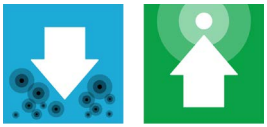
CIRCULAR ACTION GUIDE



How to cut emissions and nature impacts from material in your value chain

EXPONENTIAL ROADMAP INITIATIVE

Cradlenet

RACE TO ZERO

Version 1.0

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ABOUT THIS GUIDE

This guide is grounded in science and develops key actions for reducing value-chain emissions and negative impacts on nature[1] that are recommended in the 1.5°C Business Playbook. Since up to 70% of global greenhouse gas emissions and over 90% of global biodiversity loss and water stress impacts are believed to be tied to material extraction and the handling and use of resources, circularity is key to achieving net zero. Several policy measures at the national and local level have been initiated to drive circularity across Africa, America, APAC, and Europe. Also, the EU Corporate Sustainability Reporting Directive (CSRD) requires companies to report on data for "resource use and circular economy" from 2024 onwards, affecting companies worldwide.

This guide is for anyone who plans to transform their business to become a part of the circular economy, including managers and employees in eg business development, product design and management, procurement, and sustainability roles. It offers practical steps for companies to analyse their value chain, product portfolio and business model in order to scale circular climate solutions and fully integrate circularity into their strategic business functions, thus supporting the wider transformation to net zero.

1 In order to stay within the planetary boundaries.

UNDERSTANDING CIRCULAR ECONOMY

To avoid resource depletion, waste generation and environmental degradation, the economic system and company value chains need to shift from the linear take-make-dispose value chains to circular models. The circular economy is an economy powered by renewable energy and one in which resources and products are kept in use through multiple use cycles and/or used more efficiently. When the material is no longer viable in the material value chain, it should safely be returned to nature.

A typical linear value chain ranges from material extraction to product manufacturing, usage and disposal of the remaining material in landfills or for energy use. A circular value chain by contrast applies the following principles adapted from the Ellen MacArthur Foundation:

1. Minimise footprint and use of virgin material;
2. Use products more and for longer;
3. Circulate components and materials; and
4. Return safely to nature.[2]

The fourth principle may be less intuitive; it involves detoxifying and returning biomaterials safely to nature. The circular economy uses nature, which perfectly cycles nutrients and transforms its waste to food, as a role model. In a truly circular economy, all products and materials are designed to be able to return safely to nature at their end-of-life.

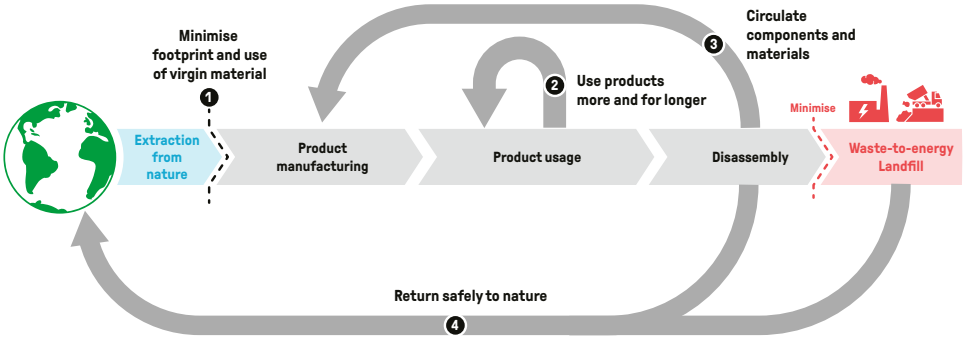

Figure 1: Four principles of the circular economy

2 This fourth principle of returning safely to nature applies primarily to biomaterials.

SEVEN KEY ACTIONS TO DRIVE A CIRCULAR TRANSFORMATION

This section provides a step-by-step guide for shifting from a linear to a circular value chain. Such a shift will involve the entire organisation, and companies will have to work in close collaboration with existing and new suppliers and customers to achieve this.

