

# Transforming resource lifecycles: An urgent shift from linear to circular

Triodos Bank's vision on the resource transition

# Summary

Humanity is facing a tremendous challenge: it must transition from an endangered environment with risks to planetary boundaries to a safe and just operating space. To tackle this challenge, we must fundamentally rethink the way we operate. A key component of this challenge is our relationship with the resources we use and the natural systems that surround us. At the start of product value chains, there is immense resource extraction and harvesting. Throughout product value chains there are risks of scarcity, concerns about depletion, high energy consumption, waste and environmental degradation. These problems are created by our current linear economic model of extract-use-dispose. We need to transform this model to ensure more sustainable

and regenerative management of resources and natural systems, circulating resources for longer and halting the environmental degradation caused by our supply chains and use practices.

Triodos Bank has formulated a vision on the resource transition. This vision paper aims to:

1. identify global challenges and their root causes related to resources and circularity
2. describe the guiding focus areas and priority sectors from a Triodos Bank perspective
3. highlight the actions through which financial institutions can have a positive impact and contribute to the transition.

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# 1. Introduction

With each of its five transition themes – Energy, Food, Societal, Wellbeing and Resources – Triodos Bank aims to contribute to building societies that allow people to live prosperous lives on a thriving planet.<sup>1</sup> Natural resources and materials are the essential building blocks of our global economy and core components of all the goods and services used to fulfil humanity’s needs, wants and aspirations.<sup>2</sup>

Aside from their value to human beings and our economy, resources and nature have their own intrinsic value in the context of the planet’s life support systems. As a result of ongoing growing demand for resources, partly caused by overconsumption and inefficient use, the current pace of resource consumption is higher than the Earth’s potential for resource generation and regeneration. Natural resource extraction and processing also make up approximately 50% of the total greenhouse gas emissions, significantly contributing to the climate crisis.<sup>3</sup> Global consumption of raw materials puts immense pressure on both natural and societal systems, causing an urgent need for a careful reconsideration of the way we use resources. The resource transition is a transition from a wasteful extract-use-dispose (linear) paradigm to an economy where resources are truly valued and used prudently along the entire value chain.

## 1.1 Current state

Within the current linear paradigm, there is huge demand for resource extraction and harvesting at the start of product value chains.<sup>4</sup> This demand creates negative impacts on the Earth’s natural systems: air, water and land. Air pollution causes many health risks among human populations but also negatively affects wildlife, crops and forests.<sup>5</sup> **Water** pollution and overuse, caused by unsustainable resource sourcing and use, also causes many negative impacts including contamination of the food chain, eutrophication and reduced access to clean water.<sup>6</sup> The Earth’s **land** (soil) is also a system, and one that is under threat from pollution by intensive farming with chemicals, pesticides and fertilisers, as well as hazardous run-off from industrial activities.<sup>7</sup> The impacts on air, water and land are destructive to biodiversity and the Earth’s intricate ecosystems. Overexploitation of the Earth’s resources also puts additional stress on societal systems due to health hazards, human rights violations in supply chains, as well as geopolitical strains caused by scarcity concerns.

It is estimated that an additional 600 million tonnes of total EU waste could be reused or recycled if potential secondary raw materials in waste were utilised through reconditioning activities.<sup>6</sup>

At the beginning of linear resource value chains, there is a security risk and concerns around resource depletion. At the end of those same value chains, there is waste. Currently, more than 100 billion tonnes of resources enter the economy every year, yet only 7.2% get recycled and used again.<sup>8</sup> This approach to consumption and production is fuelled by an expectation of cheap, non-reusable products that are always available – quickly and cheaply. In the European Union in 2020, approximately 2,135 million tonnes of waste were generated, with around 40% of generated waste still going to landfill or being incinerated without recovering secondary raw materials or energy.<sup>9</sup>

On a global scale, poor waste management affects everyone, but the negative impacts are most immediately felt by the most vulnerable: those who lose their lives and homes because of landslides from waste dumps, those working in unsafe waste picking conditions and those suffering health repercussions as a result of exposure to waste.<sup>10</sup> Most of these problems take place in the developing world, which has been made responsible for the management of the developed world’s unwanted waste.<sup>11</sup>

Scarcity and waste are only two consequences of the multifaceted issues surrounding resource use. Further consequences occur in the social and natural commons. For the natural commons, this is visible in the rise of landslides, flooding, wildfires and other environmental degradation. For the social commons, the consequences are on labour and employment practices, inclusivity, livelihood and societal wellbeing.

All these concerns are linked to current models of linear resource use that have been deeply entrenched in the economic model of value delivery over the last 50 to 100 years.

## 1.2 Future state

To transform this model, we must re-imagine the management of all resources and materials in a circular manner, halting the environmental degradation caused by our linear supply chains.<sup>12</sup> While it is not possible to circulate all resources indefinitely, the circular economic model encourages the creation of feedback loops, wherein a portion of the system’s output is used as input for future operations. We can extend the length of time products and materials are in use through various R-strategies. This umbrella term is used for all the different reuse and reconditioning activities that create feedback loops across the lifecycle of products thereby delaying end-of-life, such as reuse, repair and remanufacture. Using our resources more consciously will influence the way we shape our habitat as a species, by

The circular economy is based on three principles, driven by design:

- Eliminate waste and pollution
- Circulate products and materials (at their highest value)
- Regenerate nature

reinventing cities and other inhabited areas into healthy, sustainable, circular and regenerative environments.<sup>13</sup>

Triodos Bank sees the circular economy as more than just an economic approach to resources, but as a fundamental redesign of societies – a socially embedded circular economy – that aligns with and drives all five of Triodos Bank’s transition themes (Energy, Food, Societal, Wellbeing and Resources).

The challenges and needs of current and future societies call for a transition to circular resource use that can contribute to environmental conservation, healthy communities and inclusive prosperity. It should be noted that ‘circularity is intended as a means to an end, rather than an end in itself. The ultimate goal is to achieve long-term sustainable development environmentally, economically and socially’.<sup>14</sup> For successful circular economic actions

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This vision paper aims to provide background information and directions for building alternative resource and material cycles.<sup>15</sup> It guides our decision-making, helps forge partnerships and empower actors in Triodos Bank’s network to drive the transition forward.

