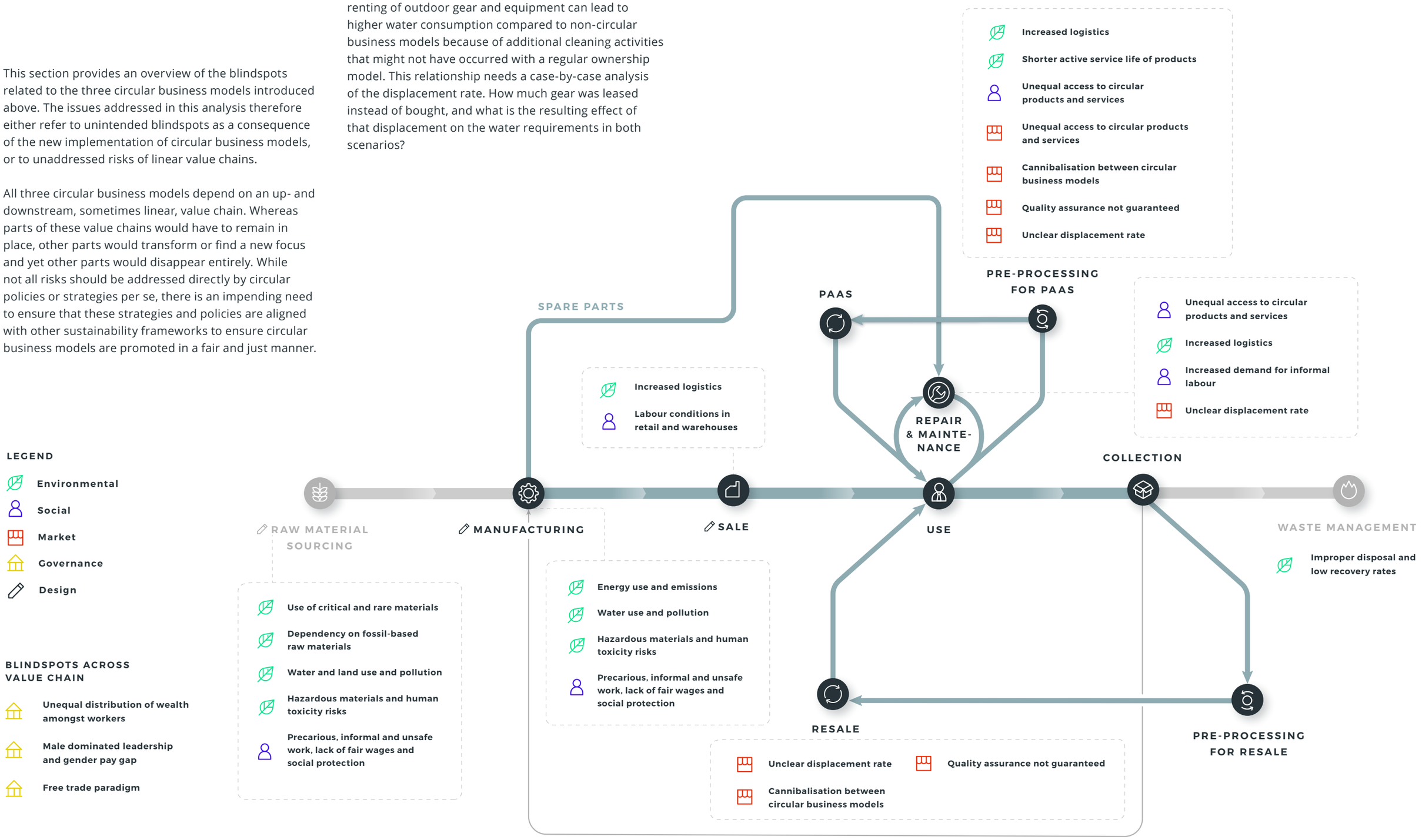
MAPPING BLINDSPOTS OF CIRCULAR BUSINESS MODELS

This section provides an overview of the blindspots related to the three circular business models introduced above. The issues addressed in this analysis therefore either refer to unintended blindspots as a consequence of the new implementation of circular business models, or to unaddressed risks of linear value chains.

All three circular business models depend on an up- and downstream, sometimes linear, value chain. Whereas parts of these value chains would have to remain in place, other parts would transform or find a new focus and yet other parts would disappear entirely. While not all risks should be addressed directly by circular policies or strategies per se, there is an impending need to ensure that these strategies and policies are aligned with other sustainability frameworks to ensure circular business models are promoted in a fair and just manner.

Note that all blindspots and their effects are dependent on organisational decisions of business holders, and generic conclusions are therefore to be interpreted carefully. For example, there is no default relationship between water usage and products as a service model. However, increased logistics of leasing goods such as renting of outdoor gear and equipment can lead to higher water consumption compared to non-circular business models because of additional cleaning activities that might not have occurred with a regular ownership model. This relationship needs a case-by-case analysis of the displacement rate. How much gear was leased instead of bought, and what is the resulting effect of that displacement on the water requirements in both scenarios?

The aim of this section is to give an overview of the potential negative impacts (blindspots), in order to develop recommendations and best practices in the next section.



GOVERNANCE BLINDSPOTS

1. Unequal distribution of power, wealth and profits amongst workers

While the major electronics manufacturers generated $27.7 trillion in combined profits in 2016, workers in this sector still face issues such as excessive overtime, low wages and increasingly on repeated short-term contracts and face extreme job insecurity, which can be very stressful.[63] Tellingly, labour costs represent a mere 0.5% of a smartphone's market price.[64]

The textiles industry generates $1.9 trillion each year and the 20 largest businesses account for approximately 97% of this sector's global retail profits.[65],[66] Wealth and profits are largely held by these corporations, while the manufacturing and raw material sourcing workforce earn minimum wage and suffer most of the adverse health and environmental negative impacts.

The three circular business models in scope, theoretically do not challenge current wealth distribution. However, from several examples of the way they are operationalised, we can observe certain potential benefits as well as risks. Who will retain financial value over products and components that are reused or cycled back into consumption? How will this value be (re) distributed amongst first sales producers, resale and PaaS platforms and how will this (re)distribution affect workers in comparison to shareholders?

Two small scale businesses interviewed mentioned that they offer employees access to ownership of a share of the business. This is highlighted by interviewees not only as a way of redistributing profits amongst employees, but also as a way of generating increased sense of commitment and belonging to the organisation.

Still, many implementations of repair and PaaS business models are yet not financially stable, and depend largely on volunteer work in order to make ends meet. An interviewed PaaS business mentioned in this regard that while they try to offer access to insurance contracts and guarantee a safe working space, the dependence on volunteer work is not sustainable nor scalable for the business model. It also remains to be seen whether similar relationships continue to exist when the organization's growth, investors get involved, and focus on profit becomes more important.

2. Male dominated leadership and gender pay gap

Both the textiles and electronics industries are highly gendered. Whereas low-skilled workers in the textiles industry are mostly women (representing 68% of the garment manufacturing sector employment globally and even higher percentages of up to 80% in large manufacturing countries such as Bangladesh),[67] most low-skilled workers in the electronics industry are men (representing 85% of the workers in mining and quarrying, iron and steel mills, the steel product and metalworking manufacturing, and 78% of electronic precision equipment repair and maintenance workers).[68] When it comes to leadership positions, women are severely underrepresented in both sectors. In Bangladesh, men occupy around 90% of managerial positions in the textiles industry.[69] In the electronics industry, women in managerial positions represent 8% of the total female sector's employment while men represent 15% of total male employment in the sector.[70]

Gender polarisation is similarly observed within circular business models. While in the textiles sector, clothing repair and remanufacturing activities are mostly conducted by female workers, positions in software development and management to handle resale and PaaS online platforms are mostly led by men. According to some of the interviewees, the gender split in these business models may be simply a reflection of the societal and educational status quo. For instance, for one of these business models' recent job opening for a software engineer role, 95% of their applicants were men. The future directions that circular business models take in either perpetuating current trends or shaping new paths towards representation and inclusivity will be key to ensure gender equality is met.

3. Growth and free-trade paradigm

It has become evident that the current economic system incites and reinforces growing inequality, labour market exclusion, and lack of accessibility to services and products for most of the world population. Whereas the circular economy has been put forward as an alternative to the current system, in its current form, it does not address the root causes of this system and tends to lack consideration of social impacts. As the circular economy is often adopted as an instrument to achieve green growth, it has yet to challenge the growth and closely related free trade paradigm.[71],[72]

In order for businesses to be able to pursue fair and circular business models that yield a safe and just economy for all, there is a need to question and shift the profit-maximising business rationale behind current business models. Mission-driven business focuses, such as is observed in social enterprises or certain worker cooperatives, may enable businesses to retain financial viability and stability, while delivering positive societal impact.[73]

MARKET BLINDSPOTS

1. Unclear displacement and overall increased consumption

For repairing, reselling, leasing or renting products to achieve substantial positive impact, these models need to be an alternative to linear forms of consumption, rather than an addition to. Evidence for the displacement rate of circular business models is mixed. Both in the textiles and electronics sector, evidence suggests that current circular business models bring about a rebound effects of additional linear consumption. A survey conducted by a luxury clothing resale platform highlighted that 32% of the surveyed sellers in the platform sold the items to be able to purchase new first sale items.[74] And whereas resale and reuse of mobile phones may displace 5% of new product sales, related rebound effects in emissions are estimated at 29%.[75],[76] At the same time, a survey conducted in the United Kingdom about resale shows a displacement rate of 52% for electronics and 34% for textiles.[77]

Some specific user engagement strategies, such as discount vouchers on next purchases, further diminish the opportunity of shifting consumer behaviour, resulting in circular business models being an opportunity for enhanced customer engagement, rather than bringing about an actual reduction in resource use.[78]

2. Cannibalisation between circular business models

Both On top of the unclear displacement rates of circular business models discussed above, circular businesses can displace consumption from each other, rather than from first sales. Interviewees suggest that an increase in rental models could lead resale models to experience small declines. This may be further incentivised by businesses, as rental may be able to provide them the opportunity to tap into more product feedback than resale, that could later on be integrated into manufacturing and design changes. Fostering competition based on true pricing could support these models competing more fairly with linear business models as well as between each other.[79]

Further, the potential of increased economic value in certain textile materials for recycling in comparison to reuse grades, may prove to have a negative impact on the prioritisation of resale.[80] Instituting recycling targets in EU law, without consideration of reuse targets may further aggravate this situation, by de-prioritising end of life treatment for reuse, moving against the waste hierarchy priorities.[81]

3. Quality assurance of secondary products in PaaS and resale models

Quality assurance is central to the success of PaaS and resale models, as it fuels customer loyalty and ensures continued transactions and brand integrity.

