

# Pathways to post-growth

Long-term Investment Outlook 2024

Triodos  Bank

Our economy and financial sector are built upon the presumption of continuous and indispensable expansion. The many social and environmental challenges we face, show that this idea is not sustainable. The fundamental problem of our dysfunctional economic system is our addiction to growth. A discourse on growth itself and the exploration of alternative routes to a flourishing and future-proof society are therefore core topic of this long-term investment outlook.

# Contents

---

<b>Executive summary</b>	<b>4</b>
<b>1 Introduction</b>	<b>5</b>
<b>2 Growth in today's society</b>	<b>6</b>
<b>3 Growth is not development but an ecological problem</b>	<b>8</b>
<b>4 Pathways to post-growth for the Eurozone</b>	<b>10</b>
4.1 Supply shift	10
4.2 Demand shift	11
4.3 Leisure shift	12
4.4 Results: economic growth and resource use	12
<b>5 Building a society that can thrive without growth</b>	<b>14</b>
5.1 Reconfiguration of fiscal policy	14
5.2 Profit-oriented companies and absolute private ownership	14
5.3 A post-growth transformation	14
<b>6 Post-growth finance</b>	<b>15</b>
<b>Data sources</b>	<b>17</b>
<b>Appendix</b>	<b>18</b>
<b>References</b>	<b>19</b>
<b>Colofon</b>	<b>20</b>

# Executive summary

---

Global economies are growing. The average individual is estimated to now be 1.5 times wealthier than they were in 2000. In this long-term outlook we discuss that growth is a fundamental characteristic of market economies as we know them. Market economies in their current set-up require growth to be stable. But, even if advanced economies would pursue growth at all costs, the long-term growth outlook is meagre.

We argue that growth constitutes an ecological problem. We are currently exceeding 6 out of 9 planetary boundaries, which is driven by economic activity. Ecological crises are deepening. Socially, growth has not delivered either. Progress on sustainable development is stalling, and poverty has risen globally. We show that counting on innovation to completely decouple economic activity from ecological impacts is not evidence-based.

We then discuss three pathways along which an economy that provides wellbeing for all within planetary boundaries might be built. We discuss a more sustainable way of producing, a more sustainable way of consuming and a collective

decision to have more free time. Although we separate them theoretically, these pathways could be mixed in practice. After briefly discussing the dynamics these pathways imply, we provide a tentative forecast for their impact on both economic growth and ecological impact. All pathways successfully reduce ecological impact and decrease the size of the economy in the process.

After demonstrating that we should move to a post-growth economy, we discuss how to make it happen. We first discuss some of the policy and mindset changes required to free our economies of the growth imperative. These entail an institutional reconfiguration enabling governments to function without growth and a reorientation of companies towards all stakeholder interests and the common good. We then turn towards implications for the financial sector and investors. A deep overhaul of the sector is required, including more diversity and an end of 'too big to fail' thinking. We conclude that investors can make financial returns in a post-growth transition, but only if they put impact first. Through investing actively in the real economy and committing for the long-term, investors can enable the post-growth transformation we need.

# 1 Introduction

---

The average individual across the globe is now estimated to be 1.5 times wealthier compared to the year 2000 based on gross domestic product calculations.

On the surface, this might seem like positive news. However, we are significantly off course in achieving the 2030 Sustainable Development Goals, due to a rise in poverty. Simultaneously, we're surpassing six out of nine planetary boundaries. It's evident that we're falling short in meeting the present generation's needs while jeopardising the capacity for future generations to meet theirs. Consequently, our global economic system is fundamentally dysfunctional in the long term.

The fundamental problem of our dysfunctional economic system is our addiction to growth. Our economy and financial sector are built upon the presumption of continuous and indispensable expansion. The operational framework of our government, the dynamics of negotiation between owners and labourers, the very essence of capitalism founded on capital accumulation and profit maximisation, and the structure of the financial sector all assume that continual economic growth – an increase in production and consumption – is the inherent norm.

The ongoing ecological and social degradation stem from the relentless pursuit of economic growth. Biodiversity loss and climate change are direct consequences of economic activities that encroach upon land, degrade soils and pollute our natural surroundings. Similarly, the bulk of carbon emissions result from burning fossil fuels to sustain our economies. Simultaneously, the extra income mainly benefits those who are already rich, exacerbating inequality.

There is no evidence indicating that innovation alone can resolve these pressing challenges. Therefore, a discourse on growth itself and the exploration of alternative routes to a flourishing and future-proof society should form a core aspect of a long-term vision for an institution like ours, which champions the transition to a **sustainable economy**.

In this Long-term Outlook, we outline several pathways to the necessary transformation of our economy. Our standard neoclassical long-term growth forecast shows only modest growth can be expected even without transformation. This alone is reason enough to initiate a discussion on the overreliance of our economic system on growth.

With our alternative pathways we aim to underscore that while a more sustainable economy is attainable, achieving it requires more profound shifts than conventionally assumed. Our analysis is more of an outline than a definitive blueprint, contingent upon numerous assumptions. This is not so different from the 'standard' approach, however, which also hinges on crucial, often obscured assumptions, the most significant being the presumption that everything can continue as 'business as usual'.

We define three alternative pathways towards a more sustainable economic system, drawing upon degrowth and post-growth literature. We infer the implications of these transitions on output, productivity, and employment across sectors<sup>4,5,6</sup>. This analysis shows that an end to growth seems inevitable in sustainability transitions. However, this need not be a cause for concern. Improving human wellbeing may not necessarily demand further growth but instead call for transformative changes in our economic system<sup>7,8</sup>.

In the final chapter, we establish a link with finance, delving into what these diverse pathways imply for the financial sector and investors.

## 2 Growth in today's economy

---

Economic growth is not a natural law. Historically, before the Industrial Revolution, there was no sustained growth. Rather, certain countries experienced sporadic growth. Nevertheless, growth is a systemic element of market economies.

Economic growth sometimes stems from innovation; new ideas, new organisations or new technology can offer societies the space to produce more with the same people. There are diverse sources of short-term growth aside from these productivity enhancements. Demographics (more people with disposable income / of working age), debt (spending beyond earnings), and the commodification of natural resources (turning previously non-marketable resources into saleable assets) are all enticing avenues to bolster growth. Economic growth means increased production, whatever it is we produce, and however we distribute it for consumption.

Growth has brought many benefits. The increases in life expectancy, human health, sanitary conditions, education levels and material comfort that many have witnessed since the Industrial Revolution are intimately tied to economic growth (usually in causal loops)<sup>10,11</sup>. In several countries in the world, expansion of consumption is still necessary to improve human wellbeing. People in absolute poverty need more income, and to reach the socioeconomic Sustainable

Development Goals (SDG's), more consumption and fiscal capacity is necessary in many countries in the Global South. Economic growth will likely help improve human wellbeing in most emerging markets.

At the same time, the benefits of growth are distributed unequally and seem finite. In advanced economies, like the OECD countries, the share of income paid to workers has been declining<sup>12</sup>. Many (though not all) in advanced economies have had their basic needs covered for quite some time. Some of the benefits that growth brought in the 20<sup>th</sup> century are now stagnating or even declining<sup>13,14</sup>. It seems that more income in advanced economies no longer improves people's happiness much<sup>15</sup>. Further economic growth will therefore probably not help human wellbeing much in advanced economies. Instead, path dependency in institutional setups and mental models of policymakers, business and consumers keeps economies that are 'grown up' dependent on more growth.

We share one set of global planetary boundaries, and we are exceeding most of them. As we demonstrate at greater length later, this is strongly related to the size of the world economy. Knowing that inclusive economic growth in emerging markets will improve human wellbeing locally much more than growth in advanced economies, while pollution from the global economy

will hurt wellbeing globally, shrinking advanced economies seems only sensible. As we run into planetary boundaries, the size of national economies becomes a distributive issue.

### Growth imperative

One of the reasons why discussing post-growth is hard, is that capitalism creates a growth imperative. The goal of businesses is to accumulate capital, which can be reached through increasing profits over time. However, in a stationary economy, increasing profits requires cutting costs. Therefore, without innovation, a conflict between those who work (labour) and those who own (capital) arises. Innovation can help both parties escape from the conflict, as it allows more production with the same inputs; in other words, growth resolves this conflict.

Multiple factors strengthen the growth imperative. Debt is one of them. Growth reduces real debts. The more individuals or nations are indebted, the more they welcome growth. Through heightened leveraging, the financial system intensifies this dependence on growth. The financial sector's vulnerability without economic growth, which could lead to defaults and reduced asset values, coupled with its systemic significance, further amplifies the need for growth.

Inequities in wealth and income also reinforce the drive for growth. Greater inequality within an overall income bracket means more individuals at the lower end of the income spectrum struggle to meet their needs, which might be eased by growth. While the ultra-rich are relatively secure, their wealth, primarily invested in assets, also relies on growth for its sustenance due to the response of asset prices to growth expectations. Shareholder ownership structures generally strengthen the profit incentive for companies at a micro level and growth imperative at macro level. Our institutions are literally built on the expectation of economic growth; the reason that we have a 60% debt to GDP and a 3% budget deficit rule in the eurozone, is because we assume 3% real economic growth<sup>16</sup>.