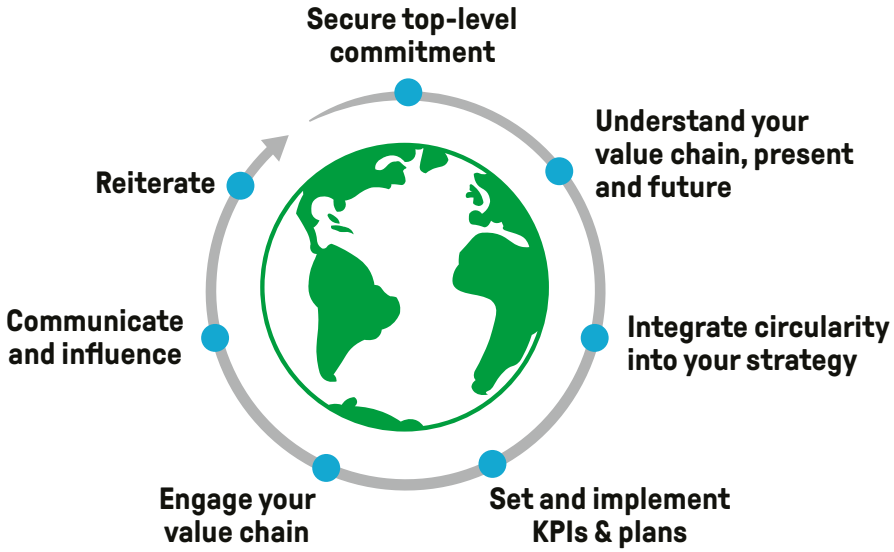

Figure 2: Seven key actions to drive a circular transformation.

ACTION 1: Secure top-level commitment

A shift to a circular economy must be integrated in companies' overall strategies and business/transition plans in order to be successful, and a solid business case must be provided for the shift. All key functions, including product design, production, purchasing and business development, must be incorporated. Therefore, top management needs to be on board and engaged.

Here's why it matters that companies shift towards circularity:

- For many companies it is necessary in order to **achieve science-aligned climate targets** and reach net zero.
- It helps **improve resilience** and decrease risks in global supply chains, eg through reduction of reliance on virgin and scarce materials and diversification of material sources in the supply chain.[3,4]
- It could increasingly give **companies and their products a competitive advantage** and an ability to grow with long-term profitability.[5]
- **Customers and financial institutions increasingly require** companies to have climate targets and transition plans in place. A circular strategy is an essential part of these plans.
- In addition to the CSRD, **compliance poses requirements on business services and product design** eg the EU Taxonomy and the Ecodesign for Sustainable Products Regulation, with implications for companies beyond the EU's borders.

3 The EU's Resilience of global supply chains and WEF Global risk report 2023 explain that the circular economy helps improve resilience by securing and diversifying the supply of critical minerals and metals, reducing the need for extraction and associated emissions.

4 Industries that are highly dependent on nature generate 15% of global GDP. Such sectors rely on either the direct extraction of resources from forests and oceans or the provision of ecosystem services such as healthy soils and clean water. As nature loses its capacity to provide such services, these sectors could suffer significant losses. See World Economic Forum.

5 The competitive advantages and an ability to grow take into account that customers' purchasing decisions are affected by their demand for more sustainable products and services as per Ellen MacArthur Foundation's Growth within report, the World Economic Forum on 5 circular economy business models and McKinsey's Mapping the benefits of a circular economy.

ACTION 2: Understand your value chain, present and future

The present: Mapping the flow of materials and products through your current value chain helps you understand the impact on climate, nature and the environment at a high level. This understanding is key to developing a strategy and plan based on the best possible knowledge about how to start, what the most effective actions to take are, and how much time and effort are required. Such data mapping also provides transparency to investors and customers.

Perform a Life Cycle Assessment (LCA) of existing products to understand the environmental impacts in each life-cycle stage of your product's portfolio, from virgin material extraction to product disposal, to identify material and impact hotspots.

It is also recommended that the double materiality methodology be applied for the company and for external stakeholders. This will sort those aspects of a company's activities that have a high impact on climate and nature from those with a low impact and assess how circular strategies will impact materiality.

