VAN LANSCHOT KEMPEN

White paper: Navigating through transitions

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1. Main takeaways

- The world is crossing planetary boundaries and impeding social foundations as well, leading to pressure on society for current and future generations.
- We will need to transition towards a sustainable economy. We see three main transitions to focus on: energy transition, food transition and materials transition.
- Van Lanschot Kempen is well-positioned with a long-term value creation view to navigate its clients through these transitions.
- To be effective and have impact as a wealth manager, focus for us is key, lending most attention to climate change and the energy transition first.

2. Introduction

It seems that our world is in flux with increasing uncertainty. In this world, phrased by the United Nations as 'uncertainty complex', there are multiple interrelated crises, sometimes called 'polycrises'. Only around two years ago we faced a worldwide (Covid-19) pandemic, almost directly followed by the first global energy crisis[1] in 2022 with high inflation, accelerated by the war in Ukraine, and in parallel a global food crisis. Furthermore, global warming is getting more visible each year with, amongst others, extreme droughts, wildfires and large flooding impacting all continents. The planet and societies appear to be on a drift. Are we on the cusp of a new era?[2]

We see signs of moving parts and an interplay between economy and society, people and planet. From a global perspective, the economy has provided more welfare when based on GDP levels, although the GDP indicator itself is questionable as 'it is increasingly a poor measure of prosperity'.[3] With the success of our economic system, the planetary boundaries or limits are both in sight and some have already been crossed, while simultaneous impediments to our social foundation occur. The many relevant externalities of the economy are putting pressure on the way we organise and live together, as well as on our relation with nature and environment. The livability of our planet is being threatened due to the negative impact of human (based) activities, leading and/or contributing to climate change, biodiversity loss and other negative impacts on nature and environment. In short, our planetary boundaries, environmental limits within which humanity can safely operate, are under pressure.

At the same time, not all countries - and within countries many people - are enjoying the fruits of economic productivity and welfare increase, where access to energy and food, affordable housing, clean water and air, is not a given. These basic human needs, the social foundation, are also being put under pressure as a result of increasing pressure on the planetary boundaries. For instance, global warming due to climate change is leading to more frequent heatwaves, wildfires and flooding, thereby increasing risk that people don't have access to basic needs such as energy, food and shelter.

Our current economic system has, despite its success, many unwanted external effects on people and planet and is therefore not sustainable. The need to transition to a sustainable economy is paramount. Along with it, this transformation brings both risks and opportunities for investors. At Van Lanschot Kempen we have been focused on solutions and possibilities in a changing world. As societies and economies transform, we help our clients navigate through these transitions with our knowledge and expertise.

3. Why we need to transform

The way our economies have been organised has led to increasing wealth on a global level. Although countries show different growth paths, since the Industrial Revolution global GDP has increased exponentially[4]; especially after the Second World War the economic growth accelerated significantly.[5] The jump in economic growth has led to more societies with strong social foundations, where people have gained (more) access to energy, food, education, healthcare and housing among others. On the other hand, GDP as a proxy for prosperity is flawed. While GDP went up, other relevant environmental and social indicators went down. For instance, the worldwide temperature already increased with 1.1°C since pre-industrial levels and it is expected to rise towards more dangerous levels.[6] Furthermore, the global population of wild species has already fallen by 60% over the last 40 years.[7]

These and other destabilising planetary pressures are also impeding human development worldwide. For the first time, the Human Development Index declined for two years straight, which is worry-some as this index measures relevant dimensions of human development like health and having a decent standard of living.[8] The negative impact is also stipulated by the recent reports of the Intergovernmental Panel on Climate Change, the intergovernmental scientific body of the United Nations on climate change, which show that climate change has a detrimental impact on human systems, such as food production, health (e.g. via infectious diseases), cities and infrastructure.[9] The impact will become more severe when temperature rises. As the planetary boundaries and social foundation are being, or will be, crossed, the urge to transform our economies becomes paramount.

The urge to act increases from a consumer perspective

To manage the global challenges from the pressure on planetary boundaries like climate change, each country will need to do its part. Often the position is to refer to where the source of negative impact is being produced. This is called the producer perspective.[10] The drawback of this approach is that it's neglecting the consumer side and how the value chain is organised. Outsourcing activities from developed to developing and emerging countries was a strategic dominant choice for companies and there appears a positive relationship between outsourcing activities by companies and their performance, stated in the overview paper from Lahiri et al. (2022).[11] This has led to relocating polluting activities as well. However, when we take the consumer perspective into account, the urge to act will increase for countries with high(er) consumption patterns.

For instance, Denkwerk shows that the Netherlands based on a consumption perspective would have to decrease its greenhouse gas emissions more and faster than based on a production perspective, as the country has moved production processes to other countries.[12]

The urge to act increases from a 'fair share' perspective

The pressure on planetary boundaries did not start yesterday but is a build-up which started sometimes decades or even centuries ago, such as is the case with climate change. It is imperative to include the historical context, as countries with a longer history of production had more time to develop their economies, pollute more as a consequence of production, and increase their wealth. The urge to act soon is increasing for these (mainly developed) countries, and to function as 'role model' for other countries. The following example relates to climate change. Carbon Action Tracker examines the objectives, policies and actions countries have set to move to a climate neutral economy. When looking at the climate objectives based on a country's historical 'fair share', then current

policies and objectives of the EU, US and UK to limit global warming below 1.5°C for 2030 all fall short when taking into account their historical greenhouse gas (GHG) emissions. For instance, the EU has an emission reduction target of 55 percent by 2030 (compared to 1990), while based on the 'fair share' this should be around 90 percent.[13] The urge to act based on this perspective thus increases.

Planetary boundaries under pressure

The increasing human (economic) activities have put pressure on the planet to be a liveable space. The question how much pressure the ecosystems can withstand was picked up by an international group of scientists via the Stockholm Resilience Centre. In 2009, they came up with nine critical processes which are known as the 'planetary boundaries', aimed to define the environmental limits within which humanity can safely operate.[14] These boundaries can be found in figure 1. Already five of the planetary boundaries have been crossed: climate change, biodiversity, biogeochemical flows, land use and more recently also novel entities (including plastics).[15]

- **Climate change** may be seen as one of the most urgent boundaries due to its global and adverse impact already being seen currently. The average global warming is currently at 1.1°C and based on current country policies the expected warming towards the end of the century ranges between 2.1°C - 2.9°C,[16] a rise predicted to lead to more frequent and severe climate impacts such as stronger storms, more flooding and longer heatwaves.[17] The expected temperature rise is above the goals of the Paris Agreement, established in 2015, where countries committed to limit global warming to well below 2°C and preferably 1.5°C. In fact, based on the current global GHG emissions, societies only have until the end of this decade before crossing the global carbon budget to stay below 1.5°C global warming.[18] Until now, the trend moves towards the opposite direction. Global GHG emissions have accelerated the last decades, in line with economic growth. Since 1970 almost two-third of all cumulative GHG emissions between 1850-2019 (170 years) was emitted since 1970 (50 years), and 43% since 1990 (30 years) and around 17% since 2010 (10 years).[19] As the global economy grows, it is expected that the emissions will also grow. Although more countries show signs of decoupling between economic growth and emission growth, on a global level the two still appear to be coupled.[20] In order to limit emissions and move to net zero, each year global emissions should decrease with even a bit more (1%) than what was achieved during the GHG emission drop due to the pandemic in 2020, which was around 5%.[21]
- **Biodiversity loss** due to human activities was more rapid in the past 50 years than at any time in human history. Mainly driven by demand for food, water and natural resources. These drivers are either steady or are increasing in intensity.[22]
- **Biogeochemical cycles** of nitrogen and phosphorus are important essential nutrients for sustaining life on earth, for e.g. transfer of energy within organisms. These natural cycles have been changed by human activities like industrial and agricultural processes, leading to pollution of waterways for instance. As nitrogen and phosphorus are essential elements for plant growth, fertilizer production and application has become a main concern.[23]
- **Land use** has come under pressure due to converting nature areas (via cutting trees) into land used for agriculture.[24]
- **Novel entities** are new substances that have the potential for unwanted geophysical and/or biological effects, such as plastic pollution. Recently data became available and led to the conclusion that this boundary also transgressed.[25]

Furthermore, except **ozone depletion** ('hole in the ozone layer'), the trend on the other eight planetary boundaries is negative[26], understating the ongoing pressure from human activities and stresses the urge to change.