In the resale market of electronic products, quality assurance has been a major issue. The lack of standards in this product segment has led refurbishers to impose their own standards (often including three to four grades of quality).[82] This can leave certain customers dissatisfied with the quality of the product they purchased, and may decrease trust in the refurbished market. Proposals for quality labelling in the reuse sector have been put forward, although these may become a high financial burden for small businesses in the reuse sector.[83]

Within the Clothing as a Service models, consumer expectations on quality of garments seem to be sometimes higher than in ownership models, increasing the pressure on businesses to market products that are new or barely worn.[84] Further, physical or imagined contamination such as odour, stains and wrinkles, may prove to be a challenging barrier for Paas clothing models.[85] These pressures may potentially accelerate the disposal of garments by these platforms, redirecting products that do not meet quality standards to last resort processing such as recycling, accelerating the end of their service life. This has also been seen amongst some clothing resale models, as a survey points towards 62% of the products sold on resale luxury platforms to be unworn or barely worn.[86]

SOCIAL BLINDSPOTS

1. Precarious, informal, unsafe work, lack of minimum wage and social protection in sourcing and manufacturing

Both the electronics and textiles industries are built on long and untransparent supply chains, where precarious labour conditions are omnipresent. In mining for raw materials for the electronics industry, workers take on hazardous activities and are highly exposed to toxins and poor air quality.[87] These conditions are often worsened by the use of forced labour, including child labour, in illegal mining operations in conflic areas, where no safety or health standards are guaranteed.[88] Mining activities have also been related to corruption of social leaders and is an important driver for armed conflict within countries.[89]

Within the textiles and apparel sector, manufacturing workers are commonly exposed to lack of access to living wages, significant overtime, unsafe work and in some cases, forms of bonded or forced labour, including child labour in raw material cultivation and forced labour in apparel cut-make-trim facilities.[90] Forms of informal work are also massively adopted in the sector. For instance, in Bangladesh, the ready-made garment, RMG, sector accounts for 83% of the country's total exports, in value,[91] while 93-98% of workers in the RMG sector that are not in management positions, are informally employed.[92]

All three circular business models, when implemented at scale, reduce the need for sourcing and manufacturing activities as described above.

For electronic products, interviewees contested that it makes sense for repair and remanufacturing activities to take place close to the customer, as large and bulky products (such as white goods) are too expensive to ship around the world and the price of small high tech products (such as smartphones and laptops) is too volatile to spend weeks in shipping. Further, the WEEE Directive has made the shipping of faulty products for repair more complex.[93] For textiles and clothing, interviewees also suggested the need to establish repair operations as close to the customer as possible, avoiding unwanted additional costs and logistics.
For the European market, this would generally improve working conditions in these circular supply chains, but precarious and unsafe work is omnipresent in Europe too (although we are currently unable to distinguish working conditions in manufacturing from the repair and remanufacturing sectors).[94]

Moverover, the outsourcing of repair and maintenance of electronic products in PaaS models, could lead to an increase in irregular work with a potential negative effect on the working conditions as it increases the distance and accountability between user and supplier.

Moreover, mitigating measures should be taken to overcome the potential job loss in the currently globalised supply chains.[95] While some of the jobs along supply chains host poor working conditions, people depend on them and have in many cases migrated for them. Transforming these jobs into ones that provide value and a way forward is key for sustainable development.

2. Labour conditions in retail and warehouses

Overseeing informality, social dialogue and labour conditions at the retail end of the supply chain is not an area of focus for businesses with their core consumption market within the Global North. Interviewees attested that this lack of focus in comparison to the upstream value chain is due to trusted retail partners hosting operations in countries with more stringent labour laws. Still, the retail sector in the European Union, especially large volume retailers, is characterised by flexible and atypical contracts, fast working pace and time pressure and physical burden.[96]

PaaS models, as a consequence of retained ownership over the product by the producer, are often accompanied by increased warehousing needs. Both repair and resale depend on the retail sector for their services. The risks associated with labour conditions in retail and warehousing therefore remain unchanged for these models.

3. Unequal access to circular products and services

PaaS models increase accessibility in terms of products that would otherwise be too expensive for consumers to buy and retain ownership of. However, inequality may also be experienced through this model, which is increasingly hosted through digital platforms. In terms of connectivity, there is a potential issue of mainstreaming these practices as around 55% of the population worldwide did not have access to stable internet services and digital education in 2016.[97]
The technological threshold may not be high for EU citizens, but may prove to be a difficulty in scaling this model digitally in other regions. On the other hand, other PaaS models which do not necessarily require access to digital platforms, such as the leasing of solar photovoltaic panels are increasingly growing in the African continent.[98]
Certain modes of implementation of this model moreover require access to credit card ownership. There are still important differences between access to financial services and owning an account between men and women. In countries such as Bangladesh, Pakistan and Turkey, the gap of account ownership is approximately 30%.[99] Lack of access to financial services also poses a barrier to participate in these digitally-savvy business models.

Repair models are in some product categories not a financially viable option for lower income households. According to a 2014 survey, 77% of EU citizens would rather repair their goods than buy new ones, but ultimately have to replace or discard them because they are discouraged by the cost of repairs and the level of service provided.[100] The cost of repair can consist of labour needed but can also just relate to the sale of spare parts, which in some situations are sometimes described as more expensive than the product itself.[101]

4. Increased demand for informal labour

The economics of repair and refurbishment are not always attractive; materials are cheap, while labour is expensive, resulting in an industry where the repair of goods costs more than new products. In specific contexts, it can be more cost effective to repair far from home than within countries with high labour costs. There are cases reported in Norway where electronic repairs are done abroad, which has increased the demand for informal repair work.[102] Repair cafes, in which people come together to fix products such as toasters, computers and clothing, offers an alternative and opens up the opportunity to repair low value products.[103] Repair cafes hinge on voluntary work though, and are therefore no long-term or large scale solution to the challenge of high labour costs in consuming markets.

There is a specific segment of products, though, for which it already makes sense to repair and refurbish them locally. These include, amongst others, electronic products with high price elasticity, such as smartphones and laptops. The time it takes to ship a product intercontinentally may be enough for the product to drop in value, for example as a result of the manufacturer releasing a new version or series.

ENVIRONMENTAL BLINDSPOTS

1. Use of critical and rare materials

Sourcing and processing virgin materials has accelerated over the past two decades and accounts for 90% of global biodiversity loss and water stress and almost half of climate change impacts.[104]

The electronics industry currently depends on a number of critical materials with a highly polluting impact. Ore mining, for example, is one of the raw material sourcing activities with the highest negative environmental impact.[105],[106] Mining is moreover related to deforestation, soil erosion and toxic chemicals drainage.[107] Extractive industries are responsible for half of the world's carbon emissions and more than 80% of biodiversity loss.[108] Moreover, a lot of these materials, such as lithium, nickel, cobalt and gold, are often required for the renewable energy sector too, increasing the need for reduced and efficient use and cycling.[109]

The repair, resale and PaaS business models are designed to mitigate this blindspot. All three circular business models prolong the active service life of products and are expected to lower rare material demand, when and if displacing new consumption. Yet, the current scale of circular business models is not nearly enough to meet growing global demand. Moreover, when maintenance, repair or refurbishment are no longer possible, the increasing complexity of electronic products makes the recovery of rare metals through recycling increasingly difficult. This requires aggressive solvents and high amounts of energy, which could in some cases result in bigger environmental pressures than mining these metals did in the first place.[110] Extension and recycling measures on their own currently cannot radically mitigate the issue of scarcity and criticality of certain metals. These strategies should be closely linked to circular design practices, which become increasingly important as the product in question becomes more complex.[111]

2. Dependency on fossil-based raw materials

The fibre market for textiles and apparel is largely dominated by polyester, with 52% of the global market share. This is a synthetic fibre, dependent on fossil fuel extraction for its manufacturing with a yearly production of nearly 58 million tonnes.[112] Additional to the impacts linked to fossil fuel consumption and its resource scarcity, the polyester fibre manufacturing process is energy intensive, microplastics are released to waste waters and grey waters both across the manufacturing as well as laundry during the use phase of textiles or clothing. When discarded at its end-of-life, this fibre may take up to 200 years to decompose, and is mostly sitting in landfills across the world.[113] Technologies for high-value recycling of these fibres are still not at scale, with some technologies currently piloting their solutions at smaller scale. When PET bottles are recycled into clothing, they cannot be cycled back into textile products other than lower value applications such as seat fillings for the automotive industry, hence, increasing the volumes of polyester items discarded after their first use.[114]

Plastics account for about 20% of the 50 million tonnes of electronic waste produced each year, which is expected to more than double to 110 million tonnes by 2050.[115] Most electronics source the plastics required for their manufacturing from fossil fuels, making the sector heavily reliant on their input as raw materials. Although some of the businesses are already researching alternatives to fossil-based plastics, this is yet not implemented as a mainstream practice.[116] The scale of emission reductions that could be enabled by the smart integration of sensors and electronics into new ways of operating living, working, learning and travelling, makes the sector a key player in the fight against climate change, despite its own growing footprint.[117]

All three circular business models prolong the active service life of products and are therefore expected to lower the amount of fossil-based materials per year when reaching scale and displacing new consumption. The circular economy favours the use of renewable resources and aims to enhance natural systems by returning valuable nutrients to the soil.[118] None of the business models in scope, however, directly address the fossil based material dependency of the products they process, which should therefore be addressed separately through circular design principles.