The future: In addition to understanding your company's current value chain, strive to understand what your portfolio and value chain may look like in the net zero world. This is a future in which eg global energy systems are based on efficient renewable energy and the relationship with nature

Life Cycle Assessment (LCA)

A Life Cycle Assessment (LCA) is a thorough inventory of the energy and materials that are required during parts of or the full life cycle of a product, process or service, and calculates the corresponding emissions into the environment over that cycle. The aim is to understand and obtain comparable data on the overall environmental footprint of the product and the company. This is helpful as a basis for priorities and strategic choices. An LCA helps to pinpoint areas for improvement in the life cycle of a product or a company by making comparisons between similar options. It also helps to identify additional environmental costs from arising when adopting new solutions. In the EU context, the Joint Research Centre of the European Commission has released the International reference Life Cycle Data system handbook to enhance the comparability of LCAs applied to products and organisations.

has become regenerative rather than extractive.[6]

A value chain in a net zero and circular economy will not only have close-to-zero emissions (and outbalance residual emissions), it will also ensure that products are kept in use and used more efficiently and that material is returned safely to nature. It will be oriented towards solutions that deliver on core human needs such as eg food, housing and mobility.

- Consider which of your products and services will fit into a net zero, circular and nature-positive future and which will not.
- Outline how these services and products will be implemented with near-zero material waste (eg no material to landfill or incineration), maximal product durability and 100% renewable energy across the value chain.
- Identify the gap between your current and future business models in a net zero value chain, and define your path from there. Highlight any gap in your own business and in your supply and customer chain that would have to be filled to deliver on the identified need.

This vision of your company operating in the net zero future will work as a guiding star for your business strategy. It will also enable you to identify the key gaps between your current and ideal net zero value chain as well as new business opportunities.

6 The vision of a net zero future is rooted in the report Climate Change 2022: Mitigation of Climate Change of the Intergovernmental Panel on Climate Change (IPCC) and was presented in a speech by the Executive Secretary of the UN Framework Convention on Climate Change.

What would a net zero value chain for personal mobility look like?

For example, a net zero future in the mobility sector regarding material and product circularity may look something like this:

- Vehicles, from bicycles, cars and trains to aeroplanes, are manufactured using circulated (or fossil-free) material.
- Vehicles are produced by and run efficiently on renewable energy.
- Mobility-as-a-service, car-sharing or bike-sharing programmes become readily available and widely used, reducing individual vehicle ownership and wasted capacity.

On a system level, we will go even further by avoiding transport altogether through more flexible work and by designing communities so that movement between places is reduced and cycling, walking and shared transport is encouraged.

ACTION 3: Integrate circularity into your strategy

You can move towards a circular value chain using different tactics as shown in Figure 3. Two of these start from existing products, the third starts from new products, and the final one seeks to introduce circularity on the product and business strategy level simultaneously.

While focusing on improving the circularity of existing products is a positive step, designing new products that will be fully incorporated in a circular business model may present a more sustainable, innovative and profitable long-term strategy. This could be the case if you start collaborating with other companies to implement reverse logistics and extend the use phase of your products. One example would be a new electric car designed for mobility-as-a-service or a consumer appliance with Internet-of-Things capability to enable efficient resale, sharing, rent-out, remote connectivity and analysis for optimised maintenance, and recovery of material at end-of-life.

a) **Circular materials and components in existing products:** Changing the material mix across your existing products may provide the fastest opportunity to reduce the carbon and environmental footprint. It is also important to work to reduce energy intensity and material intensity, and to remove toxic substances and materials or designs that inhibit circularity.

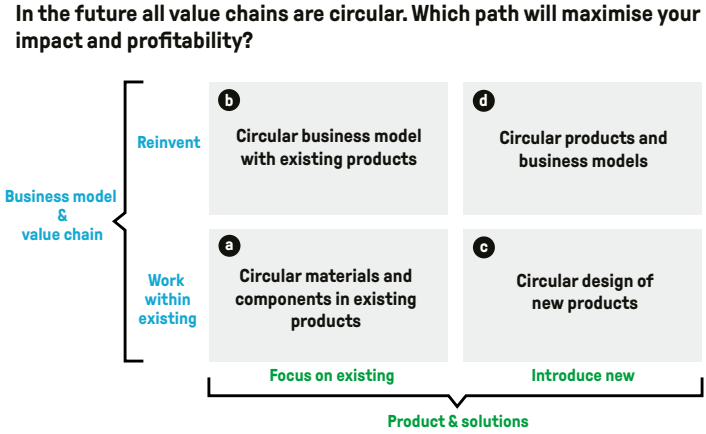

Figure 3: Circular strategy matrix. Inspired by Strategies for Diversification.

b) **Circular business model with existing products:** The second opportunity is to integrate existing products into circular business models, such as "product-as-a-service", resell, sharing, renting, repair, refurbishing, take-back schemes and recirculation of materials. For implementation, a company can either expand its own business operation to support these models or do so through partnerships. See the appendix for a list of important circular business models.

c) **Circular design of new products:** It has been shown that about 80% of a product's environmental impact is influenced by decisions made at the design stage. We recommend introducing a circular design checklist for all new products as exemplified below in the box.

d) **Circular products and business models:** The fourth opportunity is to design circular products integrated in circular business models from day one. It might turn out that launching a new company or business unit that is "born circular" is a faster and more attractive path for full adoption of circular and regenerative principles than reinventing your original business step by step. See the appendix for a list of important circular business models.