### Future growth not guaranteed

For decades, the assumption of continuous growth held true, except for the occasional recession and financial crisis. These destabilised the system, resulting in unemployment, bankruptcies, uncertainty, and austerity, but they did not overthrow it. In advanced economies, the sources of growth evolved. After World War II, growth initially relied on high productivity gains and increased labour participation of women. In the 1980s, this shifted towards economic integration and globalisation, as

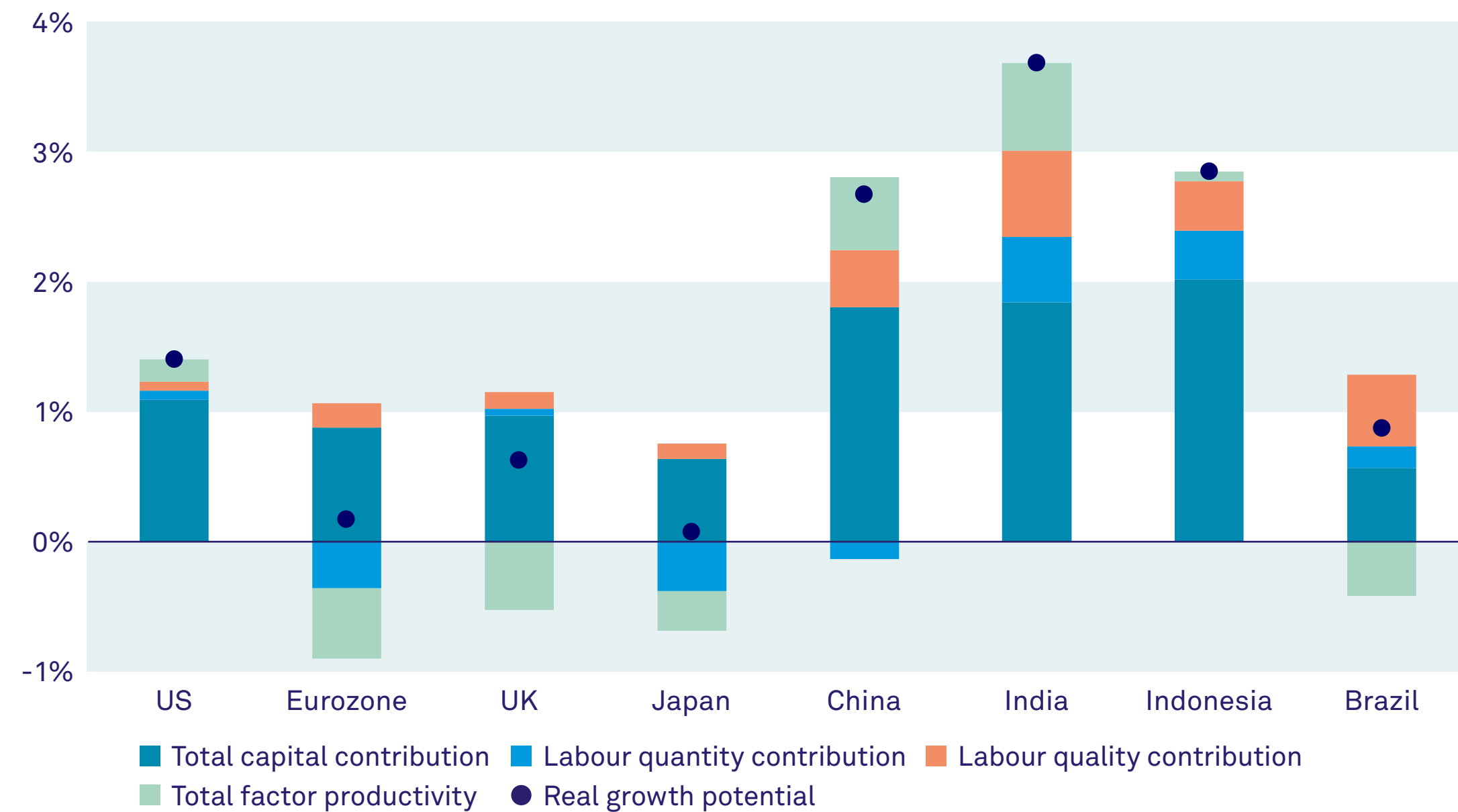
## Long-term Investment Outlook 2024

well as commodification of people and nature. The liberalisation of the labour markets in the 1990s aimed to boost growth, but primarily benefited capital owners through increased profit shares. After the deregulation of the financial markets in the UK in 1986 – the London ‘Big Bang’ – and accelerating after the global financial crisis in 2008, growth was increasingly found in financialisation. Consumption grew in sync with debt, while the financial sector’s influence expanded<sup>17</sup>.

The upcoming 15 years are poised to be different\*. Our forecast suggests nearly stagnant growth in the eurozone and Japan at 0.2% and 0.1% annually (see figure 1). The outlook for the US, the UK and Brazil is only slightly better. This is driven by a shrinking labour force (already highly educated in the advanced economies), and a continued decline in labour productivity in some regions. Capital still contributes to growth a bit, but not as much in emerging markets. These also benefit from an increasingly skilled labour force, particularly in Indonesia and India. Growth is therefore likely to decline in most Western countries in the coming decade, potentially turning negative in the second half of this century, even if the economy is allowed to develop freely<sup>18,19</sup>.

\* We derive our growth forecast from a traditional Cobb-Douglas production function. Data sources are listed in the appendix.

**Figure 1 Structural growth potential 2023 – 2038 of various economies**



Source: Triodos Bank

# 3 Growth is an ecological problem

We are currently exceeding six of the nine planetary boundaries, and we are on the brink of crossing two more. Living a life beyond planetary boundaries compromises the ability of future generations to foster wellbeing; they will live on a degraded planet. Our efforts to uphold these boundaries fall significantly short of what is needed<sup>20</sup>. If we recognise the crucial significance of honouring planetary boundaries, it seems rational to envision a pathway where upholding these boundaries becomes the primary focus, alongside ensuring substantial human wellbeing.

## Ecological footprint

The ecological footprint provides insights into whether humanity is living within the means of nature’s regenerative capacity. It holds an edge over alternative methodologies in quantifying environmental sustainability<sup>21,22,23</sup>. This makes it a suitable measure for evaluating the extent of transformation necessary to uphold planetary boundaries.

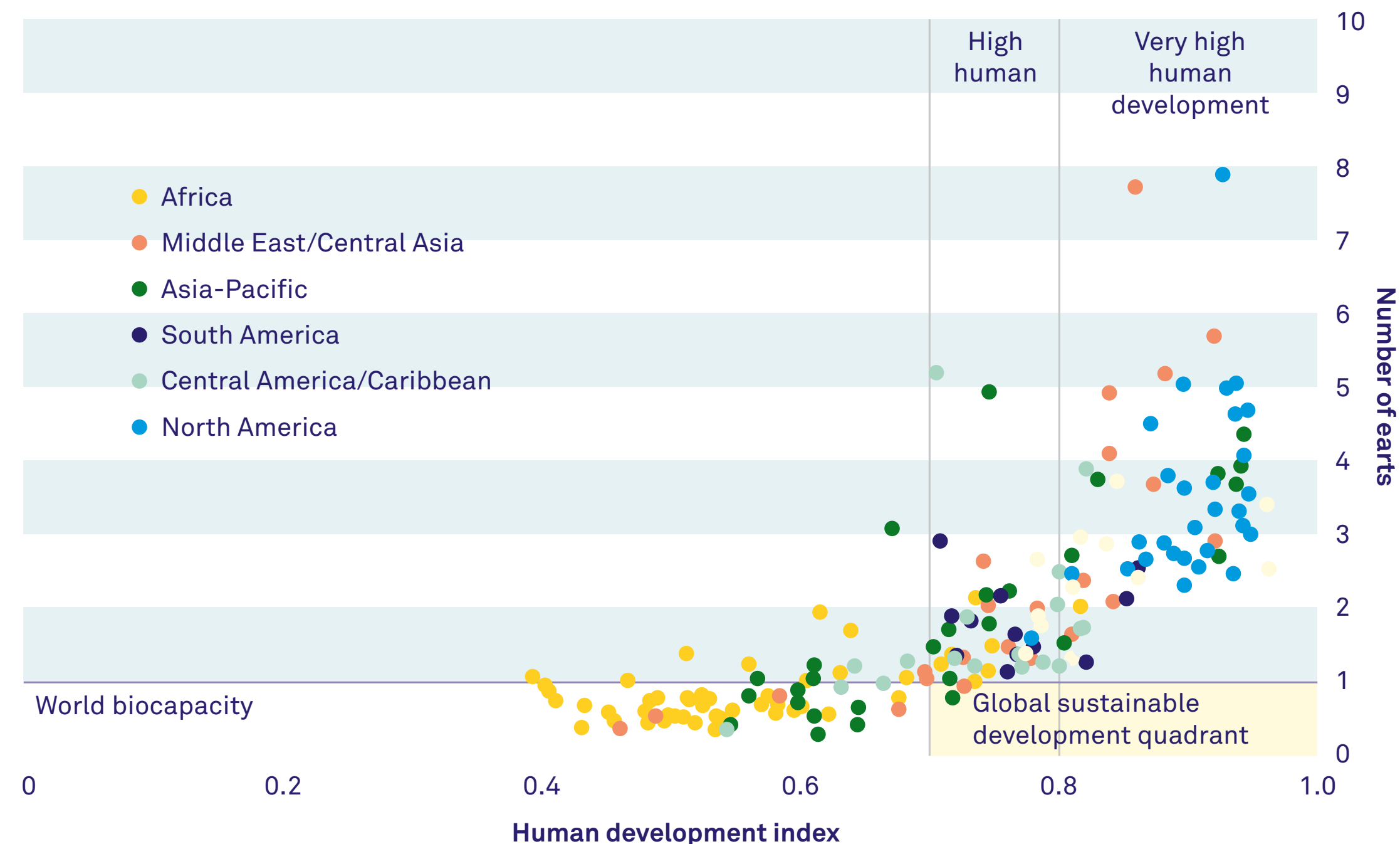
The ecological footprint assesses whether the consumption in a particular region, if extended to the entire global population, aligns with the Earth’s ecological capacity. It adopts an equal per-person allocation of the resources Earth can regenerate, without considering past ecological debts. This metric

gauges the environmental impact stemming from six types of land use, including the theoretical land needed to counteract greenhouse gas emissions. While the carbon calculation method has faced criticism for potentially exaggerating land requirements for sequestration, some other land use types might be underestimated<sup>24,25</sup>.