The different planetary boundaries are interrelated as the earth is, in the end, one system, and (negative) impact on one boundary can have impact on another and should not be seen in isolation. For instance, land use is closely related to climate change as trees provide carbon sinks and help limit global warming. Deforestation does not only have a negative impact on climate change, it may have detrimental effects on biodiversity as well if the land is used for mono agriculture. Another example is that heat stress and droughts increase due to global warming, which in turn, puts pressure on the use of freshwater.

Social foundation under pressure

Basic needs such as access to energy, food, water, education, healthcare and housing function as a social foundation for humans as the minimum one needs to function. As not all people have access to these basic needs, human rights regulation has been developed and later goals have been formulated by governments and formalised in the global Sustainable Development Goals (SDGs). Another measure which also takes human development into account is the Human Development Index (HDI), which measures relevant dimensions of social foundation such as health and other basic needs. The social foundation relates to the planetary boundaries as well, as can be seen in figure 1. For instance, increased heatwaves, droughts, wildfires and floods are already affecting billions of people around the globe.[27]

The pressure on planetary boundaries and its destabilising effects can also impede this social foundation (further).[28] We can already see negative impact of the last years, mentioned in the latest SDG and HDI 2022 reports. The HDI index declined for the second year in a row, due to among others, consequences of the global pandemic, the global energy crisis and climate change.[29] These same crises were named in the SDG report as a cause for the increasing risk that the SDGs will not be achieved by 2030. The need and urge to act is increasing.

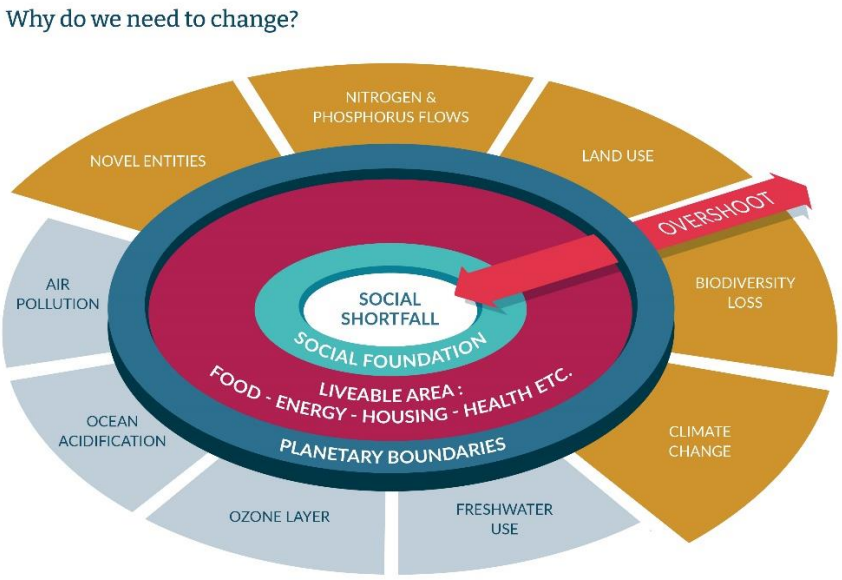

Figure 1: *planetary boundaries and social foundation*

4. Why it matters for investors and focus of Van Lanschot Kempen

The pressure on the planetary boundaries and their impediment on social development demonstrates the urgency to act. In short, we will need to transform to a sustainable economy where all actors have a role to play in the transition. This requires the transformation of several societal systems, such as the energy and food system, towards sustainable ones. For investors, recognising transitions is important as they can provide risks and opportunities: which social-technological developments will lead to a more sustainable economy and subsequently, which companies will be the leaders and laggards of the future.

An example of increasing investment opportunities is that to achieve net-zero goals, the demand for climate-friendly goods and services will be booming according to McKinsey.[30] They expect that some sectors will grow multiples and have identified 11 high-potential value pools (like low carbon buildings, power and transport) that could be worth anywhere between USD 9 trillion to more than USD 12 trillion of annual revenues by 2030. First movers are gaining the upper hand via low-cost green financing to build out low-carbon production. On the other hand, risks will be present as well as some activities will decrease and/or will be phased out (such as coal). Central banks and regulators are therefore asking financial institutions, including investors, more and more to include transition climate risks into their portfolios.[31] For investors, it's important to make a well-balanced decision between the various risks and opportunities the transformation to a sustainable economy presents.

There are several characteristics related to transitions one needs to consider:

- Transitions are transformative and lead to fundamental and irreversible change.[32]
- Transitions are complex, where different actors interrelate with each other.[33]
- There are non-linear risks involved due to the changing systems.[34] For instance, climate change may urge governments to phase out polluting activities (such as producing combustion engines) or will lead to more extreme weather with non-linear increasing costs involved.
- The internalisation of externalities. Several non-financial factors which are important for the economy and society have not been included in economic models yet, but will need to be included, such as a price on carbon emissions and biodiversity loss. Thereby following the 'polluter pays principle'.
- Transitions tend to have a long horizon and may take decades. For instance, in earlier energy transitions it took decades before coal and oil became the dominant energy source in the energy system in the last two centuries.[35] For investors with a long horizon, such as pension funds and insurers, the investment horizon would be a more natural fit with the horizon of transitions.

X-curve as guidance for transitions

When looking at transitions, it is good to bear in mind that societies are continuously changing, in which some areas such as energy and food are paramount for human development.[36] The current era seems to be special in a way that several systems need to change all together on a global scale. The X-curve, from Loorbach et al. (2020)[37] and shown in figure 2, as a conceptual model can provide guidance in the transformation of several system changes. The X-curve enhances the well-known S-curve. The latter is being used for upcoming market practices in systems, for instance electric vehicles in transport or renewables in the energy system. The S-curve shows the pathway from initial small-scale innovations (in transition management this is phrased 'niches') with limited (market) growth, towards accelerated growth and becoming part of the mature system (in transition management this is phrased as 'regime'). Next to this upward cycle of 'new' practices towards established and institutionalised market practices, we can also take into account the downward cycle from established market practices towards the phase out of practices. The combination of the upward and downward cycles is called the X-curve. By including both cycles which interact with each other in systems, a more complete picture of systems in transition can be shown. It shows the change dynamics in a transforming system as well, although in reality these pathways are more chaotic and not necessarily a conscious process.

