SYSTEMIQ

Co-Chair Opinion Piece

MAKING CLIMATE TARGETS ACHIEVABLE

Improving Wellbeing through Reduced Absolute Resource Use

Extended Report

This publication was written together with the Co-Chairs of the International Resource Panel, in support of the IRP publication published in July 2022

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Today, Janez Potočnik and Izabella Teixeira are colleagues as Co-Chairs of the International Resource Panel (IRP). For over a decade, they have collaborated as friends in their respective roles as negotiators for sustainability-related United Nations conferences and conventions. They have distilled this decade of experience into clear, science-based, policy-relevant principles informed by the research of the IRP.

To the world's efforts to address climate change, they add an indispensable missing piece: resource efficiency strategies to reduce and improve the use of natural resources. *This opinion piece supplements the previous* Building Biodiversity *paper published by the Co-Chairs last year. Together, these opinion pieces highlight how natural resources sit at the heart of the triple planetary crisis and provide a picture of hope: using fewer natural resources offers major opportunities to deliver solutions for all countries that address all aspects of the crisis together.*

Sharing lessons from their past and present roles, and based on powerful scientific evidence from the IRP and beyond, the Co-Chairs urge parties to push for bold global action on resource efficiency. ***Countries must apply resource efficiency broadly, going beyond decarbonization to reduce the overall use of natural resources according to national circumstances, so that economic prosperity and wellbeing can be achieved, while environmental pressures and impacts are reversed.***

Janez Potočnik and **Izabella Teixeira**
Co-Chairs of the International Resource Panel

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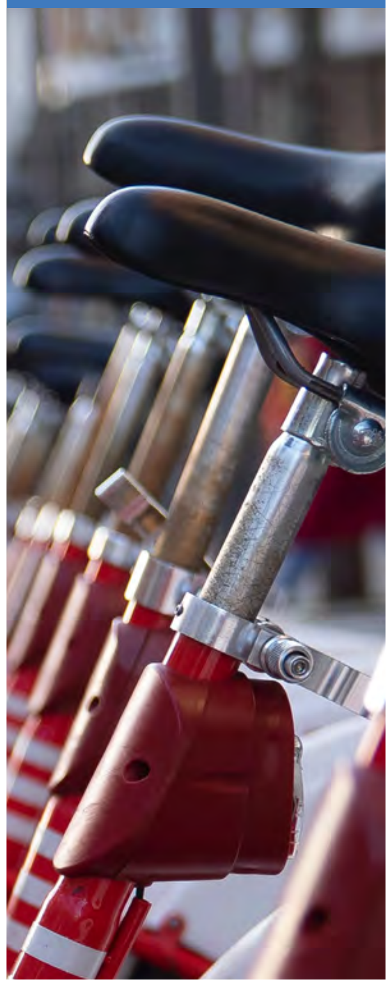
An absolute reduction in the use of natural resources is indispensable to realize climate change, biodiversity and pollution ambitions

2

To meet climate targets, we must go beyond decarbonization and reduce resource use



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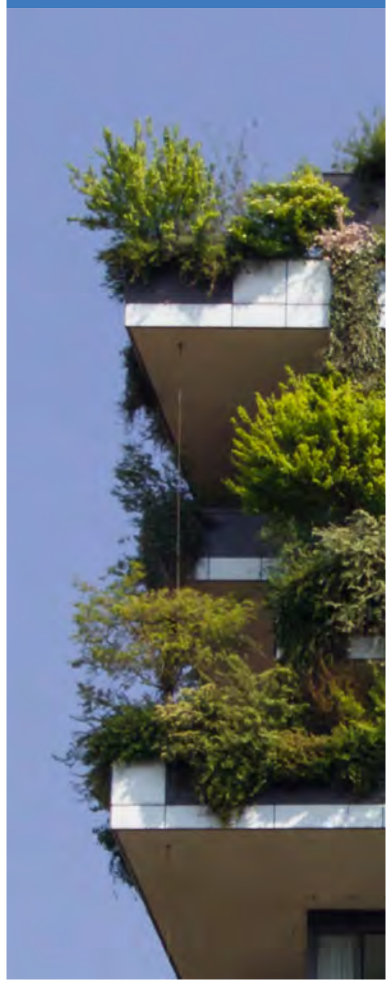
Most climate policies neglect resource efficiency solutions and thus miss major opportunities for climate and society



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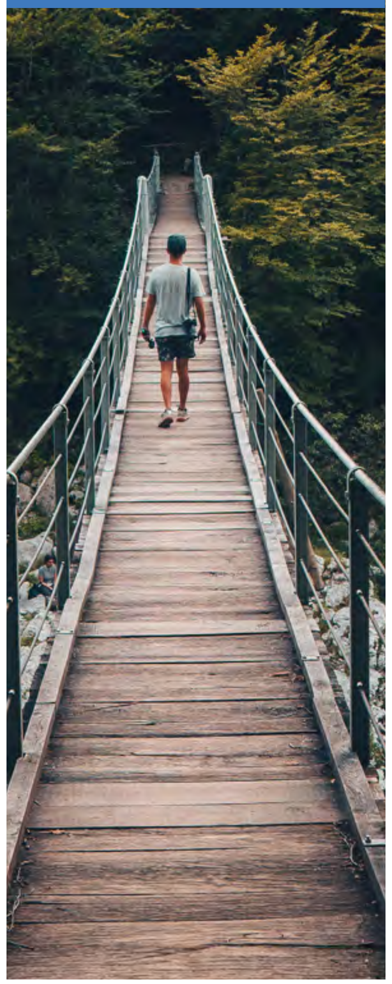
Absolute reduction of natural resources through resource efficiency can deliver climate mitigation with benefits for nature, people and industry



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To reap climate and social benefits, economic and climate policies must apply resource efficiency holistically

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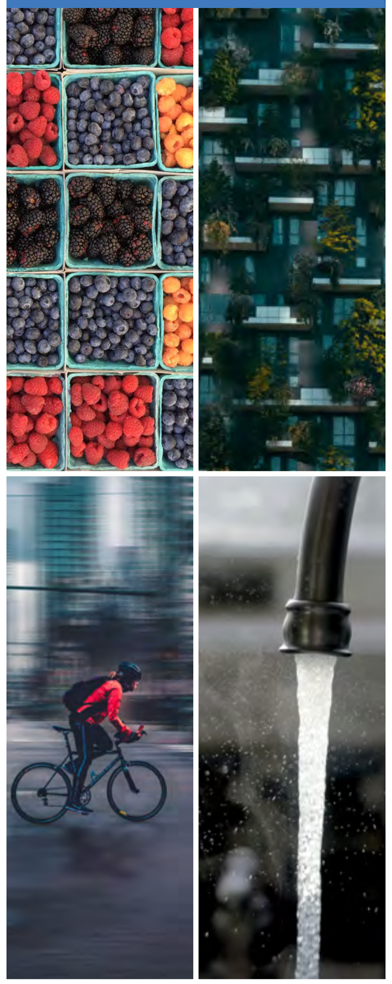
Innovative solutions already exist across all dimensions of resource efficiency to build a resilient economy for societal wellbeing



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Countries should seize the opportunity offered by all dimensions of resource efficiency to deliver climate targets and biodiversity and pollution benefits

GLOSSARY

TERM	DEFINITION
9R framework	The 9R framework is a hierarchical circular economy framework. The smaller the loop (the lower the R number), the more circular the strategy. The nine Rs are: R0: Refuse, **R1:** Rethink; **R2:** Reduce; **R3:** Reuse; **R4:** Repair; **R5:** Refurbish; **R6:** Remanufacture; **R7:** Repurpose; **R8:** Recycle; **R9:** Recover
Circular economy	A circular economy is one in which the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimized. This contrasts with a linear economy, which is based on the "extract, make and dispose" model of production and consumption (IRP, 2019).
Consumption	The use of products and services for (domestic) final demand—that is, for households, governments and investments. The consumption of resources can be calculated by attributing the lifecycle-wide resource requirements to those products and services (e.g., by input-output calculation) (IRP, 2019).
Decoupling	"Decoupling" is when resource use or some environmental pressure either grows at a slower rate than the economic activity that is causing it (relative decoupling) or declines while the economic activity continues to grow (absolute decoupling) (IRP, 2019).
Dematerialization	"Dematerialization" ultimately describes the process of reducing the material requirements of whole economies. It involves: • reducing the material intensity of products and services by increasing material efficiency; and • in particular, reducing the use of primary material resources (e.g., ores, coal, minerals, metals) by improving recycling and reuse of secondary materials (ie, shifting to a circular economy). It is frequently regarded as a necessary condition for the sustainable development of economies and is synonymous with absolute resource decoupling (IRP, 2022).
Everything-as-a-Service	"Everything-as-a-Service (XaaS) models combine tangible products and intangible services so that they are jointly capable of satisfying final user needs. In XaaS models, producers typically maintain product ownership and lifecycle responsibility and are consequently incentivized toward adopting circular economy strategies (long-lasting and circular design, use phase intensification, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling)" (SYSTEMIQ, 2021).
Greenhouse gas emissions	Emissions of gases that cause the greenhouse effect. Reported in units of potency equivalent to that of a kilogram, ton or gigaton of carbon dioxide (IRP, 2020).
Gross domestic product	"Gross domestic product (GDP) is the standard measure of the value added created through the production of goods and services in a country during a certain period. As such, it also measures the income earned from that production, or the total amount spent on final goods and services (less imports)" (OECD, 2022).
Materials	Materials include: • biomass (e.g., crops for food, energy and bio-based materials, as well as wood for energy and industrial uses); • fossil fuels (in particular, coal, gas and oil for energy); • metals (e.g., iron, aluminum and copper used in construction and electronics manufacturing); and • non-metallic minerals (used for construction—notably sand, gravel and limestone) (IRP, 2019).
Material efficiency	The pursuit of technical strategies, business models, consumer preferences and policy instruments that would lead to a substantial reduction in the production of high-volume, energy-intensive materials required to deliver human wellbeing, expressed as a ratio of the amount of product or service obtained by unit of material use (IRP, 2020).

