Earth for All:
A Survival Guide for Humanity

EXECUTIVE SUMMARY

September 2022

Earth 4All

Earth4All

Earth4All is an international initiative to explore how to achieve wellbeing for all within planetary boundaries this century.

We were established in 2020 by The Club of Rome, the Norwegian Business School, Stockholm Resilience Centre and the Potsdam Institute for Climate Impact Research.

Earth4All builds on the legacies of The Limits to Growth and the Planetary Boundaries frameworks. We are rethinking our economic systems for a safe, secure and prosperous future in the Anthropocene.

At the heart of the analysis are two complementary intellectual engines that have allowed us to explore and develop bold proposals for the 21st century: the Transformational Economics Commission (TEC) and the system dynamics model Earth4All.

The book, Earth for All: A Survival Guide for Humanity was published in September 2022. The book is supplemented by a series of deep-dive papers.

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SUPPORTING DEEP DIVE PAPERS

(available at www.earth4all.life)

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Anders Wijkman, Chair of the Governing Board, Climate-KIC, Honorary President, The Club of Rome.

An extraordinary book at an extraordinary time. For today and tomorrow's leaders, Earth for All is a must-read. This book offers a concrete, breakthrough vision on how to ensure wellbeing for all — in any country — on our finite planet. Together, we can build a world that is genuinely equitable by following the 5 Turnarounds — a roadmap to accelerate the realization of the Sustainable Development Goals in the next decade. I hope it will inspire a new movement of minds and souls that are willing to save our precious humanity.

Ban Ki-moon
8th Secretary General of the United Nations,
and Deputy Chair of The Elders

PHOTO CREDIT UN-MARK GARTEN

A recalibrated set of lenses to explore the challenges of our generation: global equity and a healthy planet. A map to explore, dive deep and inspire. A must-read for any policymaker who values our future, as well as for corporate leaders, responsible investors and the general public worldwide. "Earth for All" is a call for action and a movement to infuse social and political change for the common good. "Earth for All" is inspired by the legacy of "The Limits to Growth" but it goes well beyond that. It provides a guide to leapfrog into the future most of us long for. This is the tale of our time. A story not to be missed.

Teresa Ribera
Deputy Prime Minister for the Ecological Transition,
Government of Spain.

Earth for All conclusively shows that humanity's future on a liveable planet depends on drastically reducing socio-economic inequality and a more equitable distribution of wealth and power. Essential reading on our long journey toward an "Earth for All" society.

Thomas Piketty
Author, Capital in the Twenty-First Century
and A Brief History of Equality

If we'd paid attention to The Limits to Growth in 1972, we wouldn't be in the fix we're in today; as the modelling in this book makes clear, what's left of this decade may be our last best hope to get it at least partly right.

Bill McKibben
Author, The End of Nature

PHOTO CREDIT STORYWORKZ

Contents

Breakdown or breakthrough

The shocks keep coming. It is obvious to most that despite unprecedented wealth, societies remain extremely vulnerable to economic, health, humanitarian, geopolitical and environmental shocks. This century, societies will face long-term existential threats on a scale never before experienced. These will come on top of inevitable short-term shocks.

Where are we headed? This was summed up succinctly by the United Nations Secretary General António Guterrres: "Business as usual could result in **breakdown** of the global order, into a world of perpetual crisis and winner-takes-all... or we could decide to change course, heralding a **breakthrough** to a greener, better, safer future for all."

How can we possibly navigate this century as a collective of interlinked, interdependent societies? As a civilization? Can we upgrade and transform our failing economic operating systems and come out stronger, more resilient than today?

In 2020, a unique economic foresighting initiative Earth4All set out to answer some of these questions. The full analysis is published in a book *Earth for All: A Survival Guide for Humanity*, September 2022.

The analysis focused on two possible scenarios – breakdown or breakthrough – for the world this century to 2100:

Too Little Too Late

A scenario that explores the path of economic development and unsustainable consumption if they continue on the same course as the last forty years. Will political dysfunction and perpetual crises deepen, or is there a light at the end of the tunnel?

Giant Leap

A scenario that explores a path where societies make extraordinary decisions and investments now that enhance social cohesion, build trust and establish, essentially, a new social contract between people and the state. What if societies start to invest to truly value our collective futures on Earth, and beyond?

We conclude that humanity is ill-prepared to deal with approaching known threats: dysfunctional polarisation, food and energy security, climate change and ecological collapse.

Unless there is truly extraordinary action relative to the previous 40 years, we are entering a generation of declining human wellbeing in many places. Over the next 30 years the world will experience sustained poverty, rising inequality, growing social tensions and climate shocks. Societal breakdown in vulnerable nations and regions cannot be ruled out. Without efforts to improve social cohesion, the concerning trend of "democratic backsliding" on all continents is likely to continue, with increasing risks of countries slipping into authoritarianism. As national and regional tensions rise, it will be more difficult to address climate and ecological crises.

We also conclude it is possible to be optimistic about our future on Earth. It is possible to transform to wellbeing economies – and improve wellbeing for all on a finite planet.

In order to achieve this *Giant Leap*, **five extraordinary turnarounds** are needed to build societal cohesion. If we act now, with the largest effort and investment in this decade, then within a single generation we can achieve many of the sustainable development goals, and we can build societies that respect planetary boundaries. This future will be built on a new social contract between government and citizens to upgrade the economic system. It will be built upon;

- **cathedral thinking – long-term and intergenerational**
- **reshaped markets and an upgraded global financial system**
- **circularity and regeneration**
- **new ways of thinking about property rights so that all benefit from the global commons.**

An essential starting point is for governments to adopt new economic indicators that value the future. We need to move beyond a singular focus on GDP growth. We need indicators that really define long-term prosperity, economic dynamism and innovation. This is not some impossible utopia. Rather, it is about building fair, accountable and resilient democratic societies able to deal with the shocks and existential threats coming our way.

Earth4All's key messages

Key message #1:

Earth for all is possible. It is possible for all to have a high standard of living within the limits of the planet.

Key message #2:

The current economic system is destabilising people and planet.

Despite unprecedented wealth, societies remain extremely vulnerable to health, humanitarian and economic shocks. This century, societies will face long-term existential threats on top of inevitable short-term shocks.

Key message #3:

The gap between rich and poor will keep growing ever wider in the coming decades unless action is taken to address it. We can expect rising social tensions. ***Destructive levels of inequality and the growing climate and ecological emergencies will likely be major contributors to rising social tensions.*** High levels of inequality reduce trust and undermine social cohesion. This will make it more difficult for democratic governments to deal with rolling shocks and existential challenges like these planetary emergencies.

Key message #4:

On current paths, global average temperature is likely to hit a catastrophic 2.5°C this century. This significantly exceeds the target stipulated in the UN Paris Agreement on Climate. This brings severe risks to all societies. Earth's resilience – its capacity to respond and rebound from shock – is reducing each decade as a result of inaction to protect the climate and biosphere. Even today, human activities have pushed Earth into the danger zone for tipping points relating to the Greenland ice sheet, the Antarctic ice sheet and permafrost. When climate heating passes 1.5°C there is a higher risk of crossing multiple unstoppable, self-reinforcing tipping points. Without immediate action, future generations will have to cope with a dangerously destabilising climate system.