3. Water and land use and pollution for sourcing

Cotton is the second most used fibre in textiles, after polyester, with 23%[119] of the global fibre market share. Being a commodity crop that is grown in over 75 countries, employing around 26 million cotton farmers worldwide,[120] it occupies 2.5% to 3% of global agricultural land. Cotton grown in its traditional and widespread form requires large quantities of water, many times in significantly water stressed areas, and uses large volumes of fertilisers and pesticides.[121] The excessive and misuse of chemicals in cotton growing as well as the intensive use of the land for monocropping have led to 4% of arable land being left fallow.[122] All three circular business models prolong the active service life of products and are therefore expected to lower the amount of cotton-based textiles per year when reaching scale and displacing new consumption. Other circular business models look more broadly into bio-based substitutions for cotton fibre, or into material durability of different fibre, however, none of the business models in scope for this report, directly address the water and land use for cotton farming.

For electronics, the process of land grabbing involves the contentious issue of large-scale land acquisitions, the buying or leasing of large pieces of land by domestic and transnational companies. Mining companies are a big contributor to this process. These activities lead to migration and displacement of communities. Dispossession is historically thought about only in relation to land, but it more broadly affects culture and identity.[123]

4. Hazardous materials and human toxicity risks in sourcing and manufacturing facilities

Each processing stage in the electronics industry uses a specific set of chemicals with its own occupational health and safety concerns.[124] There have been several controversies and concerns about chemical toxicity at electronics manufacturing facilities—causing cancer and other health problems. Examples of these hazardous materials are gases such as arsine, phosphine, diborane, ammonia, chlorine; doping agents containing arsenic; strong acids such as hydrofluoric and hydrochloric acids; and numerous solvents. Most of these chemicals are used safely in enclosed systems, nevertheless, exposure can occur during maintenance or repair work, or in the event of accidental leaks or spills.[125]

Hazardous chemicals and agents used for dyeing and finishing techniques are widespread across the textiles sector as well.[126] A 2014 analysis shows that 10% of the textile-related substances assessed were identified of potentially high concern for human health while 5% of these substances were of high concern for the environment.[127] In textile heavy manufacturing areas in China, wastewater from industrial laundries was found to contain chemicals that could impact reproduction or cause cancer, as well as challenge access to clean drinking water in some of the surrounding areas.[128] Although campaigns such as Greenpeace Detox and the resulting industry initiative Zero Discharge of Hazardous Chemicals, ZDHC, are working hard to reduce the use of hazardous chemicals by replacing them with safer alternatives or ensure their appropriate treatment when no other options are currently available, several risks remain including the use of some varieties of azodyes, antimony used for polyester manufacturing, alkylphenol ethoxylates used in softeners and detergents, formaldehyde that increases wrinkle resistance, heavy metals present in some dyes or pigments, and perfluorinated chemicals found in water repellent textiles. Although these substances are already regulated in some countries, this is not the case for all countries where manufacturing is held, and poses a risk to both the workers as well as for the environment.[129]

Even if no changes occur in the current use of chemicals across sourcing and manufacturing, all three circular business models prolong the active service life of products and are therefore expected to lower the amount of toxic and hazardous materials used per year, if displacing new consumption. None of these business models, however, address the toxic material content of the products they process, which should therefore be addressed separately.

Nevertheless, PaaS and resale models could further contribute to either improving or worsening the impact of hazardous chemicals and human toxicity through their own operations. For example, dry-cleaning required for certain clothing as a service and resale models may utilise solvents that can cause negative health effects in workers and environmental hazards if not handled properly.[130] Laundering required poses similar challenges in handling soaps, detergents as those from dyeing and finishing stages. Cleaning and laundering processes should therefore be conducted in the most sustainable and safe way available.[131] Additional concerns in relation to human and environmental toxicity for electronics as a service models are discussed in the section below on improper disposal.

5. Energy use and emissions of manufacturing activities

The energy used to manufacture electronic products is considerably higher than the energy used during their active service life. Data around the energy consumption of electronics through the use phase is fairly easy to obtain, whilst it is much harder to collect reliable and recent figures on the energy consumed during the manufacturing phase.[132]

A life cycle analysis of a computer concludes that while the ratio of fossil fuel use to product weight is two to one for most manufactured products, the ratio is twelve to one for a computer. With an average life expectancy of three years, this implies that the total energy use of this computer is dominated by production (83%) as opposed to operation (17%).[133] Another study suggests that the production phase of a notebook holds around 56% of the total greenhouse gas emissions of a notebook, which is significantly higher than the emissions derived from the use phase, and concludes that the share of emissions from the production phase can significantly decrease by implementing measures to extend the useful lifetime of the product.[134]

All three circular business models prolong the active service life of products and are therefore expected to lower the amount of energy needed for manufacturing activities per year, when displacing consumption of new products. In PaaS business models products should be designed to have longer life cycles and multiple users. For electronics, this could entail a potential increase in the energy required during the manufacturing phase whilst reducing the overall energy needed per user.

For clothing, energy consumption for retail and logistics associated with clothing reuse are much lower than those linked to the production of virgin materials.[135] Nevertheless, a study from Sweden shows that energy intensity in PaaS has the potential to offset the gains from reduced energy demands in manufacturing when the scenarios involve a large amount of customer transactions / users in a short period of time, considering that the customers are going physically to the clothing library or stores and transportation is done by car. This is because customer transportation warrants the highest energy demand in PaaS models, significantly higher to laundry, cleaning or other logistics.[136] According to this study, a reduction in the burden of CO_2 emissions can be observed on clothing only when the active life of a garment is extended four times or more.[137]

6. Water use and pollution of manufacturing activities

Water is a vital resource for both the textiles and electronics industries. In electronics, the majority of the sector's water footprint is related to the manufacturing of semiconductors, which are miniature electronic circuits with transistors that are used in our mobile phones, computers and cars. It takes over 7,500 litres of water, including almost 6,000 litres of clean water to create one integrated circuit on a 30-centimeters wafer. One computer can contain multiple of these semiconductors.[138]

Industrial wastewater, then, contains a high load of cyanide, toxic metals and chemical oxygen demand.[139] The hazardous properties of the wastewater determines when the heavy metals either get dissolved or remain suspended in the wastewater even after treatment and such water is discharged into the sewage stream. Unfortunately most of the chemicals that are used for electronics manufacturing are labelled trade secrets, where neither workers nor environmental agencies know what is being used. At the same time innovation rates in electronics manufacturing are relatively fast - making research on this topic quite a challenge. Proper treatment method is mandatory prior to the discharge of highly hazardous wastewater to the open water channels, however this is not always effectively enforced.

While for textiles and apparel, water use at raw material sourcing and consumer use are the highest footprint stages, in the manufacturing stage, the water footprint is highly concentrated in the dyeing and finishing stages.[140],[141] It takes around 7000 litres of water to create a pair of denim jeans, while water at the manufacturing stage represents 100-150 litres per kg of textile and the remaining mostly is used for cotton growing.[142] However, this water consumption is essential to acknowledge as waste water from the dyeing and finishing stages, as well as synthetic fibre production, may be highly polluted with substances such as antimony, heavy metals, perfluorinated substances, and can harm local ecosystems if not properly dealt with. Countries where most manufacturing occurs for these two sectors, in several cases hold lenient environmental policies or poor monitoring systems to uphold environmental policies, increasing the probabilities to pollute local waterways.[143]

None of the three business models, automatically address the water use and pollution in the manufacturing phase, which should therefore be addressed separately. Additionally, in relation to water use, PaaS models for clothing show significant savings in comparison to average use phases in ownership models. While some studies claim that these savings can represent up to 75% of the water used in the lifecycle of a garment, other studies indicate that the potential savings are very much dependent on the washing and cleaning behaviour of consumers, eg. after how many uses, using which type of cycle, in comparison to industrial washing cycles.[144]

7. Increased logistics

Around 5% to 10% of in-store purchases are returned. This number rises to 15% to 40% for online purchases, with clothing and electronics as the two largest categories of returned products.[145]

Products that are damaged or do not match the description are the two most important reasons for returns, which could indicate that organisations improve the provision of the right information for consumers.[146] For clothing and apparel, returns are overwhelmingly related to consumer preference such as size, fit or style while damaged product claims represent less than 10%.[147] This puts in the spotlight the cyclic and fast-paced nature of current fashion trends, exacerbated by an estimated 25% share of returned products being thrown away.[148]

The logistics tied to PaaS—and to a lesser extent also repair—create an increased environmental burden to the system.[149] This burden can be further increased due to more frequent customer transactions, and their related transportation in some PaaS business models.[150] Taking into consideration the additional business and consumer logistics and transportation, as well as the policies that promote or not decreased environmental impacts from these activities, are essential when striving to implement a circular business model, and may have a significant impact on the environmental footprint of the model.[151],[152]

8. Shorter active service life of products due to high utilisation rates and lack of proper care

Products in certain Paas models have been reported to have shorter active service life than in traditional ownership models. This may be a consequence of intensive use. For example, a washing machine can have a life cycle of three years if used once a week. With multiple users in a shorter period of time, the active service life of the product might decrease in time, even though utilisation rates are increasing.[153]

Unfortunately there are also indications that the lifetime (both service life and utilisation time) may decrease with these models due to more careless handling of these products by users.[154] This is the case, for example with washing machines that are consistently used with loads that are over the machine's capacity.[155] This is also the case also for other consumer goods linked for example to mobility, such as e-scooters.[156] A PaaS service provider could choose to withdraw the equipment earlier in order to for example resell it on the secondary market while the price is still high. In such situations, it is unclear whether the lifespan of the product would be reduced below its technical potential.