TERM	DEFINITION
Material footprint	This represents the whole system of environmental pressures exerted by a human activity, including direct pressures occurring within the geographical boundaries where the activity occurs and indirect/or supply chain pressures beyond (i.e., transboundary pressures). The material footprint encompasses all material resources used (IRP, 2019).
Nationally determined contributions	"Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive NDCs that it intends to achieve" (UNFCCC, 2022a).
Natural resources	The International Resource Panel defines "natural resources" as referring to land, water and materials (see "Materials" above). These resources can be tracked as flows through the economy, from extraction through processing and consumption to point of reuse or discarding at end of life (IRP, 2021).
Planetary boundaries	This concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. The nine planetary boundaries are: climate change, ocean acidification, stratospheric ozone, global phosphorus and nitrogen cycles, atmospheric aerosol loading, freshwater use, land use change, biodiversity loss and chemical pollution (Rockström, et al., 2009).
Provisioning systems	A system which uses natural resources to deliver essential human needs. For example, the food system uses land, water and biomass to deliver human nutrition.
Resource efficiency	This describes the overarching goals of decoupling—increasing human wellbeing and economic growth while reducing the amount of resources required and the negative environmental impacts associated with resource use. In technical terms, resource efficiency involves achieving higher outputs from lower inputs and can be reflected by indicators such as resource productivity (including GDP/resource consumption). Ambitions to achieve a resource-efficient economy therefore refer to systems of production and consumption that have been optimized with regard to resource use. These include strategies of dematerialization (savings, reduction of material and energy use) and rematerialization (reuse, remanufacturing and recycling) in a systems-wide approach to a circular economy, as well as infrastructure transitions within sustainable urbanization (IRP, 2019).
Resource productivity	This describes the economic gains achieved through resource efficiency. It depicts the value obtained from a certain amount of natural resources. It may be presented together with indicators of labor or capital productivity (IRP, 2019).
Shared mobility	This refers to the shared use of a vehicle, bicycle or other mode of transportation. This transportation strategy gives users access to transportation services on an as-needed basis.
Urban sprawl	The rapid expansion of the geographic extent of cities and towns, often characterized by low-density residential housing, single-use zoning and increased reliance on the private automobile for transportation (Encyclopedia Britannica, 2022).
Wellbeing	The state of being comfortable, healthy or happy. This opinion piece focuses on the essential human needs and the specific aspects of wellbeing that depend on resource use.
Zoning	"Zoning is a planning control tool for regulating the built environment and creating functional real estate markets. It does so by dividing land into sections, permitting particular land uses on specific sites to shape the layout of towns and cities and enable various types of development. Zoning has a relatively short history as a tool for land-use planning. It determines the location, size, and use of buildings and decides the density of city blocks" (The World Bank, 2022).

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1.

AN ABSOLUTE REDUCTION IN THE USE OF NATURAL RESOURCES IS INDISPENSABLE TO REALIZE CLIMATE CHANGE, BIODIVERSITY AND POLLUTION AMBITIONS

We are wholly dependent on natural resources (land, water and materials)[1] to meet all our wellbeing needs, from food and shelter to transport and energy systems and everything that helps us to thrive in between. However, current production and consumption systems are causing the transgression of planetary boundaries,[2] with catastrophic impacts on our planet, our health and our wellbeing.

The world finds itself in the midst of a triple planetary crisis of climate change, biodiversity loss and pollution and waste, driven by the unsustainable consumption patterns of the wealthiest countries and citizens (see Figure 1). Human-induced greenhouse gas (GHG) emissions mean that our climate is now 1.2°C hotter than the pre-industrial average. One need only turn on the news to witness the devastation this changing climate is already wreaking around the globe. Every gigaton of carbon emitted and every tenth of a degree of warming that we can avoid is crucial in our global battle to keep warming below 1.5°C as agreed in the Paris Agreement, and to protect the most vulnerable populations and geographies.

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1 "Material resources are defined as biomass (like crops for food, energy and bio- based materials, as well as wood for energy and industrial uses), fossil fuels (in particular coal, gas and oil for energy), metals (such as iron, aluminium and copper used in construction and electronics manufacturing) and non-metallic minerals (used for construction, notably sand, gravel and limestone)" (IRP, 2019).

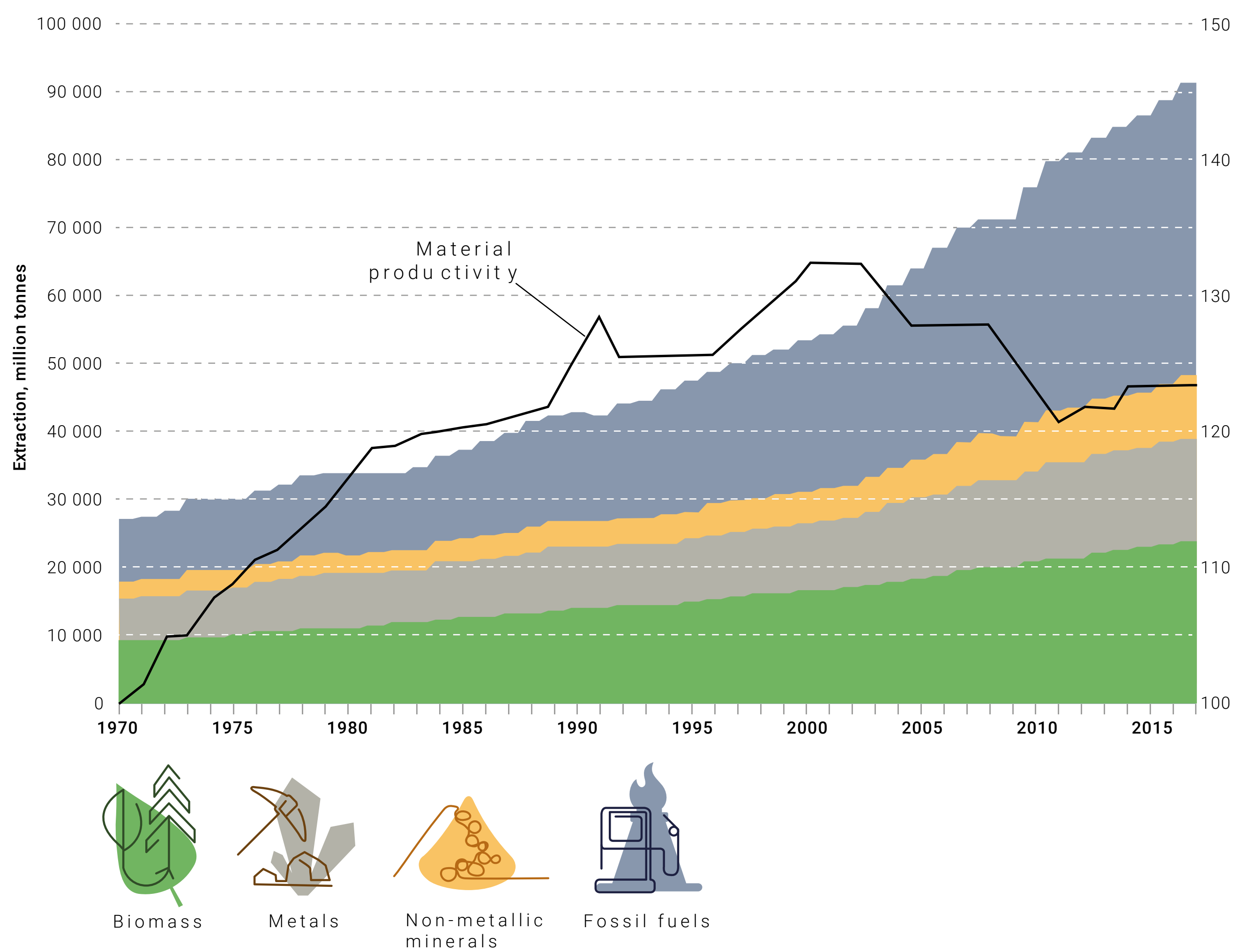
2 The planetary boundaries aim to define the environmental limits within which humanity can safely operate (Steffen *et al.*, 2015). The uptake in natural resource use has contributed to a situation where four out of nine planetary boundaries are exceeding their recommended limits (IRP, 2017a; Rockström et al., 2009; Steffen et al., 2015). The planetary boundaries framework, which is based on an understanding of the long-term behavior of the Earth system, underscores why it is necessary to change how natural resources are being used and managed. A global society living outside of the planetary boundaries may lead to an altered, less hospitable Earth system (Steffen et al., 2015). Two of the planetary boundaries—climate change and biosphere integrity (including biodiversity loss)—are regarded as core boundaries because the coevolution of life on Earth and the physical climate are defining aspects of the Earth system. Due to the interactions and feedbacks between life and climate, changes to either boundary have the potential to compromise the entire Earth system (Steffen et al., 2015).

Figure 1 **Natural resources underpin human consumption and production systems, and are intertwined with climate, biodiversity and pollution/health.**

Source: IRP, 2021

Research conducted by the International Resource Panel (IRP) has found that the extraction and processing of materials (metals, minerals, fuels and biomass) account for about half of all GHG emissions and cause 90 percent of global land-related biodiversity loss and water stress. They are also responsible for approximately 30 percent of pollution-related health impacts, mainly from particulate matter. The IRP's analysis further reveals that global material extraction is on a dangerous trajectory: it has tripled since 1970, while global resource productivity has declined since the beginning of the 21st century and stabilized after 2010[3] (see Figure 2) (IRP, 2019). This means that we are now deriving less economic output and less value from each ton of material extracted. This is likely due to the structural shift of global production and trade dynamics: in many cases, production has shifted to locations where industrial processes are less efficient. Current trends suggest that a growing global population with rising average wealth will continue to drive consumption of, and demand for, materials. Without transformative measures, demand for materials will double by 2060–with severe impacts on climate change, biodiversity and pollution (IRP, 2019).