Section 2 provides an overview of the resource challenges within the current system. Section 3 lays out Triodos Bank’s vision of the resource transition through the four focus areas to create change in the different phases of the resource lifecycle: 1) sustain and restore nature, 2) extend the life of products and 3) prevent waste and downcycling. Also outlined in Section 3 are the sectors which most urgently need attention to reduce negative impacts associated with current practices. Section 4 briefly summarises several actions financial institutions can take to accelerate the resource transition across sectors.

## 2. Global challenges for resources and circularity

The challenges surrounding resource scarcity and waste are increasingly complex and interconnected. Several global trends complicate the goal of reaching resource security, including a host of environmental, societal, economic, regulatory and technical challenges.

### 2.1 Societal challenges

Socioeconomic drivers from human activities create negative impacts on the environment.<sup>16</sup> Global **population growth** is slowing, but the population has increased dramatically over the last 100 years, from roughly 1.5 billion to 8 billion people.<sup>17</sup> The rapid increase in population, in combination with the expanding middle class, is part of the reason the planet's resources are under strain. Consumption patterns will only continue to increase as the world's population grows, with the UN currently forecasting the world's population is "expected to increase by nearly 2 billion in the next 30 years".<sup>18</sup>

Another major cause of the strain on nature and natural resources is **increasing consumption per person**. Consumption of natural resources is constantly growing – the global average of material demand per capita was 7.4 tonnes in 1970 and grew to 12.2 tonnes per capita in 2017.<sup>19</sup> The United Nations Environment Programme (UNEP) and International Resource Panel predict that

if current usage trends continue, the demand for raw materials is expected to rise by 60% by 2060 (Figure 1). Increasing resource consumption can be explained using the IPAT formula, which quantifies the relationship between human populations and their impact on the environment (impact = population x affluence x technology).<sup>20</sup> 'Affluence' (higher incomes) leads to more demand for resources and overconsumption of

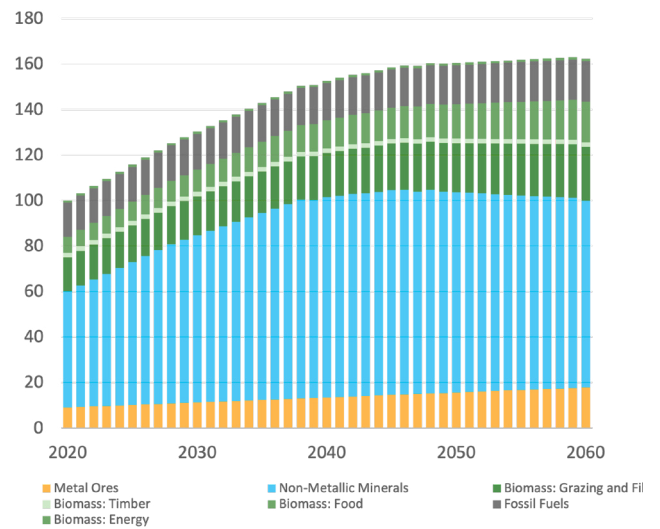


Figure 1: Outlook for resource use under historical trends (2020-2060)<sup>21</sup>  
Source: UNEP and the International Resource Panel, Global resources outlook 2024.

### Ecological Footprint per person

Hectars per capita 0 12

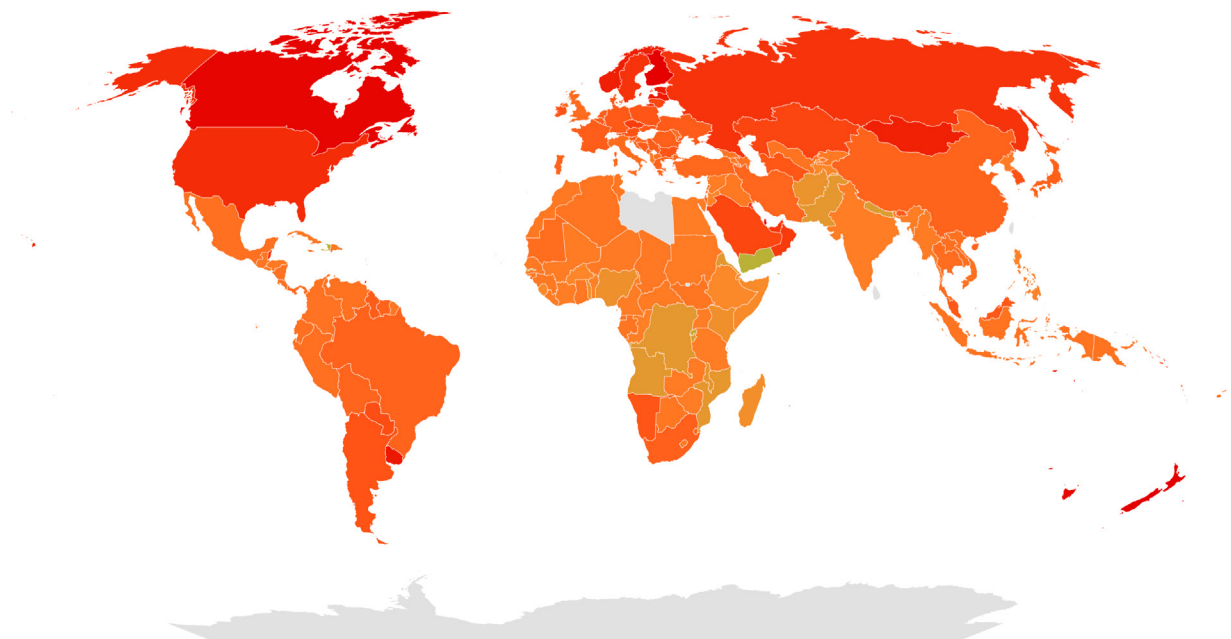


Figure 2: Total ecological footprint of a country's population (in global hectares)<sup>25</sup>  
Source: Global Footprint Network. Total ecological footprint of a country's population (in global hectares).