Examples of circular design checklist for existing and new products[7]

1. Material utilisation & footprint:

- Are materials minimised, recycled, recyclable, renewable, not hazardous, not scarce, and do they have a low life-cycle footprint?
- Are mixed materials easily separable for disassembly and recycling?
- Is it possible to reduce the number of packages and the amount of packaging material?
- Is the product's physical footprint (size, weight, delivery) minimised?

2. Durability & adaptability to circular business models:

- Can the product be offered through circular business models like sharing, leasing, and repair or on an on-demand basis? And if so, how does the design reflect this potential?
- Are materials and construction designed for maximum lifespan and multiple use cycles?
- Will the product age with beauty (aesthetic and cultural durability)?
- Can components be easily replaced, repaired and upgraded to extend product life?
- Is it possible to remanufacture the product or its components?

7 Examples of design checklists were retrieved from the following sources: Houdini Sportswear, IKEA, The circular design guide, Nußholz, Julia L.K., World Green Building Council, Ecochain, European Union (Product-as-a-service, page 47) and AFVALorisatie.

3. End-of-product-life & material re-use:

- Is the product designed for disassembly and material recovery?
- Can materials be recirculated to be used in other products? If so, does the process require custom solutions and/or manual labour or are there market solutions in place to do so at scale?

4. System-level impacts:

- How does the product fit into the net zero world?
- Will the product help the customer to reduce their material footprint?
- How can the product minimise energy consumption throughout its life cycle?
- Will the product drive the shift to sustainable usage and lifestyles?

ACTION 4: Set and implement KPIs & plans

To transform your value chain and your own business towards a net zero and circular value chain you will need to set forward-looking key performance indicators (KPIs), targets and plans. These should be integrated in your business and transition plans in order to drive the business in the right direction.

Outlined below are suggested KPIs for each stage of the value chain; they are aligned with relevant regulations and matched with potential company functions and responsibilities. These KPIs support the principles outlined earlier and should complement the overall GHG reductions targets and other KPIs eg for renewable energy.[8] While specific functions may own certain targets and KPIs, multiple functions will contribute to their achievement.

With the above in mind, develop a plan for the first 2–3 years, but ensure that these KPIs support your long-term plan and targets as well. Identify gaps between current and target state, determine measurable objectives, assign responsibilities and establish follow-up procedures. Note that as your plans move forward you will evaluate your actions and results and refine your approach.

8 The 1.5°C Business Playbook suggests a set of KPIs across key areas (page 31).

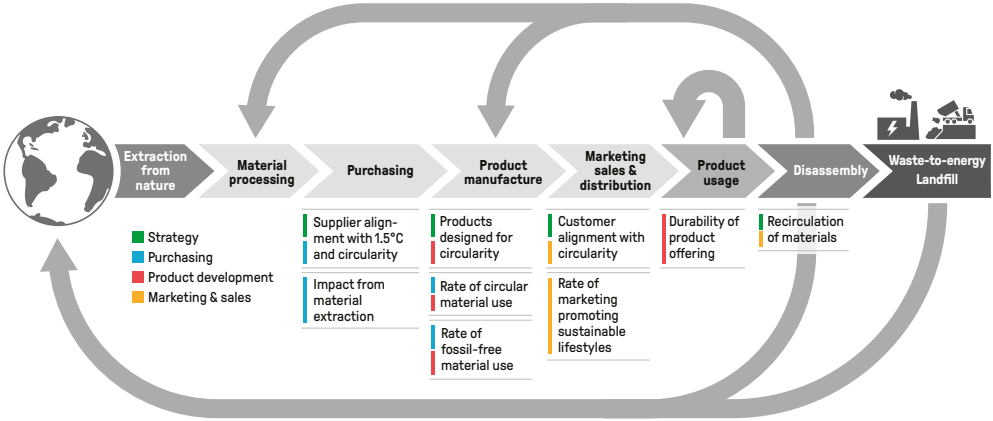

Figure 4: Example of key functional responsibilities and key performance indicators to drive a circular strategy across the value chain.