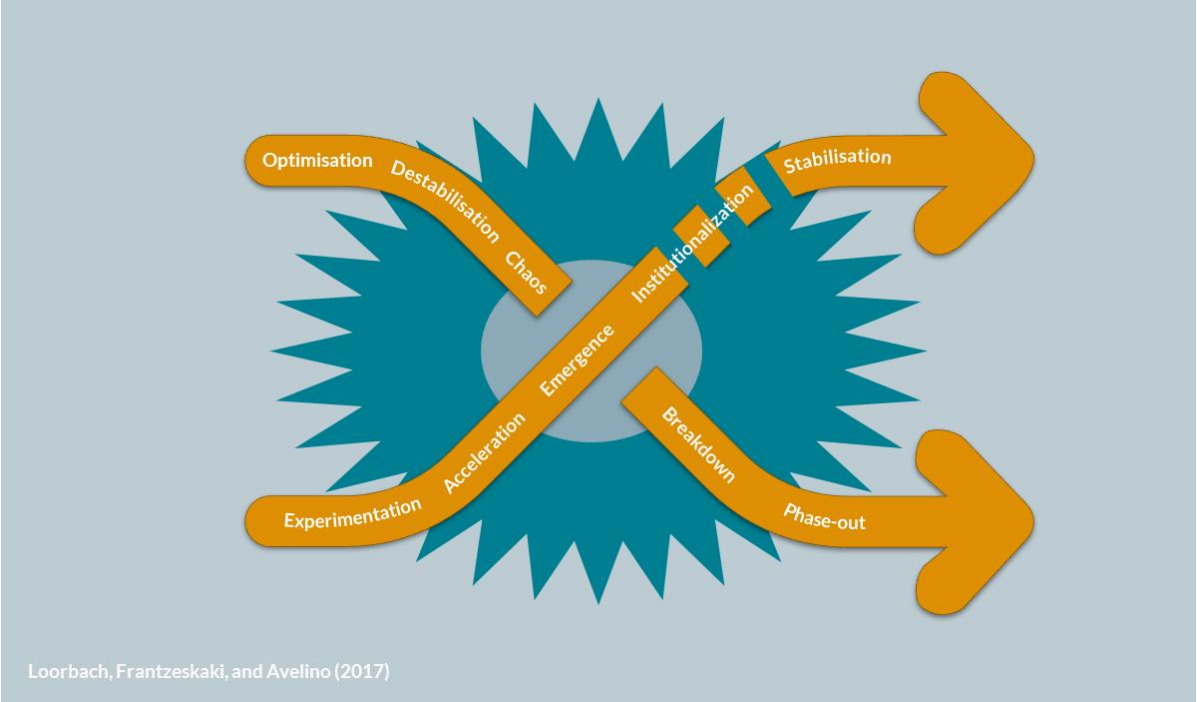

Figure 2: *X-curve of transitions*

Van Lanschot Kempen and transitions

We need to relieve the pressure on our planetary boundaries and social foundation. Van Lanschot Kempen has formulated four sustainability themes where it will focus on in order to be effective and have impact as a wealth manager to create long-term value. These themes are limiting climate change and biodiversity loss; produce and consume in a circular manner; taking into account people's health and wellbeing.

How we can get there and contribute to achieving a sustainable economy, is by focusing on 3 transitions: (1) energy transition; (2) food transition; and (3) materials transition. We consider these transitions essential to move towards a sustainable economy. In order to be effective and impactful, we will focus on the 3 transitions. In figure 3 these transitions are shown in relation to our sustainability themes.[38] Furthermore, note that the transitions are interrelated as well, as materials such as minerals are needed in the energy transition, and energy is needed to transform the food system. Furthermore, all transitions include social elements as well. For example, in the transformation to a more electric and decentralised energy system, people will still need to have access to energy.

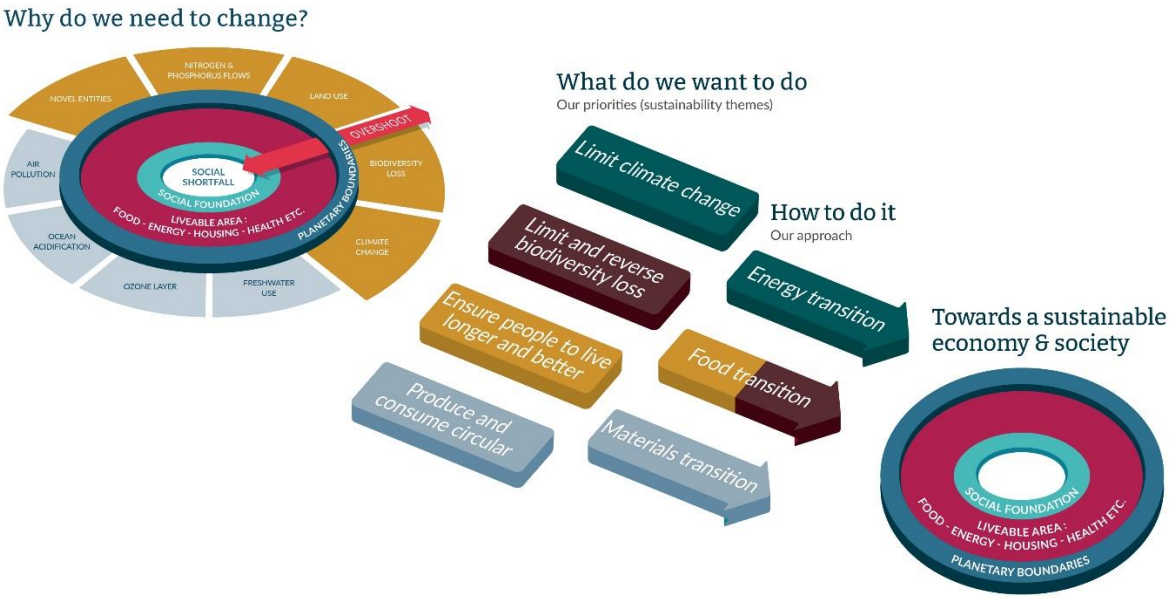

Figure 3: *from unsustainable to sustainable economy and society*

5. Main transitions for Van Lanschot Kempen

The energy, food and materials transitions are systemic changes impacting effectively all parts of the economy and society. These transitions are described in more detail below. Our primary focus will be first on the energy transition and the move towards a low carbon economy.

5.1 Energy Transition

The energy system is a vital part of our society and economy. Smil (2017) mentions that historically there were several energy transitions, which were pivotal for human development. From wood as main fuel to coal and later to hydrocarbons; and from people (i.e. human labor) in most of societies until the 19th century as prime mover to combustion engines.[39] The additional challenges in the current change in the energy system are twofold: the *pace;* and the *current dominant supply source* decrease.

Regarding the first additional challenge, the *pace* needed to become the dominant energy source in total energy supply took around 60 years (from 5% to around 40%) for coal and crude oil in respectively the 19th century and 20th century. If we want to go to net zero by the middle of this century to limit global warming to 1.5°C, then based on the Net Zero scenario of the IEA (as an indication), the share of renewables in the energy supply will need to go in less than 30 years, from 12% in 2021 to around 70% by 2050.[40] This means almost a doubling in percentage of share of energy supply within half the time, compared to previous energy transitions.

Regarding the second additional challenge, *current dominant supply source*, in contrast to earlier energy transitions when the dominant fuel changed in the fuel supply (wood to coal and coal to hydrocarbons), the fuel which was 'overturned' (first wood, then coal) declined in relative terms but still grew in absolute terms (see figure 4).[41] Based on the Net Zero scenario of the IEA (as an indication), in the current energy transition the supply of hydrocarbons will need to decrease in absolute terms with 80% compared to 2021. In relative terms, this is from around 80% of energy supply in 2021 to around 20% by 2050. When looking at the current climate policies scenario from the IEA, which would lead to around 2.5°C of global warming, then the absolute and relative supply of hydrocarbons will need to decrease as well, while energy demand is expected to increase with almost a quarter by 2050.