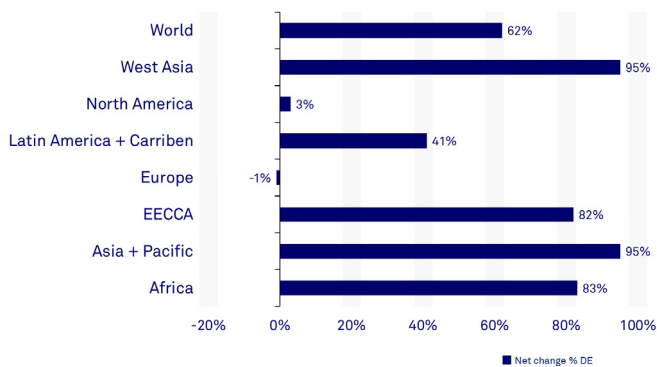
products – with the latter being mainly a phenomenon of advanced economies.<sup>22</sup> In addition to depleting natural resources, overconsumption worsens climate breakdown, increases air pollution and exhausts the planet's life support systems, such as fresh water.<sup>23</sup>

Consumption patterns are not equal worldwide, with increasing wealth resulting in ever-higher consumption and a deepening global North-South divide. Only 12% of the world's population live in North America and Western Europe, but this part of the population accounts for around 60% of all private consumption.<sup>24</sup> This is reflected in measurements like the ecological footprint, shown in Figure 2, which looks at human demand on natural capital (the quantity of nature it takes to support people and their economies).

On average, a person living in North America consumes around 90 kilograms of resources each day. In Europe, consumption is around 45 kg per day, while in Africa it is around 10 kg per day. High-income countries have the highest material footprint per capita.<sup>26</sup>

**Urbanisation** has also contributed to a higher consumption of resources.<sup>27</sup> Experts have long predicted that by 2030 two-thirds of the world's population will live in cities.<sup>28</sup> Per capita consumption varies greatly among populations because of differences in income levels and spending preferences. Urbanisation leads to cities with more inhabitants, and these cities place a particular strain on the way resources are consumed. Most resources in cities are either converted into building and infrastructure stock or rapidly used and converted into waste. The use of resources has tripled since 1970, and if the global population reaches 9.6 billion (or more) by 2050 as forecasted by the UN, we will require the equivalent of three Earths to provide the natural resources needed to support our current consumption patterns.<sup>29</sup>

High consumption increases levels of carbon emissions, leading to the prediction that by 2030 cities will be responsible for 70% of global emissions.<sup>30</sup> This is why consumption and production trends require special attention, especially in the context of **climate change**.



Switching to renewable energy will only lead to a 55% reduction in global greenhouse gas emissions.<sup>31</sup> The remaining 45% comes from the way we make and use products.<sup>32</sup>

A mitigant of higher demand for resources, according to the IPAT formula, is technology (or, more specifically, all other effects on the impact than demographics and affluence). Technological development offsets around one third of the increase from higher per capita consumption and population increase in the period 1970–2000. In the period 2000–2022, technology has almost offset the increased demand for population and affluence in the richest countries, but not on a global level. Without radical policy changes, this is not likely to change in the near future.

## 2.2 Economic challenges

It is not only individual consumption habits that impact resource overconsumption. The growth imperative of the economy as a whole plays a significant role too. Until now, modern market economies have relied on growth to achieve stability. They function as expanding super-organisms that require more and more resources for continued growth, even as they become more efficient.<sup>33</sup> This is in contrast to an economic system aimed at sufficiency; to produce what's necessary for a certain level of consumption and be stable thereafter.

In our growth-addicted economies, efficiency gains usually create feedback loops that result in resource efficiency giving way to higher production volumes. We call these feedback loops rebound effects.<sup>34</sup> Sometimes the increase in production outstrips the gains in productivity, meaning that more resources are required than before the improvement in productivity. This is known as the Jevons Paradox. In this way market economies incentivise overproduction, which leads to overconsumption.

Overproduction can often be a viable business model, as long as companies disregard non-financial impacts.

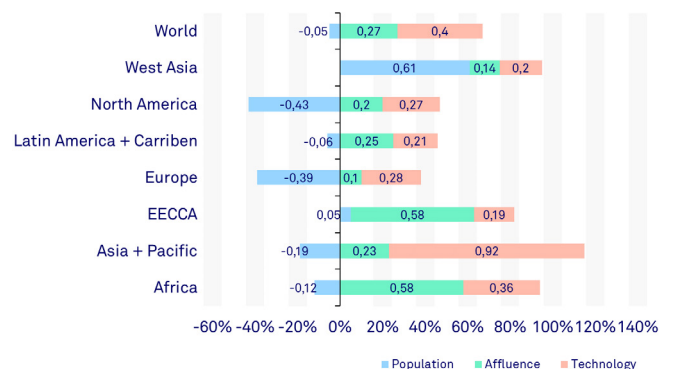


Figure 3: Drivers of material footprint, 2000–2022<sup>35</sup>  
Source: UNEP and the International Resource Panel (2024), Global resources outlook.

The practice occurs in many sectors, including oil<sup>36</sup> and food,<sup>37</sup> but two tangible examples that hit close to home come from the fashion and technological sectors. A textile industry based on fast fashion continues to accelerate overproduction leading to massively underutilising and undervaluing clothing products, as well as the labour and resources that went into making them.<sup>38</sup> The emergence of fast fashion demonstrates why it is relevant to speak of overproduction as well as overconsumption. Fast fashion did not emerge as a consumer-driven phenomenon but has rather been invented as a good business model by the fashion industry.<sup>39</sup> Another example is the technological sector, where planned obsolescence of products like mobile phones and the frequent release of new electronic gadgets contribute to fast-amassing electronic waste and resource depletion.