Purchasing and related KPIs

It is essential to establish sourcing strategies that are aligned with your overall circular strategy and design principles. Your purchasing strategies should prioritise recycled materials, renewable resources and minimise waste. If more sustainable options have a higher cost than the alternatives, this should be highlighted and weighed in the context of the circular transition plan. Prioritising lowest cost can render product longevity impossible and damage the company's reputation.

Product development and related KPIs

Products should be designed for circularity by focusing on, for example, repairability, serviceability, upgradeability, re-manufacturability, and ability to separate materials for re-use and safe return to nature. Product design should also consider longevity, usage intensity and associated business models – eg sharing, product-as-a-service and rental models. It's also important to perform LCAs in the design phase to ensure that the identified KPIs (eg lower emissions, resource consumption and water usage) are achieved.

Marketing & sales and related KPIs

Companies should communicate and promote sustainable lifestyles and to ensure recirculation of materials, components and products.

Strategy and related KPIs

To succeed in its transformation, a company must ensure that its suppliers (upstream) and customers (downstream) are implementing circular strategies. This can be done through influencing or shifting the supplier and customer base over time.

Table 1: Examples of KPIs for circularity in terms of measurements and goals.

KPI focus	KPI Owner/ Function	As measured by	Goals
Rate of circular material use[9]	Purchasing, Product development	Increase circular material use rate by %	Increase circular material (eg recycled, reused, and secondary materials and components which are recyclable) use rate by 50%
Rate of fossil-free material use	Purchasing, Product development	% of product from near-zero[10] or non-fossil-based materials by weight or volume	75% near-zero or fossil-free material inputs (which cannot be covered through circular materials) by 2025

9 The use rate is defined as the ratio of circular use of materials to overall use of materials. Aligned with ESRS E5 paragraph 31(c).

10 Near zero material signifies materials produced with minimal greenhouse gas emissions across all stages of their life cycle., for example near zero-emission steel.

KPI focus	KPI Owner/ Function	As measured by	Goals
Impact from material extraction	Purchasing	No. of hectares of virgin landscape converted for extraction Deforestation (hectares) per material unit GHG emissions per material unit	Zero virgin land converted for material extraction in supply chain by 2025 Eliminate deforestation from supply of commodity inputs (eg from meat production) by 2030
Products designed for circularity	Strategy, Product development	% of sales revenue or weight from products that fulfil circular design principles	75% of revenue by 2030
Durability of product offering[11]	Product development	No. of meaningful uses (eg wears/hours/years)	100% increase from baseline by 2026
Recirculation of materials	Strategy, Marketing & sales	% of material recirculated or safely returned to nature at end-of-life % of material/component/ product that is bought back or recollected from customers/consumers	95% by 2030 (close to zero landfill)
Rate of marketing promoting sustainable lifestyles	Marketing & sales	% of marketing & sales budget used supporting sustainable lifestyles integrating circularity	50% of marketing & sales budget used to support sustainable lifestyles that integrate circularity
Supplier alignment with 1.5°C and circularity	Strategy, Purchasing	% of suppliers with credible net zero and circularity targets and plans[12]	90% of procurement spent from suppliers with credible net zero and circularity targets by 2030
Customer alignment with circularity	Strategy, Sales	% of revenues (internal and from customers) related to circular business models	80% of revenues (internal and from customers) related to circular business models

11 Aligned with ESRS E5 paragraph 20(c).

12 This is explained in the Supplier Action Guide.

ACTION 5: Engage your value chain

The transition to a circular economy requires collaboration with the stakeholders along the value chain. Collaboration fosters knowledge sharing, fuels innovation, mitigates risk and promotes a shared responsibility for sustainability. It also empowers stakeholders to influence policy for a more circular future. Including downstream recyclers in this collaboration is particularly crucial, especially if your product/packaging is unlikely to be in a closed-loop system.

Make sure to:

- Communicate your circular requirements and procurement policies with your suppliers to set clear expectations for responsible sourcing and collaboration in achieving circular goals.
- Collaborate with customers and clients to encourage improvement in product and service design, responsible product use, recycling, return, and the shift to circular business models.
- Engage with industry associations, NGOs and governmental agencies to share best practices and advocate for regulatory support.