Figure 2 **Global material extraction and material productivity, 1970-2017**



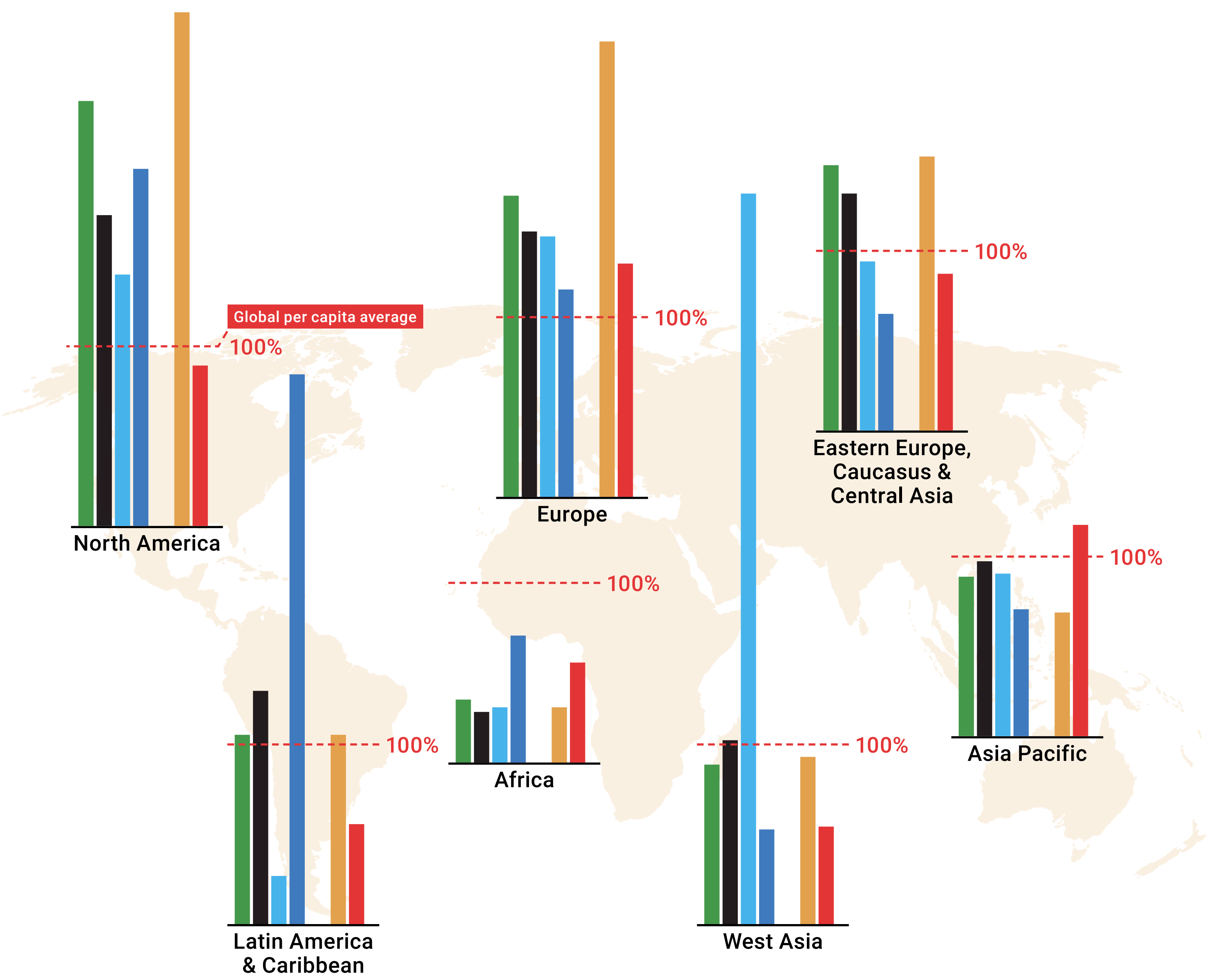
Source: IRP, 2019

3 "Global resource productivity" is the economic gain achieved through resource efficiency calculated as GDP per tonne of material IRP, 2019.

Natural resource use in high-income countries is a key driver of the triple planetary crisis and must be urgently reduced

Our current use of natural resources is characterized by deep inequalities. High-income economies benefit most from the planet's natural resources; while low-income economies face the outsized burden of the negative impacts of extraction and processing. The average person in a high-income country has a consumption footprint which is 60 percent greater than that in an upper-middle income country and over 13 times that in a low-income country (IRP, 2019). The unequal exchange of resources from Global South to Global North has recently been quantified in financial terms as being equal to 25 percent of the Global North's annual GDP. This highlights that the Global South is effectively subsidizing overconsumption in the Global North; and this drain of resources is several times greater than the value of government aid that it receives (Hickel *et al.*, 2022).

Figure 3 **Per capita impacts, by region of consumption, 2011**



Source: IRP, 2019

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The latest assessments of responsibility for the planetary crisis are clear: by using a new method to define each country's "fair" share of natural resource use over the last five decades, Hickel and colleagues have shown that high-income countries are responsible for 74 percent of global excess material use (beyond their fair share) and China for a further 15 percent. Meanwhile, low-income and middle-income countries (excluding China) are responsible for just 8 percent of excess material use (Hickel *et al.*, 2022).[4] This unequal exchange of resources and impacts is illustrated in Figure 3. The research confirms that high-income nations are the primary drivers of global ecological breakdown, and must thus urgently reduce their resource use to fair and sustainable levels and rethink what they consider to be sufficient.

It is clear that our current system is inefficient in meeting fundamental needs and is failing to ensure that these can be met in the future. Today, more than 10 percent of the world's population suffer from underconsumption, living in extreme poverty and struggling to meet their most basic needs under the UN Sustainable Development Goals (SDGs), such as nutrition, clean water and sanitation, and access to clean and affordable energy (UN, 2015). This once again highlights how resource-related benefits are not shared equitably and do not adequately serve the most vulnerable among us, including those in biodiversity and natural resource-rich countries. Meeting basic needs is intrinsically linked to the use of natural resources; and it is of the utmost importance that these needs are satisfied equitably across the global population in a way that supports development toward decent living standards and improved wellbeing in middle and low-income countries. Meeting basic needs without transgressing planetary boundaries has been defined as humanity's "safe and just operating space" (Figure 4) (Raworth, 2018).

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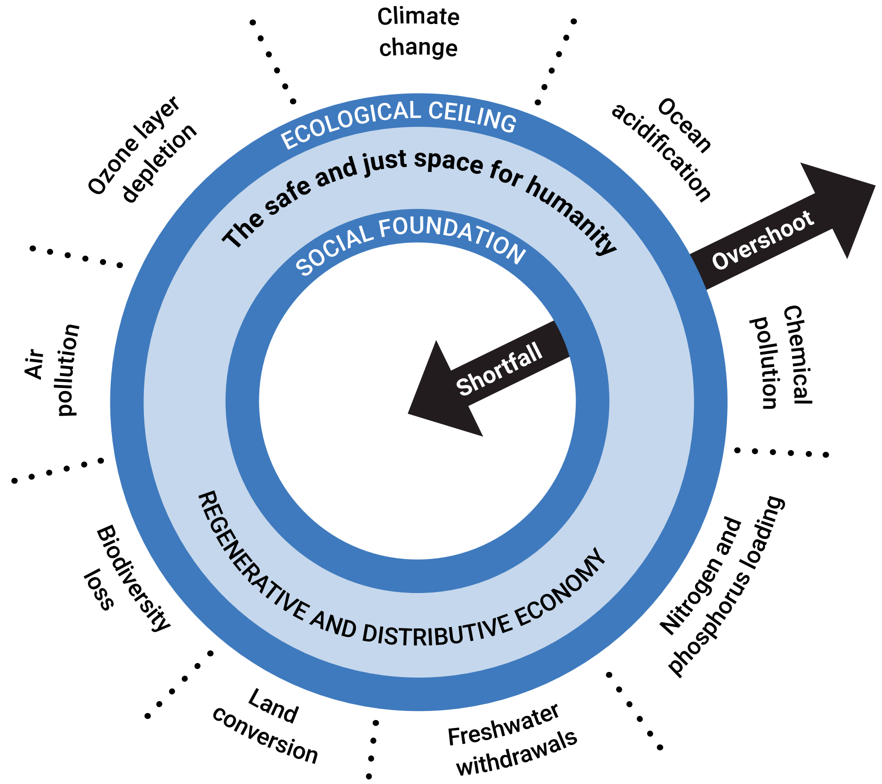
4 The analytical approach is novel: some question its assumptions on defining a "sustainable" level of resource use.

Figure 4 Rockstrom's "Doughnut Economics" depicts humanity's "safe and just operating space": human wellbeing needs met for all within the planetary boundaries



Source: Rockstrom, 2009; Raworth, 2018

As well as facing the long-term challenge of meeting human needs[5] within a safe and just operating space, there are more immediate challenges for resource use. As the COVID-19 pandemic and renewed military aggression—including the ongoing conflict between the Russian Federation and Ukraine—have starkly illustrated, a smooth global supply chain and supply of resources cannot be taken for granted, and most economies are incredibly vulnerable to supply shocks.

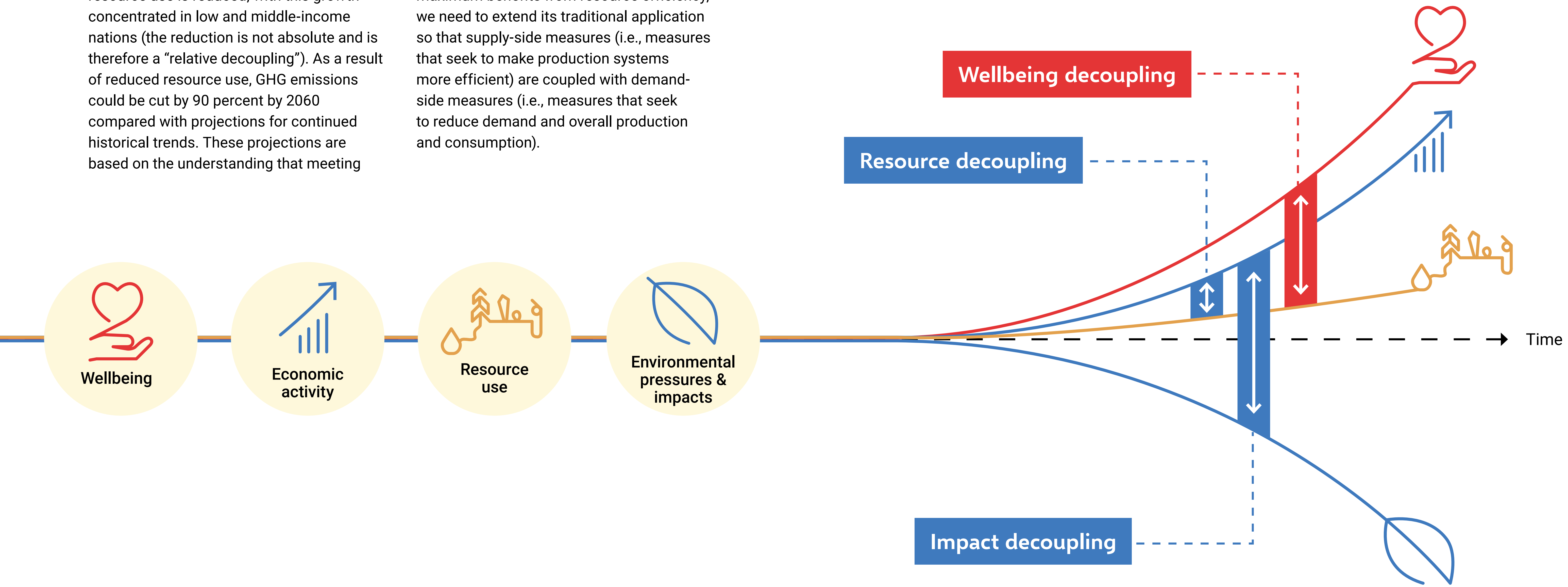
Reducing resource use while continuing to improve economic development and human wellbeing is known as "decoupling" (see Figure 5). To ensure an equitable transition to sustainable resource use, the concept of decoupling should be applied differently in different global contexts. High-income countries should reduce their resource use while aiming to maintain or increase wellbeing through "absolute decoupling"; and low and middle-income countries should increase resource use at a comparatively slower rate while aiming to increase wellbeing through "relative decoupling" (IRP, 2011). Societies and governments should aim to decouple resource use from economic activity, and ultimately from human wellbeing. Crucially, where resource use must continue in order to deliver wellbeing, it should be decoupled from its negative impacts as far as possible. To achieve humanity's safe and just operating space, our ultimate aim should be an absolute reduction in resource use and its impacts together with increased wellbeing, regardless of the impact on traditional economic activity.