Overproduction and inefficient resource use is exacerbated by global supply chains. Though they enhance product quality and reduce costs, global supply chains are also near impossible to monitor, especially when it comes to sustainability.<sup>40</sup> In many industries, challenges to sustainability are external and dependent on suppliers across the supply chain – with around 90% of companies' impacts on the environment coming from their supply chains.<sup>41</sup>

## 2.3 Regulatory and political challenges

The circular economy has emerged as a top priority for many governments with a wave of circular economy action plans and regulatory incentives coming into force. This regulatory policy attention has been fuelled by targets in the Paris Agreement, as well as the links between circularity and the Sustainable Development Goals (SDGs). The Paris Agreement calls for protection of all ecosystems and biodiversity, as well as a transformation of production and consumption patterns – all of which are heavily linked to the resource and circularity transitions.<sup>43</sup>

The aims of circularity are also linked to many SDGs, most relevant to the resource transition are SDGs 6, 9, 11, 12, 13, 14 and 15.

The price volatility of resources and geopolitics further contribute to the policy attention. Producing countries such as China, Russia and some in the Middle East and Northern Africa are increasingly aware that they have the power to 'set the price' for critical resources.<sup>44</sup> As a result, the price of these resources has increased significantly.

These financial concerns are increasingly related to strategic concerns too. When a country lacks its own critical resources, it becomes reliant on producing countries and more vulnerable in terms of the supply of

commodities which are vital for food security and for the agricultural sector.<sup>45</sup>

The goal of a circular economy is to facilitate responsible production and consumption through circular value chains designed to keep the value of materials and natural resources in narrow, closed loops. This is done by reducing resource use and product consumption, as well as through a series of R-strategies. Even though this logic is recommended by legislation, it is often not implemented, because it is not binding.

Figure 5 illustrates the five-step waste hierarchy, part of the EU's Waste Framework Directive. It codifies these same types of narrow feedback loops that prioritise waste prevention and reduction, and discourage the more energy/treatment intensive practices that lower the value of a material like recycling and recovery. The same logic is central to national iterations of circular economy action plans, like the R-ladder recommended by the Dutch Circular Economy Programme.<sup>46</sup>

The aspect of 'prevention' is often neglected in these frameworks, despite its crucial role in achieving sustainability and maintaining life within the planetary boundaries. The policies pursued in many of the circular economy frameworks are "foremost in the category of mitigation of negative effects of production (intentionally extending lifetimes of products, eco-design, standardisation and extend producer responsibility), user and consumption (transparency of information about sustainability of products, right to repair, green public procurement) and waste management without addressing overconsumption directly or indirectly".<sup>47</sup> As such, the wider feedback loops (recycle, recover) or no feedback loops at all (dispose) remain the norm.<sup>48</sup>

## 2.4 Digital technical challenges

Digital technologies will significantly impact resource optimisation in a smart circular economy.<sup>49</sup> Among other applications, technology will allow advancements in materials science and product design to access the wider market more rapidly. It will also improve information sharing among stakeholders about resource surpluses, so that materials can be efficiently shared. For example, there is currently a growing interest in companies working on data measuring tools in the construction sector to improve leakage, misuse and underperformance of energy in the light, heating and cooling systems of buildings.<sup>50</sup> This data provides the basis for quick action that improves energy efficiency through more efficient use of construction materials. As well as being a positive example of the links between the energy transition and the resource transition, it also showcases the type of technological advancements that are needed to support a circular system.



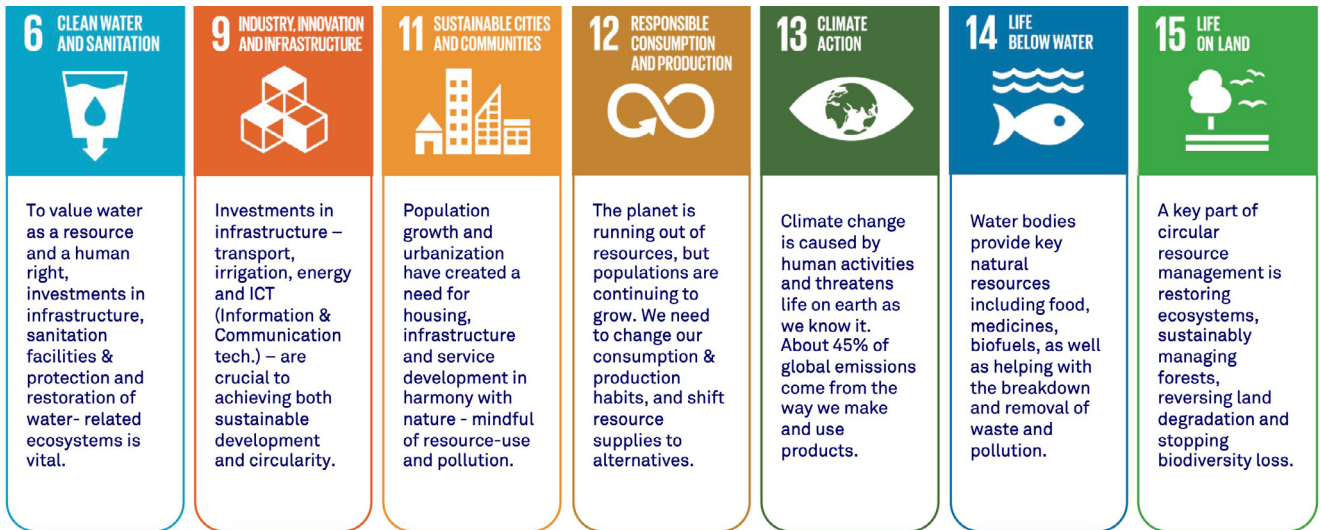


Figure 4: Resource transition links to the SDGs

Currently, there is an absence of such digital technology application, often because of legitimate concerns around intellectual property, safety or limitations to large-scale data applications. For example, the suggested use of AI to remove circularity barriers through information flows or creation of entirely new markets and business models, would require extensive computing power.<sup>51</sup> While working to solve the problem, these AI systems would require large amounts of scarce resources to build the computer systems, as well as water to keep them cool and energy to keep them running.<sup>52</sup>

Additional limitations to further digital drivers of the transition are difficulties in data collection and storage; data analysis and model building; high computational capacity requirements; and high energy consumption by technologies such as blockchain. Despite these challenges, technological data-based improvements can play a role in advancing the transition – making it more transparent. Technology can enable reductions in information costs but cannot solve all the problems within the transition independently. Instead, a holistic approach to the challenges in the transition is needed.