## Human Development Index

We also know that human wellbeing is about much more than income. The Human Development Index (HDI) was created to emphasize that development is about more than economic growth. The HDI serves as a comprehensive metric summarising the average attainment in critical aspects of human development, namely, enjoying a long and healthy life, possessing knowledge, and maintaining a decent standard of living. In bottom-up analyses, income similarly only accounts for a minority of people’s happiness<sup>26</sup>. If we put HDI together with the ecological footprint, we see that we structure our economies in such a way that they bring high human development within planetary boundaries. Currently, hardly any country operates in this ‘Global Sustainable Development Quadrant’ (see figure 2).

Figure 2 HDI and ecological footprint of countries (2019)



Source: Ecological Footprint: York University Ecological Footprint Initiative & Global Footprint Network. National Footprint and Biocapacity Accounts, 2023 edition. Human Development Index: Human Development Report, 2023, UNDP.



## Long-term Investment Outlook 2024

Europe's average ecological footprint currently stands at 3.08 times what the Earth can annually regenerate<sup>27,\*</sup>. This implies that we need to slash production and consumption across the board by more than two-thirds if we want to start living within planetary boundaries tomorrow in Europe. However, our hope is that there are more innovative ways of reducing our impact on the world than just accepting today's system as is and slashing consumption. If we can decouple economic production from its negative consequences on ecology, then we do not need to scale down production and consumption to meet planetary boundaries. For the last 30 years the proponents of this 'green growth' concept have been hoping for innovation in 'ecotechnologies' to deliver this absolute decoupling<sup>28</sup>.

### Little evidence

There is some evidence of increasing resource and energy efficiency, such as the ecological footprint in Europe decreasing slightly since 2008. This decrease has been driven primarily by decreasing greenhouse gas emissions. With renewable energy, we have the technology to create electricity with lower greenhouse

gas emissions. Yet, globally, greenhouse gas emissions from energy generation have kept rising<sup>29</sup>. Our energy consumption has been growing faster than we have been installing renewable energy until now.

The picture looks even more bleak for an absolute decoupling of resource use - material extraction has more than tripled since 1970, and almost doubled since 2000<sup>30</sup>. We have not yet found a way to produce more products while using less resources. Even the IT revolution has not led to a true dematerialisation<sup>31</sup>. Rebound effects are a main culprit. Whenever we manage to do something more efficiently (through innovation), we at least partly offset this gain by consuming more. Economy-wide rebound effects usually exceed 50%<sup>32</sup>.

Despite the technological progress in recent decades, we have only achieved a minimal level of decoupling. Meeting planetary boundaries necessitates a substantial and rapid reduction in greenhouse gas emissions and a parallel decrease in resource use<sup>33,34</sup>. Absolute decoupling of greenhouse gas emissions from GDP growth is highly improbable, and moreover there is no evidence of an absolute decoupling between resource consumption and growth<sup>35</sup>.

To approximate the impact of ongoing innovation, we examined the relationship between real GDP and the ecological footprint from 1995 to 2022. It's striking that until 2008 virtually no decoupling between the two occurred, but since then real GDP has grown while the ecological footprint has come down slightly. We extrapolate the same trend of decoupling until 2038 and include the expected real GDP growth of 0.2% per year from our business-as-usual forecast. We find that even if the current pace of decoupling is maintained annually until 2038, Europe's ecological footprint would still be 2.2. Bringing it back to 1 and adhering to planetary boundaries would necessitate a reduction of about 55% in the ecological footprint (equivalent to a 3.7% annual reduction). This is a formidable challenge; relying solely on innovation within our current economic framework will certainly not do the trick.

\* The ecological footprint used here applies to Europe, and the data we use for our pathways relates to the European Union. Having reviewed the underlying country and region footprints, we conclude that the footprint for Europe approximates the EU's footprint closely.

# 4 Pathways to post-growth for the Eurozone

There are various strategies for achieving a prosperous society within planetary boundaries. The degrowth concept, supported by scholars such as Hickel, Parrique and Schmelzer, imagines an economy functioning without continuous growth<sup>36</sup>. However, enacting these changes within current structures is challenging. To build a sustainable, inclusive economy, fundamental shifts in both mindset and policy are essential.

One essential shift would be to prioritise solidarity and sufficiency. This involves curtailing overconsumption<sup>37</sup>. While defining excessive consumption proves challenging, it's clear that the wealthiest individuals consume resources and energy at an excessively high rate. This is primarily due to their significant share of global wealth, allowing for extravagant spending on consumer goods. Redistributing income and wealth towards those at the bottom is crucial to achieve any sustainability transition. Ensuring security for basic needs, such as housing, healthcare, food, education, and living wages, not only reduces stress but also diminishes the pressure to work excessively and produce. Policies to this end, such as free public services including housing, implementing a basic income, and providing a public job guarantee, present viable options.

We have developed three pathways along which an economy that upholds the planetary boundaries

and prioritises general wellbeing might be built. They represent three common high-over options for sustainability transitions. We separate them for our theoretical exercise, but they could coincide and even reinforce each other in practice. Like conventional growth forecasts, these pathways consider labour and capital as production factors, but impose changes to lower energy and resource use. Standard growth projections ignore the energy and resource demands, implying that reducing these is not necessary.

The three pathways exploring how to reduce our ecological impact while maintaining and improving wellbeing are called:

- the supply shift
- the demand shift
- the leisure shift

These shifts are based on some relatively simple assumptions (see table 1), using data on productivity, gross value added, energy supply and final consumption, and employment per NACE sector in the eurozone<sup>\*,\*\*</sup>. As structured data for the effects on

\* Not all level 1 NACE sectors are represented in all underlying data sets. We deal with this by grouping sectors where necessary and by interpolating productivity numbers for the missing sectors. The reason that some sectors do not figure in productivity statistics is caused by estimation problems; yet, for total economic productivity these sectors are included. Our interpolations are in line with some recent reports.

\*\* We construct total factor productivity and its development from statistics on labour and capital productivity by assuming a fixed labour/capital bundle of 0,66/0,33.

**Table 1** summary of assumptions in each pathway

Pathway	Employment shift between sectors	Productivity development within sectors	Working hours per capita	Material + energy intensity within sectors
Business as usual	None	Trend-based	Current	Current
Demand shift	Large	Trend-based	Current	Current
Supply shift	Small	Literature- based	Current	Lower
Leisure shift	None	Trend-based	Lower	Current

resource use is unavailable, we added information from literature to our model.

Our model only considers the immediate impacts of these shifts. Secondary effects would likely partially offset the gains from the initial changes. The level of decoupling we could achieve following the pathways is contingent on limiting these secondary effects. To mitigate these secondary effects, policy and behavioural changes are both required. Transitioning to a sustainable society ultimately requires the alignment of all aspects of our society with this objective. Additionally, our model does not factor in the

costs associated with a transition of this magnitude, including stranded assets. This means the results likely underestimate the negative impact on growth.

## 4.1 Supply shift

A shift towards a circular economy, which eliminates waste, circulating products and materials, and regenerates nature, is feasible, even if 100% circularity may not be possible<sup>38</sup>. Estimates suggest potential reductions in virgin material extraction of up to 34% and an 80% improvement in resource productivity compared to current levels<sup>39</sup>. Addressing rebound effects – when consumption increases in response to efficiency gains – is essential to reach these levels of reduction. Policies aimed at capping resource extraction, supporting the right to repair, and

advocating resource sharing are pivotal<sup>40</sup>. Influencing behaviour through sufficiency campaigns and advertising restrictions may also help.

The supply shift involves producing and consuming products with a diminished environmental footprint, employing circular economy practices centred on product durability, reusability, and more efficient resource cycles. Instead of buy-and-dispose, it emphasises using sturdy, locally sourced products, encouraging repairs, and fostering sharing. This shift could impact productivity and employment, particularly enhancing production methods and repair services. Decreased resource demands will prompt employment shifts away from sectors involved in resource extraction. Overall, this shift would result in fewer products sold due to enhanced durability and reparability and increased reuse or sharing, thus potentially impacting economic growth.

Obtaining precise productivity data for such a shift is challenging due to its insignificance in current production practices. Nonetheless, some indicators can be identified. Here we present our assumptions for two resource intensive sectors: agriculture and manufacturing. The assumptions for other sectors can be found in the appendix.