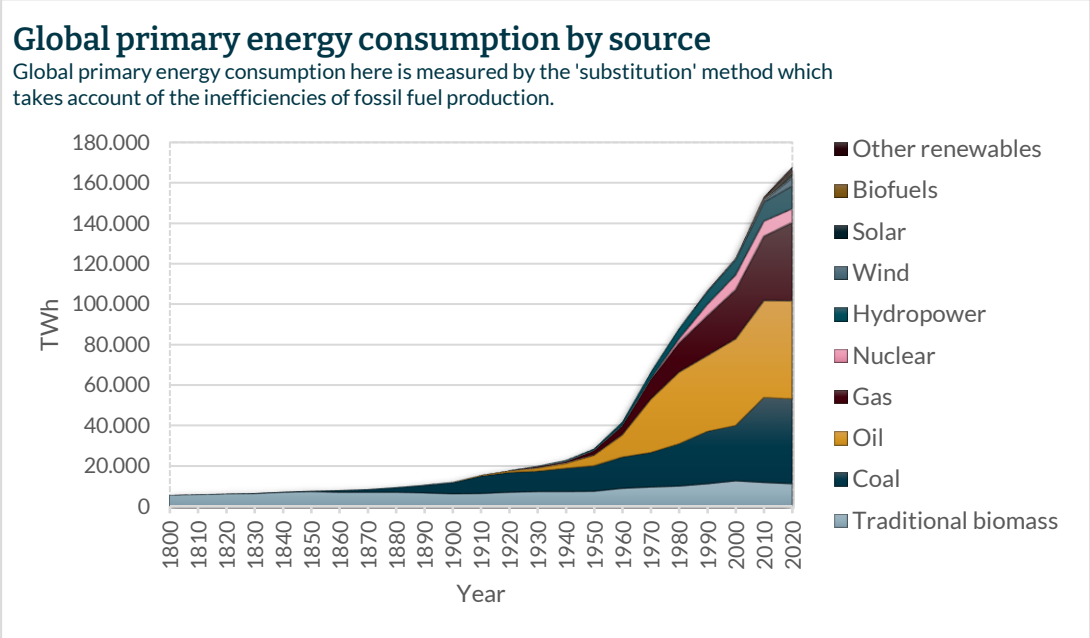

Figure 4: *global primary energy supply by source (Our World in Data based on Vaclav Smil 2017) and BP Statistical Review of World Energy*

Planetary boundaries

The energy transition is unprecedented but needed in order to move to a net zero emission economy and to limit global warming to well below 2°C, and preferably to 1.5°C. The energy system has a material impact on limiting climate change, and transforming the way we use and source energy is needed to limit global warming.[42] Although the negative impact on climate change appears to be the largest contribution by the energy system, it impacts other planetary boundaries as well – directly or indirectly. The direct impact can be seen via air pollution due to for instance transportation. It has indirect impact as climate change has a detrimental effect on the ocean via ocean acidification and biodiversity loss.[43]

Social foundation

The energy transition and move towards a low carbon economy may have a serious impact on people's social foundation, such as access to energy and affordability of energy, and income. Regarding the latter, people may be impacted due to the relocation of work from carbon intensive sectors to low carbon sectors.[44] According to the IEA, the energy transition is already transforming the landscape for energy employment, as more than half of the energy workforce is currently employed in clean energy. In all IEA's scenarios the new jobs created will outweigh the jobs lost in fossil fuel industries. The caveat is that the relocation may not be in the same places and the required skills will be different,[45] also underlined by IMF working papers.[46] Companies will be expected to take into account considerations about the transition of its workforce, and local communities, if fossil fuel activities will be divested. Investors will need to take into account social justice in the transition towards a low carbon economy. As a member of the Institutional Investors on Climate Change and participant of the collaborative engagement initiative Climate Action 100+, we support the inclusion of social justice as an element to assess and engage companies on their net zero emissions transition.[47]

Transition towards a net zero energy system

In the transformation to an energy system with net-zero emissions, countries and value chains will need to transition. As mentioned in the latest UNEP Emission Gap report, it does not require incremental sector-by-sector change, but wide-ranging, large-scale, rapid and systemic transformations.[48] When heading to a net-zero emission economy, McKinsey distinguishes 6 characteristics for this transformation: the transition is universal where relevant parts of the economy are involved; the additional annual capital spending on low emissions assets needed is significant with USD 3.5 trillion per year; and this spending is front-loaded (i.e. more investments now to accelerate the transition); the exposure to the transition is unevenly distributed where developing and fossil fuel-rich regions are more exposed; the transition provides risks and opportunities for businesses and countries. These characteristics show the material shift which is needed and the risks and opportunities the transition brings, not only for countries and companies but also for investors. Let's look into the transition related to countries, companies and investments.

Countries in the transition

Since the Paris Agreement was signed in 2015, more and more countries have set net zero targets. This has led to around 83 percent of emissions targeted for reduction under net zero commitments.[49] The increasing focus on net zero targets by countries has led to climate scenarios where global temperature ranges are around 1% lower.[50] Whereas a few years ago the world was heading towards more than 3°C global warming, currently the average global warming scenarios are around 2.5°C. As every degree of global warming counts towards having less detrimental climate impacts, this is a positive development.

On the other hand, the policies have not been enough to go to net zero and limit global warming to 1.5C.[51] The gap increased between 'what is needed to be on a net zero pathway by 2030' and to be 'net zero by the middle of the century'. Since last year on the COP26, where governments promised to strengthen their climate ambitions, countries appeared to not live up to these promises.[52]

Moreover, governments can use carbon pricing as a policy instrument to steer towards a low carbon economy, which is based on the 'polluter pays principle'. At COP27, the International Monetary Fund (IMF) called for a $75/ton carbon price needed by 2030.[53] Because the IMF estimates that the global average carbon emission price is currently no more than $5/ton, several institutions such as the Intergovernmental Panel on Climate Change and the Network for Greening the Financial System, estimate that a carbon price of more than $100 would be required to achieve the Paris Climate Agreement.[54] Expanding the global coverage of carbon price mechanisms would be a related challenge, as according to the World Bank just 23% of global greenhouse gas emissions are covered by a carbon pricing mechanism.[55]

Furthermore, although there seems to be decoupling between economic growth and GHG emissions for some countries, on a global level the two are still coupled. It appears that only in recessions do emissions fall on a global basis, as in the pandemic year 2020 (with approximately 5%).[56] Governments will need to come with additional policies and actions to go to net zero.

One can say that the lack of progress of ambition is due to the geopolitical unrest and global energy crisis, and that governments should focus on energy security and affordability. These are fair points and one should take into account all aspects of the 'energy trilemma', consisting of energy security, affordability and sustainability.

Nevertheless the global energy crisis appears not primarily being caused by focusing in on climate and net zero and lack of fossil fuel investments, but also due to the war, lack of investments in renewables[57] and dependency on fossil fuels as mentioned by the IEA.[58] We will need to distinguish between the short- and long-term. As analysed by the IEA, governments have taken short-term steps to cope with the energy crisis which also negatively impacts climate change, such as turning up coal power production. For the mid- to long-term though, policy responses by governments are fast-tracking the emergence of a clean energy economy. The US stimulates their clean energy sector with the Inflation Reduction Act, the EU has its RePowerEU plan and Green Deal, Japan its Green Transformation, and China and India have large renewable energy targets, with respectively 1,200 and 500 gigawatts of installed renewables in 2030.[59] This provides not only a large opportunity for growth and jobs, it can also lead to more energy security and affordability. Fatih Birol, the director of the IEA, states that the key solution to today's energy crisis and to get on track for net zero emissions is dramatic scaling up of energy efficiency and clean energy.[60] This decade is critical for delivering a more secure, sustainable and affordable energy system if strong action is taken. Then, investments in clean energy, electrification and modernised grids can offer cost-effective opportunities to decrease emissions.[61]

Companies in the transition

The energy transition and the move towards a net zero emission economy will probably impact virtually all companies and sectors to a certain extent. Although the impact per company and sector will differ, we opine that companies will need to be prepared for the transformation and look at their business models, governance, policies, reporting and actions. This would be reflected in (science based) targets where the transition of a company towards net zero emission activities would be reflected. We see momentum as by 2021 net-zero-by-2050 pledges covered 70% of the global economy, with around 1,500 companies and financial institutions, while the coverage was 16% in 2019.[62] The mid-term targets show that more ambition and action is still needed this decade. According to analysis from Roland Berger, the sum of the corporate targets would only lead to a 20% reduction of emissions by 2030, while a reduction of 43% is needed to be on the Paris Agreement goals pathway.[63]

Companies and sectors may fundamentally change in a transition. It is therefore insightful to look at the system level via demand and supply. In the energy transition and move towards a low carbon economy, the demand sectors are power, industry, transport and buildings. Energy, agriculture & forestry can be seen as supply sectors. The main developments and actions needed per sector are shown in table 1. In general, the table shows that all demand and supply side sectors need significant actions to transform to low carbon sectors towards the mid of the century, and that the current actions are not sufficient to achieve the intermediate 2030 ambition, as stated in the recent State of the Climate Action 2022 report.[64] Additional efforts will be needed this decade to keep up with the ambitions.