The Paas model could moreover limit the right to repair and threaten independent repair facilities seeing they could try to keep the repair for themselves and not allow others to repair.

9. Improper disposal and low recovery rates

Both within the textiles and electronics industry products are not properly disposed of at the end of their life. Most clothing is still currently being discarded through regular household waste.[157] In some EU countries there is a separate collection for textiles in place, collecting around 30% of textiles in waste streams separately. From those textiles, 5-10% are resold locally in the EU, and 54-59% are exported for reuse, mostly to Eastern European or African countries.[158]

E-waste is the fastest growing waste stream worldwide, with an annual growth rate of 4 % in 2016. 9 Million tonnes of electrical and electronic products were put on the EU market and 3.5 million tonnes of e- waste were separately collected in 2012. Further 1.6 million tonnes of waste batteries and accumulators were generated in the EU in the same year.[159] The electronics that were not collected separately as waste were either kept by consumers in their homes; collected outside regular channels and either properly or improperly treated; or disposed of with mixed ordinary waste, going to landfills or incinerators.[160] There is little transparency on the size and whereabouts of these flows, and resale transactions are sometimes opaque.[161] Additionally, illegal trade is still significant.[162] Further, lack of clarity in the definitions of waste for both streams leads to multiple perspectives and claims on what is reusable and what is not.

Toxicity from substances released to land and water from landfilled textiles and e-waste pose a threat to human and environmental health.[163] The soil at e-waste processing sites is polluted by arsenic, cadmium, copper, lead, zinc, and chromium.[164] Informal recycling workers are commonly exposed to skin diseases and respiratory illnesses and toxins may enter the local food chains through land and water.[165] Lastly, synthetic textiles fibres are likely to stay in landfills for 200 years before degrading and if handled inappropriately may also lead to fires.[166],[167]

Waste from both electronic and textile products requires proper end-of-life management. This presents an opportunity as well as a challenge. For example, while electronic waste may contain scarce and expensive metal and rare earth materials needed for the production of new electronics, hazardous substances that can lead to major human or eco toxicity issues are present as well.[168] Encouraging recycling is often proposed as a better alternative to landfill or incineration. For textiles, this is already possible for some material streams, such as wool or cotton, whilst for others, such as polyester or material blends, there are no high-quality recovery methods at scale yet.[169] For electronics, recycling is often proposed as a way to lower the embodied energy of products - the energy required to extract resources and manufacture the full electronic product. Unfortunately, this is not the case for all elements, and micro-electronics, or nanomaterials, are a clear example as most of the embodied energy comes from the manufacturing process itself and not from the raw materials used to create this element. Although this offers savings in terms of material use, this means manufacturing a new product with the recycled material would carry almost as much energy embodied as a new product.[170]

PaaS, resale and repair business models potentially may reduce the volumes of waste improperly disposed of. For electronics, where almost half of the e-waste weight constitutes large household appliances,[171] the potential of extending their lifetime through these three business models, and replacing parts rather than the whole equipment, may reduce the rate of disposability of these items. Further, PaaS models organise the collection and handling of the products at the end of life, as they retain ownership of the products. This will enable organisations with enough scale to organise the correct processing for an homogeneous stream of products and their components and materials. This business model would also enable optimisation for the disassembly of the products, maximising reuse opportunities. Regardless, the recyclability of certain materials still remains a large challenge which requires further research and development. And even if recycling is done in the proper way, there remain losses in collection, pre-recycling and in the recycling processes. This is the case for example of the collection and recycling of batteries amongst small consumer electronics in rental models, or the non rewearable clothing made out of blended fibres.

RECOMMENDATIONS

This section includes a set of recommendations intended to eliminate or address the blindspots of circular business models introduced in this report. Note that they are not intended to solve all blindspots related to linear supply chains, as this is beyond the scope of this report.
The recommendations are mainly targeted towards EU policy makers, including the institutions and member states, as well as businesses, public procurers and civil society based in the European Union. Even though these recommendations focus on the European Union, we hope that they can at least be partially relevant to other regions as well.

1. ENSURE A HIGH DISPLACEMENT RATE OF CIRCULAR BUSINESS MODELS.

Displacement rates are currently considered with regards to the environmental gains of a purchased product or services, without accounting for their effect on the overall market. This may not give a realistic picture of its environmental gains. A key environmental risk of circular business models is indeed that they may represent an entirely new form of consumption, appealing to a new demographic rather than replacing linear ones. Increasingly brands market themselves as being circular, while their overarching business model remains linear. This has been widely criticised in the Fast Moving Consumer Goods, FMCG, sector in the case of plastic waste.[172] As such, some circular business models will not result in genuine resource savings or waste prevention.

- **Policy makers** should develop clear macro and sectoral level targets and metrics for absolute reductions in resource use and associated environmental impacts, e.g. within the Circular Economy Monitoring Framework. These should be accompanied by modelling and scenarios to identify how meaningful reductions might be achieved within relevant timelines. Policy makers should ensure that the burden of proof on achieving these targets by the industry is distributed fairly amongst stronger and weaker market players.

  Policy makers should eliminate all (indirect) regulatory obstacles to circular business models, which prioritise reuse and repair over recycling. EPR regulation should be harmonised with eco-modulation fees, so as to not support recycling only.

  The European Commission initiative on "Empowering the Consumer for the Green Transition"[173] also presents an opportunity to prevent greenwashing from businesses which present themselves as circular but instead continue adding to waste and pollution issues.

  Policy makers should moreover always develop policy responses in a comprehensive and coordinated way, which reflects the complexity of the issue and its root causes at hand, consulting and including the voices of affected stakeholders through these policies -including for example trade unions, worker representatives and civil society organisations. As such, they should deliver a coherent contribution from diverse policy areas ranging from research and innovation, over industrial policy to trade and labour market policy.
- **Businesses** should make circularity central to their offering and communicate in a non-misleading way about the level of circularity of their offering, rather than simply offer circular products as part of a range of predominantly linear ones. Large businesses should monitor their resource flows and target resource reductions over time (e.g. using Sankey diagrams) as well as publicly disclosing their environmental and material footprints. Businesses which fail to follow through on circular commitments risk initiatives being labelled as green washing.

2. ENFORCE SOCIAL PERFORMANCE UP AND DOWNSTREAM IN VALUE CHAINS.

Violations of human rights or poor working conditions may be no less relevant to circular business models compared to linear ones. Circular business models may reinforce trends towards more irregular work, such as platform and sub-contracting work, which may increase these risks. Moreover, the current global waste management and recycling system hinges on an informal labour force, without social protection, fair wages and working in unhealthy and unsafe conditions. At EU level, a lack of a clear vision for how the Circular Economy Action Plan can contribute to the Green Deal objective to "leave no one behind" is observed.

- **Policy makers** should make human and environmental due diligence mandatory – as the European Commission has announced it will do in the EU sustainable corporate governance legislation to be proposed in 2021, while defining the mandatory role of independent worker-driven monitoring. Sectoral circular economy policies, such as those addressing textiles, ICT and batteries should support not only circular but also fair and sustainable value chains.[174] EU trade agreements should have binding and enforceable human rights and sustainability clauses. The implementation of their sustainability chapters should proactive support circular economy, social economy and fair trade initiatives so these supply chains, in particular those that combine these approaches, gradually represent a larger share of international trade.
- **Public procurers** should, just like in regular contracts, systematically add clauses in their circular service contracts to ensure that suppliers of the service providers that win the public contract, respect social and fair trade criteria along their supply chain, including the production of raw materials to the manufacturing of the finished product. They should also ensure that the procurer allocates time to manage the contract with the supplier in order to monitor the contract implementation. To ensure this compliance throughout contract implementation, public procurers should make use of industry independent monitoring instruments.
- **Businesses** may not be in control over the entire value chain for their products, and so must take responsibility for carrying out human and environmental due diligence for their offerings from material extraction to waste management. In general, Tier 1 auditing such as that proposed in existing label schemes are not a sufficient guarantee of good practice. Ensure employees throughout supply chains are paid a living wage – for example through joint living wage initiatives such as the ones such up by Fair Wear Foundation[175] involving private entities such as Armstrong Knitting Mills and Nudie Jeans.[176] Means for collective action or unionisation should be established in all sectors where not yet present. In countries where independent unions are not permitted, businesses should seek to establish meaningful social dialogue with other legitimate worker representative bodies.
- **Civil society** should strengthen dialogue between fair trade, labour unions and environmental NGOs working on issues of resource efficiency and zero waste.

3. ENSURE DESIGN FOR VALUE RETENTION.

Many upstream risks and blindspots for circular products depend on the design of products. Circular businesses should favour products with a lower overall environmental footprint and those which are designed for circularity, including durability, reparability, and reduced toxicity.

- **Policy makers** should enable design for value retention by making use of product policy such as ecodesign style requirements and extended producer responsibility. For example, the Right to repair rules, such as access to spare parts, disassembly requirements and repair information should be applied to all relevant product groups. They can moreover stimulate circular design practices, by including circular economy principles in design and engineering education and training.

  Policy makers should, next to incentivising the most desired design practices, ban the worst. They should develop and enforce regulatory frameworks against planned obsolescence, so as to accelerate the circular shift of the design sector. To achieve it, they should specify minimum requirements for the circular design and sustainable performance of products, as well as requirements for producer responsibility schemes at EU level and value chain requirements for manufacture outside of the EU.