**Table 2 Assumptions Pathway supply shift**

Sector	Dominant practice before transition	Dominant practice after transition	Employment change	Productivity change	Energy & resource need change
Manufacturing	Bulk production of goods for linear use; planned obsolescence	Repair and retrofit of existing goods; longevity of product; built to re-use	=	-	-
Mining & quarrying	Large amount of virgin material extraction	Minimal virgin resource extraction, where extraction is unavoidable: reduced pollution, energy intensity and improved labour conditions	-	-	-
Agriculture	Industrial scale farm, high meat consumption, use of synthetic fertilizer and pesticides	Smaller scale farm, lower meat consumption, less fertilizer and no more pesticides	=	-	-
Construction	Mostly new builds, use or demolish	Mostly energy-efficient retrofitting; new buildings reusable	=	-	-
Transportation	Mostly individual modes of transport (cars), increasing in size	Mostly communal transport (sharing services); more trains, fewer cars	=	=	=
Energy	Mixed sources, increasing demand	Electricity from renewable sources, lower demand	-	=	-
Information & communication	Increasing demand, linear use	Circular raw material use, cap on data use	=	-	-
Finance	Increasing financialization and leverage	Focus on real economy, decreased leverage	-	=	-

In agriculture, we assume a farming method that reduces pesticide and fertiliser use, focusing on natural inputs and healthy soils, as embraced by the organic farming movement. While organic farming minimises ecological impact, it requires more labour to obtain a similar produce output<sup>41,42,43,44</sup>. Consequently, reducing the ecological burden in agriculture might entail accepting lower productivity.

For manufacturing, our assumption involves a transition from lengthy global supply chains with linear production paradigms towards product

longevity, partly supported by local repair services. Repair and reuse sectors are likely to see increased employment, primarily as this work is labour-intensive and currently associated with lower wages<sup>45,46</sup>. Given the predominance of low-wage jobs currently and the prevalent use of planned obsolescence, productivity will probably decrease.

Achieving a genuine circular economy may challenge the pursuit of increased productivity altogether, as efforts to prolong product life do not contribute to productivity or GDP<sup>47,48</sup>. Table 2 summarises the

anticipated changes and their potential impact on employment, productivity, as well as energy and resource requirements per sector.

## 4.2 Demand shift

This strategy involves reorienting our production and consumption towards prioritising experiences (especially local ones) over material possessions. This signifies a shift towards demand-driven dematerialisation within the economy, long deemed

a path to greater sustainability<sup>49</sup>. Solutions from the demand side revolve around altering consumption habits, lifestyles, and service offerings<sup>50</sup>.

Though larger service sectors in economies haven't shown the necessary dematerialisation rates, rebound effects could be responsible for this shortfall<sup>51,52</sup>.

Nevertheless, through behavioural change and policies aimed at curbing rebound effects, it may be possible to redirect demand towards less resource and energy-intensive lifestyles. Activities like walking or cycling, valuing experiences over material possessions, and engaging in communal activities have proven to enhance overall happiness more than amassing possessions<sup>53,54</sup>.

This pathway envisages a significant reduction in resource and/or energy-intensive products and a shift towards less-intensive sectors. Achieving this relies on reshaping societal norms and encouraging a renewed focus on community and environmental care. We assume that a shift in production factors away from intensive industries will reduce energy and resource requirements. While services-oriented economies currently do not show reduced energy and resource intensity, a strong commitment from both governments and consumers could drive this successful shift in demand reduction. Employment remains stable, but there's a shift in the distribution of employees

across sectors. Sectors heavily relying on energy and resources (Manufacturing, Electricity & Gas Supply, Mining & Quarrying, Agriculture) would witness by assumption a halved workforce, redirecting to low-footprint, high-wellbeing sectors (Healthcare, Education, Arts & Recreation, Food Services & Other Services). Of course, halving the energy supply demands additional changes, such as rapidly enhancing real estate energy efficiency. Halving agricultural produce seems more difficult, but significant gains could be made by reducing food waste, though not explicitly modelled in this pathway. These changes would complement the *supply shift* pathway.

### 4.3 Leisure shift

The third strategy prioritises leisure time over working hours. Shortening the work week has been shown to enhance wellbeing through an improved work-life balance and reduced stress levels<sup>55</sup>. A shorter work week may also diminish the ecological burden of production and consumption. Individuals with more leisure time seem to allocate more resources to experience, rather than to material possessions, while reduced overall production would contribute to lower environmental impact<sup>56</sup>. It is crucial in this strategy to ensure that wages are sufficient to cover the basic needs, particularly at the lower income distribution

levels. It is also essential to actively prevent possible rebound effects, such as the replacement of human labour with energy-intensive machinery.

Essentially, this pathway envisages a conscious reduction in production and consumption by working fewer hours. Modes of production and employment distribution remain the same, but the work week is shortened. We model a 20% reduction of the work week, which likely improves wellbeing, lowering reported stress and burnout while enhancing work-life balance. An increase in productivity from people with a sense of improved wellbeing may occur. In this forecast, we assume that the increase in productivity compensates for half the loss in working hours. Furthermore, we expect both wages and profits to decrease in line with a lower production.

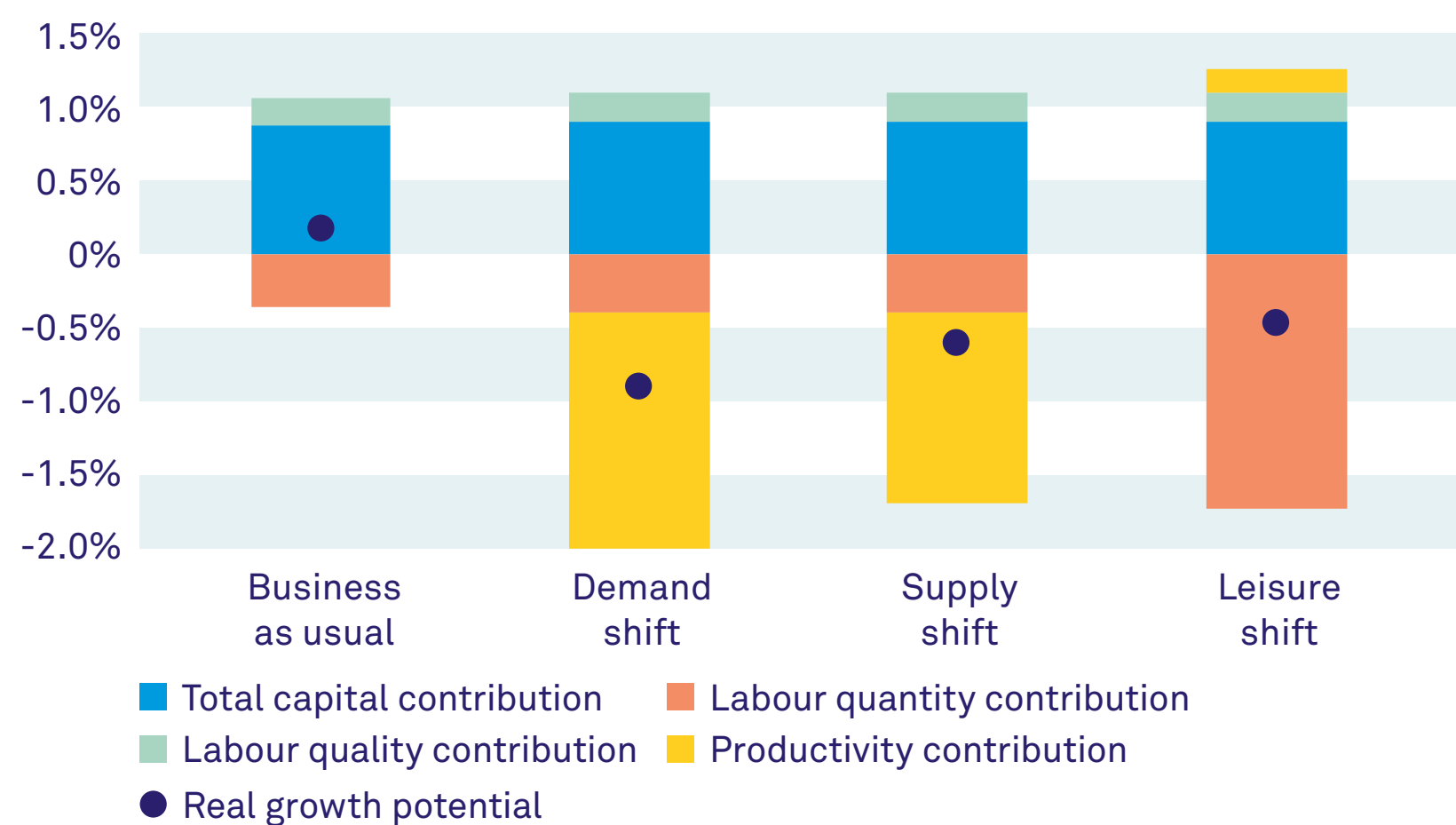
### 4.4 Results: economic growth and ecological footprint

All three pathways would have a significant negative impact on economic growth. Structural growth forecasts point towards a cumulative reduction in economic activity ranging from 7% to 13% over the next 15 years. While all four growth forecasts expect labour quality and capital to bolster growth in the next 15 years, differences exist in the expected contribution

of labour quantity and in productivity effects. In both the *supply shift* and *demand shift* scenario, productivity effects seriously weigh down the growth forecast. The underlying drivers of these productivity effects differ. In the *demand shift*, productivity changes along with the sizeable shift between sectors. As people move to work and consume in services, output per person falls and grows more slowly. Research supports the notion that services have significantly lower productivity growth, compared to industrial sectors<sup>57</sup>. In the *supply shift* scenario, on the other hand, most of the productivity effects are caused by the changes in production practices that we infer from literature. There is a limited shift of employment between sectors, too, which lowers productivity analogously to the *demand shift* scenario. Labour quantity contributes negatively to growth in the *leisure shift* scenario, simply because everyone works less. This is partly offset by a slightly positive productivity effect, but not fully.