### 3. Triodos Bank's focus in the resource transition

The resource transition is broad since it encompasses nearly all sectors, products and services. Although it has relevance for every business, it is essential for those that design products and use resource-intensive production methods.

Triodos Bank provides lending, investment and gift money to a variety of different actors across resource supply chains, including processors, manufacturers, secondary producers, retailers and waste re-processors. We use our minimum standards to help us narrow down our focus within this broad field. Applying the minimum standards means we exclude certain industries, companies or projects that are unethical or harmful to people and nature from our investment and lending activities, while there are other, more sustainable alternatives. In the context of the resource transition, Triodos Bank has already implemented minimum standards on deforestation which commits companies operating in high-risk industries to preserve forest areas, and minimum standards on water scarcity that require companies operating in high-risk industries to address their freshwater use.

Beyond minimising negative impacts through exclusions, Triodos Bank's main objective is to create positive impact through lending and advocacy. To steer on the resource transition, Triodos Bank has identified three strategic focus areas to drive change, as well as priority sectors that will have the greatest impact in moving the transition forward.

#### 3.1 Guiding focus areas

To contribute effectively and efficiently to the transition, Triodos Bank has formulated key intervention points. We developed the focus areas by exploring the challenges within the current state that obstruct progress and the role that Triodos Bank can play in creating the future state. All three focus areas apply to multiple parts of a resource value chain, from raw material extraction, to manufacturing, distribution and retail, use by consumers, and waste. Each focus area is explained below and shown in Figure 6.

##### Sustain and restore nature

The first focus area intends to relieve the pressure current production and use practices place on raw virgin resources, as well as the surrounding natural environment. Advancing the resource transition involves more than just preventing harm to nature - it encompasses actively restoring biodiversity and ecosystems to reverse the damage inflicted by human activities. This entails alleviating pressure on resources and natural systems by adopting regenerative, nature-based solutions, re-

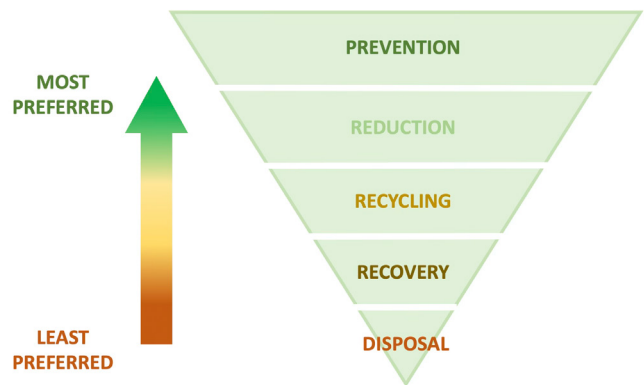


Figure 5 – The EU's waste hierarchy

source-efficient product design and making a concerted effort to reduce reliance on non-renewable materials, opting instead for sustainably sourced renewables or recycled alternatives.

For instance, phosphorus is a frequently used ingredient in fertilisers – so frequently used that its natural biogeochemical cycle is disrupted, leading to scarcity concerns over its long-term availability. In addition, phosphorus is one of the major contributors to nutrient pollution caused by leeching from agricultural lands. Phosphorus' natural cycles can be restored by reducing virgin mining and seeking alternative agricultural practices (alternative fertilisers, compost, or recovery of phosphorus from waste). Further, natural systems related to phosphorus can be revitalised through the regeneration of old mining areas, reforestation and the application of nature-based solutions to restore agricultural soil and recover nutrients or pollutants from waste water (thereby restoring waterflows in a stressed water system).<sup>55</sup> At Triodos Bank, we finance nature conservation and rewilding projects and invest in innovative companies that produce alternative fertilisers or contribute to biosphere restoration.

These varied applications demonstrate that the focus area is relevant not just at the beginning of the resource lifecycle, when natural resources are sourced, but to all stages of a material's lifecycle. Nature can be sustained and restored throughout the lifecycle: from the design and planning of manufacturing facilities to the production processes (closed loops systems, with clean by-products and run-off), goods transportation and end-consumer product use and disposal.

##### Extend the life of materials and products

Responsible production and consumption should be facilitated by creating circular products, designed to maintain the highest possible value of resources and keep them in closed value chain loops.<sup>56</sup> Though it may

at first seem that extending the life of products and materials is only relevant for non-renewable resources, Triodos Bank considers this focus area relevant for both renewable and non-renewable resources. For renewable resources, the criterion for circularity is that the harvest rates are lower (or equal to) the rate of regeneration. This ensures that nature is returned to a steady, balanced state. While for non-renewable resources, the criterion is that extraction should be balanced through the development of renewable substitutes.<sup>57</sup>

Extending the life of products and materials applies, firstly, to producers during the design and manufacturing phase of the product lifecycle, as well as to retailers in the retail and distribution phase. Extending the life of products in the design and manufacturing stage entails selecting materials and crafting product designs that prioritise longevity, durability and recyclability – laying the foundation for sustainable use and eventual recycling. This type of design and manufacturing is explicitly counter to early obsolescence and allows products to remain in use longer through additional measures in the retail stage, such as longer warranty periods. At Triodos Bank, we execute this focus area through financing construction projects that refurbish existing buildings rather than creating new builds and contributing to knowledge building around sharing-and-repair based business models in the information technology and construction sectors (like materials as a service).

In the retail and distribution phase of the lifecycle, products-as-a-service models (such as technology or tool renting and sharing services) are key examples of how ownership models are changing in a circular economy. They facilitate a shift from individual ownership to communal ownership. This part of the value chain, around product use, is hugely relevant for consumers as well. Consumers must be encouraged to use products for as long as possible and keep them in circulation through various R-strategies.

Our public advocacy agenda contributes to political and regulatory discussions on how an effective governance structure can support financing in this area – creating a level playing field for circular practices and supporting a shift away from the linear production and use paradigm.

### **Prevent waste and downcycling**

Measures aimed at extending the lifespan of products and materials inherently contribute to waste prevention because the longer a product or material is in circulation, the longer it takes for it to reach its end-of-life and become waste. Beyond that, reuse and recycling are two of the many R-strategies which can both extend the life of products and **prevent waste and downcycling**.