- **Public procurers** should use procurement criteria which favour products designed for value retention. Value retention for publicly purchased products can range from design for longevity (high quality materials, parts and joints), for reusability, repairability and—less desirable—recyclability (mono-materials and modular products). For example, procurement cycles should be extended to support circular design changes -in the electronics sector, procurement cycles of notebooks could be extended towards 5 years and desktop cycles to 7 years.
- **Businesses** should develop long-term strategies of transformation of design and technology to develop innovation and business cycles supportive of products based on longevity and repairability. Users should be incentivised to engage in product stewardship of the durability of the products, even if they are not the owners. Reuse, repair and refurbishment services could favour or help customers identify products which have been well designed – for example by displaying a repair score like that offered by iFixit.

4. ENSURE EQUAL ACCESS TO CIRCULAR PRODUCTS AND SERVICES.

Circular products and business offerings should not be a luxury. Low income and marginalised groups should be empowered to benefit from circular products and in turn create scale.

- **Policy makers** should utilise economic incentives and environmental fiscal reform to ensure that circular products are competitive on the market. They should pursue a tax shift, away from taxing labour, towards taxing negative externalities on people and the environment. Examples include using VAT reductions for value retention or using EPR (extended producer responsibility) fee modulation to favour products designed to reuse or longevity.

  Competition law should also work to support sustainability objectives - such as making markets for circular products competitive, e.g. preventing businesses from blocking repair by independent actors in order to monopolise after sales markets.[177]
- **Public procurers** should be enabled to purchase used or refurbished products, such as laptops in the context of schools reducing their running costs and alleviating issues such as digital poverty. They should systematically favour Fair Trade Enterprises and other Social Economy actors, such as repair cafes and reuse initiatives which are both circular and serve a social purpose.
- **Businesses** should avoid marketing sustainable or circular products as being premium but rather as the default in their ranges. Pricing should not deter users from extending the lifetime of a product – e.g. setting the price of repair higher than the cost of buying new. PaaS can offer opportunities to offer circular products to low income households – one example is the Papillon project offered by BHS.[178]

5. ENABLE BOTH CIRCULAR AND SOCIALLY RESPONSIBLE PROCUREMENT.

Existing policies on procurement such as criteria and tool kits tend to focus on discrete aspects of sustainability, rather than systematically addressing both circularity and fairness. Public or private procurers are often not educated about the correct use of such guidelines, resulting in a gap between ambitions for and implementation of circular and fair procurement guidelines.

- **Policy makers** should simultaneously support fair and circular procurement, rather than addressing “green”, “innovative”, “social”, “fair” and “circular” public procurement in silos (see, for example, recommendations from ICLEI on procuring ICT products in a socially responsible way).179 This is for example the case with the Buying Green! handbook by DG Environment and Buying Social by DG Grow, next to the Guidance on Innovation Procurement by the European Commission.[180],[181]

  Policy makers should make sustainability, including circular and fair trade criteria mandatory in all public procurement, as the European Commission has announced it plans to do for the public procurement of food.[182]

  EU member states should offer professional training for circular and fair procurement practices, specifically with regards to market engagement, developing selection and award criteria and contract management. Verification of criteria, then, should be carried out objectively by an independent body. For electronic products, Electronics Watch could be such an organisation. Initiatives to develop independent monitoring and verification bodies for other sectors should be started immediately. EU member states should organise national events on the transposition into national legislations and the implementation of the social considerations and other instruments (aiming at fostering the access of social economy enterprises and other SMEs).
- **Public procurers** should engage in training on fair and circular procurement as well as support the cultural change within public authorities, through colleague dialogue and awareness raising. Further, utilising exclusion and selection criteria that address potential social and environmental harmful practices, ensure ethical labour practices across all areas of the value chain, assuming the need for the provider to abide by responsible sourcing practices in line with ILO standards, and have supplier codes of conduct, risk screenings and audit programmes in place. Public procurers could also establish a network of contracting authorities that wish to buy circular and fair, building on examples such as Procura+.[183]

  They should develop circular procurement criteria with regards to the overall environmental footprint of a product or service, including embedded emissions, materials and occupational health and safety considerations, as well as levels of repairability and reuse. A focus on energy efficiency alone is too narrow.

  Next to including the right criteria, public procurers should develop long-term relations with supply chain partners so as to improve the environmental and social performance of suppliers. Dialog oriented approaches based on contract conditions should become the central form of circular procurement. Pre-tender market dialogues and contact management should become the standard for any procurement to develop market capabilities and increase stringent standards throughout each step of the process.

  Fair Trade Enterprises and other Social Economy actors, such as cooperatives, are mission-driven business models whose goals include achieving societal objectives. These actors should be systematically favoured in calls for tenders. Public procurers should also, as much as possible, divide calls for tenders into lots, to enable smaller suppliers, such as social economy actors, to have more chances to win public contracts. They should also include social economy representatives in procurers’ preliminary market consultations.
- **Public procurers** should open up opportunities for the procurement of services with PaaS models, while also taking into consideration the overall effects of PaaS, especially focusing on potential for loss of internal employment and skills. The procurement department should work closely with the financial department to ensure the financial management of circular options within public procurement is feasible and aligned with fair employment practices.
- **Businesses** should equally engage in circular and fair corporate procurement, as well as in public procurement which represents around 14% EU demand. Large organisations such as those covered by the non-financial reporting directive should come forward as front runners in this regard.

6. OPTIMISE REVERSE LOGISTICS AND VALUE RETENTION PROCESSES.

The environmental footprint of activities such as take back, washing and repairing should not offset the material savings. These activities should also present opportunities for creating labour and social enterprises.

- **Policy makers** should amplify research and development funds, for example in Horizon Europe, for developing value retention activities at scale. Standardisation or common guidelines may present opportunities for enabling value retention such as repair at scale.
- **Businesses** should look for opportunities to pool or scale up value retention at the local level in order to create economies of scale. Ensure the financial viability of circular business models through life cycle budgeting, joining budgets for purchasing and maintenance.

7. TERMINATE THE LOGIC OF EXPLOITING NATURAL AND HUMAN CAPITAL FOR ECONOMIC GROWTH AND ENSURE A JUST TRANSITION TO THE CIRCULAR ECONOMY.

Business models based on exploitation, whether of natural or human capital, do not create long term sustainable societal benefits and belong in the past. The transition to circular business models will moreover lead to a decline in certain sectors, such as traditional manufacturing, putting millions of workers at risk if not properly managed.

- **Policy makers** should focus on public wellbeing as well as environmental protection as the impetus for Europe's socio-economic development and policy making. Defining sustainable finance policies which integrate define what fair and circular businesses are. The Sustainable Finance Taxonomy and the Revision of the Non-Financial Reporting Directive provide clear opportunities to do this.

  Policy makers should moreover invest in the professional skills development to redeploy workers who are currently active in sectors that will decline in the transition to the circular economy, such as traditional manufacturing. This is especially true for low-skilled workers, to open up higher quality and better paid employment opportunities.
- **Businesses** should shift their rationale from profit maximising to being mission driven while remaining commercially viable. Large businesses should integrate social enterprises, including cooperatives, into their supply chain and work with small businesses rather than trying to push them out of the market. Credible sustainable businesses should lobby for rather than against progressive environmental and social policies.

  Businesses should develop comprehensive policies on equality, gender and race, and can furthermore consider cooperative structures and offering employees business ownership to address power imbalances. Guidance materials such as the 'Square your Circle' guidance for apparel reuse models to ensure a just transition, developed by WRAP and WRI, may support businesses in initiating this transition.[184]

  Businesses should invest in the development of their employees, building and nurturing human capital, rather than exploiting it. This is especially true for low-skilled and vulnerable workers. Businesses can consider legacy industries in decline in deciding locations, so as to make use of the local pool of talent.

8. USE TRANSPARENCY AND DISCLOSURE TO ENABLE BOTH CIRCULARITY AND ETHICS

- **Policy makers** should activate circular business activities such as repair and recycling through enabling the flow of standardised information in supply chains. The product passport concept should be implemented to provide a harmonised access point for product information at the European level. Incentives should be established to encourage businesses towards transparency on key issues such as toxicity and due diligence. More ambitious levels of due diligence can moreover be made mandatory.

  Policy makers should enable citizens to make educated consumer choices by further advancing correct and transparent information sharing about products' environmental and social performance through a "right to know". Policy makers can moreover advance the public debate and discussions around sufficiency, as well as addressing producer-driven demand through advertising.

  Policy makers should moreover ensure that the burden of proof on achieving these targets by the industry is distributed fairly amongst stronger and weaker market players.
- **Public procurers** should write transparency requirements into award and technical criteria of public contracts that go beyond the transparency standards provided by the industry. Public procurers should use their regulatory framework of subject matter of the contract as a tool to push for disclosure of factory locations, audit data, chemical data directly linked to their supply chains.
- **Businesses** should be open about their business practices and products, providing relevant information to consumers, third parties, market surveillance authorities and waste management actors. Transparency should be embraced as a necessity for brand loyalty.

CONCLUSION

This report provides an overview of the blindspots—the unintended, unaddressed or underexplored negative impacts—of promoting circular business models. The aim is to get a holistic understanding of the impacts of circular business models, specifically taking into account the social sphere. The report considers three circular business models (repair, resale and PaaS) and four types of blindspots (governance, market, social and environmental). Recommendations for (EU) policy makers, public procurers and businesses were then formulated to address these blindspots.

Circular business models overwhelmingly address the environmental blindspots in linear supply chains. In order for this positive environmental potential to become reality, they should be realised at scale, not as an add-on to the current system. This requires mainstreaming circular principles in the design stage of the value chain, as well as further stimulating circular business models through for example procurement.