The effects on energy and material use vary across the pathways. While the leisure pathway lowers energy and material use by only 10% compared to the business-as-usual scenario, the demand shift pathway could potentially reduce them by approximately 25%, while the supply shift pathway might achieve a reduction of about 50%.

**Figure 3** Effects on annual economic growth in the different pathways

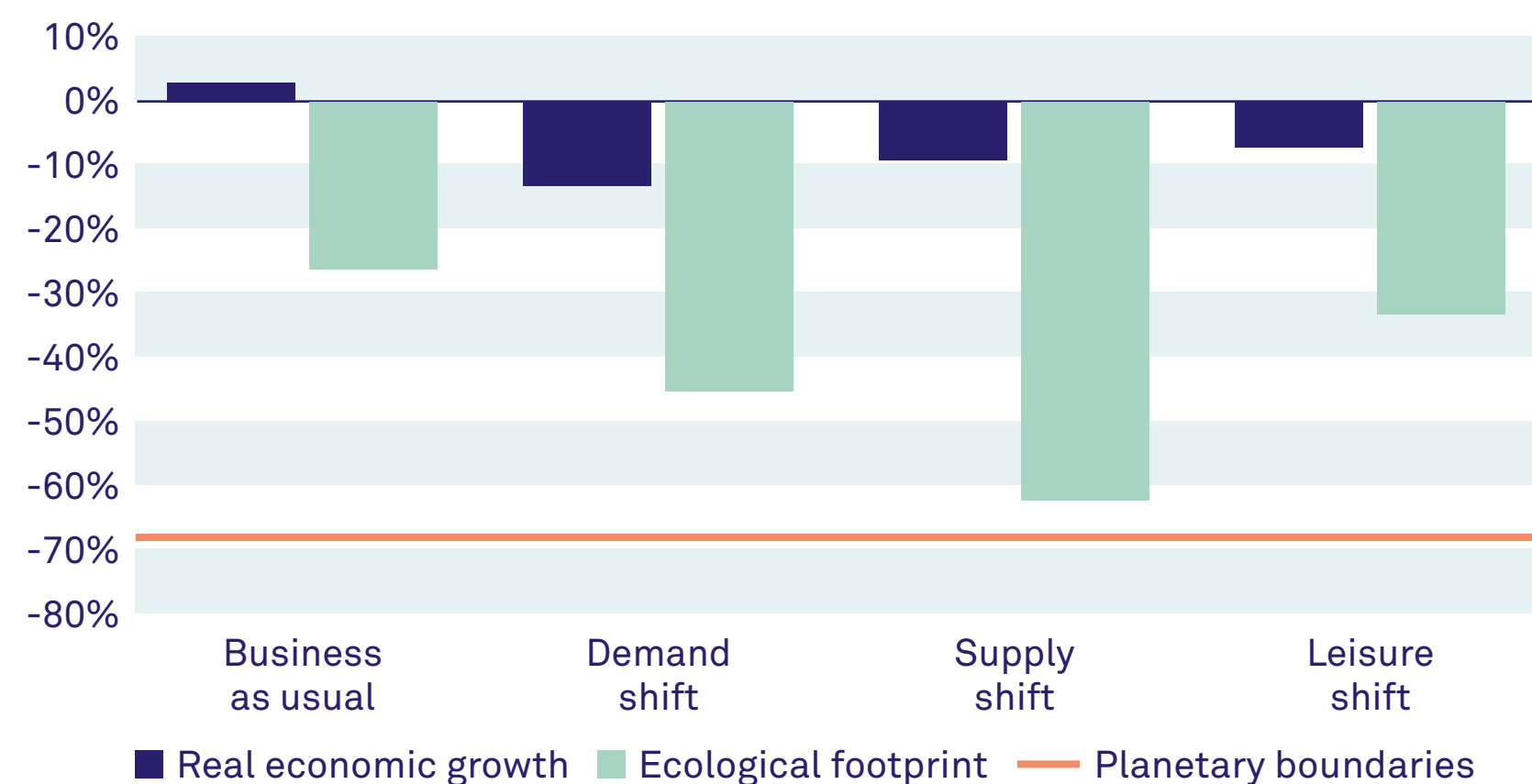


Source: Triodos Bank

The pathways are based on a simplified picture of our economy. In reality, any structural changes are likely to be far more intricate, involving feedback loops, behavioural and institutional change, and potentially combining elements from all three pathways. Our assumptions are steeped in uncertainty, particularly in the supply shift pathway where we lack precise data. However, we believe that the general direction of these shifts is appropriate. Research shows that keeping economic activity within the planetary boundaries will almost certainly impede economic growth<sup>58,59,60</sup>.

We use the ecological footprint to gauge the measures needed to align economies with planetary boundaries over the next 15 years. European economies must reduce their ecological footprint by 68% from today's levels to stay within the planetary boundaries. If we continue at the current rate of decoupling – following the business-as-usual trajectory – we would only achieve a 26% decrease. Our pathways result in more significant reductions in the energy and resource use, which we equate to the ecological footprint. Separately, however, these (optimistic) pathways would

**Figure 4** Economic growth and change in the ecological footprint over 15 years in different pathways



Source: Triodos Bank

still fail to bring Europe back within the planetary boundaries by 2038 (see figure 4).

A combination of the supply and demand shift pathways could potentially place us well within planetary boundaries by 2038. Shifting a substantial share of production from industry to services, adopting circular production practices, together with behavioural and policy changes could bring the ecological footprint to or below one. But even if this would be a positive development towards a sustainable

economy, it would still mean a prolongation of the overshoot for another 15 years. Reaching an economy within planetary boundaries in 15 years is far too late. With only 12 years left to reach global net zero and limit climate change to 1.5 degrees as agreed in the Paris Climate Agreement, the crisis we face requires immediate and decisive action.

In conclusion: Our current economic system is built on the premise of perpetual growth. However, we cannot hold on to growth as our primary policy objective without severe adverse consequences for people and planet. Especially in advanced economies, economic growth does not equal improved wellbeing. We must therefore transition away from a growth-dependent system. In the following chapter, we explore possible ways to liberate ourselves from the growth imperative.

Our three suggested pathways give an indication of how cutting demand, reducing supply, and lowering working hours could affect the ecological overshoot. As noted before, these transitions can only be inclusive if we build on a base of solidarity and sufficiency. Here, we present several policy recommendations, derived from existing literature, on how to free ourselves from growth.

# 5 Building an economy that can thrive without growth

## 5.1 Reconfiguration of fiscal policies

Taxes play an important dual role: they raise the necessary public funding and can be used to internalise externalities.

Presently, a significant part of tax revenues in most eurozone countries derives from income and profit taxes. Given government debt levels, fiscal stability is therefore tied to expanding profits and incomes, which in turn require economic growth.

Environmental externalities stemming from resource use remain untaxed or undertaxed. Shifting the tax burden from income towards these externalities through, for example, carbon pricing and resource extraction tax would help to overcome this. Additionally, wealth taxes and inheritance taxes can make the tax base less growth dependent and, in addition to reducing inequality, foster more sustainable consumption and production practices.

Even if taxes shift, budgetary rules need an update. Aligning the Stability and Growth Pact (SGP) rules with reduced, nominal growth could lead to a lower sustainable debt level, lower than the established 60%. Fiscal arrangements that incentivise private leverage and thus support the growth addiction, such as tax benefits for interest payments or debt, should be minimised.

## 5.2 Reconfiguration of business

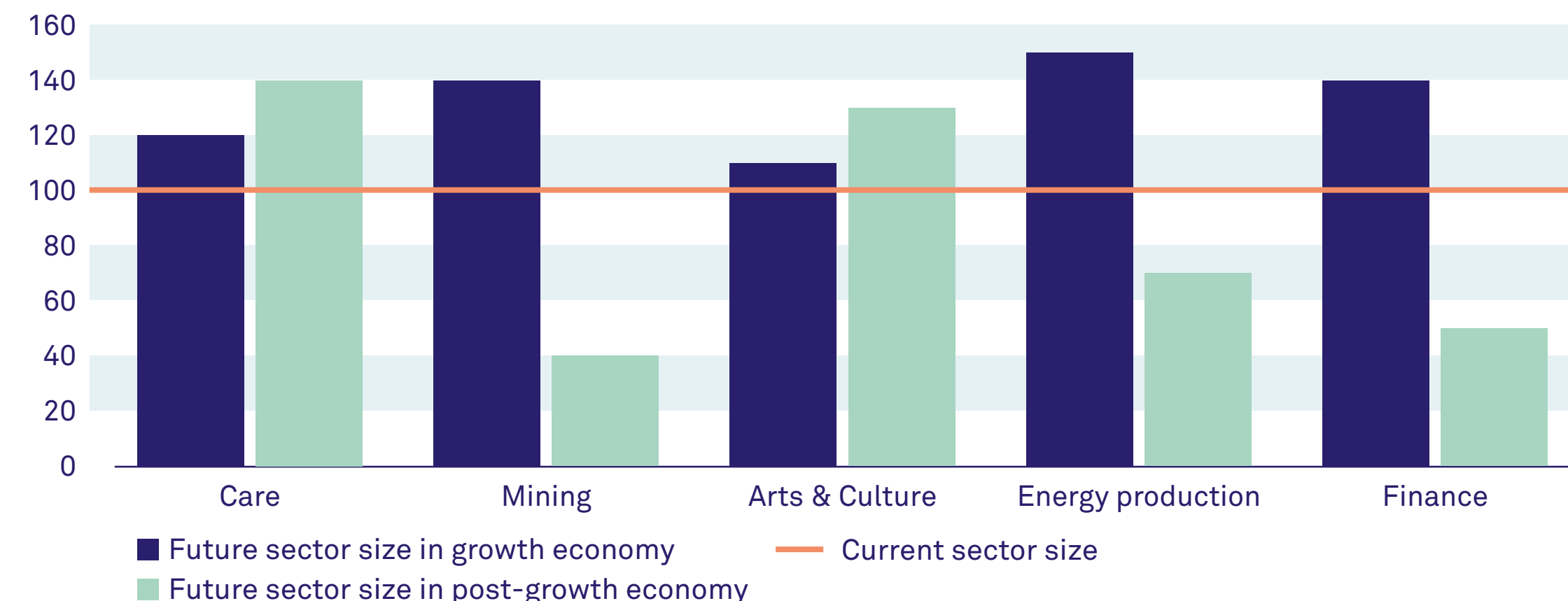
The allocation of influence often operates as a zero-sum game, where significant sway for one party inherently implies a lesser role for others. This is particularly apparent in a company's ownership and decision-making structures, dictating its actions. For instance, high return expectations among owners create immense pressure to maximise profits and revenue<sup>61</sup>.