Key message #5:

The faster we act, the better. Humanity's future on Earth will be vastly more peaceful, more prosperous and more secure if societies do everything in their power to transform economic systems this decade than if they do not. If current efforts are not accelerated dramatically in this decade, continued poverty and rising climate change will risk deep societal problems in vulnerable regions of the globe. Societal collapse cannot be ruled out in vulnerable regions, with destabilising impacts spilling over globally.

Key message #6:

The transformation to ***"wellbeing economies" is likely to be disruptive.*** The world has passed the point where incremental transformation is possible. Solutions must be fair and just, or they risk rejection.

Key message #7:

It will take ***five extraordinary turnarounds*** relating to poverty, inequality, gender empowerment, food and energy. These extraordinary turnarounds amount to a full-scale economic transformation.

Key message #8:

The economic transformation is affordable. The investment needed to build a more resilient civilization is likely to be small: in the order of 2-4% of global income per year for sustainable energy security and food security. Costs will be highest during the first decades after implementation starts, and then decline.

Key message #9:

The economic transformation requires strong, active governments to reshape markets and invest in long-term infrastructure projects. The process will build trust, create millions of jobs and drive innovation and economic progress.

Key message #10:

Over-consumption in high-income countries must be curbed and global consumption patterns shifted towards circular and regenerative models. Material consumption among high-income takers is a major driver of climate change, ecosystem decline and pollution and makes it increasingly difficult for poor people to enhance their living standards. Policies must be implemented to provide sufficiency for all by redistributing wealth and lowering the material footprint of the rich and enhance the shift towards smart natural resource use, circularity and regenerative solutions in low, middle and high income countries.

Key message #11:

Wealth must be redistributed more fairly to address inequality. This will enhance societal cohesion and build trust in governments to reshape markets and invest in the future. We advocate that policies are introduced to ensure the richest 10% take less than 40% of national income by around 2030, and efforts to reduce inequality even further are implemented beyond this date.

Key message #12:

We have reached a positive social tipping point. Citizens are ready for change. Our global survey of G20 countries found that 74% of people support reform of economic systems away from a singular focus on profit and growth towards a stronger focus on human wellbeing and the planet.

Major coalitions and political initiatives are emerging that indicate a new worldview is forming and this is driving transformation. These include the Wellbeing Alliance of countries, Europe's Green Deal, the U.S New Deal, a proposed Global Deal and China's Ecological Civilization. The need now is to scale up a major advocacy and public campaign to build larger coalitions and drive the conversation on economic systems change.

Overcoming inertia

Building strong political coalitions: Citizens' assemblies for economic systems change

Inertia and polarisation in many societies are preventing governments from acting at the speed and scale needed to fulfil their most fundamental of roles: protecting their citizens, present and future, from harm. A promising approach to find common ground around the challenge of economic systems change is through citizens' assemblies. Citizens' assemblies have helped divided communities navigate contentious issues. They bring new voices to the table and can enhance democratic processes. We advocate for citizens' assemblies focused on economic systems change to help navigate political resistance to transformation and to find solutions that work for the majority not the few.

The scale of the challenge

It is now 50 years since the UN's first Earth Summit

In 1972, the UN convened the Conference of the Human Environment in Stockholm, a significant milestone in political acknowledgement of existential risks to humanity linked to global scale environmental destruction. In advance of the conference, *The Limits to Growth* report was published. Using one of the first system dynamics computer models, the authors suggested that exponential growth in material use, population and pollution, risked profoundly destabilising societies later in the 21st century. This conclusion contributed to the foundational thinking of the UN's first Earth Summit and is still valid today. In the last fifty years consumption patterns have only grown, inequality has increased, and we are exceeding the carrying capacity of the planet. The wealthiest have by far the most out-sized footprint. As outlined in one of *The Limits to Growth* scenarios – social and environmental crises are now converging

Instead of an economy designed to create economic security, support human progress, uphold democracy, improve health and wellbeing, and enhance the stability of Earth, we have the opposite. The system undermines democracies, destroys the fabric of societies, and plunders finite natural resources *by design*. The system prioritises short-term profits, and short-time horizons over everything else. The fault lines are now clearly visible – social instability, environmental instability, and a financial system that fails to value what matters: our collective future. This is driving chronic destabilisation. We are now living through a planetary emergency.

Economic systems failure #1: destabilising societies

By design, the dominant global economic system creates ever greater inequality due to the simple fact that wealth accumulates faster than economies grow (and much faster than the incomes of the middle classes). Deep economic polarisation due to inequality has a destabilising influence on democratic societies making it difficult to make long-term decisions that benefit the majority of people. Without intervention, the chasm between the small minority of wealth holders and the rest of the world will keep growing ever wider. Each decade of delay to address this imbalance, inequality rises further, exacerbating social and geopolitical tensions making it more difficult to cooperate to solve existential civilisational challenges.

Economic systems failure #2: destabilising the planet

The second fault line is the economic system's destabilising impact on the planet through greenhouse gas emissions, pollution, deforestation and habitat loss. Large populations are already experiencing extreme heat, megadroughts, megafires and megafloods. This century, places that are considered largely uninhabitable due to extreme heat, will expand in area. Without urgent action, billions of people will be living in these areas. Even with urgent action, it is now almost certain the world will cross 1.5°C above preindustrial temperatures. At this temperature the world faces high risks of crossing ecological and climate tipping points. The impacts will last centuries to millennia. Each decade of delay leads to measurable declines in the resilience of Earth's biosphere.

Economic systems failure #3: failure to value the future

The third failure is chronic short-termism. Decisions made by governments and the private sector place an exceptionally heavy emphasis on the short term, meaning that societies ignore the profound implications of today's decisions and current crises: COVID, climate, conflict for our children and grandchildren, and ultimately for human progress. Even attempts to account for ecological and societal impacts focus on financial valuation rather than understanding their value for economic systems to function at all.

Political failure: democracy at risk

Democracies are already under pressure due to failures to deal systemically with risks in the past. More than a quarter of the world's population now live in countries that are backsliding on democracy. Two-thirds of the world live in either non-democratic regimes or backsliding democracies. If democracy is cherished, economic reforms to mirror these values are needed for human progress and human dignity. Systems transformation that strengthens these democratic values is urgently required.

Earth4All – a ground-breaking 2-year research project

Everyone knows we need to solve the climate and biodiversity crises. Everyone knows extreme poverty is unacceptable in a world that has never been so wealthy. Everyone knows the food system is vulnerable to shocks. Everyone knows inequality is driving anxiety, depression, resentment and polarisation. How do we move beyond this towards solutions that actually work?

Earth4All focused on three deeply intertwined systems: economy, society and the Earth system. At the heart of the analysis were two complementary intellectual engines that have allowed us to explore and develop bold proposals for the 21st century: the Transformational Economics Commission (TEC) and the system dynamics model Earth4All. This arrangement allowed the teams to test economic ideas using the Earth4All model(s). This allowed the team to explore were the ideas big enough to have a truly global impact on people, economic regions, nature and the whole planet over the long-term (2050; 2100).