	Development and actions (needed) to move to net zero by 2050[65]	Progress on climate action to 2030[66]
Demand		
Power	- Electrification and switch to renewables; avoidance of fossil fuel infrastructure. - Decoupling economic growth and energy demand due to efficiency benefits of electrification and behavioral change (for all demand sectors). - Preparation grid for decentral and higher share of renewables.	*Indicators* carbon intensity, low share of fossil fuels and high share of renewables are not on track for 2030, although large steps taken.
Industry	- Strong and coordinated action on emissions reduction. - Improved energy and materials efficiency. - Increase share of electricity. - Scale-up and market green technologies currently in demonstration phase (e.g. green hydrogen).	*Indicators* increase share of electricity, carbon intensity of production, green hydrogen production are not on track.
Transport	- Switch to electricity, like battery-electric or hydrogen vehicles (road). - Move to both blending and direct use of low-emissions fuels, like biofuels and hydrogen (aviation and shipping).	*All indicators* related to road, aviation and shipping are not on track.
Buildings	- Expanding the role of electricity in cooking, water heating and space heating. - Improving energy efficiency and behavioural change. - Managing the up-front capital costs for end consumers to retrofit equipment.	*Indicator* energy intensity of building operations is not on track (other indicators have insufficient data).
Supply		
Energy	- Global energy mix profound shift from hydrocarbons to low carbon sources such as electricity, hydrogen and biofuels. - Decoupling economic growth and energy supply due to electrification, energy efficiency and behavioural changes.	n/a
Agriculture & forestry	- Producers deploying emissions-efficient farming practices. - Consumers shifting their diets away from ruminant animals which generate (material quantities of) methane. - Increase production of energy crops to produce biofuels. - Stop deforestation and to accelerate restoration of forests and other natural environments.	*Indicators* on reforestation, ruminant meat productivity and consumption and crop yields are not on track.

Table 1: *development, actions and progress on climate action*

Investments

The investment needs to transform the energy system and move towards a low carbon economy are considerable, although based as percentage of GDP appear to be manageable.[67] According to the IEA, the current clean energy investments are approximately USD 1.3 trillion per annum and should increase threefold to USD 4.3 trillion annually.[68] A large part of this increase would be for renewables, electrification (including infrastructure) and energy efficiency.

The estimated investment gap of around USD 3 trillion per annum was also concluded by McKinsey in their analysis on what amount of investment is needed to go to net zero. The additional annual investment is somewhat higher, USD 3.5 trillion until 2050, which would relate to an average approximately 2.8% of GDP. Although the investments seem substantial, as percentage of GDP they seem manageable, also as such investments can lead to (future) benefits like job creation[69] and a more livable planet. When one takes into account the additional costs involved due to climate change when no additional climate actions are taken, the case becomes stronger. The IMF state in its latest World Economic Outlook that the effect on economic growth is manageable (0.15-0.25%) when climate policy

is implemented soon and credible, and the costs are dwarfed by the innumerable long-term benefits of arresting climate change.[70] This appears to be underlined by the Network of Central Banks and Supervisors for Greening the Financial System as well, which estimate that the annual negative impact on the economy would be around 4% less by 2050 for a net zero scenario compared to the 'current policy' scenario.[71] Investing sooner rather than later to prevent climate change seems to be the best strategy forward.

Opportunities and challenges

The transition to a low carbon economy requires fundamental changes which comes with challenges and opportunities. The opportunities include the following:

- *Investment needs in electrification and renewables*: as stated in the previous section, to achieve net zero emissions, (much) larger annual investments are needed in renewables and electrification. The scale will need to go up and the costs of renewables have come down the last years. Although last year prices went up. Nevertheless, clean technologies in the power sector remain the most cost-efficient option for new power generation in many countries, even before taking account of the exceptionally high prices for coal and gas seen in 2022.[72]
- *Investments in (other) demand and supply sectors:* next to the power sector, demand for net zero offerings for demand and supply sectors could, according to McKinsey, generate more than USD 12 trillion of annual sales by 2030. These include highest estimates for buildings (between USD 1.3 trillion – USD 1.8 trillion) and transport (between USD 2.3 trillion - USD 2.7 trillion).[73]
- *Demand to scale-up (new) technologies and markets:* some technologies which are expected to play an important part in the transition will need to scale-up. These include (green) hydrogen and carbon capture and storage. For example, in the Net Zero scenario from the IEA the investment needs would be around USD 200 billion per annum until 2050.[74] Furthermore, in most 1.5°C scenarios negative emissions will be needed. Next to carbon capture, carbon removal techniques to remove carbon emissions from the atmosphere, like nature based solutions, are still in an early phase with the expectation to grow substantially the coming decades.[75]

The challenges we see include:

- *New dependencies on minerals due to clean energy:* the energy transition with the rise of electricity and clean energy also poses new challenges to supply chains. Critical mineral demand rises in the basis scenario from the IEA from 7 Mt in 2021 to 13 Mt in 2050, and in the Net Zero scenario it grows to 20 Mt in 2050. Critical minerals like copper (grids), silicon (solar panels), rare earth elements (wind turbines) and lithium (battery storage) are all expected to double or triple (even 50-fold for lithium in the Net Zero scenario) to keep up with demand. The sharp increase in demand poses risks to the supply chain as only a few countries mine and process these minerals. Some of these countries can be seen as strategic system rivals and autocracies.[76]
- *Technology needs to scale up:* some sectors do not have net zero technologies on a sufficient scale to decarbonize it's products such as steel and cement. Scaling up technologies, including additional investments, like (green) hydrogen will be needed to decarbonise.

5.2 Food Transition

Food is another important requisite for societies to sustain and develop. The global population could not have reached 8 billion without earlier food transitions, of which intensification of regular crop rotations and better ways of field preparations and new ways of grain harvesting (from a reaper to first combines) are important contributors. But fertilizers were key to increase food production for the growing population, especially since the second half of the last century.[77]

Planetary boundaries

The transition of the global food system would be for several planetary boundaries, such as biodiversity loss, land use and climate change, one of the most important system change to stay withing boundaries.[78] In its report on biodiversity and food, MSCI states that the food production system is the primary human activity responsible for biodiversity loss.[79] An assessment by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services identified five key drivers of biodiversity loss: land and sea-use change, climate change, overexploitation of natural resources, pollution and invasive alien species.[80] As MSCI states, the intensification of agriculture to produce more food at cheaper prices has played a critical role in increasing biodiversity loss across all the main drivers.[81]

While the food system leads to adverse impact on biodiversity, we are at the same time dependent on the food that nature provides us. A growing population in combination with increasing standards of living have resulted in a food production system with negative externalities in which natural resources are being depleted, the environment is being polluted and farmers can be marginalised. Working with ecosystems is important for the food system. Having a variety in animals, plants, fungi and microorganisms is crucial to maintain an ecosystem. In contrast to the Paris Agreement to limit climate change, there has been no overarching objective for biodiversity yet, although there have been annual conferences to come with such targets – without results until now.[82]

The negative impact on our ecosystems may impact our economy and financial markets as well. Although exact numbers are difficult to obtain and will need to be treated with caution, there have been some estimations on the potential impact. According to the World Economic Forum, around half of the world's GDP, approximately USD 44 trillion, is moderately or highly dependent on nature and its services.[83]

Social foundation

The food transition may have serious impact on people's social foundation, such as on their health and access to food. Transforming food systems is important for ensuring healthy diets and food security. Imbalanced diets which are low in fruits, vegetables and whole grains, and high in red and processed meat are a leading health burden in most regions. They are responsible for more than one in five premature deaths globally. Additionally, around 2 billion people are overweight and obese, while about 800 million are suffering from hunger.[84] In line with the transition to a low carbon economy, we opine that the food transformation will need to be just as well and improve the livelihood of these people. Although due to the current crises the risks of disrupting food systems and increasing costs of foods appears to be present.