ACTION 6: Communicate and influence

Communication and collaboration serve as the driving force for change, motivating and aligning all relevant parties in the journey towards a circular economy. It is essential to be transparent with your goals, what you have achieved so far and what you still need to work on. Tailor your message to resonate with different audiences by:

- Empowering and educating your employees with the "why" and "how" of your circular practices. This will foster buy-in and engagement.
- Impressing your stakeholders, including customers, capital markets and consumers with your commitment to and practice of circularity. This can build brand loyalty and potentially attract new customers and investors.
- Advocating for regulatory support. While the circular economy offers a promising path towards sustainability, its full potential hinges on securing supportive regulations, eg incentives to increase high quality recycled material in the supply chain and procurement policies for circular materials.

ACTION 7: Reiterate

Working with circularity requires a continuous journey of learning and adaptation. Adapt as your organisation grows and learns, the market evolves, and new possibilities emerge. Refine strategies, expand your scope and embrace collaboration with stakeholders.

Make sure to:

- Adapt your circular strategy as markets, regulations, and technology and design advancements shift.
- Gather internal and external stakeholder feedback to identify areas for improvement.
- Consider using double materiality assessments[13] to identify and act on emerging issues.
- Celebrate achievements and set up more ambitious circularity goals.

13 See More resources (p 18).

MORE RESOURCES

Future adaptive design offers design guidelines for extended product life, through robustness, flexibility and upgradeability.

Sustainable Growth with Circular Economy Business Models offers a practical guide that provides insight, examples and hands-on tools to help businesses transition to circular business models, as well as an overview of the European regulations on the transition to a circular business.

The Business Model Design Guide offers useful workshop templates to help business teams jointly identify circular opportunities and find ways to explore circular business models.

Product-as-a-Service is a digital toolkit that offers a tangible opportunity for companies to reduce dependence on new resources and achieve their sustainability goals.

Circle Economy, The Value Hill is a categorisation of circular strategies based on the life cycle phases of a product: pre-, in- and post-use. This allows businesses to position themselves on the Value Hill and understand possible circular strategies they can implement as well as identify missing partners in their circular network.

Willie Pietersen, Strategic Learning is a practical toolkit, with analytical frameworks allowing teams to follow a clear roadmap for creating and implementing winning strategies.

Double Materiality looks into the impact of the company on people and the environment, as well as the impact of people and the environment on the company. The concept was introduced in the CSRD and will be reflected in the disclosure requirements.

Circular Economy Target-setting inspires and is helpful for designing and implementing circular business models and procedures for target setting.

The Circular Transition Indicators offers company-level measuring tools to assess circularity within a business's operations with guidelines that are straightforward

Strategy Paper for Circular Economy: Mobile devices looks at how mobile devices can evolve towards more circular business models.

APPENDIX: A LIST OF CIRCULAR BUSINESS MODELS

The figure describes important circular business models supporting the various stages of the product and material life cycle. It is an extension and adaptation of the listing provided in the Nordic Circular Economy Playbook.

Stage	Business model	Sub-model	Examples
Material Processing	Circular inputs	build to last	appliances, furniture, houses, vehicles
		circular supplies	recirculated steel, aluminium, plastics, wood, rare earths
Product Usage	Sharing platform	private share	enable private sharing of tools, apartments, cars
		professional rental/leasing service	rent-out of space, vehicles and things
	Product as a service	product as a service	machinery, mobility, fashion, baby goods
		performance as a service	hours of operation, power, lighting, rent a molecule, indoor climate, chemical management services
	Product use extension	repair and maintain	IT, machinery, household appliances, clothes
		upgrade	vehicles, IT equipment, mobile devices
		resell service	facilitating resale of used furniture, vehicles, tools, clothes
		remanufacture/refurbish	refurbish phones, clothes, furniture
Disassembly	Resource Recovery	recycle/upcycle	clothes, cans, bottles
		component as a service	batteries, engines
		material as a service	track, manage, recover steel, aluminium through life cycle
		material recycling service	Collect and recycle plastics, paper, metals, wood
Waste-to-energy, Landfill	Resource Recovery	material extraction	metals from landfills and nutritions from purification plants
		incineration	providing energy including separation of valuable versus toxic material

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