- **The Transformational Economics Commission** is an international group of leading economic thinkers tasked with finding common ground around new economic paradigms. Which ideas show most promise? Where are the overlaps? Which ideas can unite societies? And which ideas can bring long-term prosperity to the majority?
- **Earth4All developed two unique systems dynamics models:** a global model that can handle over 700 interactions and a regional model with 10 regions and around 2000 interactions. The models allow researchers to explore the dynamics of human wellbeing on a finite Earth this century, to 2100. The models are primarily used to generate internally consistent scenarios for population, poverty, GDP, inequality, the use of food and energy, and other relevant variables from 1980 to 2100. The ambition is to identify policies that increase the likelihood of a future that combines high wellbeing for the global majority while keeping within planetary boundaries. The Earth4All model allows us to explore and illustrate which solutions might be strong enough to have the potential to solve challenges at a global scale over several human generations.

Two scenarios

How can we possibly navigate this century as a collective of interlinked, interdependent societies? As a civilization? Can we upgrade and transform our economic operating systems and emerge stronger, more resilient, than today?

As mentioned in the introduction, in 2021, the United Nations Secretary General António Guterres said the world is heading for breakdown or breakthrough. The Earth4All analysis focused on these two possible scenarios for the world this century. We called them:

- **Too Little Too Late** – a scenario that explores what if economic policy continues in the same track it has for the last forty years.
- **Giant Leap** – a scenario that explores what if societies make extraordinary decisions and invest in building more resilient societies? What will valuing our collective future look like? Can societies enhance social cohesion and strengthen democracies to reduce vulnerability to shocks and provide wellbeing for the majority on a planet under enormous pressure?

Scenario #1: Too Little Too Late

This scenario explores the co-evolution of the global economy and Earth system (1980-2100) assuming political action at similar levels to the past 40 years. The economy will continue to grow, but at the expense of social cohesion, wellbeing and a stable planet. There will be huge regional differences resulting in large-scale regional tensions. Sporadic societal collapses cannot be ruled out.

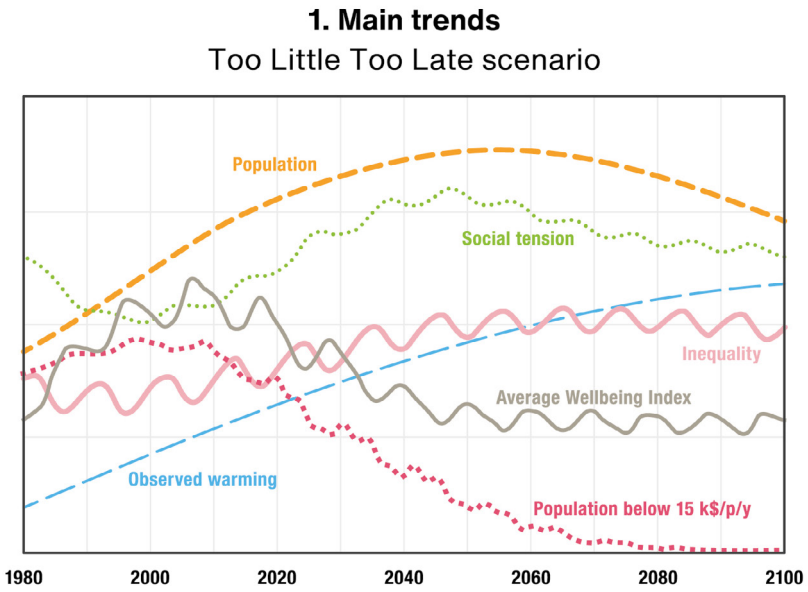


Figure 1. Main trends in the Too Little Too Late Scenario of the Earth4All model – World 1980 to 2100.

Global population peaks at around 9 billion

As a result of economic growth and investments in public services such as education and health in low-income countries, the global population will grow to a peak in the middle of the century and then decline. All regions experience an increasing fraction of elderly and fewer young as the century progresses with implications for the labour force, healthcare and economies.

Poverty

Low-income countries face a hard slog out of poverty due to slow growth, and even economic stagnation. By the end of the century, all regions reach a GDP of over $15,000 per person per annum (the amount needed to satisfy most UN Sustainable Development Goals).

GDP will grow, regardless

Gross Domestic Product (GDP) continues to grow throughout the century and could potentially cut absolute poverty by 50% by 2050. Growth in population and GDP will drive an increase in the use of energy, food and materials. Consumption levels peak around 30% above current levels.

Falling wellbeing

Throughout the century there is a decline in human wellbeing on average. When economies reach an average income of $20,000 per person, GDP has less influence over wellbeing in societies. In wealthier economies, while GDP increases and people have on average more disposable income, wellbeing is affected negatively by high levels of income inequality, economic insecurity, and food and energy price volatility as a result of climate change among other factors.

Rising inequality

Inequality will continue to rise both within and among nations. This resembles the situation in the US over the last 40 years, where 70% of all households have had stable incomes in real terms, while taxes on the rich have been reduced. Destructive levels of inequality undermine social cohesion. This will make it more difficult to deal with existential challenges within democratic societies.

Greenhouse gas emissions will overshoot

Action to avert climate catastrophe is slow. Global average temperature is likely to surpass 2.5°C this century. While carbon dioxide emissions peak around 2030, they decline too slowly. Earth's capacity to respond and rebound from shock reduces each decade as a result of inadequate action to protect the climate and biosphere. This puts Earth in a high-risk zone for crossing multiple (and connected) abrupt or irreversible tipping points. This brings severe risks to all societies on timescales of centuries to millennia.

Rising social tensions and risk of regional collapses

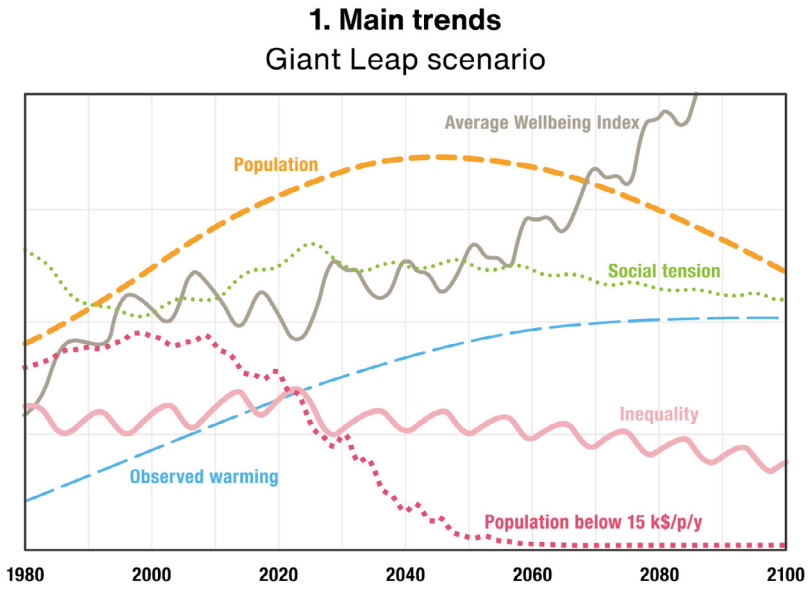
Social tension is likely to rise as life for the working majority in many places will become increasingly unbearable. In this scenario, regional societal collapses cannot be ruled out this century. We use this term to mean societies enter a vicious cycle where rising social tensions lead to a decline in trust causing political destabilisation and economic stagnation causing wellbeing to fall. Governments struggle to regain trust with impacts lasting decades.