The transition may also lead to jobs lost and gained. For instance, in one estimation of a net zero transition scenario around 34 million jobs would be lost, mainly due to diminished production of ruminant meat, while 61 million jobs would be gained, largely due to increased production of energy crops and poultry. The overall gain of jobs would be around 4% of the around 720 million of direct agriculture jobs today.[85]

Transition of producing food: taking inspiration from old age practices

Whereas crop rotation used to be the most prevalent agricultural practice, the past decades farmers increasingly started to specialise on one or a limited amount of agricultural commodities. The most common agriculture practice to date is monoculture broadacre farming. The reasons were simple, more efficient planting and harvesting, fewer types of expensive equipment, fewer labourers with specialised knowledge of individual crops, and strengthened knowledge of one value chain and commercial market.[86] However, with the increased reliance on one crop also comes the increased reliance on pesticides since there are no non-monoculture type of plants to limit the spread of diseases and no animals that control pests through predation. This in turn leads to pollution which decreases the variety of animals, plants, fungi and microorganisms in and around the land which are crucial to maintain an ecosystem. Furthermore, growing one crop year after year will lead to reduced availability of certain nutrients and the exhaustion of land. Currently, 40% of our land is degraded, mainly caused by the way we produce our food.[87] The expectation is that agriculture production will increase to 2030, thereby also leading to increasing greenhouse gas emissions.[88]

We belief that the food systems will need to transition which includes more sustainable agricultural practices in which we not only extract nutrients from the ground, but feed the land in a way that the land can feed us. More diverse and nutritious production systems will be needed. Think of crop diversification, combinations of annuals and perennials, sustainable intensification, crop rotation and agroforestry. In addition to focusing on more diversified crops, other agricultural practices could be adopted to further restore and maintain the biodiversity in and around the land. These methods include no-dig methods which keeps soil structure intact, cover crops to provide soil protecting during periods of no crop production and reducing or eliminating the use of pesticides to limit their negative impact.

Transition of consuming food: more plant-based protein

Besides making the production more sustainable, food consumption will need to change as well in the food transition, while it is expected that global consumption will increase as mentioned in the joined OECD-FAO report.[89] The challenge around the role of livestock in our food consumption is known as the feed-food competition. Do we focus on using lands, crops and wild fish for feeding humans or feeding livestock? Currently, 98% of our soybeans production is used for animal feed[90] whereas this crop would also be suitable for human consumption. Most of our agriculture land is used for raising livestock. If the world would adopt a plant-based diet, we could reduce global agricultural land use from 4 to 1 billion hectares.[91] Furthermore, animal products have a large impact on several planetary boundaries, as analysed by Denkwerk and shown in figure 5, with differences of 100x between animal and plant based impacts. Food from animals is responsible for around 50% of the greenhouse gas emissions and 75% of land sue via the global food production.[92] Switching animal protein to vegetable protein can have large potential in lowering our impact on natural resources, emissions and land use. Another transformations that can facilitate the food transition is by motivating consumer to buy more local and seasonal products.

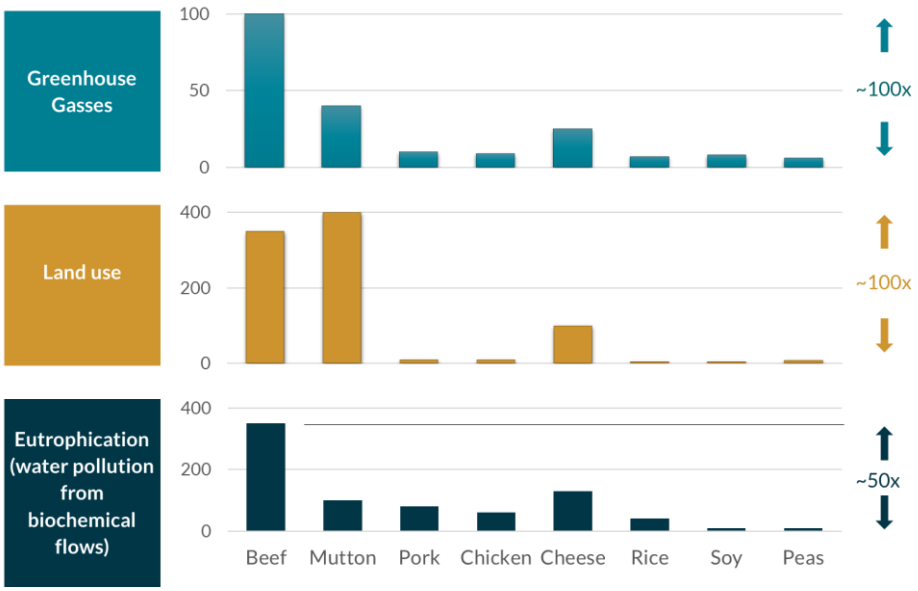

Figure 5: *impact of animal products on greenhouse gas emissions, land use and eutrophication. The combination of three factors causes loss of biodiversity; for this planetary boundary, the impact of animal products is also factors larger.*

Transition of supply chains

The food supply chain comprises of all the stages that food products go through, from production to consumption. This supply chain has extended and become more fragmented with products traveling large distances and many products being cold stored for months before making it to the supermarket. The longer the value chain, the more food gets wasted. Each year, 1.6 billion tons of food worth about USD 1.2 trillion are lost or go to waste; one-third of the total amount of food produced globally.[93] Next to the food waste, long supply chains often have a larger CO_2 footprint. Furthermore, the food supply chain accounts for approximately 50% of pressure on biodiversity.[94] Making supply chains more efficient, for example by limiting food waste, and reducing the distance from farm to table can be necessary transformations in our food supply chain to return to our safe operating space within our planetary boundaries.