A shift in company approaches could significantly lower the growth imperative. Establishing strategies that balance stakeholder interests and a corporate social mission, while maintaining responsibility for all production and consumption effects, can counteract this pressure<sup>62</sup>. Lowering these growth expectations could be achieved through voluntary reductions in owner return targets or by moderating the influence of owners. Alternative ownership structures, such as cooperatives or steward-owned companies, empower various stakeholders. Governments could incentivise these models by offering tax benefits to such organisations.

## 5.3 A post-growth transformation

Economic transformation takes time. While our focus has primarily been on the macro level, tangible shifts take place at micro and meso levels. Considered from a transition perspective, a post-growth economy

Figure 5 Macro degrowth, meso growth and decline of sectors



Source: Triodos Bank

necessitates the contraction of certain sectors while enabling the growth of others. These pathways illustrate this dynamic (see figure 5). In the business-as-usual pathway, all sectors grow. However, in the alternative pathways, our forecasts envision substantial sectoral contractions alongside growth in other sectors, culminating in a macro-level decline in economic activity. For example, the supply shift pathway points to an inevitable reduction in sectors like manufacturing, mining, fossil fuel production, industrial agriculture, and construction. Meanwhile, it highlights the potential growth in sectors ranging

from culture and health care to local farming and recreational activities.

At a microeconomic level, the narrative is more intricate. The general principle involves substituting polluting activities with lower-impact alternatives (e.g., transitioning from meat-based to plant-based consumption, replacing combustion engine cars with public transport) and downsizing or eliminating polluting activities without feasible substitutes.

## 6 Post-growth finance

---

Post-growth requires a thorough overhaul of finance as we know it. The financial sector needs to become a servant to the real economy again, focused on fulfilling its core task of financing capital development<sup>63</sup>. Profit-maximising behemoths have shown themselves to be unfit to either limit themselves to this role or fulfil it properly. To make this overhaul happen, the financialization of our economies – the increasing role of financial motives, markets, actors, and institutions in the operation of the domestic and international economies – which has been going on since the middle of the 1980's, will need to be rolled back<sup>64</sup>.

Several aspects need to change to create a post-growth financial sector (see figure 6). First, all finance must be (re)connected to real economic outcomes. Finance should be about investment, which means an activity in the real economy that creates a financial return, again. It shouldn't be about investing, where only the financial return counts and the real economic consequences are disregarded.

Second, activities should create 'useful' value. Investment in the right companies and organisations will still earn a fair return, as distributing capital across the economy remains a necessity. Interest payments in and of themselves do not create a growth imperative if they are recirculated within the economy<sup>65</sup>.

Third, to break the growth imperative, debt must become aligned with real economy growth needs. On the micro level, this requires financial institutions to make conscious choices. High leverage, including highly leveraged banks with low buffers, is not compatible with a post-growth world. Banking will on average become less profitable. On the macro level, this could be driven by supervisors gradually raising the capital requirements. Furthermore, financial institutions cannot remain "too big to fail"; this enables the sector's stranglehold of the real economy. Essentially, one of the reasons that the financial sector is unable to finance the necessary transition is that many financial institutions have too many stranded assets on their balance sheets – and because they are indeed too big to fail.

Fourth, more diversity in the financial sector and the investment landscape is key. If everybody does the same, this reinforces the status quo. Room for experimentation, risk, alternative finance constructions, etc., is key in a transformation. This not only relates to the risk-return profile for different financial instruments, but also to regulation and diversity. Scale and uniformity are dominant features of the current financial sector because of the very high regulatory and compliance costs. This is not a plea for less regulation, but for different regimes in regulation, depending on size and risk of investments.

Proportionality is the key word here to make sure that the financial sector becomes flexible enough to finance the post-growth world.

Fifth, financial institutions' contribution to a post-growth transition begins with a value-based reorientation towards the common good<sup>66</sup>. In other words, their goal should evolve from creating only financial value to multi-capital creation. Businesses in general simply cannot pursue only financial profit as an end in a sustainable economy (Hinton, 2022). Financial actors must see themselves as stewards of the future, making conscious investments in the transitions that we and future generations need. Positive impact for people and planet, should come before risk and return. Only then can they become part of the post-growth world. Even if financial institutions do not start changing voluntarily, it is questionable how long society will keep supporting them enforcing absolute debts given the human consequences of spiraling debt<sup>67</sup>.

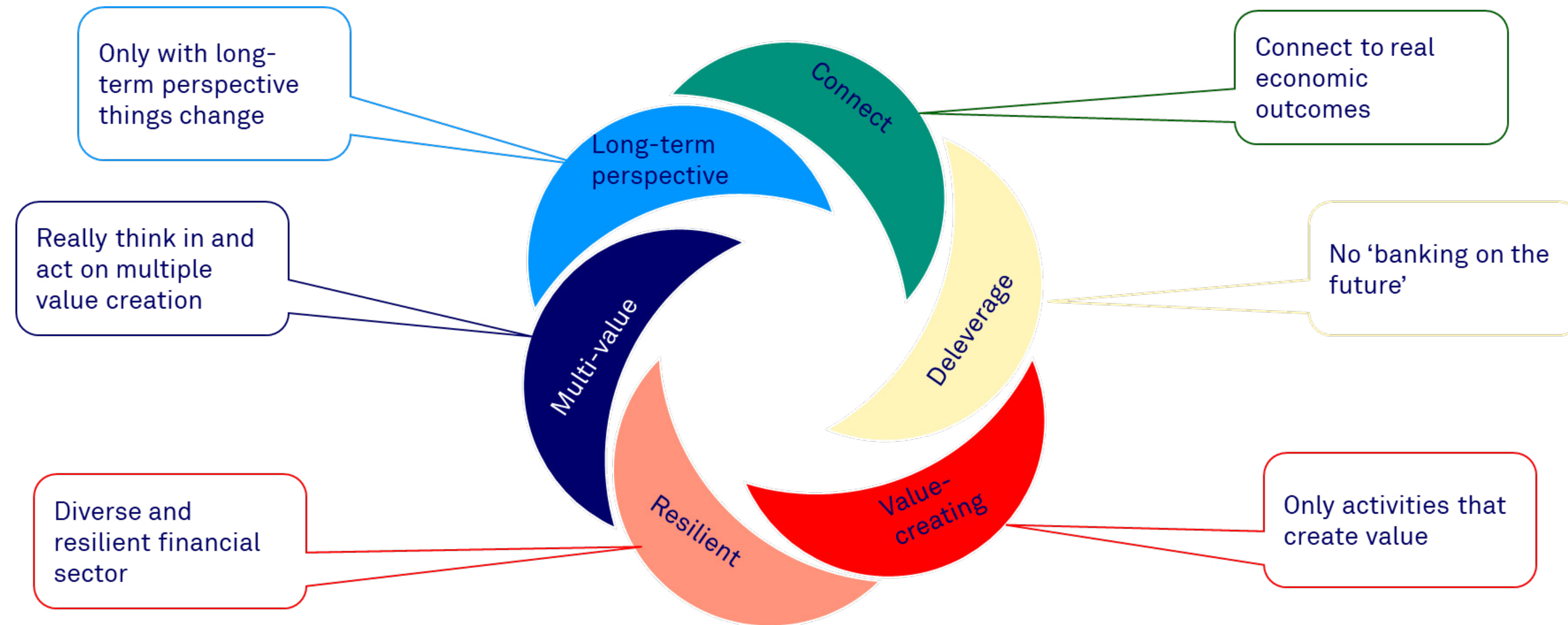
Finally, this transformation is a long-term process. Only when the financial sector looks beyond short-term gains and focuses on the long term, can it successfully contribute and become part of a post-growth economy.

Our recommendations for impact investors are straightforward:

1. Do not invest passively in an index. The index represents the business-as-usual pathway.
2. Only invest in the real economy
3. Only invest in value creation that helps society thrive
4. Be in there for the long term
5. Impact first, then risk and financial returns.

Post-growth offers investing opportunities with financial returns for investors. But only if you dare to choose.

Figure 6 A post-growth financial sector



Source: Triodos Bank



# Data sources

## Ecological Footprint

We used the Ecological Footprint of Europe expressed in number of Earths.