Left unchecked, rising income inequality in the next 50 years will lead to increasingly dysfunctional societies, making co-operation to deal with existential threats like climate change more difficult. However, the world can still stabilise global temperatures below 2°C and eradicate extreme poverty by 2050 by enacting five 'extraordinary turnarounds.

Scenario #2: Giant Leap

This scenario explores the co-evolution of the global economy and Earth system (1980-2100) assuming extraordinary cooperation and action, particularly in the decade 2020-2030.

Figure 2. Main trends in the Giant Leap Scenario of the Earth4All model – World 1980 to 2100.



End of absolute poverty in sight

By 2060, most low-income countries have achieved a GDP of $15,000 per person per year. This is achieved a generation earlier than Too Little, Too Late. Poverty reduction is accelerated by de-risking investments in clean energy and sustainable food security and trade protection. Specifically, restructuring of international financial institutes such as the World Bank and International Monetary Fund provides much greater access to financial resources for economic development, for example Special Drawing Rights.

Energy security and abundance

The world follows a “Carbon Law” pathway of cutting fossil fuels and other greenhouse gases 50% every decade to reach net zero emissions by 2050. This brings many benefits and helps spur responsible economic growth. But it is disruptive so policies are needed to support citizens to ensure a fair and just transition.

Global population peaks at around 8.5 billion by around 2040 then declines

Nations adopt the 5 extraordinary turnarounds which combined have a very strong effect on global population. All low-income countries develop very rapidly and invest substantially in health and education (government spending is the proxy for these in the model).

Climate change

Global average temperature stabilises at below 2°C. This avoids the most serious existential risks to societies but it will bring severe economic hardship to many regions. Safety nets (investment in public services and citizens' funds, for example) help societies adapt.

Wellbeing economies

Throughout the century more countries move towards "wellbeing economies" built on abundant, clean energy. Countries no longer focus on GDP growth as a core metric of progress, and from 2080 global GDP stabilises. They adopt new metrics based on societal progress and environmental stability. Some industries grow, for example clean energy and regenerative agriculture. All industries move to circular and regenerative business models.

Investment

The investment needed is about 2-4% of global income to realise, annually, this century. Or, about USD$2-4 trillion. This is not negligible, but neither is it shockingly high. It is certainly less than the financial needs to deal with the global pandemic, though that was a short-term shock, and the Giant Leap is a generational project. The biggest investments will be needed within the first decade of the transformation which is why governments need to become more active to drive the change now.

Government share of GDP

A growing government share of GDP everywhere improves the capacity for collective action on equality and wellbeing: In the Giant leap scenario, the government gross income grows from around a quarter (25%) in 2020 to a third (35%) of GDP by 2040 and then stays on this level.

Falling inequality

By 2050 the world achieves "fairer inequality". By 2030 societies should work to ensure the wealthiest 10% take less than 40% of national incomes, and inequality declines further throughout the century. This is achieved through progressive taxation, empowerment of workers, and establishment of citizens' funds for the global commons to provide Universal Basic Dividends to all citizens. These initiatives improve societal cohesion and democratic processes. The long-term policy goal should be to continue improvements in wealth inequality.

Rising wellbeing

Wellbeing rises throughout the century as result of greater economic security, reduced inequality and greater government investment. This shift is guided by the adoption of economic indicators that go beyond GDP and include social and environmental dimensions.

Trust in government improves

With social tensions falling as a result of greater equality and government investment in low- and middle-income homes, trust in governments rises. This helps democracies invest in long-term policies that benefit the majority in societies.

The five extraordinary turnarounds are designed as a systemic framework for a fair, just and affordable action plan for the planet. A systemic approach means that isolated policy proposals are insufficient to achieve the necessary leverage. Greater equality is a climate solution. Gender equity is an inequality solution. A more resilient food system is a poverty solution. If these solutions are addressed as a whole, the system will trigger positive feedback loops that can lead us on a pathway towards a giant leap for humanity.

For each of the five extraordinary turnarounds we propose three policy levers that we estimate will have a significant impact. With the Earth4All model we can explore if these 15 policy levers are consistent and if they drive lasting change. These are not the only solutions needed. In the book, Earth for All, we explore additional solutions and we will publish a series of policy reports providing more in-depth analysis.

Earth4All's Call to Action

Overarching aim: Upgrade our economic system

Goal: Re define what really matters in economic policies

Call to action: Choose wellbeing economies, adopt new economic indicators that deliver better outcomes for people and planet and place them at the centre of policymaking.

- Support a shift away from unsustainable consumption as a key driver of GDP growth in high-income countries, through appropriate fiscal incentives and disincentives and regulation of some activities.
- Open discussions for implementing universal basic services and national universal basic dividends for a just transformation.
- Open conversations with citizens via government-sponsored citizen assemblies on what economic systems change they want to see.

Turnaround 1: Eliminate poverty

Goal: GDP growth rate of at least 5% for low-income countries until GDP per person is greater than USD 15K / year.

Call to action: Reform the international financial systems and trade regulations to support low income countries – *reducing multidimensional poverty and enabling sustainable economic progress for all*.

- The International Monetary Fund should create over US$1 trillion per year in new "Special Drawing Rights" and allocate additional funds from unused SDRs to low- income countries (<US$10.000 income per person) for green jobs-creating investments.
- High-income countries and the World Trade Organization (WTO) should allow local protection of fledgling industries and encourage sustainable export expansion in low-income countries . The WTO should enable Intellectual Property Rights waivers on the patented technologies necessary for public health, and the energy transition.
- High-income countries should cancel the debt of low-income countries and create a viable system for debt relief for all debt-stressed middle- and low- income countries.

Turnaround 2: Reduce inequality

Goal: By 2030, the wealthiest 10% take less than 40% of national income.

Call to action: Governments should increase taxes (income and wealth) on the 10% richest in societies until they take less than 40% of national incomes.

- Stronger progressive taxation of individuals and big companies and closure of international loopholes are essential to deal with destabilising inequality and luxury carbon and biosphere consumption.
- Empower workers – Governments should pass laws to strengthen worker's rights and trade unionisation. In a time of deep transformation, workers need economic protection and new skills development opportunities.
- Governments should introduce citizens' funds to give all citizens their fair share of a nation's wealth and the global commons in the form of a Universal Basic Dividend.

Turnaround 3: Empowerment

Goal: Full gender equity in terms of agency, rights, resources, and power in both law and employment.

Call to action: Empower women and others disadvantaged in current systems to have equal access to education, economic and social rights, power and assets by 2030 – *stabilising the world's population immediately and unleashing the potential of all*.

- All governments to ensure the right to education for women and girls.
- All corporations and public bodies to achieve gender equality in leadership positions.
- All governments to guarantee universal social protection and put adequate universal pension systems in place.