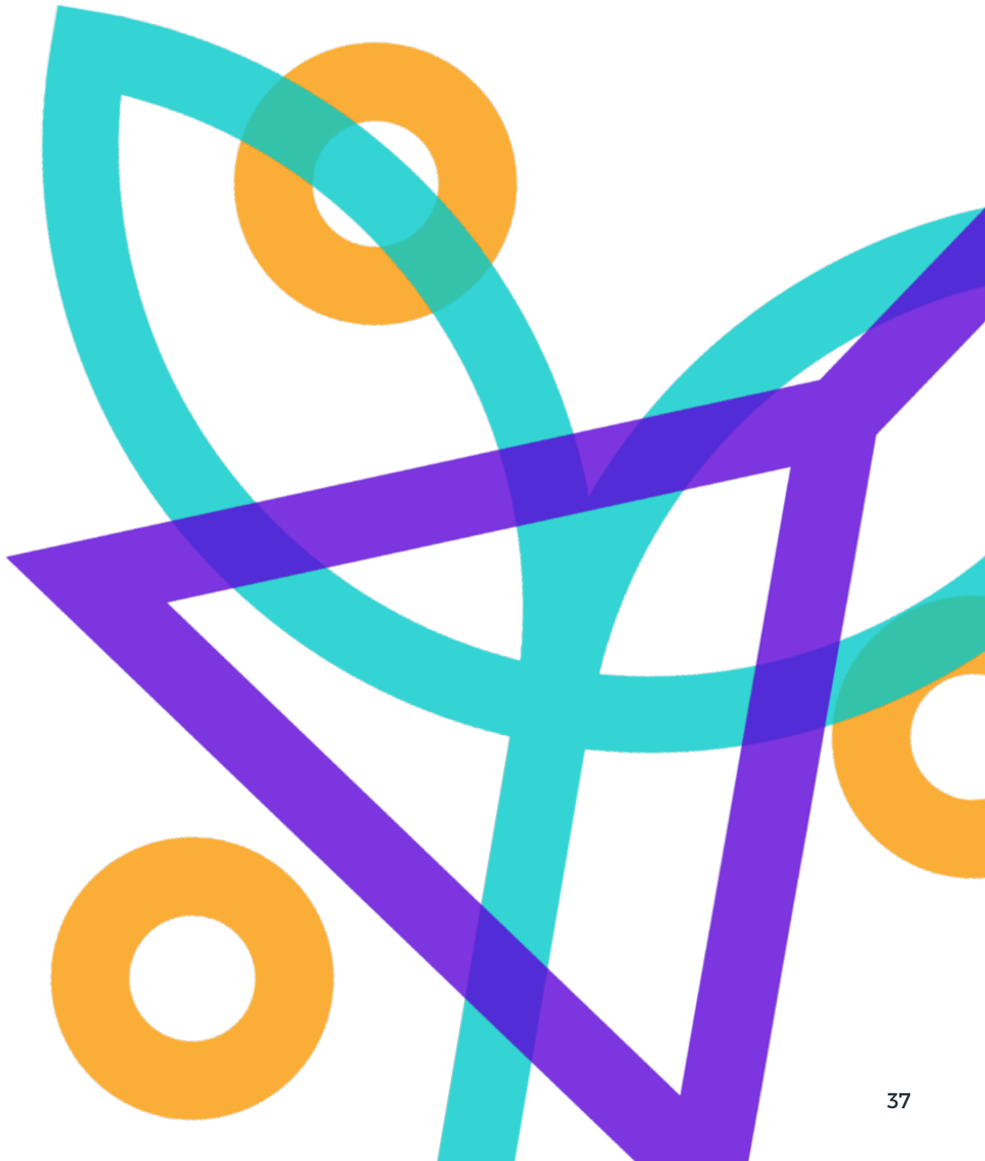
Circular business models moreover address a number of social and governance blindspots related to linear supply chains that will be eliminated or reduced in a circular economy. Some social blindspots are not addressed by circular business models, and we can then consider to what extent it is their role to do so. Regardless of this, there is a need to ensure that circular economy policy is aligned with other sustainability frameworks to make sure that circular business models are promoted in a fair and just manner.

On the other hand, circular business models also bring about new blindspots.

Circular business models create a small number of environmental blindspots, which are related to their displacement rate and rebound effect, as well as the increased logistics they require. The former can be addressed by mainstreaming circular products and services, and the latter with sound, efficient and environmentally sound logistics.

Circular business models also create governance and social blindspots. Circular business models as yet do not address the growth and free trade paradigm, do not show a break in male dominated leadership, or ensure equal access to products and services.

Solving the governance and social blindspots of circular business models requires rethinking the social foundations of circular economy thinking. They point to the need of integrating the fair trade and circular economy and systematically addressing environmental, social, ethical and fairness considerations when advancing the circular economy.



REFERENCE LIST

1. Gorissen, L. et al. (2016). Transition thinking and business model innovation–towards a transformative business model and new role for the reuse centers of Limburg, Belgium. *Sustainability, 8*(2), 112.
2. Circular Economy Action Plan - For a cleaner and more competitive Europe (COM/2020/98final). Retrieved from: EUR-lex website
3. European Commission (2020). A European Green Deal. Retrieved from: EC website
4. ThredUp (2019). Resale market. Retrieved from: ThredUp website
5. FFACT (2020). Massabalans textiel 2018. Retrieved from: Ffact website
6. United States Environmental Protection Agency (n.d.). Facts and figures. Retrieved from: EPA website
7. Deloitte. (2016). Used smartphones: the $17 billion market you may never have heard of. Retrieved from: Deloitte website
8. Research and Markets (2019). Global appliances rental market outlook: industry analysis & opportunity evaluation 2017-2025. Retrieved from: Research and Markets website
9. Bakker, C. et al. (2014). Products that go round: exploring product life extension through design. Journal of Cleaner Production. 69, 10-16.
10. European Environment Agency (2020). Europe's consumption in a circular economy: the benefits of longer-lasting electronics. Retrieved from: EEA website
11. Manninen et al. (2018). Do circular economy business models capture intended environmental value propositions?. Journal of Cleaner Production. 171, 413-422.
12. Öhgren, M. et al. (2019). Public procurement of reconditioned furniture and the potential transition to product service systems solutions. Procedia CIRP, 83, 151-156.
13. Whalen, K. A., and Milios, L. (2019). Circular economy policy at a crossroads: Driving business models for durable products, or enabling faster recycling of short- lived products? Proceedings of the 3rd International Conference PLATE (Product Lifetimes and the Environment), 18-20 September 2019, Berlin, Germany.
14. Burger, M. and Stavropoulos, S. (2019). Modelling strategy and net employment effects of renewable energy and energy efficiency: a meta-regression. Tinbergen Institute, Research paper.
15. World Economic Forum (2020) The Future of Jobs http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf
16. Raworth, K. (2017). Doughnut economics: seven ways to think like a 21st-century economist. Random House.
17. European Commission (n.d.). Directive 2008/98/EC on waste (Waste Framework Directive). Retrieved from: EC website
18. Leal Filho, W. et al. (2019). A review of the socio-economic advantages of textile recycling. Journal of Cleaner Production, 218, 10-20.
19. Webster, K. (2017). The circular economy: a wealth of flows. Ellen MacArthur Foundation Publishing.
20. Lüdeke-Freund, F. et al. (2019). A review and typology of circular economy business model patterns. Journal of Industrial Ecology, 23(1), 36-61.
21. Bocken, N. et al. (2016) Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33 (5), 308-320. doi:10.1080/21681015.2016.1172124
22. Organisation for Economic Cooperation and Development (2019). Business models for the circular economy: opportunities and challenges for policy. OECD Publishing, Paris. doi:10.1787/g2g9dd62-en
23. Racklin, M. (2019). Instead of hiding rips and tears, the visible mending movement turns them into art. Retrieved from: Vox website
24. European Environmental Bureau. (2019). Cool products don't cost the earth - full report. Retrieved from: EEB website
25. Wijkman, A. and Skåneberg, K. (2015). The Circular Economy And Benefits For Society Jobs And Climate Clear Winners In An Economy Based On Renewable Energy And Resource Efficiency A Study Pertaining To Finland, France, The Netherlands, Spain And Sweden. A study report at the request of the Club of Rome with support from the MAVA Foundation. Retrieved from: Club of Rome website
26. Gwilt, A. (2014). What prevents people repairing clothes? : an investigation into community-based approaches to sustainable product service systems for clothing repair. Making Futures Journal, 3.
27. Fontell, P. and Heikilla, P. (2017). Model of circular business ecosystem for textiles. Retrieved from: VTT website
28. Fisher, T. et al. (2008) Public understanding of sustainable clothing: A report for the Department for Environment, Food and Rural Affairs. London: DEFRA.
29. Laitala, K. and Klepp, I., 2018. Care and Production of Clothing in Norwegian Homes: Environmental Implications of Mending and Making Practices. Sustainability, 10(8), 2899.
30. Nudie Jeans (2020). Sustainability report 2019. Retrieved from: Nudie Jeans website
31. Patagonia (2016). Notes from the road. Worn Wear Fall 2016. Retrieved from: Patagonia website
32. Charter, M. and Keiller, S. (2016). The second global survey of repair cafés: a summary of findings. Retrieved from: The Centre for Sustainable Design website
33. Repair Cafe (n.d.). Home. Retrieved from: Repaircafe.org
34. Golden Joinery (n.d.) Home. Retrieved from: Golden Joinery website
35. Proctor, N. (2020). The fix is in: how our smartphones get fixed, why it's harder than it should be and why that matters. U.S. PIRG Education Fund. Retrieved from: US PIRG Fund website
36. GIAB (n.d.) Mobilcirkeln. Retrieved from GIAB Nordic website
37. Hanley, D. et al. (2020). Fixing America: Breaking Manufacturers' Aftermarket Monopoly and Restoring Consumers' Right to Repair. Retrieved from: Open Markets Institute website
38. Terryn, E. (2019). A right to repair? Towards sustainable remedies in consumer law. 27, European Review of Private Law, 4, 851-873. Retrieved from: Kluwer Law website
39. Lüdeke-Freund, F. et al. (2019). A review and typology of circular economy business model patterns. Journal of Industrial Ecology, 23(1), 36-61.
40. Geyer, R., Van Wassenhove, L. and Atasu, A., 2007. The Economics of Remanufacturing Under Limited Component Durability and Finite Product Life Cycles. Management Science, 53(1), pp.88-100.
41. den Hollander, M., Bakker, C. and Hultink, E., 2017. Product Design in a Circular Economy: Development of a Typology of Key Concepts and Terms. Journal of Industrial Ecology, 21(3), pp.517-525.
42. Hvass, K. K. (2015). Business model innovation through second hand retailing: a fashion industry case. Journal of Corporate Citizenship, (57), 11-32
43. Rreuse (n.d.) Home. Retrieved from: rreuse.org
44. Deloitte (2016). Used smartphones: the $17 billion market you may never have heard of. Retrieved from: Deloitte website
45. Trade in Tech (2020). Electronics you can resell for profit. Retrieved from: Trade in tech website
46. Meloni, M., and Sturges, S. F. (2018). Circular consumer electronics: an initial exploration.
47. Whalen, K., Milios, L. and Nussholz, J. (2018). Bridging the gap: Barriers and potential for scaling reuse practices in the Swedish ICT sector. Resources, Conservation and Recycling, 135, 123-131.
48. Circle Economy (2020). PaaS question KIT. Retrieved from: CE website
49. Belk, R. (2014). You are what you can access: Sharing and collaborative consumption online. Journal of business research, 67(8), 1595-1600.
50. Hüer, L. et al. (2018). Impacts of Product-Service Systems on Sustainability – A structured Literature Review. Procedia CIRP, 73, 228-234.
51. Wasserbaur, R. et al. (2020). What if everyone becomes a sharer? A quantification of the environmental impact of access-based consumption for household laundry activities. Resources, Conservation and Recycling, 158. doi:10.1016/j.resconrec.2020.104780
52. Circle Economy (2020). PaaS question KIT. Retrieved from: CE website
53. Organisation for Economic Cooperation and Development (2019). OECD Input to the Netherlands Independent commission on the Regulation of Work (Commissie Regulering Werk). Retrieved from: vaanarbeidsrecht.nl
54. Albihn, I. (2016). Creating customer value in a circular economy. Master Thesis, Lund University. Retrieved from: http://lup.lub.lu.se/
55. Dibella Textiles (n.d.). Home. Retrieved from: dibellatextiles.com
56. Textile Services (n.d.). Renting kitchen, restaurant and hotel linen products enhance image and appearance. Retrieved from: textile-services.eu
57. Lindstrom Group (n.d.). Our services for different industries. Retrieved from: lindstromgoup.com
58. CWS Deutschland (n.d.). Home. Retrieved from: CWS website
59. Interview Gerrard Street x Metabolic. (2019). Retrieved from: Metabolic website