Investments

When looking at the food transition, investments are needed to transform the food system and avoid biodiversity loss and global warming. According to the OECD, embedding biodiversity in the financial sector can provide significant investment opportunities, including in activities to support a transition to more sustainable practices, such as sustainable land-use. Biodiversity action also requires unlocking investment in activities dedicated to biodiversity restoration and conservation. An analysis puts the biodiversity finance gap at USD 598 to 824 billion per year.[95] Furthermore, more than USD 60 billion of annual investments would be needed to enable more emission efficient farming.[96]

5.3 Materials Transitions

The worldwide materials extraction needed for our economy has increased considerably during the last decades, as shown in figure 6. While materials consumption localised for most of human history, from the industrial revolution technologies were developed and stimulated demand and transport materials globally. Due to rising populations, growing incomes and new technologies, the billions of tonnes of materials tripled from the 1970s to 2019, with the rate of growth accelerating to almost 100 billion tonnes by 2019.[97] The growth rate of resource extraction outpaces improvements in efficiency and in end-of-use recovery by a factor of two to three.[98]

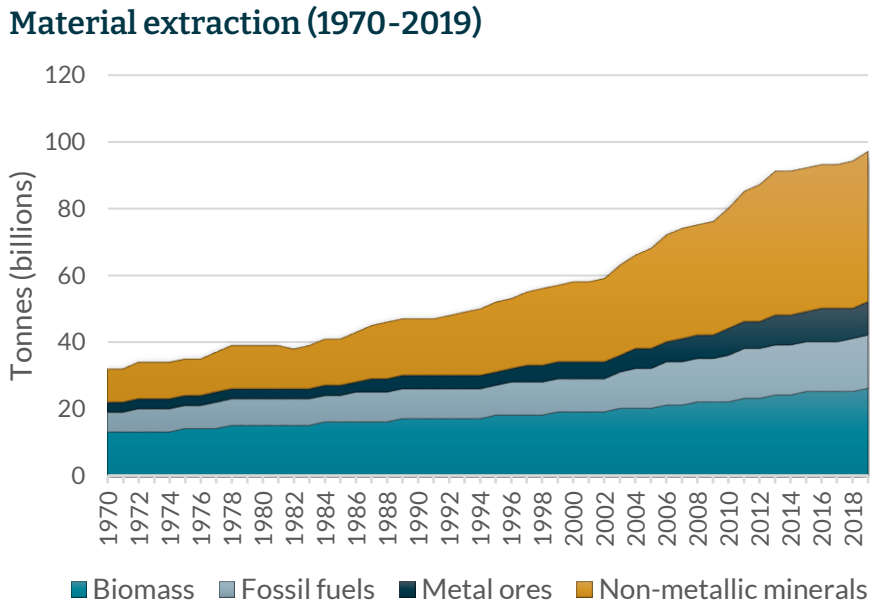

Figure 6: *global materials extraction*[99]

Planetary boundaries

The materials society extracts for production and consumption is putting pressure on several planetary boundaries, depending on the product. Concrete has a large impact on climate change, electronics on biodiversity and wood furniture on land use.[100] The extraction and processing of primary materials, such as fuels, metals and food, accounts for more than 90% of global biodiversity loss and water stress impacts and around 50% of global greenhouse gas emissions.[101] Society only recycles about 9% and around 90% of the materials humans use is waste. It shows that the linear approach of producing and consuming is (still) dominant. When the current path continues, projections of material extraction stated in the Circularity Gap Report expect an increase by 70% by 2050, see figure 7. [102]

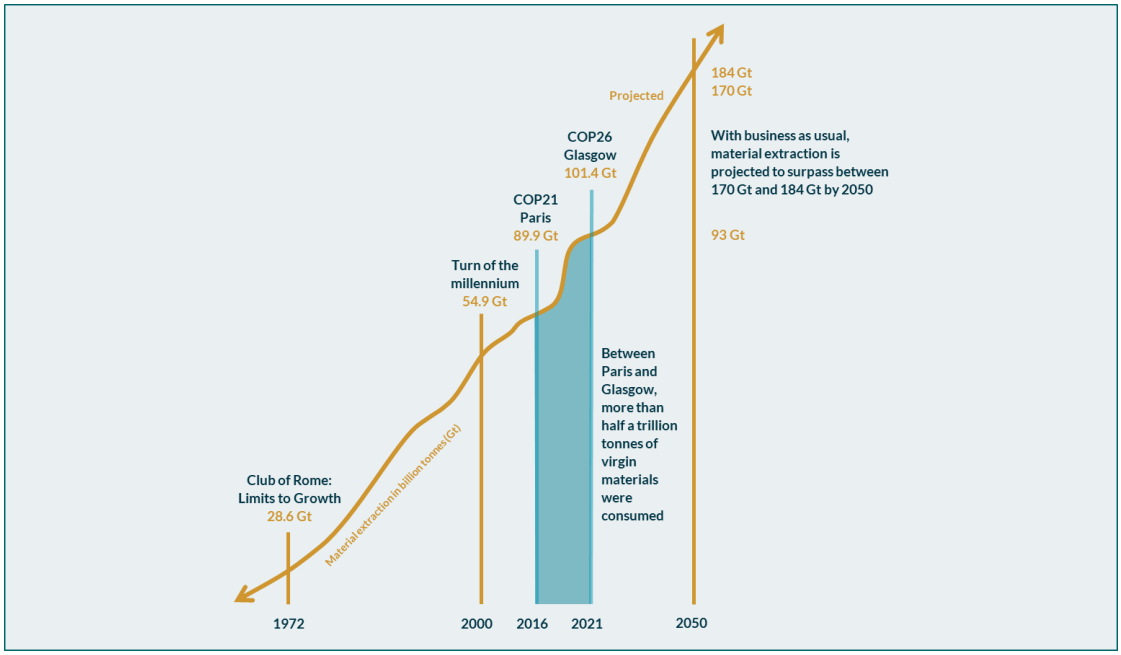

Figure 7: *global materials extraction*[103]

Social foundation

The materials transition may have impact on people's social foundation, such as to decent jobs. For instance, the EU estimated that applying circular economy principles across the economy would have the potential to not only increase GDP but also to create around 700,000 new jobs. Furthermore, when less materials would be extracted, the exposures to environmental and social issues will probably decrease.

Transition to circular production and consumption

The current trend is not sustainable and we belief that the economy and society will need to transition to a more circular way of producing and consuming, where we use less materials, use it longer, differently and circularly. How circular use would look like is shown in the Denkwerk report on transitions and can be found in figure 8.[104]

Although the material transition has interlinkages with the energy transition and climate change, the latter seems more developed as there is a global objective (Paris Agreement and shift to low carbon system), with regulation and targets by governments, companies and financial institutions; public awareness and scrutiny. The material transition can learn from the energy transition, as some of the same challenges occur as mentioned by Wood MacKenzie[105]:

- *Changing societal preferences*: increasing concern of material excavation on environmental and social issues (e.g. unsustainable sand extraction, child labour in mines).
- *Political and regulatory response*: bans on products like plastic bags or waste and scrap imports (China; and regulation such as EU Single-Use Plastic Directive and (China) waste.
- *Technological innovation*: redesigning products to reduce materials impact; investment in new waste management technologies (e.g. chemical recycling).
- *Reorganisation of value chains*: consumer brands partnering with waste management companies to source 'feedstock' inputs into packaging.

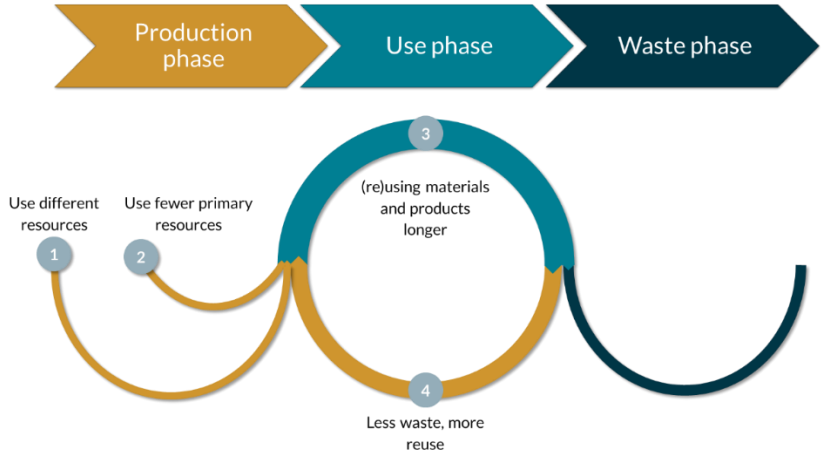

Figure 8: *circular use of materials*

Investments

The materials transition that applies circular-economy principles, can lead to lower-impact ways to produce materials and not only reduces material extraction and use, but it can also help to realise global net zero goals. The materials transition provides, next to environmental gains, growth opportunities. Look for instance at Europe, the region with the most concrete circular policies. As stated by the Ellen Macarthur Foundation, the expected benefits of adopting circular economy principles in Europe in mobility, food and built environment could offer annual benefits EUR 1.8 trillion in 2030.[106] The European Commission also stressed the opportunities a shift towards a circular economy would bring. Applying circular economy principles across the EU economy would have the potential to increase GDP by an additional 0.5% by 2030. Furthermore, this could be interesting for companies as manufacturing firms in the EU spend on average about 40% on materials. Closed loop models can increase their profitability, while sheltering them from resource price fluctuations.[107] This could be interesting for companies active in different value chains. The EU Circular Action Plan focuses on key product value chains: electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food, water and nutrients.