Turnaround 4: Transforming the food system

Goal: A regenerative, sustainable food system that works for all within planetary boundaries

Call to action: Transform the food system towards regenerative and sustainable agriculture and provide healthy diets for people without destroying the planet – *halting biodiversity loss and protecting the global commons to ensure food for all without destroying nature and health*.

- Shift 50% of arable land to regenerative and sustainable agriculture by 2030 and shift perverse subsidies, trade and procurement practices to enable the food transformation to regenerative and sustainable agriculture.
- Farmers and regulators must work together to end the agricultural expansion that destroys nature by embracing and incentivising techniques for healthier soils and more sustainable and regenerative forms of cultivation.
- Enable the transformation to healthy diets that respect planetary boundaries. From farm to fork, disincentivize and end wastefulness in food chains especially in global food chains.

Turnaround 5: Transforming the energy system

Goal: Net-zero emissions by 2030

Call to action: Transform our inefficient fossil energy system to a clean and optimised energy system reaching a 50% cut in GHG emissions by 2030 and net zero carbon and biodiversity loss by 2050 – *Ensuring sustainable energy for all.*

- Immediately phase-out and redesign fossil-based energy systems and subsidies towards clean and efficient energy solutions.
- Foster smart electrification alongside optimizing greater efficiencies for multiple win wins: save energy, drive down use of materials and reduce air pollution.
- Triple investments immediately to >US$1 trillion per year in new renewables with storage capacity and related infrastructure. All governments to guarantee access to clean energy and protect the most vulnerable from energy poverty.

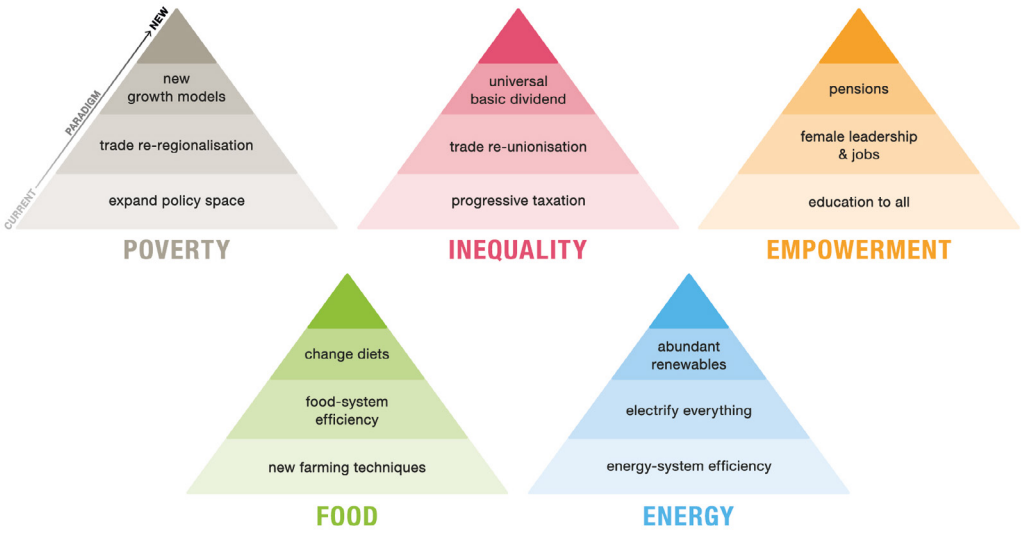


Figure 3. The policy interventions needed to achieve the five extraordinary turnarounds recommended by Earth4All.

Five extraordinary turnarounds

Eliminate poverty

Almost half the world still lives in extreme poverty, surviving on less than US$4 per day. Economic growth in some low-income countries remains low and even stagnating. And now, the pandemic has put back economic development by six or seven years.

According to our assessment, the policies proposed here have the potential to achieve economic development in low-income countries a generation earlier than the current business-as-usual scenario.

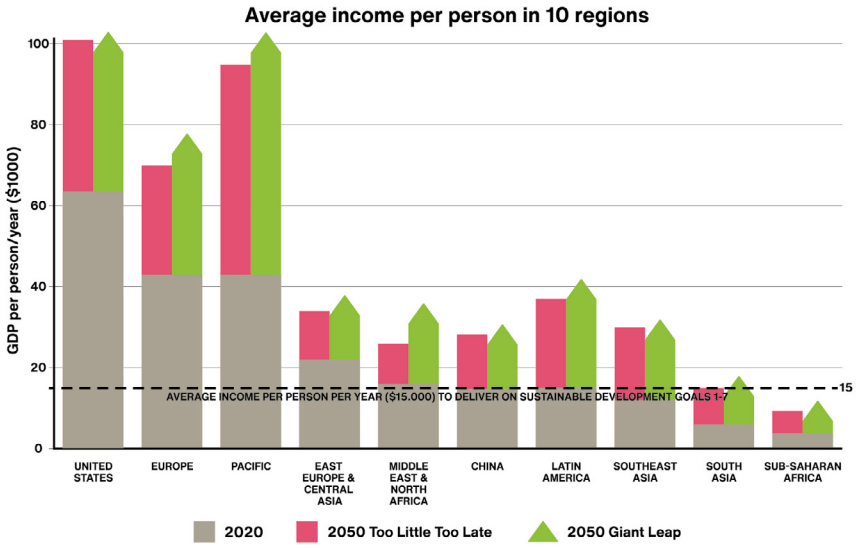


Figure 4. Incomes per person (GDP pp in thousand USD per year), in 2020 (grey bar) and in 2050 with Too Little Too Late (red), and 2050 with Giant Leap (arrow). Source: E4Aregional-220401

Reduce inequality

Decade by decade, countries have become more unequal in every region of the world, with the exception of Europe. The poorest 50% of people take less than 15% in total earnings, while the richest 10% take closer to 60% in many regions. New data has allowed us to see an unambiguous pattern related to inequality over recent decades: countries with greater equality perform better in all areas of human wellbeing and achievement. A key goal of the Earth4All inequality turnaround is to ensure the richest 10% take less than e 40% of national incomes by 2030 and progress continues beyond that to reduce inequality further.

Long-term structural economic inequality combined with short-term economic crises (ie. the current economic modus operandi in most large economies), contributes to economic anxiety, distrust and political dysfunction. These are important risk factors for destructive polarisation and rising social tensions in democratic societies. In the Too Little Too Late scenario social tension rises towards the middle of the 21st century as a result of rising inequality and

other factors including energy and food price volatility. We can infer that this would make it increasingly more challenging for governments in democratic countries to take bold long-term decisions that benefit the majority of people. This is likely to lead to inadequate responses to the climate and ecological emergency.

Conversely, significant efforts to address inequality reduce social tensions in the model and lead to higher wellbeing. This will also reduce environmental pressures which are predominantly caused by the wealthiest in societies.