Footprint Data Foundation, York University Ecological Footprint Initiative, and Global Footprint Network: National Footprint and Biocapacity Accounts, 2022 edition. Available online at <https://data.footprintnetwork.org>

## Business-as-usual growth forecast

**Capital and labour share and productivity:** We obtained data on capital and labour respective shares and productivity developments from the Conference Board’s Total Economy Database.

The Conference Board Total Economy Database™ (Adjusted version), November 2017

**Labour quality:** We obtained an estimate for labour quality through calculating the average mean years of schooling for the labour force from the mean years of schooling by age data set from the Wittgenstein Centre.

Source: Wittgenstein Centre for Demography and Global Human Capital (2018). Wittgenstein Centre Data Explorer Version 2.0

**Labour quantity:** We infer the size of the labour force from the UN population forecasts by age group.

Suggested citation: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1.

We complement it with inflation, real GDP and nominal GDP data from NiGEM and the OECD.

## Post-growth pathways

We used Eurostat data for the Euro Area over the last 15 years. The data set names, codes and links are listed in the table below. For any further questions, please contact the authors at [ernst.hobma@triodos.com](mailto:ernst.hobma@triodos.com)

Data set name	Unit	Online data code	Link
Gross value added and income by A*10 industry breakdowns	% of total	NAMA_10_A10__custom_7927330	<a href="#">Statistics   Eurostat (europa.eu)</a>
Labour productivity and unit labour costs at industry level	Index, 2015=100	nama_10_lp_a21__custom_7890584	<a href="#">Statistics   Eurostat (europa.eu)</a>
Capital stock based productivity indicators at industry level	Index, 2015=100	nama_10_cp_a21__custom_7890473	<a href="#">Statistics   Eurostat (europa.eu)</a>
Employment by A*10 industry breakdowns	% of total based on persons	NAMA_10_A10_E__custom_7828411	<a href="#">Statistics   Eurostat (europa.eu)</a>
Energy supply and use by NACE Rev. 2 activity	Terajoule	[env_ac_pefasu__custom_7916028]	<a href="#">Statistics   Eurostat (europa.eu)</a>

# Appendix

Construction will need to shift from mostly new building to mostly retrofitting. This would decrease resource requirements, but likely also means a drop in productivity as retrofitting faces challenges; it requires more bespoke solutions and related know-how and must deal with building history and, often, residents<sup>68</sup>. We expect productivity to drop 20%, with a stable employment, and an improvement in material and energy efficiency of 40%. Because of energy-efficiency retrofitting, we also assume that the final energy consumption of households will drop significantly. For transportation, the picture looks mixed. All freight transport and aviation should decrease, but employment in passenger transport might increase as we switch from individual to collective transport. For lack of a clear direction, we keep the sector's value added and productivity stable. The mining & quarrying sector is less necessary than it was before; fewer virgin materials are now required by industry sectors. To improve labour conditions in the supply chain, wages will need to go up. We therefore expect both lower labour inputs and productivity, lowering ecological impact. For electricity generation, energy efficiency and electrification balance out, to keep value added and productivity stable. The information and communication sector has low direct energy use, but it does require rare earth metals, which produce toxic waste during manufacturing. Associated energy consumption is considerable, especially for artificial

intelligence<sup>69,70</sup>. At the same time, some applications of innovative information technology might help to increase the efficiency of resource use. To achieve absolute decoupling, a focus on sobriety in addition to efficiency seems necessary<sup>71</sup>. We expect this sector to focus on decreasing virgin material and energy requirements, which analogously to the manufacturing sector is likely to depress labour productivity. The financial industry today has grown beyond the size where it helps fulfill real needs, and it strengthens the growth imperative by increasing both leverage and inequality<sup>72</sup>. We therefore expect the value added of the sector to shrink, with productivity remaining constant.

Sector name	Change production factor inputs (factor)	Change in productivity (factor)	Change in energy + resource use (factor)
Information and communication	1	0,75	0,5
Manufacturing	0,75	0,8	0,55
Mining and quarrying	0,5	0,75	0,5
Financial and insurance activities	0,5	1	0,5
Wholesale and retail trade; repair of motor vehicles and motorcycles	1	1	1
Agriculture, forestry and fishing	1	0,9	0,8
Professional, scientific and technical activities	1	1	1
Electricity, gas, steam and air conditioning supply	1	1	0,5
Water supply; sewerage, waste management and remediation activities	1	1	1
Administrative and support service activities	1	1	1
Construction	1	0,8	0,6
Other service activities	1,128	1	1
Transportation and storage	1	1	0,5
Arts, entertainment and recreation	1,128	1	1
Accommodation and food service activities	1,128	1	1
Public administration, defence, education, human health and social work activities + Real estate	1,128	1	1