One of the main risks is the lack of concrete (global) policies and targets to accelerate the materials transition. Compared to the energy transition, these policies and objectives for the materials transition are lagging. Although some regions like the EU have ambitions to become circular with a circular economy action plan as one of the building blocks of the European Green Deal is to become climate neutral.[108] Regulation can be a key driver[109] and governments can use several instruments to accelerate the transition via norms, pricing and stimulation:[110]

- *Norms*: as mentioned in the previous paragraph, governments can set norms for sectors and companies to accelerate the transition, such as giving guidelines for eco-design or banning certain products to change behavior and stimulate innovation. For instance, the EU has packaging recycling targets (65% by 2025 and 70% by 2030)[111]. Ideally governments will set an international objective such as what was done for climate change with the Paris Agreement goals.
- *Pricing*: as with other transitions, internalising the externalities can give incentives to companies and consumers to change their behavior and change production and consumption patterns. The idea behind pricing externalities is that the polluter pays.
- *Stimulate*: giving subsidies or facilitating investments into new circular business models and products.

6. How we help our clients to navigate through transitions

The long horizon and continuous character of transitions sits well with Van Lanschot Kempen. From the founding of our company almost three centuries ago, we have been focused on solutions and possibilities. This is essential for understanding and moving with the fundamental changes of our time like the three transitions. As societies and economies transform, we help clients *navigate* through these transitions.

With our solutions for our clients we help them to invest through the transitions. By continuing with the transition towards a net zero economy, we focus our efforts. Where we take into account financial value and sustainability value, the latter for instance via the reduction of greenhouse gas emissions of investment portfolios. In parallel, we will also start with the other transitions as well and will work these out in the coming years.

Energy transition toward a net zero emission economy

We play an active role in the transition towards a net zero emission economy. This is done through various ways:

- Van Lanschot Kempen has sustainability integrated in its strategy and was one of the first Dutch wealth managers with a net zero commitment by 2050 and related climate policy.[112] These includes short-term targets and mid-term objectives by 2025.
- We will (re)allocate capital from our clients to opportunities the transitions bring, via our own investment funds and via external managers.
  - We apply extensive climate risk modeling and scenario analyses to determine the impact of climate change and the three transitions on the risk and return characteristics of our clients' investment portfolios. For example, we apply data-driven modeling of physical climate risks (due to e.g. floods and hurricanes) to assess risks for real estate and infrastructure investments. And we model risks for the equity markets from developments in carbon pricing.[113] We have also developed both short term and long term climate scenarios to stress test portfolios and to assess the impact of climate developments and regulation on long term expected returns.
  - We have climate goals for our own (listed) investment funds to move to a net zero economy.[114] We invest in the companies which are able to move towards a net zero economy. At the same time, we want to avoid the companies which do not want to move in the energy transition. We therefore integrate climate and energy transition into our investment processes and are continuous looking to enhance our processes.
  - We invest via our own and external funds in impact solutions, to invest in needed infrastructure and renewables. For instance, our Global Impact Pool invests in clean energy projects and the circular economy (the latest impact report can be found here).
  - We advise and help our institutional and private clients to decarbonize their portfolios to transition to a low-carbon economy. For instance, we have developed custom-made equity benchmarks in cooperation with MSCI to limit carbon intensity and to limit the impact of climate risks on our clients' equity portfolios. But we are also expanding this approach to other asset classes, such as investment grade corporate bonds, high yield bonds and emerging markets debt. In all these instances, we carefully balance risk reduction with maintaining return potential, while at the same time ensuring sufficient diversification.

- Via our active ownership approach we use our influence via our investee companies and fund managers. We engage with them to support the transition to a low carbon economy, including on their targets to be(come) aligned with a net zero pathway.
  - Via our listed internal strategies, and for some non-listed strategies as well, we engage with investee companies to transition to a low carbon economy. Concrete engagements can be found here.
  - We are a member of the Institutional Investors on Climate Change and participant of the collaborative engagement initiative Climate Action 100+.
- We support our private clients with making their houses more sustainable via our mortgage lending solutions.[115]
- In investment banking we advise corporate clients in infrastructure and renewables about the energy transition.

This white paper is written to set the 'transition' scene and we will follow-up with more in-depth research in 2023. While our first focus is on the energy transition, we will work out the food and materials transition as well (mainly) in a later stage. It does not mean that we are not already acting on these transitions. For instance, around the food transition we offer clients the opportunity to invest in the Kempen SDG Farmland Fund, which invests in farmland with the intention to improve it and to provide a long term return for investors (the interview with the fund managers can be found here). We will provide more details in our 2023 white paper(s).

7. Summary

- The world is crossing planetary boundaries and impeding social foundations, leading to pressure on society for current and future generations.
- We will need to transition towards a sustainable economy. We see three main transitions that we will focus on: energy transition, food transition and materials transition.
- Van Lanschot Kempen is well positioned with a long-term value creation view to navigate its clients through these transitions.
- To be effective and have impact as a wealth manager, focus for us is key, leading to most attention on climate change and energy transition first.

Textbox: relation transitions with mega trends and Sustainable Development Goals

The transitions are related to other interpretations to grasp a changing world, like the Sustainable Development Goals (SDGs) and mega trends. We broadly sketch the relations.

Transitions and SDGs

The Sustainable Development Goals are seventeen goals established by the United Nations in 2015. These objectives include several sustainability themes focused on planet, people and prosperity. We support these goals and focus on the ones mentioned below. The relation between our SDGs, transitions and sustainability themes can be found below. As with the transitions, SDGs are interrelated and related to other sustainability themes and transitions in addition to the ones mentioned behind each SDG.

Transitions and mega trends

We see four mega trends with worldwide long-term forces which cause structural shifts in society:

- Transition to a sustainable society: production processes without fossil energy and new energy-infrastructure.
- Technological renewal: automatization and robotization, artificial intelligence and Internet of Things.
- Social-demographic changes: growth and aging of world population, urbanization and growing middle class in emerging markets.
- Multipolar world: shift from a world with several centers of power of countries with their own political and economic views.

Our three focus transitions are primarily related to the mega trend transition to a sustainable society. Although we see that the other mega trends relate to the transitions as well. Digital technologies have the potential to accelerate the clean energy transition via for instance integrate increasing shares of variable renewables and improve the reliability of grid.[116] Demand on food and energy will be affected by the growing population the coming decades, while the shift to a multipolar world may impact (global) supply chains such as critical minerals, which are important in clean energy.

Sustainable Development Goals	Sustainability themes	Transition
Affordable and clean energy	Climate change	Energy transition
Life below water	Biodiversity	Food transition
Life on land	Biodiversity	Food transition
Decent work and economic growth	Produce and consume in a circular manner	Materials transition
Responsible consumption and production	Produce and consume in a circular manner	Materials transition
Good health and wellbeing	Living better for longer	Food transition

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Additional information

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