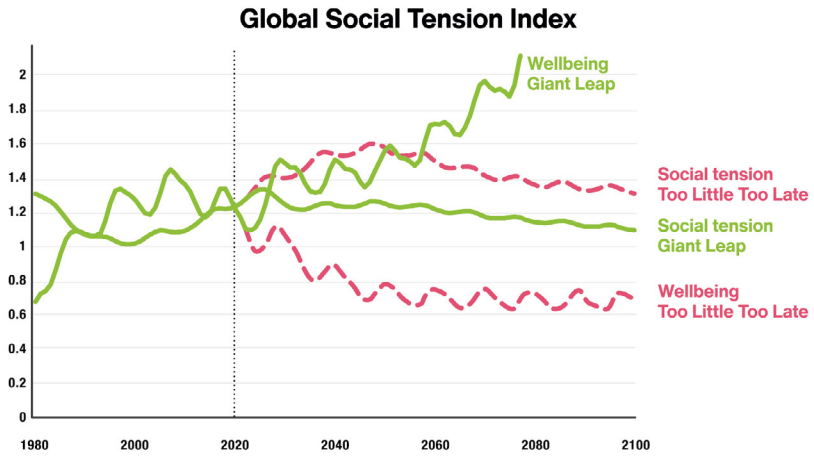


Figure 5: Social tensions run higher in Too Little Too Late than in Giant Leap as we progress towards 2100. Source: E4A-220327

Women's empowerment

Gender equity is about ensuring half of the world full human rights, opportunities, and participation. But it is also an important recipe for economic success. The wealthy Nordic countries of Denmark, Finland, Iceland, Norway, and Sweden regularly top international polls on gender equity, wellbeing and happiness. These are market economies with highly efficient states that have committed to greater gender equity and investment in families. By delivering greater gender equity, women's agency, and championing families in a changing world, this turnaround will help to reduce discrimination against women and girls in education, the work force, in society and in old age.

Greater gender equity brings a profound additional benefit. In the last fifty years the once exponential curve of population growth that dominated from 1800 to 1975 has bent down. This is a result of economic development coupled with improvements in gender equity. The Earth4All model indicates that if all turnarounds are implemented, population could peak well below 9 billion people by around the middle of the century then slowly fall towards the end of the decade reducing the pressure on resources.

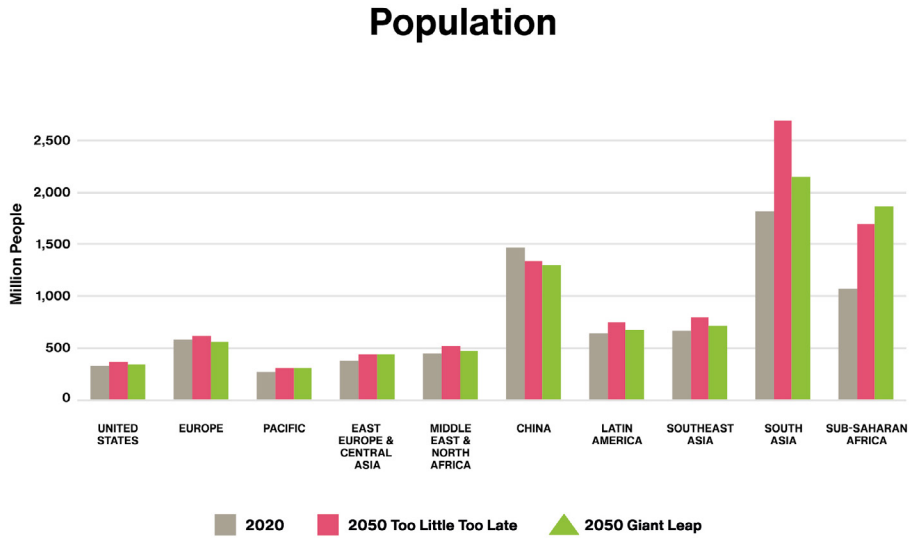


Figure 6: Population per region in 2020 and in 2050 for Too Little Too Late and Giant Leap. Sources: E4A-regional-220427; Penn World Tables; UN Population Division.

Transforming food systems

The last fifty years has witnessed a turnaround in food security with a dramatic reduction in the number of deaths as a result of famine. Yet, 800 million people still go hungry and millions more are at constant risk of famines provoked by pandemics, international conflicts, climate change and biodiversity loss. The number of undernourished people is on the rise. About one in twelve people worldwide are severely food insecure at one extreme and, at the other extreme, one in twelve deaths globally are attributable to obesity.

On top of the health and humanitarian crises, the way we farm, transport and consume food affects planetary boundaries more than any other sector. Agriculture is the biggest driver of deforestation, biodiversity loss and vast dead zones in our streams, lakes and oceans and one of the biggest sources of greenhouse gas emissions. The adoption of regenerative and sustainable agricultural and land use practices is essential to stay within planetary boundaries.

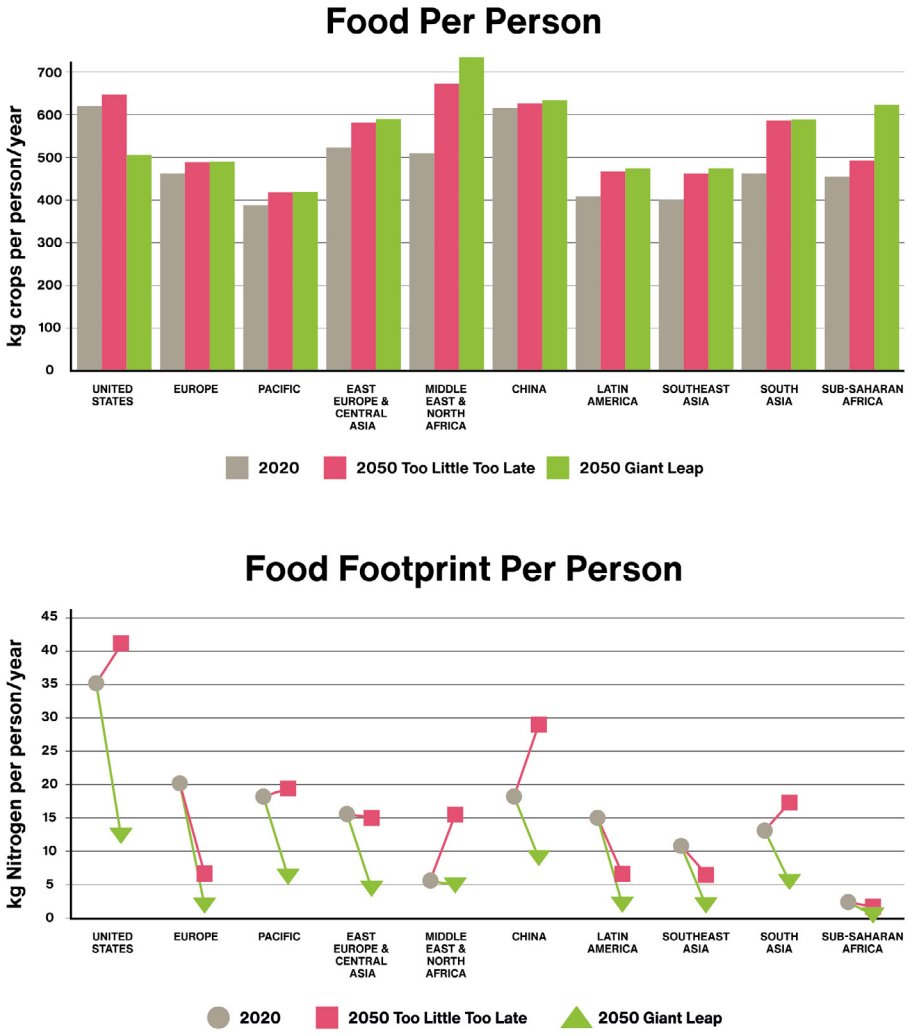


Figure 7: Regional Food footprint in 2020 and 2050 in Too Little Too Late and 2050 in Giant Leap. In this context, we define the food footprint as the amount of Nitrogen fertiliser multiplied with the cropland hectares per person, ie. kgN*ha/p/y on the vertical axis.