60. Goetvinck, M. (2014). Ricoh's circular economy, and interview with Mia Goetvinck. Retrieved from: GEF website

61. Fairphone (n.d.) Recycle your phone. Retrieved from: Fairphone website

62. Fairphone (2017). Examining the environmental footprint of electronics recycling. Retrieved from: Fairphone website

63. SOMO (2012). Workers' rights in the global electronics sector. Retrieved from: SOMO website

64. International Labour Office (2016). The impact of procurement practices in the electronics sector on labour rights and temporary and other forms of employment / Ricarda McFalls, Geneva. (Working paper; 313)

65. Global Fashion Agenda (2019). Pulse of the fashion industry.

66. Hanbury, M. (2018). 20 companies dominate the world's fashion industry. Here's who makes the list. Retrieved from: Business insider website

67. BSR (2017). Empowering Female Workers in the Apparel Industry. Retrieved from: BSR website

68. Kiersz, A. (2019). Male dominated industries with vanishing employment. Retrieved from: Business insider website

69. International Growth Centre (2012). Gender empowerment and productivity in the garment sector. Retrieved from: IGC website

70. Brussevich, M. et al. (2019) Is Technology Widening the Gender Gap? Automation and the Future of Female Employment. IMF WP/19/91.

71. Circle Economy (2020). Resilience and the circular economy. Opportunities and risks. Retrieved from: CE website

72. Hobson, K. and Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. Futures, 82, 15-25. doi:10.1016/j.futures.2016.05.012

73. Doherty, T. et al. (2019). Creating the new economy: Business models that put people and planet first.

74. Ducasse, P. (2019). Why Luxury Brands Should Celebrate the Preowned Boom. Retrieved from: BCG website

75. Zink, T. et al. (2014). Comparative life cycle assessment of smartphone reuse: repurposing vs. refurbishment. International Journal of Life Cycle Assessments. 19, 1099–1109. doi:10.1007/s11367-014-0720-7

76. Makov, T., and Font Vivanco, D. (2018). Does the circular economy grow the pie? The case of rebound effects from smartphone reuse. Frontiers in Energy Research, 6, 39.

77. WRAP. (2013). Study into consumer second-hand shopping behaviour to identify the re-use displacement effect. Retrieved form: WRAP website

78. Pal, R. (2015). EPR-systems and new business models for sustained value creation: a study of second-hand clothing networks in Sweden. 15th AUTEX World Textile Conference 2015, Bucharest. Retrieved from: DIVA Portal

79. True Price Foundation (n.d.). The Business Case for True Pricing. Retrieved from: Transparantiebenchmark.nl

80. Gorissen, L. et al. (2016). Transition thinking and business model innovation–towards a transformative business model and new role for the reuse centers of Limburg, Belgium. Sustainability, 8(2), 112.

81. Rreuse (2017). RREUSE position on the updated EU Waste Framework Directive. Retrieved from: rreuse.org

82. Interview findings.

83. Gåvertsson, I., Milios, L., & Dalhammar, C. (2020). Quality labelling for re-used ICT equipment to support consumer choice in the circular economy. Journal of Consumer Policy, 43(2), 1-25. doi: 10.1007/s10603-018-9397-9

84. Kent, S. (2020). Is Resale Actually Good for the Planet?. Business of Fashion. Retrieved from: Business of Fashion website

85. Clube, R. and Tennant, M. (2020). Exploring garment rental as a sustainable business model in the fashion industry: Does contamination impact the consumption experience?. Journal of Consumer Behaviour, 19(4), 359-370.

86. Vestiaire Collective and Boston Consulting Group (2019). Survey on 1005 Vestiaire Collective customers. Retrieved from: BCG website

87. Van der Velden, M. and Taylor, M.B. (2017). Sustainability Hotspots Analysis of the Mobile Phone Lifecycle. Oslo: University of Oslo/SMART, 82. Retrieved from: SMART website

88. BSR (2010). Conflict Minerals and the Democratic Republic of Congo: Responsible Action in Supply Chains, Government Engagement and Capacity Building. Retrieved from: BSR website

89. Knutsen, C. et al. (2016). Mining and Local Corruption in Africa. American Journal of Political Science, 61(2), 320-334.

90. Business and Human Rights Resource Centre (2018). European textile industry and human rights due diligence: Key developments, human rights allegations & best practices. Retrieved from: Business & Human Rights Resource Centre website

91. Bangladesh Manufacturers and Exporters Association (2020). About Bangladesh's Garment Industry. Retrieved from: BGMEA website

92. Rahman, M., Bhattacharya, D. and Al-Hasan, Md. (2018). The role of the informal sector in inclusive growth: a state of knowledge study from policy perspectives. Bangladesh Economic Dialogue on Inclusive Growth Research Report No. 3 in collaboration with Overseas Development Institute (ODI), London. Retrieved from: Asia Foundation website

93. European Commission (n.d.). Waste Electrical & Electronic Equipment (WEEE). Retrieved from: EC website

94. Eurofound and International Labour Organization. (2019). Working conditions in a global perspective.

95. European Commission (2020). COMMISSION STAFF WORKING DOCUMENT. Leading the way to a global circular economy: state of play and outlook. Retrieved from: EC website

96. European Trade Union Institute (2012). Discounting the workers: conditions in the retail sector. Retrieved from: ETUI website

97. World Economic Forum (2016). Internet for All: A Framework for Accelerating Internet Access and Adoption. Retrieved from: WEF website

98. Cedrick, E., Zogo, B. and Long, W. (2016). Why Solar Leasing Is Financially More Attractive for a Rapid Increase of Distributed Solar Power in Developing Countries? Journal of Economics and Sustainable Development, 7(16). Retrieved from: SSRN website

99. Georgieva, K. (2018). La brecha de género en la inclusión financiera se mantendrá: tres medidas para reducirla (in Spanish). Retrieved from: World Bank website

100. European Parliament (2017). Making consumer products more durable and easier to repair. Press Release. Retrieved from: https://www.europarl.europa.eu

101. Fix it workshop (2019). Why are some spare parts more expensive than a complete product?! Retrieved from: Fixitworkshop.co.uk

102. Outcome of interviews conducted for Circle Economy. (2020). Circularity Gap Report Norway.

103. Arredondo, J. (n.d.). How the Repair Café started a global movement to slow down waste – and what we can learn from it. Retrieved from: Bold and Open website

104. International Resource Panel (2019). Global Resources Outlook 2019: Natural Resources for the Future We Want. Retrieved from: resourcepanel.org

105. Yale Environment 360 (2013). Boom in Mining Rare Earths Poses Mounting Toxic Risks. Retrieved from: 360 Yale website

106. European Commission (2020).Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. Retrieved from: EC website

107. Van der Velden, M. & Taylor, M.B. (2017). Sustainability Hotspots Analysis of the Mobile Phone Lifecycle. Oslo: University of Oslo/SMART, pp. 82 Retrieved from: SMART website

108. Watts, J. (2019). Resource extraction responsible for half world's carbon emissions. Retrieved from: The Guardian

109. World Gold Council (2020). Gold Supply and demand statistics. Retrieved from: World Gold Council website

110. Marshall, J. (2014) Why Rare earth recycling is rare - and what we can do about it. Retrieved from: ENSIA website

111. Ljunggren Söderman, M. and André, H. (2019). Effects of circular measures on scarce metals in complex products – Case studies of electrical and electronic equipment. Resources, Conservation and Recycling, 151, 104464.