5 The perception of "needs" is a social construct that differs around the word. Wellbeing can be delivered in different ways. The needs described in this report pertain to the basic needs described in the UN SDGs, such as nutrition, clean water and sanitation, and access to clean and affordable energy.

IRP modeling undertaken for the 2019 Global Resources Outlook (GRO19) has revealed that by 2060, with a selection of resource efficiency and sustainable consumption and production policies in place, economies could continue to grow even with a 25 percent reduction in global resource use—equivalent to 47 billion tons of avoided resource extraction in the year 2060 alone. More ambitious policies, in line with the concepts explained in this report, could translate into even greater reductions. Although we question whether GDP should be the main measure of government success, the modeling shows this could increase by 8 per cent by 2060 even while resource use is reduced, with this growth concentrated in low and middle-income nations (the reduction is not absolute and is therefore a "relative decoupling"). As a result of reduced resource use, GHG emissions could be cut by 90 percent by 2060 compared with projections for continued historical trends. These projections are based on the understanding that meeting human needs in emerging and other developing economies must be balanced by absolute reductions in resource use in developed countries, while human needs are maintained (IRP, 2019).

To achieve decoupling, it will be essential for policymakers to adopt a holistic approach to resource efficiency, reducing resource use and its associated impacts for each unit of wellbeing gained. This could be achieved through strategies like building smarter urban neighborhoods and investing in green public transport systems, rather than expanding sprawling housing developments and encouraging car ownership. To reap maximum benefits from resource efficiency, we need to extend its traditional application so that supply-side measures (i.e., measures that seek to make production systems more efficient) are coupled with demand-side measures (i.e., measures that seek to reduce demand and overall production and consumption).

Figure 5 The IRP's decoupling framework



Source: IRP, 2019

Both dematerialization and decarbonization of production are urgently needed in tandem; they are two sides of the same coin

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2.

TO MEET CLIMATE TARGETS, WE MUST GO BEYOND DECARBONIZATION AND REDUCE RESOURCE USE

While decarbonization of energy production and industrial processes—including cleaner energy production, greener industrial production processes and enhanced energy efficiencies—has a crucial role to play in achieving climate targets, it is currently dominating the climate narrative at the expense of other vital strategies to address the challenges we face. Decarbonization aims to limit the extraction and impacts of fossil fuels; but it ignores the consequences of the relentless overuse of other resources. For example, the integration of renewable energy into production processes does nothing to address the increasing demand for high-impact materials such as steel, cement and biomass—and the impacts this creates.

Decarbonizing ever-growing industries will drive an increasing need for renewable energy and technologies, which in turn will require more resources. As the International Energy Agency (IEA) has highlighted, "there is a looming mismatch between the world's strengthened climate ambitions and the availability of critical minerals that are essential to realizing those ambitions" (IEA, 2021b). While decarbonization has a critical role to play in mitigating carbon emissions and climate change, if applied in isolation, it may cause unintended consequences for other planetary boundaries due to the continued global reliance on increasing resource use. An absolute reduction in resource use is therefore crucial both to realize decarbonization efforts and to stop and reverse the depletion of the natural assets and ecosystem services that are essential to our societal, economic and environmental needs. If overall production and consumption of natural resources continue to increase, staying within the planetary boundaries becomes physically impossible.

To decouple resource use from economic growth and wellbeing, both dematerialization and decarbonization of production are urgently needed in tandem; they are two sides of the same coin.

To achieve agreed climate targets and stay within the planetary boundaries, therefore, the overarching goal must be to use fewer resources to meet societal needs, and thus decouple wellbeing and economic growth from natural resources and environmental impacts. To this end, it is vital that resource efficiency is pursued holistically, incorporating both supply and demand-side measures. It should incorporate upfront demand reduction, supplemented by material and process efficiency in the design, manufacture and utilization of products.

If overall production and consumption of natural resources continue to increase, staying within the planetary boundaries becomes physically impossible

Resource use must decrease dramatically to achieve climate and other SDG-related targets

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Major climate and energy models confirm that absolute reductions in the use of energy and natural resources can deliver significant GHG emission reductions and are crucial to achieving the Paris Agreement's target of limiting global warming to 1.5°C. Reductions in energy and natural resource use by lowering demand for products and services should therefore be considered crucial aspects of national strategies.

According to the Intergovernmental Panel on Climate Change's (IPCC) latest report, *Mitigation of Climate Change* (IPCC, 2022b), strategies delivering absolute resource demand reduction (e.g., those that avoid, reduce and improve production and consumption patterns) and new models of service provision could reduce global GHG emissions from buildings, transport, food, industry and energy supply by 40-70 percent by 2050 while still delivering basic living standards and wellbeing for all.

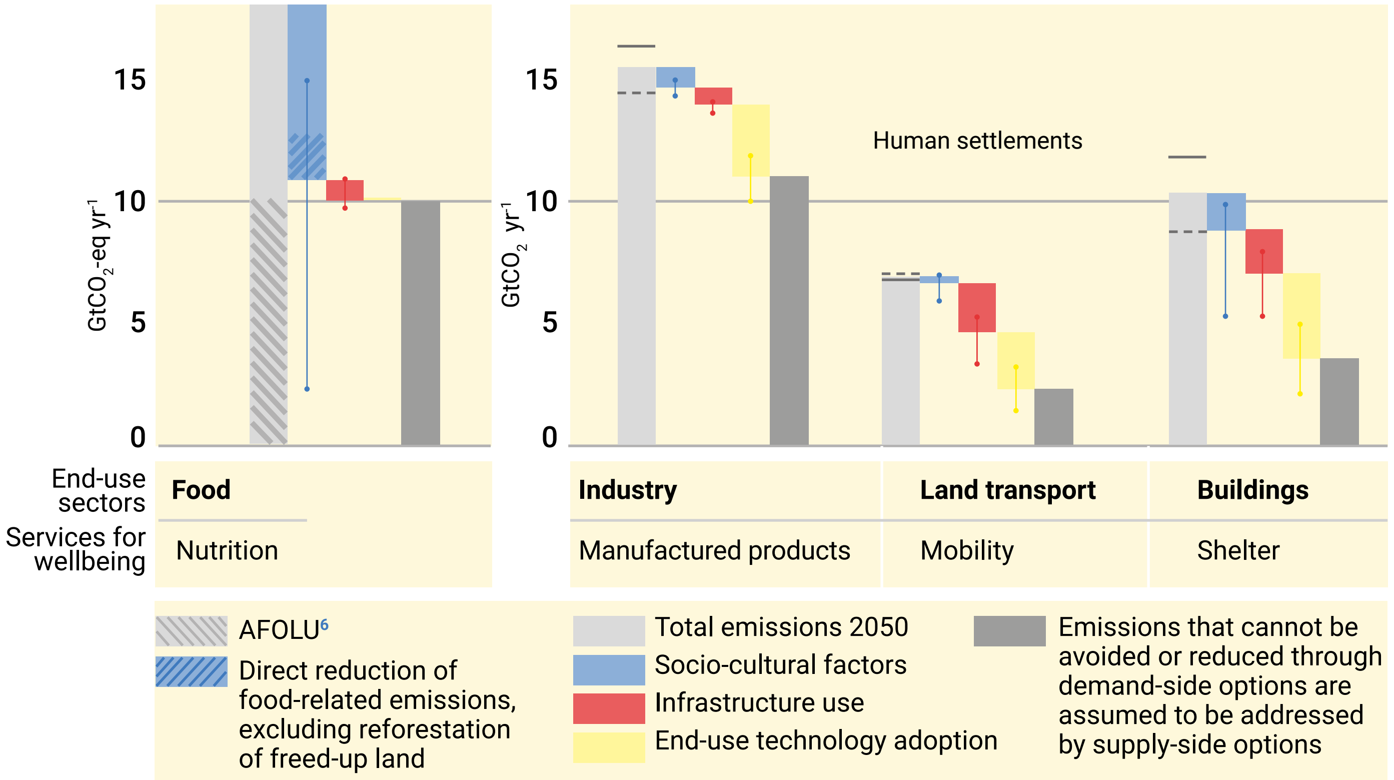
Reducing demand and use of natural resources, changing behaviors to reduce energy demand and decreasing the land and GHG intensity of food production and consumption are key elements of the IPCC's 1.5°C pathways. These strategies rely on existing technologies and human behavior change, as opposed to removal technologies—which have not yet been proven on a large scale to deliver significant GHG mitigation or benefits in terms of food security and biodiversity protection (IPCC, 2018, 2022b). They can also help households become less reliant on oil and gas to meet their energy needs, meaning that a large commodity price shock in 2030 would be 30 percent less costly for households compared to current trajectories (IEA, 2021). Importantly, such models (e.g., the IPCC Low Energy Demand scenario) are built on the baseline assumption that global population, gross world product and total food demand will increase during the 21st century. That is, the assumptions embedded within these models mimic a world in which the basic needs of a growing population are met, including through rising income levels and improved living standards in the Global South.

Despite this clear potential, however, technology-centric approaches which are heavily reliant on supply-side solutions and carbon dioxide (CO_2) removal have thus far received considerably more attention than mitigation scenarios aimed at deep demand-side reductions (IPCC, 2022a). As the IPCC highlights, demand reduction requires both behavioral change and advanced use of energy-efficient technologies; neither is sufficient by itself (Figure 5). The IEA reached a similar conclusion, stating that achieving net zero by 2050 will require not only clean technologies, but also behavioral changes that reduce energy consumption and demand (IEA,2021).