Our food systems need comprehensive redesign. The food turnaround will work hand in hand with the poverty and equity turnarounds to ensure access to food and bring about a health revolution by improving diets and reducing obesity worldwide. It will also be a profound shift in our relationship with the planet. All plausible scenarios to stabilise temperature at around 1.5°C requires agriculture to transform from a major emitter of carbon to a net store of carbon by the 2030s.

Transforming the energy system

The Paris Agreement's goal to stay well below 2°C requires approximately halving greenhouse gas emissions globally every decade from 2020, to reach close to zero in the 2050s. There are good reasons to believe this is now possible.

But global energy costs (total annual costs in both investments and operations) are higher in our Giant Leap scenario than in Too Little Too Late, for the period 2025-2050. After this period, annual total energy costs become much lower because the energy system by then has huge renewable capacity driven by sun and wind and demand side pressure has decreased through optimised efficiency measures. The good news is that this transition is already well under way. Clean power technologies are growing exponentially everywhere. The key issues are whether the turnaround will be rapid enough and whether it will be fair.

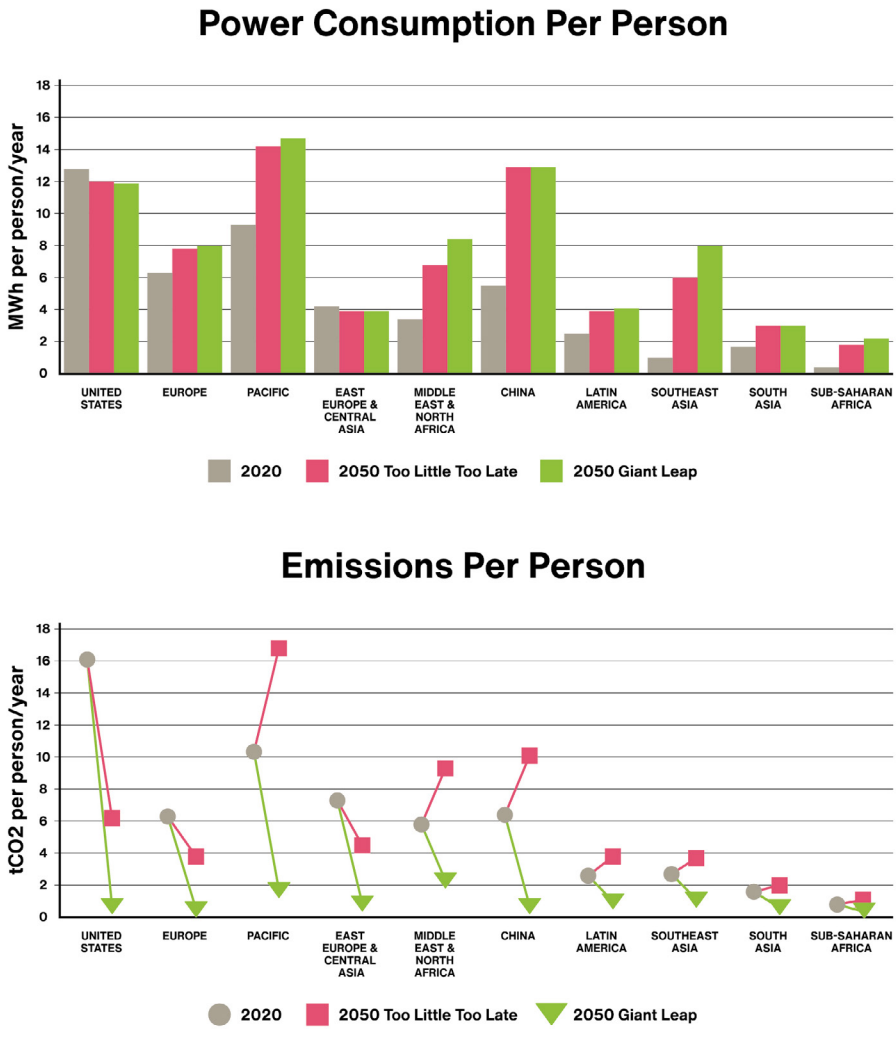
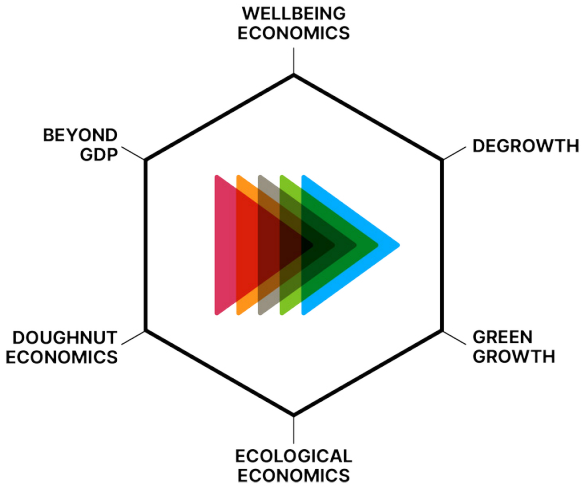


Figure 8: Large differences in regional energy footprints: showing the CO2 emissions per person in 2020, 2050 in Too Little Too Late and 2050 in Giant Leap. Source: E4Aregional 220401

Economic systems change

The 5 extraordinary turnarounds need to be driven by economic systems change. Business as usual is not an option. This means moving beyond GDP growth as a guide for a healthy economy.

There's a growing number of new frameworks for organising economies and measuring societal progress. These include concepts like the sharing economy, the circular economy, ecological economics, feminist economics, doughnut economics, green growth, steady state and degrowth. All of these ideas articulate new ways of looking at what creates and sustains prosperity while also protecting the planet.



These are not just competing buzzwords for the same concept; rather they emphasize different aspects of alternatives to our current linear, neoliberal, growth-at-all-costs economic approach. The transformed economy envisioned by the Earth4All project adopts elements of all these frameworks and aligns with the comprehensive framework known as a "wellbeing economy".

Beyond GDP: Wellbeing economies

The Wellbeing Economic Alliance (WeAll) describes the wellbeing economy framework as "one that serves people and the planet, rather than people and planet serving the economy. Earth4All has developed a wellbeing index as an alternative to GDP that is built on the wellbeing framework. The index quantifies wellbeing based on:

- Dignity: worker disposable income after tax
- Nature: climate change (global surface average temperature)
- Connection: government services indicated by spending per person, i.e., to institutions that serve common good
- Fairness: the ratio of owner income after tax to worker income after tax
- Participation: people's observed progress (how wellbeing has improved or declined in the previous five years) and labor participation

Positive social tipping points

Many major transformations in the past have been driving by large-scale social movements demanding change, for example the Civil Rights movement or the women's suffrage movement. The Giant Leap will be no different. But has the Giant Leap already begun? There is room for significant optimism.