112. Textile Exchange (2020). Preferred Fiber and Materials Market Report 2020. Retrieved from: TE website

113. Close the Loop (2020). End of Life Phase. Retrieved from: Close the loop website

114. Modefica Global (2019). Recycled PET Is Not a Solution for Sustainability in Fashion. Retrieved from: Medium

115. Kinver, N. (2019) Electronic devices 'need to use recycled plastic'. Retrieved from BBC News

116. Apple (2019). Product Environmental Report - iPhone 11 Pro. Retrieved from: Apple website

117. De Decker, K. (2009). The monster footprint of digital technology. Retrieved from: Low-Tech Magazine

118. Ellen MacArthur Foundation (2019). The Circular Economy Tackles Climate Change.

119. Textile Exchange (2020). Preferred Fiber and Materials Market Report 2020. Retrieved from: TE website

120. World Trade Organisation (2019). World Cotton Day at a Glance. Retrieved from: WTO website

121. International Trade Centre (2020). Exporter's Cotton Guide: Understanding all aspects of international cotton trade from farm to shirt. Chapter 1. Retrieved from: Cottonguide.org

122. Kooistra, K.J., Pyburn, R., and Termorshuizen, A.J. (2006). The sustainability of cotton. Consequences for man and environment, Science Shop Wageningen University & Research Centre. Report 223. ISBN: 90-6754-90-8585-000-2. Retrieved from: WUR website

123. Skosana, D. (2019). Mining activities continue to dispossess black families in South Africa. Retrieved from: The Conversation

124. Koh, D. (2020). World At Work: The Electronics Industry. Retrieved from: BMJ Journals

125. Koh, D. (2020). World At Work: The Electronics Industry. Retrieved from: BMJ Journals

126. Kant, R. (2012) Textile dyeing industry an environmental hazard. Natural Science, 4, 22-26. doi:10.4236/ns.2012.41004.

127. Swedish Chemicals Agency (2014). Chemicals in textiles- – Risks to human health and the environment. Report from a government assignment. Retrieved from: KEMI website

128. Greenpeace (2011). Dirty Laundry. Retrieved from: Greenpeace.org

129. Zero Discharge of Hazardous Chemicals. (2020). Detoxing the fashion industry. Retrieved from: Roadmap to zero website

130. Laitala, K. et al. (2018). Does Use Matter? Comparison of Environmental Impacts of Clothing Based on Fiber Type. Retrieved from: MDPI website

131. Troynikov, O. et al. (2016). Towards sustainable and safe apparel cleaning methods: A review. J. Environ. Manag. 182, 252–264

132. De Decker, K. (2009). The monster footprint of digital technology. Retrieved from: Low-Tech Magazine

133. Note that the analysis dates back to 2004 and concerns computers from the 1990s. Recent technological developments after this study might have changed this total energy balance between manufacturing and use. Retrieved from: Low-Tech Magazine

134. Federal Environment Agency Germany. (2012). Timely replacement of a notebook under consideration of environmental aspects. Retrieved from: Umweltbundesamt website

135. Woolridge, A. et al. (2006). Life cycle assessment for reuse/recycling of donated waste textiles compared to use of virgin material: An UK energy saving perspective. Resources, Conservation and Recycling, Vol 46(1), pp. 94-103.

136. Zamani, B. et al. (2017). Life cycle assessment of clothing libraries: can collaborative consumption reduce the environmental impact of fast fashion? Journal of cleaner production, Vol 162, 1368-1375.

137. Zamani, B. et al. (2017). Life cycle assessment of clothing libraries: can collaborative consumption reduce the environmental impact of fast fashion? Journal of cleaner production, Vol 162, 1368-1375. In line with: Woolridge et al., 2006; Farrant et al., 2010.

138. Gonzales, N. (2015). Electronics Industry Slow to Move the Needle on Water. Retrieved from: Triple Pundit

139. Wahaab, R. A., and Alseroury, F. A. (2019). Wastewater treatment: a case study of electronics manufacturing industry. International Journal of Environmental Science and Technology, Vol 16(1), 47-58

140. Choudhury, A. (2017).Principles Of Textile Finishing - Chapter 12: Finishing Of Denim Fabrics. Elsevier Ltd. doi:10.1016/B978-0-08-100646-7.00012-6

141. Kant, R. (2012). Textile dyeing industry an environmental hazard. Natural Science, 4, 22-26. doi:10.4236/ns.2012.41004.

142. PaCT. (2020). State of apparel sector. Special report water. Retrieved from: Textile PaCT

143. Gonzales, N. (2015) Electronics Industry Slow to Move the Needle on Water. Retrieved from: Triple Pundit

144. Piontek, F. M., Amasawa, E., and Kimita, K. (2020). Environmental implication of casual wear rental services: Case of Japan and Germany. Procedia CIRP, 90, 724-729.

145. Reagan, C. (2019). That sweater you don't like is a trillion-dollar problem for retailers. These companies want to fix it. Retrieved from: CNBC website

146. Salecycle. (2020). Ecommerce Returns: 2020 Stats and Trends. Retrieved from: Salecycle website

147. Orendorf, A. (2019). The Plague of Ecommerce Return Rates and How to Maintain Profitability. Retrieved from: Shopify website

148. Reagan, C. (2019). That sweater you don't like is a trillion-dollar problem for retailers. These companies want to fix it. Retrieved from: CNBC website

149. Circle Economy. (2020). Reading the fine print: ensuring circular business models are truly sustainable. Retrieved from: Circle Economy website

150. Leismann, K. et al. (2013). Collaborative consumption: towards a resource-saving consumption culture. Resources, 2(3), 184-203.

151. Zamani, B. et al. (2017). Life cycle assessment of clothing libraries: can collaborative consumption reduce the environmental impact of fast fashion? Journal of cleaner production, 162, 1368-1375.

152. Skjelvik, J., A. Erlandsen and O. Haavardsholm (2017), Environmental impacts and potential of the sharing economy, TemaNord, Nordic Council of Ministers, Copenhagen K, doi:10.6027/TN2017-554.

153. Yalanovsky, D. (2018). The expected lifespans of washing machines. Retrieved form: SF Gate website

154. Interview findings.

155. Yalanovsky, D. (2018). The expected lifespans of washing machines.

156. BCG (2019) The Promise and Pitfalls of E Scooter Sharing. Retrieved from: BCG website

157. Watson et al. (2018). Used Textile Collection in European Cities. Study commissioned by Rijkswaterstaat under the European Clothing Action Plan (ECAP). Retrieved from: ECAP website

158. Circle Economy (2020). Exploring the global environmental and socio-economic effects of pursuing a circular economy. Retrieved from: Circle Economy website

159. European Parliament (2015). Understanding waste streams: Treatment of specific waste. Briefing. Retrieved from: European Parliament website

160. European Parliament (2015). Understanding waste streams: Treatment of specific waste. Briefing. Retrieved from European Parliament website

161. Interview findings.

162. Basel Convention (n.d.). Home. Retrieved from: Basel Convention website

163. Marshall, P. (2020). How the UK's fast fashion habits are polluting a country halfway around the world. ITV News. Retrieved from: ITV website

164. Gu, et al. (2017). Heavy metals in soil at a waste electrical and electronic equipment processing area in China. Retrieved from: PubMed website

165. Adu-Kumi–Jonathan, J. P. S., Akortia, H. E., Bell, G. K. P. B. L., & DiGangi, J. (2019). Persistent Organic Pollutants (POPs) in Eggs: Report from Africa. Retrieved from: Ipen website

166. Close the Loop (2020). End of Life Phase. Retrieved from: close the loop website

167. Watson et al. (2016). Exports of Nordic Used Textiles. Fate, benefits and impacts. Retrieved from: Norden website

168. European Commission. (2015). Understanding waste streams. Treatment of specific waste. Retrieved from: European Parliament website

169. Fibersort. (2020). Recycled post-consumer textiles: An industry perspective. Retrieved from: Circle Economy website

170. De Decker, K. (2009). The monster footprint of digital technology. Retrieved from: Low-Tech Magazine

171. European Commission. (2015). Understanding waste streams. Treatment of specific waste. Retrieved from: European Parliament website

172. Changing Markets Foundation (2020) Talking Trash. Retrieved from: Talking Trash website

173. European Commission (2020). Empowering the consumer for the green transition. Retrieved from: EC website

174. Fair Trade Advocacy Office. (2020). The civil society shadow European strategy for sustainable textile, garments, leather and footwear. Retrieved from: Fair Trade Advocacy Office website

175. Fair wear Foundation (2019). Understanding Fair Wear's approach to living wages. Retrieved from: Fair Wear Foundation

176. Nudie Jeans (2019). Sustainability report. Retrieved from: Nudie Jeans website

177. European Commission (2020). Competition policy and the Green Deal. Retrieved from: EC website

178. Applia (2020). The papillon project. Retrieved from: Circular Culture website

179. ICLEI Europe & Electronics Watch (2020). How to procure fair ICT hardware. Criteria set for socially responsible public procurement.

180. European Commission. (2016). Buying green! A handbook on green public procurement. Retrieved from: EC website

181. European Commission. (2010). Buying social. A guide to taking account of social consideration in public procurement. Retrieved from: EC website

182. The EC Farm to Fork strategy (2020) reads *"To improve the availability and price of sustainable food and to promote healthy and sustainable diets in institutional catering, the Commission will determine the best way of setting minimum mandatory criteria for sustainable food procurement."*

183. Procura Network (2020). European sustainable procurement network. Retrieved from: Procura+ website

184. Drew, D. et al. (2020). Square your circle. Retrieved from: WRI website

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