As the IPCC has demonstrated, this combination of demand and supply-side measures will result in "greater flexibility and speed of both end-use and supply-side decarbonization, lower pollution and reduce[d] systems costs." In addition, "low energy demand also implies less need for biofuels, which reduces the adverse impacts on food security … and has diverse benefits for biodiversity, health, poverty alleviation, and climate." In sum, the necessity for, and substantial benefits of, resource reduction measures for climate targets are clear.

As the IPCC has further shown, this decade is absolutely crucial to stay on a path limiting global warming to well below 2°C, and ideally to a maximum of 1.5°C. Every small step—every gigaton of carbon which is not emitted into the atmosphere today and in the future—matters.

Figure 6 **CO_2 emission reductions can be achieved through demand-side measures across all systems. (Figure adapted from the *Summary for Policy Makers to the IPCC AR6 WRIII* report published in 2022)**



Demand-side potentials are visualized across the four end-use sectors—Food, Industry, Land transport and Buildings—representing the wellbeing services Nutrition, Manufactured products, Mobility and Shelter. [7] Options are categorized by the dimensions relating to demand reduction:

- "Socio-cultural factors," associated with individual choices, behavior and lifestyle changes, social norms and culture (e.g., dietary shifts, working from home);
- "Infrastructure use," relating to the design and use of hard and soft infrastructure that facilitates changes in individual choices and behavior (e.g., recycling networks, compact cities); and
- "End-use technology adoption," referring to the uptake of technologies by end users (e.g., electric vehicles, energy-efficient appliances).

Moreover, models investigating other planetary boundaries also unequivocally confirm that resource use must decrease dramatically to achieve climate and other SDG-related targets. The IRP's GRO19 modeling reveals that without transformative measures to reduce resource use and achieve decoupling, material extraction will double before 2060, along with all the environmental impacts that entails (IRP, 2019). By modeling three policy packages and shifts in societal behavior (a 50 percent decrease in meat consumption for high-consuming nations, and a 50 percent decrease in food waste), the *Towards Sustainability* scenario achieves slower growth in resource use, more equal per-capita resource use across countries and an absolute decoupling of environmental damage from economic growth and resource use. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concludes that less resource-intensive production and consumption patterns would contribute significantly to achieving a set of sustainability targets, such as preventing climate change, conserving biodiversity and controlling air pollution (IPBES, 2019).

Without demand reduction, we will face limitations on land and water availability, significant biodiversity loss, pollution pressures and excessive costs (Leclère *et al.*, 2020). For example, biodiversity models highlight that production and consumption must change to "bend the curve" of biodiversity loss. Similarly, analysis from leading global scientists shows that we need to break unsustainable natural resource use patterns; by transforming how we produce and consume, we can avoid most future biodiversity loss and repair the damage already done (Leclère *et al.*, 2020). Finally, *Breaking the Plastic Wave* (Pew Charitable Trusts and SYSTEMIQ, 2020) cautions that the plastic pollution problem cannot be addressed without a 30 percent reduction in virgin plastic demand.

In conclusion, these models all highlight that natural resources are intimately intertwined with climate, biodiversity and pollution; and reaffirm the idea that a targeted approach and policies around resource efficiency are indispensable to address the climate challenges we face. Fundamentally, as stated above, decarbonization and dematerialization are two sides of the same coin.

6 AFOLU refers to "agriculture, forestry and land use."

7 The estimates of total emissions in 2050 are based on around 500 bottom-up studies representing all global regions. The baseline emissions are based on sectoral mean GHG emissions in 2050 from two scenarios consistent with policies announced by national governments until 2020 (IPCC, 2022b).

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3.

MOST CLIMATE POLICIES NEGLECT RESOURCE EFFICIENCY SOLUTIONS AND THUS MISS MAJOR OPPORTUNITIES FOR CLIMATE AND SOCIETY

Although the scientific modeling is clear, achieving an absolute reduction in natural resource use is a blind spot in current climate and sustainability strategies. Most countries still neglect resource efficiency solutions that address both supply and demand in their climate policies, nationally determined contributions (NDCs) and national biodiversity plans.

A comprehensive analysis of G20 NDCs, long-term climate strategies and G20 EU National Climate and Energy Plans (NCEPs) reveals that the potential afforded by resource efficiency solutions has not yet been adequately captured. As all these documents set out national targets and pathways to reach globally agreed climate goals, there is clear scope for the inclusion of resource efficiency measures.

For example, in the case of buildings, very few plans take their full lifecycle into account: emission reduction plans tend to focus on improving the energy efficiency of a building while it is in use, rather than maximizing the opportunities presented by building design and material choice or improving the efficiency of urban design (SYSTEMIQ and Yale School of Environment, 2022). Given that enhanced building resource efficiency has the potential to reduce emissions by one-third across building lifecycles while also reducing the risk of locking in emissions, G20 policymakers are missing a significant opportunity (IRP, 2020). A comparison of the number of resource and energy efficiency strategies with defined targets tells an interesting story. Where G20 NDCs, NCEPS and long-term plans do mention resource efficiency as a means of reducing emissions, this is often merely a vague ambition which is unconnected to a tangible emissions reduction aim; there are 10 times more energy efficiency strategies which are associated with quantified targets. Given that enhanced building resource efficiency has the potential to reduce emissions by one-third across building lifecycles, G20 policymakers are missing a significant opportunity (IRP, 2020).

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It is a similar story for mobility systems: four times as many quantified energy efficiency solutions than resource efficiency policies have been put forward in the climate policy documents analyzed (UNFCCC, 2022a, 2022b) Transport strategies mainly focus on electrifying personal vehicle mobility, overlooking the major impact of embedded resource use in vehicle manufacturing. To meet the Paris Agreement objectives, national policies should incentivize low-emission travel options. Encouragingly, many G20 long-term climate strategies do recognize the importance of developing green public transport systems and encouraging active transport (walking and cycling). However, some governments are still making strides in the wrong direction: less than a month before COP26 in Glasgow, the UK reduced passenger duty on short-haul flights, thereby incentivizing passengers to choose the most carbon-intensive options for journeys which could easily be made by other means (Lewis, 2021).

We can take some encouragement from the fact that improving resource efficiency through making economies more circular is captured in several G20 NDCs and long-term plans. Some countries are implementing resource use strategies which incentivize reuse and recycling. For example, the UK is introducing extended producer responsibility for packaging by shifting the net costs of packaging disposal to producers (UK Government, 2021b); while France's climate plan references its Circular Economy Roadmap, which aims to incentivize reuse and extend product lifespans (Government France, 2018). However, if ambition ends with upscaling reuse and recycling, the full potential of resource efficiency, as demonstrated by climate science, will be lost.

Furthermore, the circular economy and sustainable resource consumption are completely absent from the plans of some of the world's biggest emitters. When the United Nations Framework Convention on Climate Change parties update their NDCs ahead of COP27, there is thus considerable scope to include more transformative resource efficiency solutions.

If ambition ends with upscaling reuse and recycling, the full potential of resource efficiency, as demonstrated by climate science, will be lost