Despite advancements in technologies and innovation surrounding R-strategies, they are often not harnessed to their full potential because of the increased costs associated with additional treatment, the absence of markets to trade, and a lack of true pricing of waste.<sup>58</sup> In other words, it is often easier to discard a product than to apply an R-strategy.<sup>59</sup> Furthermore, not all R-strategies are of equal value. The circular economic model encourages a movement away from end-of-pipe solutions and the circulation of materials at their highest value. From a resource value perspective, the ‘narrowest’ feedback loop (see Figure 6) is preferred because it maintains the highest possible value of a material. Therefore, ‘repair and maintain’ are always preferred over ‘remanufacture’ or ‘recycle’. However, from an economic perspective, the least narrow feedback loops are preferred (and commonly practiced) because the earnings model of narrower R-strategies is meagre or absent under the current system.

Nevertheless, there are ways to incorporate R-strategies and this focus area into existing supply chains. At the manufacturing stage, waste can be prevented through design if reuse and recyclability are considered from the onset. Another way to prevent waste at this stage is through careful analysis of resource flows within a manufacturing system, and a cycling of any by-products or waste streams. Appropriate data collection around materials (for example through product passports) and certification for material quality after R-strategies play a key role in this part of the material lifecycle. This focus area also tackles the problem of potential linear lock-ins, where an emphasis on waste reuse and recycling can create a dependence on linear business models that continue to generate waste, rather than circular ones that would reduce or eliminate it. While this is an important consideration in the long term, in the short term more emphasis should be placed on eliminating existing linear lock-ins that are preventing the development of the circular economy.<sup>60</sup>

Triodos Bank already finances companies that treat waste by-products and cycle them back into the economy as sustainable ingredients, fertilisers, oils, medicine and fuel. Waste can be prevented across the supply chain by ensuring various production by-products are reused or that wasteful distribution practices (like destroying unsold stocks) are avoided. Waste can also be prevented at end-of-life through the recycling and recovery of resources contained within products. Downcycling should be prevented at end-of-life through an application of the waste hierarchy (Figure 5), wherein the treatment methods that retain the highest possible value of materials are applied first - with incineration and landfill as the last and least favoured route.

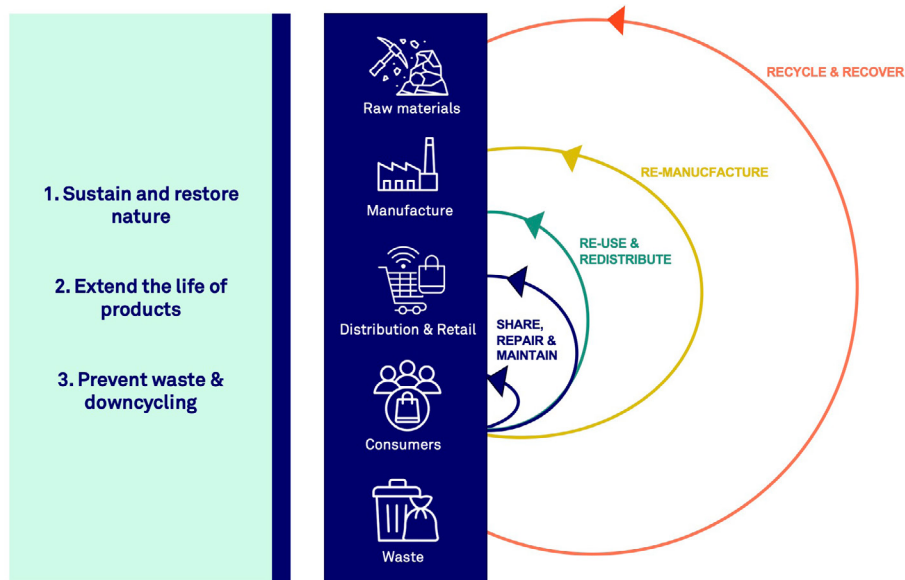


Figure 6 – Resource Transition focus areas

### 3.2 Priority sectors

We envision that the three focus areas for the resource transition will apply across all sectors and all resource streams. This means that actors across sectors should be able to ask themselves ‘how can our business practice do more to sustain and restore nature?’, ‘how can the life of the product we produce be extended?’ and ‘how can we prevent waste and downcycling – either of our product or within our business operations?’.

To further guide Triodos Bank’s activities within the resource transition, we identified four priority sectors. These sectors were chosen based on impact metrics as well as Triodos Bank’s existing clients. We have tried to prioritise the resource transition focus areas that would have the greatest and most immediate impact on resources and the environment:

1. Construction
2. Nature-based Solutions (NbS)
3. ICT and renewable energy
4. Manufacturing

The selections are aligned with the UN Environment Programme’s flagship Emissions Gap Report, which identified six sectors that can deliver more than 30GtCO<sub>2</sub>e of GHG emission reductions to limit the Earth’s temperature rise to 1.5°C. Additionally, these sectors are among the most wasteful, according to recent global and EU figures.<sup>61</sup> Wastefulness in a sector indicates that it has significant potential for improved resource use, and thereby also conservation.

#### Construction

The built environment has a significant impact on many sectors of the economy, on local jobs and on quality of life. It requires vast amounts of resources and accounts

for about 50% of material extracted for use in Europe.<sup>62</sup> Construction is also the fourth most polluting industry in the world, with the sector globally responsible for 23% of air pollution, 50% of climate change, 40% of drinking water pollution, and 50% of landfill.<sup>63</sup>

To **sustain and restore nature** in this sector, it is important to move away from using highly polluting and energy-intensive virgin materials like steel or concrete and shift to more sustainably sourced or secondary materials. Examples are recycled steel or bio-based materials like timber.<sup>64</sup> Bio-based buildings are part of the solution in this sector, which is why Triodos Bank already provides bio-based mortgages in the Netherlands, where the interest rate is linked to the building materials used. Triodos Bank also finances architectural companies and real estate developers with expertise in alternative materials and sustainable building design.