# References

- World Bank, 2023. Real GDP per capita in purchasing power parities
- Sachs, J. D., Lafortune, G., Fuller, G., & Drum, E. (2023). *Implementing the SDG Stimulus. Sustainable Development Report 2023*. <https://doi.org/10.25546/102924>
- Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., Drüke, M., Fetzer, I., Bala, G., von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., ... Rockström, J. (2023). Earth beyond six of nine planetary boundaries. *Science Advances*, 9(37), eadh2458. <https://doi.org/10.1126/sciadv.adh2458>
- Hickel, J. (2020). *Less is more*. Penguin Books. <https://doi.org/10.1111/j.1365-3148.2011.01109.x>
- Parrique, T. (2020). *The Political Economy of degrowth*. University of Clermont-Ferrand. <https://doi.org/10.4324/9780429273247-4>
- Schmelzer, M., Vetter, A., & Vansintjan, A. (2022). *The future is degrowth : a guide to a world beyond capitalism*. Verso books.
- O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95.
- Hickel, J. (2019). Is it possible to achieve a good life for all within planetary boundaries?. *Third World Quarterly*, 40(1), 18-35.
- Fouquet, R., & Broadberry, S. (2015). Seven centuries of European economic growth and decline. *Journal of Economic Perspectives*, 29(4), 227-244.
- He, L., & Li, N. (2020). The linkages between life expectancy and economic growth: some new evidence. *Empirical Economics*, 58, 2381-2402.
- Stevens, P., & Weale, M. (2004). Education and economic growth. *International handbook on the economics of education*, 27, 205-311.
- Schwellnus, C., et al. (2018), "Labour share developments over the past two decades: The role of technological progress, globalisation and "winner-takes-most" dynamics", *OECD Economics Department Working Papers*, No. 1503, OECD Publishing, Paris, <https://doi.org/10.1787/3eb9f9ed-en>.
- Harper, S., Riddell, C. A., & King, N. B. (2021). Declining life expectancy in the United States: missing the trees for the forest. *Annual review of public health*, 42, 381-403.
- Schleicher, A. (2019). PISA 2018: Insights and interpretations. *OECD Publishing*.
- Helliwell, J., Wang, S., Huang, H., & Norton, M. (2022). Happiness, benevolence, and trust during COVID-19 and beyond.
- Buiter, W. (1992). Should We Worry About the Fiscal Numerology of Maastricht? *C.E.P.R. Discussion Papers*, 668.
- Lin, K. H., & Neely, M. T. (2020). *Divested: Inequality in Financialized America*. Oxford University Press, USA.
- Guillemette, Y., & Turner, D. (2021). *The long game: Fiscal outlooks to 2060 underline need for structural reform*. 29. <https://doi.org/https://doi.org/10.1787/a112307e-en>
- Burgess, M. G., Langendorf, R. E., Moyer, J. D., Dancer, A., Hughes, B. B., & Tilman, D. (2023). Multidecadal dynamics project slow 21st-century economic growth and income convergence. *Communications Earth and Environment*, 4(1), 1–10. <https://doi.org/10.1038/s43247-023-00874-7>
- Ripple, W.J., C. Wolf, J. W. Gregg, J. Rockström, T. M. Newsome, B.E. Law, L. Marques, T. M. Lenton, C. Xu, S. Huq, L. Simons, D. A.King, The 2023 state of the climate report: Entering uncharted territory, *BioScience*, 2023;, biad080, <https://doi.org/10.1093/biosci/biad080>
- Rees, W. E., & Wackernagel, M. (2013). The shoe fits, but the footprint is larger than earth. *PLoS biology*, 11(11), e1001701.
- Zhang, L., Dzakpasu, M., Chen, R., & Wang, X. C. (2017). Validity and utility of ecological footprint accounting: A state-of-the-art review. *Sustainable Cities and Society*, 32, 411-416.
- Rees, W. E. (2023). Ecological Footprint Accounting: Thirty Years and Still Gathering Steam. *Environment*, 65(5), 5–18. <https://doi.org/10.1080/00139157.2023.2225405>
- Blomqvist, L., Brook, B. W., Ellis, E. C., Kareiva, P. M., Nordhaus, T., & Shellenberger, M. (2013). Does the shoe fit? Real versus imagined ecological footprints. *PLoS Biology*, 11(11), e1001700.
- Marques, A., Martins, I. S., Kastner, T., Plutzer, C., Theurl, M. C., Eisenmenger, N., ... & Pereira, H. M. (2019). Increasing impacts of land use on biodiversity and carbon sequestration driven by population and economic growth. *Nature ecology & evolution*, 3(4), 628-637.
- Helliwell, J., Wang, S., Huang, H., & Norton, M. (2022). Happiness, benevolence, and trust during COVID-19 and beyond.
- Footprint Data Foundation, York University Ecological Footprint Initiative, and Global Footprint Network: National Footprint and Biocapacity Accounts, 2022 edition. Available online at <https://data.footprintnetwork.org>
- Commission of the European Communities. (1993). *Growth, competitiveness, employment: The challenges and ways forward into the 21st century* (Vol. 93). Luxembourg: Office for Official Publications of the European Communities.
- Friedlingstein, P., O'sullivan, M., Jones, M. W., Andrew, R. M., Gregor, L., Hauck, J., ... & Zheng, B. (2022). Global carbon budget 2022. *Earth System Science Data Discussions*, 2022, 1-159.
- Circle Economy. (2023). The circularity gap report 2023 (pp. 1-64, Rep.). Amsterdam: Circle Economy.
- Magee, C. L., & Devezas, T. C. (2017). A simple extension of dematerialization theory: Incorporation of technical progress and the rebound effect. *Technological Forecasting and Social Change*, 117, 196-205.
- Brockway, P. E., Sorrell, S., Semieniuk, G., Heun, M. K., & Court, V. (2021). Energy efficiency and economy-wide rebound effects: A review of the evidence and its implications. *Renewable and sustainable energy reviews*, 141, 110781.
- Lamboll, R.D., Nicholls, Z.R.J., Smith, C.J. et al. Assessing the size and uncertainty of remaining carbon budgets. *Nat. Clim. Chang.* (2023). <https://doi.org/10.1038/s41558-023-01848-5>
- Rockström, J., Gupta, J., Qin, D., Lade, S. J., Abrams, J. F., Andersen, L. S., ... & Zhang, X. (2023). Safe and just Earth system boundaries. *Nature*, 1-10.
- Hickel, J., & Kallis, G. (2020). Is green growth possible?. *New political economy*, 25(4), 469-486.
- Parrique, T. (2020). *The Political Economy of degrowth*. University of Clermont-Ferrand. <https://doi.org/10.4324/9780429273247-4>
- Wiedmann, T., Steinberger, J. K., Lenzen, M., & Keyßer, L. T. (2020). Scientists' warning on affluence. *Nature Communications*, 11(3107), 1–10. <https://doi.org/10.1038/s41467-020-16941-y>
- Ellen MacArthur Foundation. 2023. *What is a circular economy? What is a circular economy? | Ellen MacArthur Foundation*
- Von Weizsacker, E. U., Hargroves, C., Smith, M. H., Desha, C., & Stasinopoulos, P. (2009). *Factor five: Transforming the global economy through 80% improvements in resource productivity*. Routledge.
- Hartley, K., Schülzchen, S., Bakker, C. A., & Kirchherr, J. (2023). A policy framework for the circular economy: Lessons from the EU. *Journal of Cleaner Production*, 412(April), 137176.
- Orsini, S., Padel, S., & Lampkin, N. (2018). Labour use on organic farms: a review of research since 2000. *Organic farming*, 4(1), 7-15.
- Alvarez, R. (2022). Comparing productivity of organic and conventional farming systems: a quantitative review. *Archives of Agronomy and Soil Science*, 68(14), 1947-1958.
- European Commission. Directorate-General for Agriculture and Rural Development. (2023). Organic farming in the EU: a decade of growth. **Organic farming in the EU: a decade of growth (europa.eu)**
- Crowder, D. W., & Reganold, J. P. (2015). Financial competitiveness of organic agriculture on a global scale. *Proceedings of the National Academy of Sciences*, 112(24), 7611-7616.
- Laubinger, F., Lanzi, E., & Chateau, J. (2020). Labour market consequences of a transition to a circular economy: A review paper.
- Llorente-González, L. J., & Vence, X. (2020). How labour-intensive is the circular economy? A policy-orientated structural analysis of the repair, reuse and recycling activities in the European Union. *Resources, Conservation and Recycling*, 162, 105033.
- Bimpizas-Pinis, M., Bozhinovska, E., Genovese, A., Lowe, B., Pansera, M., Pinyol Alberich, J., & Ramezankhani, M. J. (2021). Is efficiency enough for circular economy?. *Resources, Conservation and Recycling*, 167.
- Bauwens, T. (2021). Are the circular economy and economic growth compatible? A case for post-growth circularity. *Resources, Conservation and Recycling*, 175, 1-3.
- Bernardini, O., & Galli, R. (1993). Dematerialization: long-term trends in the intensity of use of materials and energy. *Futures*, 25(4), 431-448.
- Creutzig, F., Roy, J., Lamb, W. F., Azevedo, I. M., Bruine de Bruin, W., Dalkmann, H., ... & Weber, E. U. (2018). Towards demand-side solutions for mitigating climate change. *Nature Climate Change*, 8(4), 260-263.
- Fix, B. (2019). Dematerialization through services: evaluating the evidence. *BioPhysical Economics and Resource Quality*, 4(2), 6.
- Pulselli, F. M., Coscieme, L., Neri, L., Regoli, A., Sutton, P. C., Lemmi, A., & Bastianoni, S. (2015). The world economy in a cube: A more rational structural representation of sustainability. *Global Environmental Change*, 35, 41-51.
- Capriarello, P. A., & Reis, H. T. (2013). To do, to have, or to share? Valuing experiences over material possessions depends on the involvement of others. *Journal of personality and social psychology*, 104(2), 199.
- Jackson, T. (2021). *Post growth - life after capitalism*. Cambridge, UK : Polity Press, 2021
- Autonomy (2023). The UK's four-day week pilot. Available at: [The-results-are-in-The-UKs-four-day-week-pilot.pdf \(autonomy.work\)](#)
- De Spiegelaere, S., & Piasna, A. (2017). *The why and how of working time reduction*. European Trade Union Institute.
- OECD. (2020). *OECD Economic Surveys: United Kingdom 2020*. OECD, Paris.
- Murphy, Thomas, W. (2022). Limits to Economic Growth. *Nature Physics*, 78. <https://doi.org/10.5304/jafscd.2014.043.006>
- Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., ... & Creutzig, F. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environmental research letters*, 15(6), 065003.
- Schandl, H., Hatfield-Dodds, S., Wiedmann, T., Geschke, A., Cai, Y., West, J., ... & Owen, A. (2016). Decoupling global environmental pressure and economic growth: pathways for energy use, materials use and carbon emissions. *Journal of cleaner production*, 132, 45-56.
- Hinton, J. (2021). Five key dimensions of post-growth business: Putting the pieces together. *Futures*, 131, 102761. <https://doi.org/10.1016/j.futures.2021.102761>
- Konietzko, J., Das, A., & Bocken, N. (2023). Towards regenerative business models : A necessary shift ? *Sustainable Production and Consumption*, 38(April), 372–388. <https://doi.org/10.1016/j.spc.2023.04.014>
- Mazzucato, M., & Wray, L. R. (2015). Financing the capital development of the economy: a Keynes-Schumpeter-Minsky synthesis. *Levy Economics Institute of Bard College Working Paper*, (837).
- Definition from: Epstein, G. A. (Ed.). (2005). *Financialization and the world economy*. Edward Elgar Publishing.
- Jackson, T., & Victor, P. A. (2015). Does credit create a 'growth imperative'? A quasi-stationary economy with interest-bearing debt. *Ecological Economics*, 120, 32-48.
- Dörny, S., & Schulz, C. (2021). Financing post-growth? Green financial products for changed logics of production. In *Post-Growth Geographies.: Spatial Relations of Diverse and Alternative Economies* (pp. 241-261). Transcript Verlag.
- Graeber, D. (2009). *Debt, violence, and impersonal markets: Polanyian meditations*. na.
- Vergragt, P. J., & Brown, H. S. (2012). The challenge of energy retrofitting the residential housing stock: grassroots innovations and socio-technical system change in Worcester, MA. *Technology Analysis & Strategic Management*, 24(4), 407-420.
- Ali, S. H. (2014). Social and environmental impact of the rare earth industries. *Resources*, 3(1), 123-134.
- de Vries, A. (2023). The growing energy footprint of artificial intelligence. *Joule*, 7(10), 2191-2194.
- Bol, D., Pirson, T., & Dekimpe, R. (2021). Moore's Law and ICT Innovation in the Anthropocene. In *2021 Design, Automation & Test in Europe Conference & Exhibition* (pp. 19-24). IEEE.
- Zhu, X., Asimakopoulos, S., & Kim, J. (2020). Financial development and innovation-led growth: Is too much finance better?. *Journal of International Money and Finance*, 100, 102083.

## About Triodos Bank

Founded in 1980, Triodos Bank has become a front runner in sustainable banking globally. Triodos Bank is an independent bank that promotes responsible and transparent banking. It does not see any conflict between a focus on people and the planet and a good financial return. Instead, it believes that they reinforce each other in the long-term. Triodos Bank has banking activities in the Netherlands, Belgium, the UK, Spain and Germany as well as Investment Management activities based in the Netherlands but active globally. Triodos Bank co-founded the Global Alliance for Banking on Values, a network of 60 sustainable banks. Together these banks want to grow sustainable banking and its impact on the real economy substantially. Triodos Bank N.V. has a full banking licence and is registered with De Nederlandsche Bank N.V. (the Dutch central bank) and the Autoriteit Financiële Markten (the Dutch Authority for the Financial Markets).

Landgoed De Reehorst  
Hoofdstraat 10a,  
Driebergen-Rijsenburg  
PO Box 55  
3700 AB Zeist, The Netherlands  
Telephone +31 (0)30 693 65 00  
[www.triodos.com](http://www.triodos.com)

## Published

November 2023

## Text

Hans Stegeman  
Ernst Hobma

## Design and layout

Via Bertha, Utrecht

## Cover photo

Helena Lopes