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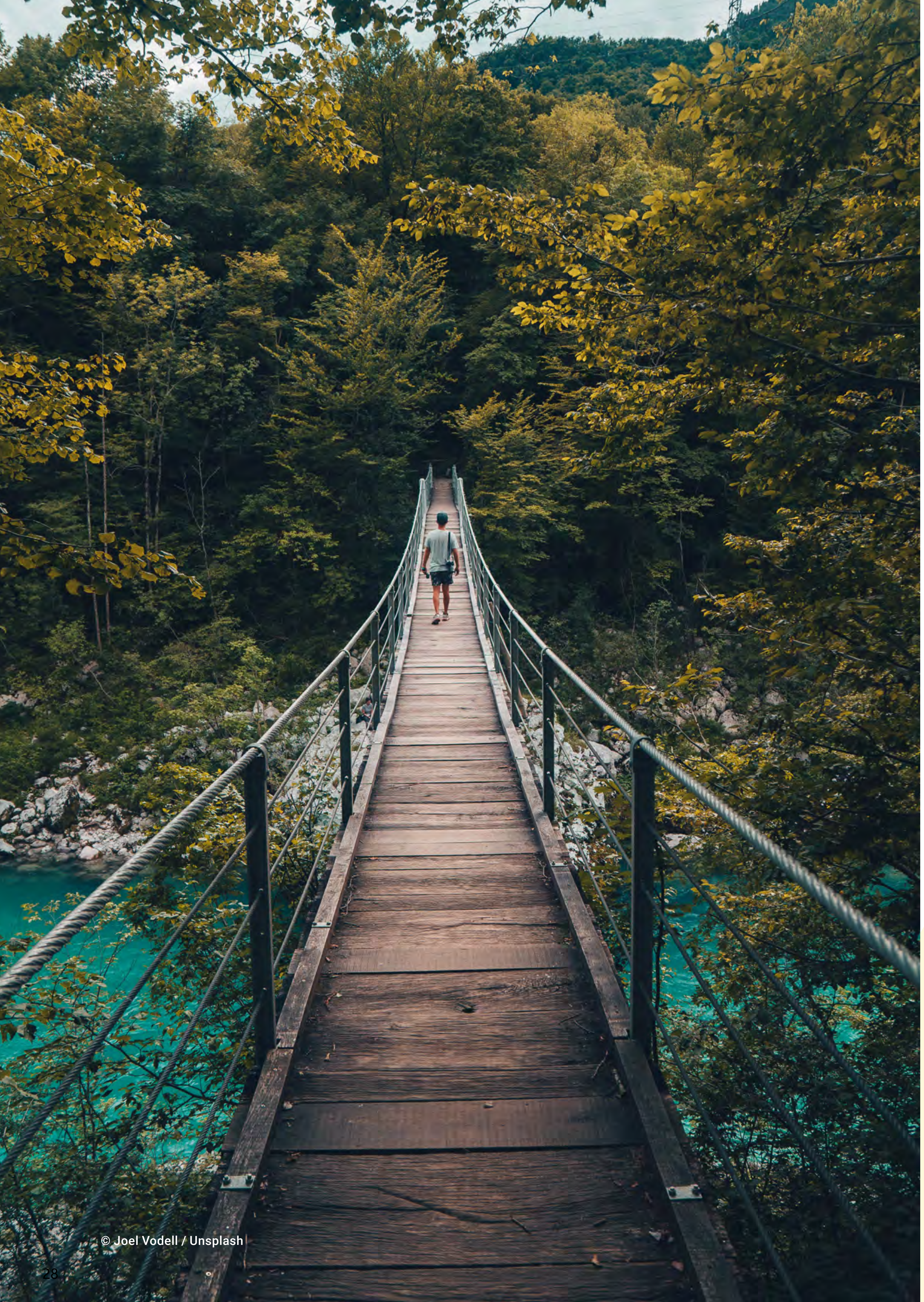
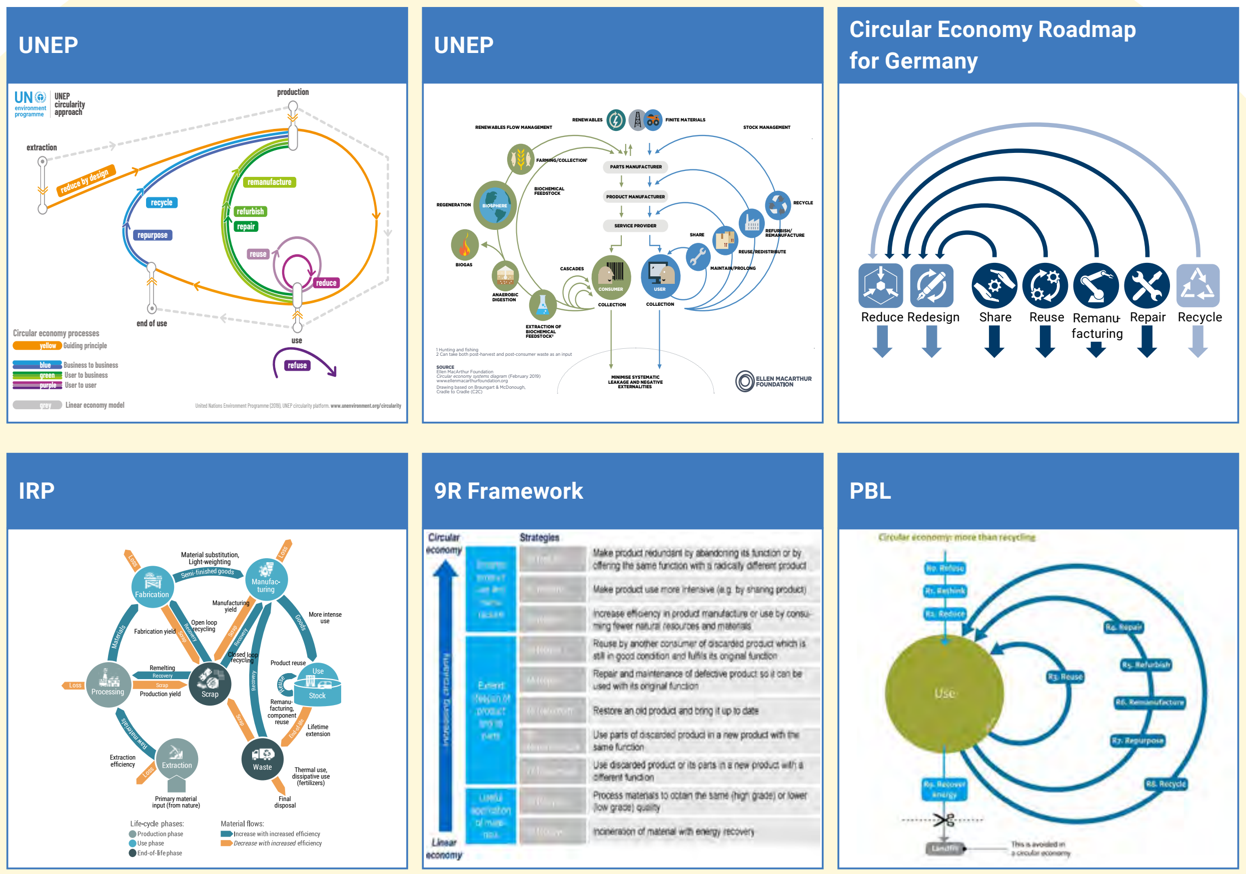


4.

ABSOLUTE REDUCTION OF NATURAL RESOURCES THROUGH RESOURCE EFFICIENCY CAN DELIVER CLIMATE MITIGATION WITH BENEFITS FOR NATURE, PEOPLE AND INDUSTRY

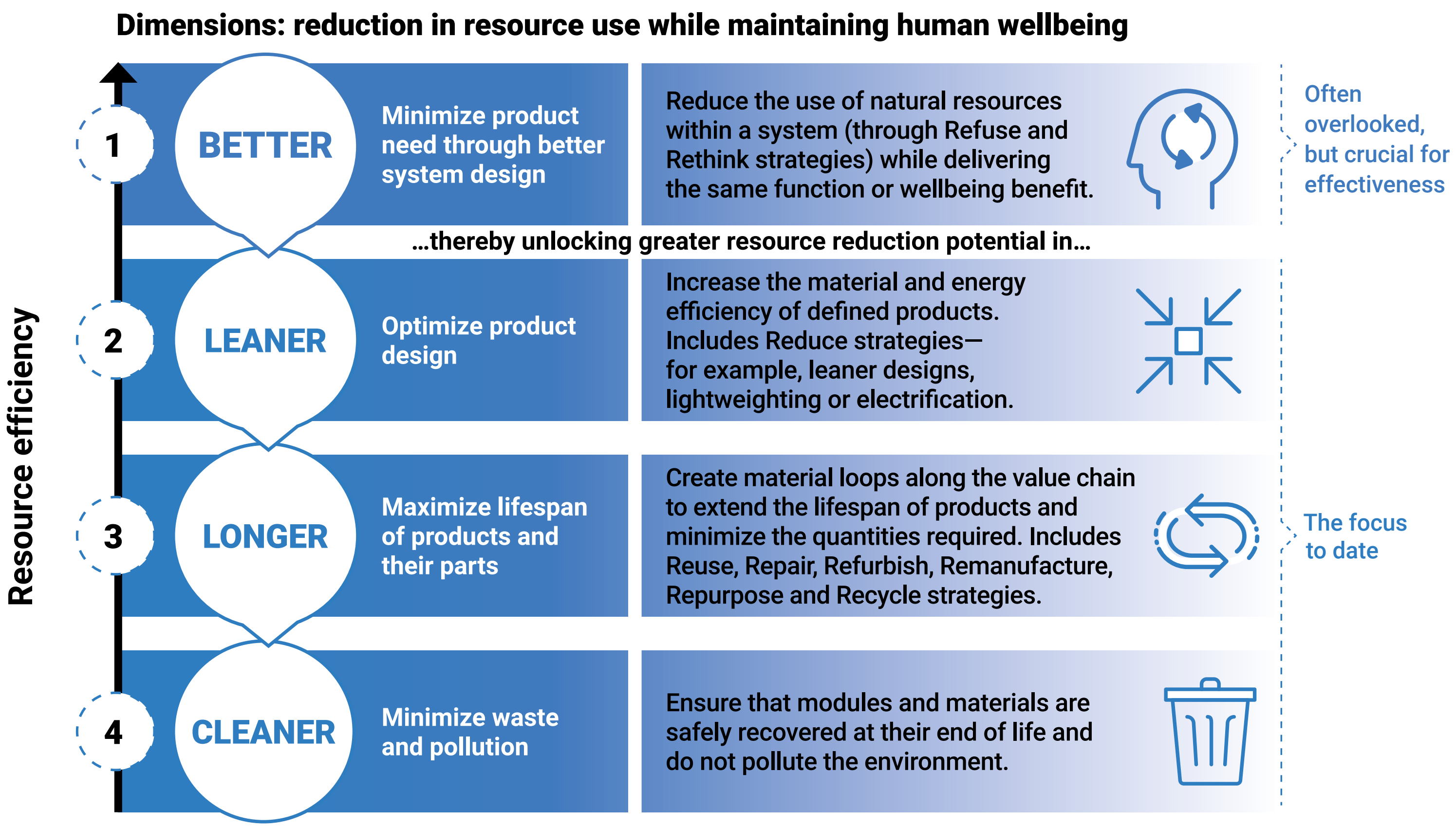
If we are to avoid exceeding the limits of what nature can sustainably provide while meeting the needs of humanity, consumption and production patterns must be fundamentally transformed. A circular economy will be vital in promoting sustainable consumption and production and achieving greater resource efficiency. Much work has been done by different organizations to develop frameworks and strategies needed to operationalize resource efficiency and circular economy measures. Many models exist, including the IRP's material efficiency strategies in a product lifecycle (IRP, 2020); the UN Environment Programme's circularity approach (UNEP, 2019); the Ellen MacArthur Foundation's circular system diagram (Ellen MacArthur Foundation, 2019b); the 9R Framework (Potting *et al.*, 2017); the Netherlands Environmental Assessment Agency's (PBL) circularity strategies (RVO, 2022); and the Circular Economy Roadmap for Germany (Circular Economy Initiative Deutschland, 2021).

Figure 7 Select circular economy frameworks



While these frameworks have slightly different nuances, the key messages can be summarized in four broad dimensions, as outlined in Figure 8. These four dimensions underpin the resource efficiency strategies needed to decouple the resource use from economic growth and environmental impacts, while improving wellbeing. All dimensions individually and collectively aim to reduce resource consumption—either absolutely or relatively, depending on national circumstances—while maintaining the primary function or wellbeing benefit delivered by a given resource (e.g., healthy nutrition), making this framework universally applicable.

Figure 8 Framework for the holistic application of resource efficiency[8, 9]



Source: Developed by SYSTEMIQ in consultation with the IRP Co-Chairs

Together, these four dimensions ensure resource efficiency is applied systematically—beyond its traditionally narrow definition, which encompasses only supply-side measures. For example, this broader understanding of "systemic" resource efficiency can be achieved through circular economy approaches if these are also applied in a comprehensive and holistic way.

8 While each is useful and necessary, it is important to note that their impact could be limited due to so-called "rebound effects": the reduction in expected gains from measures that improve the efficiency of resource use are canceled out by changes in people's behavior. This must be carefully assessed, managed and regulated.

9 While the behavior of consumers plays a part in this dimension, for them to make "sustainable" choices, these choices must be made available in a way that does not compromise their wellbeing (e.g., a shift to alternative transport options is not feasible if these are not convenient or safe; and a shift to plant-based diets is possible only if alternative nutritious food is available at comparable prices).

Better system design should be the starting point in reducing resource use and is a critical step in rethinking how resources can best meet our needs (represented by the first dimension). In essence, this involves using fewer resources to provide comparable or better societal benefits. For example, we don't need cars; we need mobility. A cleaner and convenient circular mobility system can deliver on this need while saving on steel and other critical raw materials used to manufacture private cars and limiting pressures on parking spaces.