Circular design is a part of this narrative, as a means of **extending the life of products and materials** in the sustainable construction sector. Circular design makes buildings more adaptable (modular) and facilitates high-value reuse of a structure’s materials once they have reached their end-of-life, thereby **preventing waste**.<sup>65</sup> In line with this, Triodos Bank finances architecture companies, construction companies and community buildings which have circular design, resource use and nature conservation as a core sustainability consideration.

Triodos Banks’ own head office building in the Netherlands is an example of the focus areas being applied in a construction project. The use of highly polluting and energy-intensive materials (like steel and cement) was minimised, locally sourced or secondary bio-based materials were used, a green energy carpark was constructed with vehicle-to-grid charging and spe-

cial care was taken to minimise negative impacts and regenerate surrounding ecosystems and biodiversity. When it comes to extending the life of products and preventing waste, the building is also modular and re-mountable, the materials used have product passports and there is a water recapture system, as well as waste sorting and treatment - both during construction and in current building operations.

### **Nature-based Solutions**

Nature-based Solutions (NbS) are actions to 'protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature'.<sup>66</sup> For Triodos Bank, this focus area offers opportunities that are closely aligned with our vision to regenerate nature and mitigate the climate crisis.

The Intergovernmental Panel on Climate Change (IPCC) ranks 'nature-climate' solutions among the most promising ways to tackle the climate crisis.<sup>67</sup> NbS aim to tackle the crisis by stopping the destruction of nature, strengthening and supporting ecosystems, and restoring ecosystems that have been harmed. Examples of NbS initiatives include restoration of forests and brownfields (land that is abandoned or underutilised due to pollution from industrial use), coastal habitat restoration, bringing nature into cities (through green roofs and rain gardens), creation of wetlands to reduce flood risks and safeguard water systems, and carbon sequestration projects.

Carbon sequestration is another ecosystem crucial to life on Earth. Next to fostering biodiversity and mitigating climate change, NbS can bring tangible benefits to local communities, including income, jobs and increased resilience against climate and macroeconomic change. Triodos Bank is committed to supporting projects that focus on conserving, restoring and enhancing nature and promoting the connection between people and the environment.

### **ICT and renewable energy**

The ICT sector currently makes up over 2% of global GHG emissions, but if trends continue, by 2040 it will constitute 15% of global emissions: equivalent to half of the entire world's transportation sector emissions.<sup>68</sup> The resources which are deemed most important for the economy, while posing the greatest security and scarcity risks (according to the EU list of critical raw materials), are in large part input materials for the information and communications technology (ICT) sector and the renewable energy sector. These include various rare earth elements, metals and minerals for information technology products, semiconductors, batteries or solar panels and electric vehicles.

Our consumption of these valuable resources is being met almost entirely by virgin resource mining. To counter these resource use trends (while still allowing innovation in these sectors and access to these technologies to flourish) various actions need to be taken. Triodos Bank invests in companies that provide repair services for products in the energy sector, as well as investors with a circular focus that invest in a range of circular companies. This includes technology sharing companies and technology manufacturers that focus on producing equipment that extends the life of tech products, for example by improving liquid resistance.

### **Manufacturing**

Despite governance and entrepreneurial efforts, one of the reasons the economy is becoming less circular and so few feedback loops across supply chains are closed is because of the way products are designed and manufactured. For example, the way silicon, silver, copper and aluminium are glued together in a solar panel makes it difficult to disassemble and recycle those materials at end-of-life.<sup>69</sup> In the fashion sector, when primary cotton is woven together with polyester in a garment, it becomes difficult to recycle either material.<sup>70</sup> In the packaging sector, when each beverage producer manufactures a different bottle type for their drinks it is impossible for bottles to be collected and reused by producers at their highest value. Instead, bottles must be recycled, with only a small fraction ending up actually cycled back into the economy, and always at a lower value.

If the full lifecycle including end-of-life were considered when designing and manufacturing products many of these losses would be avoided. Studies have found that circularity has the greatest untapped value in operations and production.<sup>71</sup> If applied in the solar panel industry for example, the parts can be bound using screws instead of glue, making it easier to take the panels apart for repair or recycling.<sup>72</sup> Packaging solutions like a universal bottle for soft drinks could make reuse the norm.

Many manufacturing methods can use the same approach to enhance durability, longevity and performance of R-strategies. Triodos Bank is already contributing to this type of action in the manufacturing sector by financing solar power manufacturers that offer maintenance and repair services, demonstrating that closed-loop recovery of these resources for new solar panels is possible. Triodos Bank will increase its activities in this area, given the sector's considerable circularity potential.

# 4. The way forward – how financial institutions can contribute

Triodos Bank contributes to the resource transition through investments, lending and advocacy. We plan to continue exploring different ways to accelerate this transition as a financial institution.

## 4.1 How financial institutions can further accelerate the transition

Financial institutions fulfil many important functions in our societies – one of the functions is financing entrepreneurs and institutions committed to tackling major social and ecological issues. Another is to create the enabling environment needed for them to do so.<sup>73</sup> Triodos Bank has identified several actions, relevant for financial institutions, that could help fulfil this function within the resource transition. These are all actions we deem important and will continue to explore and advocate for.

### 1) Rethinking business models

Financial institutions can finance new clients and engage with existing ones to facilitate and encourage greater circularity and nature conservation. Rethinking business models implies a transformation of a business' entire way of working - moving away from making only a small part of their supply chain circular or preventing waste of only one resource in their production process. Instead, it means taking on a full lifecycle approach that mitigates overproduction, replaces non-renewables with renewables, or incorporates R-strategies across entire supply chains.

Rethinking business models is also crucial to help businesses avoid the linear risks associated with prevailing practices. If the circular transition accelerates, companies that fail to keep pace will inevitably lose their competitive edge.<sup>74</sup> Even if the transition towards circularity falters and resources become depleted, the companies most reliant on them will suffer the most significant impact. These risks encompass market dynamics, operational challenges, reputational concerns and legal complexities. They may manifest when resources become scarcer or regulations necessitate more sustainable approaches.<sup>75</sup> However, these linear practices still need to be factored into market valuations.