The world may be approaching a number of positive social tipping points. Social movements like Fridays for Future, Black Lives Matter and #MeToo are mainstreaming new worldviews. The global energy system is undergoing a structural change – the move to clean energy is now unstoppable. The energy transformation will now accelerate because the price of new technologies is the same or cheaper than old technologies like oil and coal in most places and getting cheaper every year. Many governments are waking up to the scale of the challenge. A new group of countries "The Wellbeing Economies" of Finland, Iceland, New Zealand, Scotland and Wales are exploring new ways of measuring economic progress within planetary and social boundaries. And more countries are proposing "Green New Deals" – major investment strategies for clean, green and fair transformations. Earth4All provides a systemic framework for these strategies.

A decisive decade

The Earth4All foresight analysis concludes there is still time to act to substantially reduce risks to societies and ensure economic security and wellbeing for all. It is still possible to safeguard a liveable planet. But the greatest effort will need to be in the first ten years. This is the decade with the highest costs requiring the greatest investment to drive the transformation. This is the decade when greenhouse gas emissions must peak and fall approximately 50% to avoid the most existential risks related to the climate emergency. This is the decade farming systems need to shift from being a source of carbon to a store of carbon. This is the decade the world needs to halt destruction of nature. But first of all, this is the decade the world needs to address crippling inequality.

Next steps: G20, UNFCCC COPs, the UN Summit for the Future and citizens' assemblies

World leaders have the chance to open a new era of global cooperation in the next decade to save humanity and our planet. It is possible. We encourage everybody to bring in new ideas on how to upgrade our economic systems, and governments to lead this conversation by opening assemblies for their citizens to participate, investing in the 5 turnarounds, choose new indicators to measure progress, and reforming the international system to meet the challenges of our days. It is not too late.

The Earth4All model

The Earth4All model is a system dynamics model that is made to simulate the time development in global wellbeing within planetary boundaries towards 2100. The model is a rough approximation to the real world and has been kept simple in order to increase transparency and understandability. It has been used to generate scenarios, such as the Too-Little-Too-Late and Giant Leap scenarios, but in all cases, what can be reasonably concluded is the following:

1. The global population will peak in the middle of the 21st century between 2040 and 2060 and between 9 and 11 billion people.
2. The world's gross domestic product (GDP) will continue to grow throughout the century at a rate between 0.5 and 4% per year when smoothed over the 4-year business cycle.
3. The 10-year growth cycle (in investment fraction and owner share of income) will continue throughout the century about 10 years apart and be followed by what is normally described as a financial crisis.

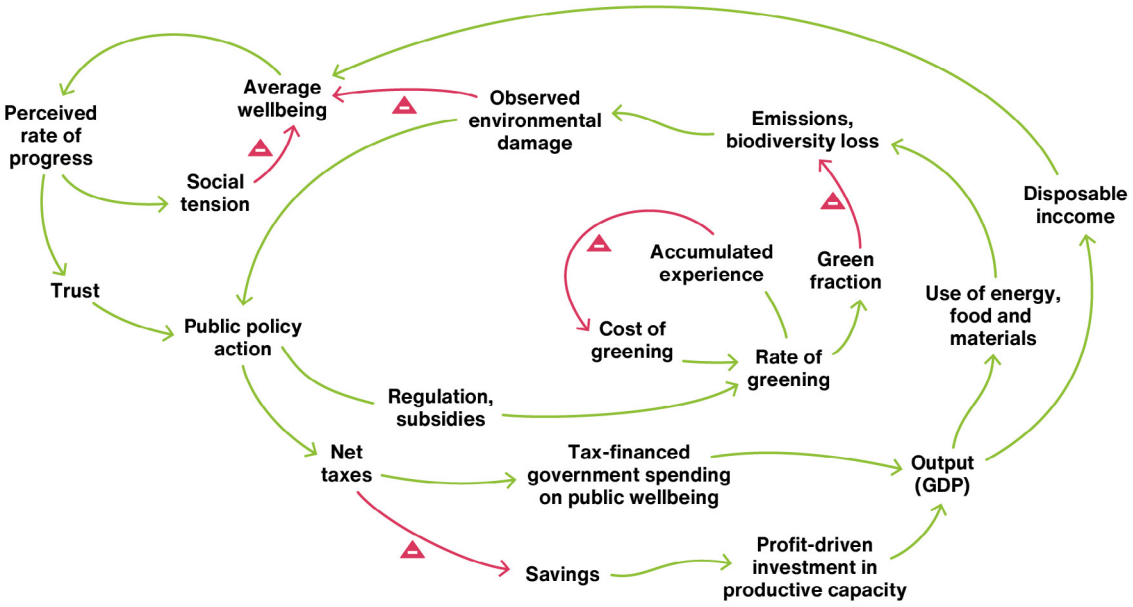


Figure 9: A simplified overview of main variables in the Earth4All model and their relationships. The full Earth4All global model has some 800 variables. The code is available in both Stella and Vensim system dynamics software for download at www.earth4all.life.

For more information and details about Earth4All, including how to buy the book, see the website: earth4all.life.

This brief is based on the book Earth for All. A Survival Guide for Humanity, authored by Sandrine Dixson-Declève, Owen Gaffney, Jayati Ghosh, Jørgen Randers, Johan Rockström, Per Espen Stocknes and a wide range of contributing authors.

Deep-dive papers (available on www.earth4all.life/resources)

- **Wilkinson, R. and K. Pickett. 2022.** "From Inequality to Sustainability". Earth4All Deep Dive.
- **Harrington, G. 2022.** "The Limits to Growth Model: Still Prescient Fifty Years Later". Earth4All Deep Dive.
- **Lake, N. and J. Randers, 2022.** "Planetary Turnaround: An Investment Banker's Perspective on Climate Change Action". Earth4All Deep Dive.
- **Das, D, Chakraborty S., and J. Ghosh. 2022.** "Climate Change Mitigation Strategies: Impacts and Obstacles in Low and Middle-Income Countries". Earth4All Deep Dive
- **Webster, K. 2022.** "The Long Road to a Social Dividend". Earth4All Deep Dive.
- **Ghosh, J, Chakraborty, S, Diaz Ceballos, and A. I. J. Adiba. 2022.** "A Just Transition: How can we fairly assign climate responsibility?". Earth4All Deep Dive.
- **Ramphele, M. 2022.** "A Living Systems Approach to Achieving Global Equity for a Healthy Planet". Earth4All Deep Dive.
- **Ahmed, N. 2022.** "The Clean Energy Transformation: A New Paradigm for Social Progress Within Planetary Boundaries". Earth4All Deep Dive.
- **Lô, M. 2022.** "Growth Within Limits through Solidarity and Equity". Earth4All Deep Dive.

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Supporting deep dive papers (available at www.earth4all.life)

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