While the frameworks as such are quite comprehensive and capture the need to change systems of production and consumption, an examination of their application in practice and their discussion in policy and business debates reveals an imbalance. The focus to date has been on the "Leaner", "Longer", "Cleaner" dimensions of resource efficiency by improving the supply side of production and consumption systems—for example, through strategies for lightweighting or recycling—rather than addressing the demand side by considering

how the total amount of natural resources needed to deliver a certain function can be reduced. In other words, the '"Better" system design dimension of resource efficiency, as outlined above in Figure 8, is to a large extent neglected. This disregard for the first dimension was clearly demonstrated in the Glasgow "Breakthroughs" in 2021. Rather than offering a systemic perspective on the changes needed to mobility solutions, world leaders set out to make "Zero-emission vehicles the new normal and accessible, affordable, and sustainable in all regions by 2030." This imbalanced application is further reflected in PBL's analysis of circular activities in the Netherlands, which showed that "Rethink and Refuse" initiatives (the system design dimension) accounted for just 8 percent of initiatives in 2018—in stark contrast to recycling initiatives, which made up about 75 percent (PBL, 2019).

This is alarming, as in many cases the "Better" system design dimension of resource efficiency—reducing the use of natural resources by improving the way (production and consumption) systems are designed to deliver value—has the greatest potential for climate mitigation. For example, analysis by the IRP reveals that better utilization (i.e., reducing excessive floor space through smarter urban planning and building design) would result in the highest emissions reductions in the built environment in G7 countries. Similarly, better utilization of vehicles through car sharing and ride sharing is the most promising strategy for increasing the material efficiency and lifecycle emissions of cars (IRP, 2020). By applying resource efficiency narrowly and ignoring the system design dimension, we miss out on major opportunities to achieve the absolute resource reduction that is needed to reach climate goals.

Demand-side measures are essential to better address the mitigation issues relating to responsibility and equity. Resource efficiency, particularly in high-income countries, should thus be complemented with sufficiency-based policies. We must stop ignoring the inherent wastefulness of current production and consumption

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systems. For example, it is futile to decarbonize the production of steel if it is used to produce underutilized cars and houses, which exacerbate traffic and property market bubbles, and make no contribution to real social prosperity.

Why is the system design dimension often overlooked?

There are various reasons why the system design dimension of resource efficiency has largely been overlooked to date. One major factor is that its implementation requires **the deepest shifts across sectors and the most radical innovation in business models**. In optimizing products and traditional production sectors in isolation, which most economic policies do, we **block deeper innovations across sectors** and **prevent shifts of value creation** and jobs from resource-intensive sectors to less resource-intensive, service-oriented business models. Sectors are designed to increase economic activity and productive output, rather than to meet human needs. For example, applying resource efficiency to the automotive sector may produce leaner, more efficient vehicles; but we should also tap the potential of new ownership models that increase vehicle utilization, promote a shift to other transport modes and eliminate the need for travel in the first place through more compact city design and increased remote working. Otherwise, major opportunities for absolute resource reduction will be missed.

To implement resource efficiency in a way that reduces our material footprint,[10] we need to fundamentally **redefine** what we are optimizing for. We need to shift away from merely maximizing production output to focusing on **delivering performance and meeting needs**.

This requires a rethink of the systems that meet our needs, to make low-resource—and even no-resource—alternatives easy and attractive options. For example, many people might choose to live in denser urban areas if neighborhoods were greener, safer and better connected. Redesigning systems for resource efficiency is by no means simple; but it can unlock greater multiple benefits than merely tinkering around the edges of existing systems and making small, isolated efficiency gains in production processes.

To this end, the *System Change Compass* report[11] by SYSTEMIQ and the Club of Rome (SYSTEMIQ and the Club of Rome, 2020) identifies four resource-intensive "provisioning systems" which each meet a specific societal need and demonstrate a direct link to natural resources and our respect for the planetary boundaries:[12, 13]

- built environment;
- nutrition;
- mobility; and
- daily functional needs met through consumer goods (e.g., hygiene, clothing and communications devices).[14]

10 This term is used to represent the whole system of environmental pressures exerted by human activity, including direct pressures occurring within the geographical boundary where the activity occurs and indirect or supply chain pressures beyond (transboundary pressures). The material footprint encompasses all material resources used (IRP, 2019).

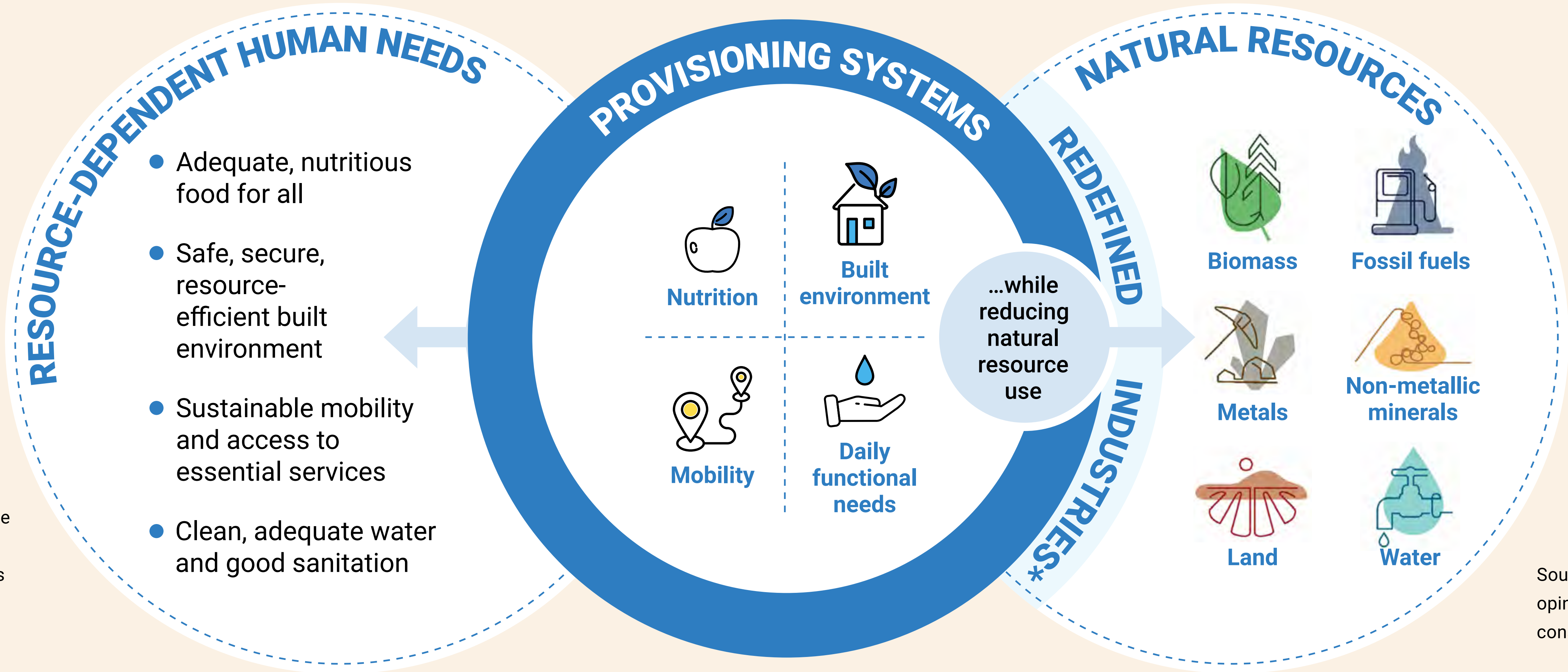
11 This report is based on IRP science and has a natural resource focus.

12 These are aligned with the seven societal needs identified in the *Circularity Gap* report (Circle Economy, 2021).

13 The work has been recently complemented by the International System Change Compass, which analyses the global implications of the targets set for decarbonization and decoupling, and in particular the importance of fairness and equity linked to natural resource exploitation and use (SYSTEMIQ and the Club of Rome, 2022).

14 We recognize that there are many other societal needs, including education and political voice. However, the focus of the four systems described is on the most resource-intensive needs.

Figure 9 Provisioning systems aim to deliver resource-dependent human needs while minimizing resource use



* Redefined industries service the provisioning systems by delivering wellbeing benefits with circular resources (e.g., energy, digitalization)

Source: Developed for this opinion piece by SYSTEMIQ in consultation with IRP Co-Chairs

These provisioning systems are in turn supported by natural resources, as shown above in Figure 9.

To implement all four dimensions of resource efficiency, policymakers must optimize "provisioning systems" to meet societal needs with minimal resource input

To create a resource-resilient economy that promotes a prosperous and healthy society, we must redefine the logic of our economic model to fit exactly that goal. Optimizing individual sectors for production is no longer the most useful approach; instead, we need to optimize provisioning systems to meet societal needs with minimal resource input.

This can be illustrated through the example of mobility. In many G7 economies, the societal need for mobility and access cannot be met with more cars—even if leaner and cleaner—or even with more roads. This is because mobility issues are determined not by lack of car ownership, but rather by traffic jams, pollution and unequal access to mobility solutions. The productivity lost through traffic jams has been widely documented: for example, these cost the British economy £8 billion and the average London commuter 227 lost hours in 2018 alone (INRIX, 2019). Hence, overall economic performance—as well as societal performance—would improve if the functional performance of mobility were enhanced through smart sharing, better public transport, increased active transport and the planned distribution of essential services within and across neighborhoods. However, such a radical shift cannot be realized through piecemeal efforts to optimize sector by sector; it can only be achieved if both economic policies and business strategies are developed in a way that optimizes the mobility system itself, as measured by its performance in delivering mobility, rather than a blind fixation on higher production.

To date, there has been some promising progress in applying mostly the latter three dimensions of resource efficiency (i.e., "Leaner," "Longer," "Cleaner") to traditional production sectors, which has increased efficiency but has achieved little progress in reducing the absolute need for virgin resources. Therefore, to achieve climate targets and enhance societal performance, we now need to apply all four dimensions to all resource-intensive provisioning systems (see Figure 8).

A sustainable economy that links humans to nature will not only be significantly less polluting by design, but will also be more resilient to supply shocks—whether due to geopolitical conflicts, financial market volatility or environmental disasters.