Post-growth strategies are also a part of rethinking business models. In our Economic Outlook 2024, Triodos Bank reflects on the pathways to post-growth, questioning the feasibility of our economy and financial sector continuing to function based on a presumption of continuous and indispensable expansion.<sup>76</sup> This link between post-growth and the resource transition is one that Triodos Bank will continue to look further into.

### 2) Focusing on product design and manufacturing operations

Financial institutions could make impactful change by lending and investing in more companies that have re-designed products in alignment with nature and circularity, as well as by targeting financing at companies in the manufacturing stage of product lifecycles. As discussed above for the manufacturing sector, circularity has the greatest untapped value in operations and production.<sup>77</sup> This untapped value comes from integrating resource conservation into the design of products, sourcing resources sustainably, reducing dependency on primary materials and intertwining circular practices throughout the entire manufacturing operation.

Triodos Bank already invests in businesses that embody this approach. For example, a manufacturer of sewer pipes from recycled plastic, and a manufacturer of fertilisers and oils from food waste. Supporting manufacturers who are replacing linear with circular manufacturing practices limits the negative externalities associated with a linear manufacturing process (resource scarcity, reliance on resources from third countries, volatile prices, etc.). Predictions suggest that circularity in this part of the lifecycle can improve a company's risk profile, thereby helping to overcome one of the economic challenges associated with circular business models: risk. This is just one of the ways financial institutions can modify existing linear risk models or, if necessary, develop new risk models to explicitly include circular value in financing and investment decisions.

### 3) Linchpin role creating supply chain collaboration

The challenge for circularity, resource conservation and some nature-based solutions is the need for extensive cooperation between parties who may struggle to connect and do not always know where their business models align. Financial institutions have the potential to take a broader overview and play a connecting role - both in connecting businesses through lending and investment activities, and through cooperation with other asset managers to leverage engagement impact.

### 4) Engagement and advocacy

Financial institutions can also be thought leaders, engaging with consumers and changing the way societies make decisions around product purchases and the way we reflect on trends – be it in fashion or technology. Advocacy within the resource transition extends to retail banking activities, where financial institutions can empower clients with insights and information on alternative resource consumption practices and nature conservation through various channels, like newsletters, banking apps and articles.

Financial institutions can engage with businesses to ensure they do not lag behind regulatory and system changes but are at the forefront. This can help them reap the financial benefits of being an early mover in the circularity transition and gain from government incentives around resource and nature conservation. It is also essential that financial institutions engage with regulation and policymakers to advocate for measures that accelerate circularity and resource conservation. Examples include extended producer responsibility laws, development of clear circularity metrics, shifting taxes from labour to materials (Ex'Tax), or providing tax exemptions for businesses that contribute to waste prevention through the provision of repair and reuse services.

An important advocacy topic under the resource transition is true pricing. True pricing is potentially the quickest way to begin conserving non-renewable, natural resources by placing a monetary valuation on social and environmental externalities. This internalises costs stemming from unsustainable production and consumption. Resource sustainability and restoration cannot be achieved if raw materials remain cheaper than secondary materials and if there is a lack of transparency around resource use and sourcing across supply chains. The increased transparency needed for true pricing may potentially be helped by the sustainability information requirements related to the EU's Corporate Sustainability Reporting Directive.

## 4.2 Triodos Bank's current resource and nature activities

As explained above, Triodos Bank limits negative impacts through its minimum standards and seeks to create positive impact through lending, investment and advocacy. When residential mortgages are included, the resource transition is the largest part of Triodos Bank's current portfolio. Residential sustainable mortgages constituted 31% of total outstanding loans and funds in 2023, while other topics under the resource transition constituted 12%.<sup>78</sup> The 12% consist of loans and funds in the sustainable property sector, in which we finance new buildings and renovation projects to reach high sustainability standards. In addition to sustainable construction, we are funding positive impact through other projects in the resource transition such as those with a product-as-a-service business model, post-consumer repair and recycling, material recovery and nature restoration projects. These actions are in the beginning stages, and Triodos Bank will continue to engage in knowledge-sharing initiatives to contribute to making nature-conservation and resource-efficient business models more bankable.

In addition to our direct impact on financing the resource transition, Triodos Bank's advocacy and change finance activities also influence regulations, instituti-

onal arrangements, societal norms and other financial institutions – pushing for more progressive regulations and institutional arrangements to create an enabling environment for the resource transition.

Triodos Bank will continue to align its change finance agenda with the objectives of the resource transition. When it comes to **sustaining and restoring nature**, Triodos Bank has already signed the Finance for Biodiversity Pledge, backed the EU Nature Restoration Law and is collaborating with other institutions in the financial sector that advocate for transparency and true pricing of resources.

In terms of **extending the life of products and materials**, Triodos Bank is working to influence national circular economy action plans in several European countries. A recent example of this is our participation in the Dutch Circular Economy Working Group (*Kopgroep Circulaire Financiering*), which brings together financial actors to propose concrete actions to address bottlenecks in financing circular businesses and projects.

Furthermore, preventing waste and downcycling is targeted through many of the same actions as extending the life of products. From an advocacy perspective, both focus areas will require continued efforts to stimulate a major mindset shift and behaviour change on the part of public institutions, financial institutions and investors.

### Call to action: Accelerating the resource transition!

At the crux of all of Triodos Bank's transition themes is the ambition to realign profit-generating activities with positive outcomes for both people and nature. The resource transition is a priority for Triodos Bank as we strive to contribute to a socially embedded circular economy that manages resources sustainably, contributes to nature conservation, and ultimately achieves long-term sustainable development environmentally, economically and socially.

### How you can stimulate the resource transition through circular resource lifecycles:

- **Focus on sustainable financing aligned with the transition objectives:** Exclude unethical and harmful actors, stimulate companies that sustain and restore nature, extend the life of products and work to prevent waste and downcycling.
- **Catalyse systemic change:** collaborate across stakeholder groups to help diverse actors create synergic links across supply chains, rethink business models, and develop new risk-return models that explicitly include circular and resource value.
- **Change finance:** Promote awareness and action for sustainable production and consumption practices through engagement efforts with clients, fellow financial institutions and through regulatory and policy reforms.

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**Published**

April 2024

**Text**

Triodos Bank

**Design and layout**

PI&Q, Zeist