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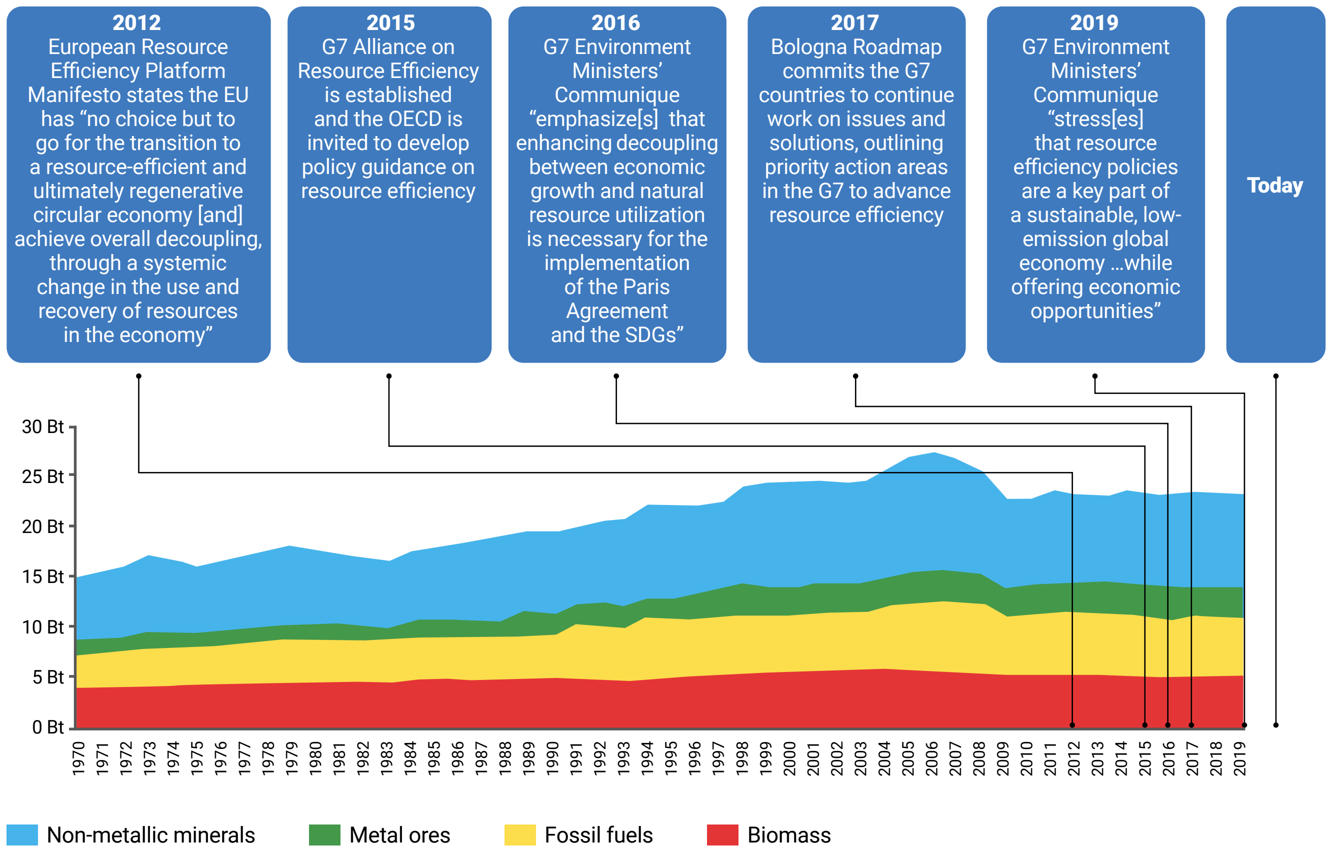
5.

TO REAP CLIMATE AND SOCIAL BENEFITS, ECONOMIC AND CLIMATE POLICIES MUST APPLY RESOURCE EFFICIENCY HOLISTICALLY

There is already a high level of agreement among global policymakers that a transition to a more sustainable society and economy is needed; but it will be the speed and scale of this transition that determine humanity's safe and just operating space on Earth. This will require us to address the drivers and pressures that cause the challenges we face, provide a systemic perspective to guide decision making and channel sufficient investments to support that transition. To ensure credibility, countries with the largest consumption footprints and the greatest impacts must lead by example to promote fairness and equality.

We should not forget that the standards and behavior patterns associated with the current economic model were set by high-income countries. As such, these countries are bound to demonstrate that they are willing and able to change the reality they have created and lead the transition efforts. The G7 has acknowledged the importance of resource efficiency since 2012, yet actions thus far have done little to reduce damaging resource use (see Figure 10 below).

Figure 10 G7 material footprints and corresponding actions on the challenge over time



Source: Material Flows, 2022; G7 Alliance on Resource Efficiency, 2022.

Building on the understanding that resource production and consumption are at the heart of the triple planetary crisis, and their reduction is key to achieving climate and sustainability targets, policymakers must now work to deliver real action.

This year, the G7 has a big opportunity to create an ambitious new roadmap, building on 2017's Bologna Roadmap. The focus to date has been on the "Leaner," "Longer," "Cleaner" dimensions of resource efficiency; while "Better"—the system design dimension of resource efficiency—has been neglected. Better systems design should be the starting point in reducing our resource use and is a critical first step in rethinking how resources can best meet our needs. In essence, this involves using fewer resources to provide comparable or improved societal benefits. Accelerating resource efficiency and—crucially—applying it across all four dimensions requires us to reassess our values, rethink our economies and reduce overconsumption and resource use, while still delivering on wellbeing outcomes.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IMPLEMENTING THE FOLLOWING STEPS WITH IMMEDIATE EFFECT IS ESSENTIAL TO BEGIN TO MAKE THIS A REALITY

1. **Redefine value:** Rethinking how value is defined and how economic success is measured can ensure that resources are used to deliver genuine human needs.

2. **Rethink our perspective:** Taking a provisioning systems perspective, as opposed to looking at individual sectors, would enable policymakers to act in accordance with inclusive wealth measures and optimize for these values. Resource efficiency could thus be applied holistically.

3. **Define the North Star:** Countries should set clear ambitions to promote resource efficiency across all four dimensions by setting resource reduction-related targets and integrating them into climate and other sustainability strategies to guide us on a more sustainable path with revised incentives.

4. **Foster global collaboration:** Global collaboration for resource efficiency should be founded on principles of equity and inclusion.

5. **Support implementation:** To realize their resource reduction-related ambitions, policymakers should ensure governments, businesses and consumers are incentivized through regulatory and fiscal policies that support the application of **all four dimensions** of resource efficiency. These should:
   - utilize metrics to track progress against targets and create transparency;
   - promote inclusive innovation, working closely with industry and communities to support new business models; and
   - accelerate innovation through targeted investments and fiscal incentives.

1 Redefine "value" to deliver genuine human needs

For new reduction-related targets to be **achievable,** they must be underpinned by a **shift in how economic success is measured**.

Government decision making often hinges on short-term, growth-based economic projections, which are not necessarily aligned with long-term wellbeing and planetary stability. Therefore, the current economic policies of most G7 countries need a refit to support truly sustainable resource use. Economic decision makers need to accept that their policies can no longer be underpinned by the assumption that growth in production—often connected to growth in resource use and its harmful impacts—is the only way to generate long-term prosperity. Instead, the focus should be on redesigning systems to facilitate innovative circular and service-based activities that deliver human needs in the most efficient and resource-rational way.

As our primary measure of economic success, GDP misses many aspects important to long-term stability and therefore encourages us to pursue unsustainable economic growth and development. For example, GDP takes a positive count of the cars we produce, but does not account for the emissions they generate; it adds the value of the sugar-laced beverages we sell, but fails to subtract the health problems they cause; it includes the value of building new cities, but does not discount for the vital forests they replace. As Robert Kennedy put it in his famous election speech in 1968, "[GDP] measures everything in short, except that which makes life worthwhile" (Kapoor and Debroy, 2019). Even the Nobel Prize-winning economist and designer of modern GDP Simon Kuznets has said, "the welfare of a nation can scarcely be inferred from a measurement of national income" (European Commission, 2022).

As the IPCC (IPCC, 2022) has stated, GDP is a poor metric of human wellbeing if used in isolation. Countries need to look beyond GDP toward metrics that present a more nuanced message about human wellbeing, how resource use contributes to it and how it is distributed. To judge whether economic development is sustainable, an inclusive measure of wealth is needed to get a more comprehensive view of development and ensure informed policymaking that does not exclusively prioritize short-term economic growth at the cost of long-term wellbeing and planetary stability.

It is time to shift to a fundamentally new mindset and to decouple resource use and its impacts from wellbeing to a sustainable level, focusing on targeting resource use to deliver genuine human needs. The solution starts with understanding and accepting a simple truth: our economies are embedded in nature, not external to it (Dasgupta, 2021). Introducing natural capital into national accounting systems is a critical step toward making "inclusive wealth"[15] our measure of progress. The concept of inclusive wealth accounts for the benefits of investing in natural assets and highlights the tradeoffs and interactions between investments in different assets. This would unlock major opportunities for the environment, the economy and human health. It would also make it much easier to pursue the absolute reduction of resource use, because resource efficiency solutions contribute to increases in natural capital and human wellbeing. "With a change in what we measure and perceive as a barometer of development, our policy interventions will become more aligned with the aspects of life that citizens truly value, and society will be better served" (Kapoor and Debroy, 2019).

Targeting resource use to deliver genuine human needs forms the basis of the four dimensions of resource efficiency.

2 Rethink our perspective: Deliver human needs through a provisioning systems perspective

As described in section 4, to create a resource-resilient economy that promotes a prosperous and healthy society, we must redefine the logic of our economic model to fit exactly that goal. Optimizing individual sectors for production is no longer the most useful approach; instead, we need to optimize provisioning systems (built environment, mobility, nutrition and consumer goods) to meet societal needs with minimal resource input. This approach will allow the first system design dimension of resource efficiency to be more easily applied.

This approach centralizes the actual human need delivered, rather than the industry-optimizing production of goods associated with those needs. Shifting the focus from production to need can unlock new, less resource-intensive ways of delivering human needs (SYSTEMIQ and the Club of Rome, 2020). In the same way that growth-based measures of success are aided by optimization of production, shifting to a provisioning systems perspective goes hand in hand with redefining economic success.

15 A country's inclusive wealth is the social value (not dollar price) of all its capital assets, including natural capital, human capital and produced capital (UNEP, 2018).

Envision a future based on optimized provisioning systems

In order to facilitate this shift, the G7 could play an important role in setting and rethinking aspirations. To set decision makers in the G7 and beyond on the path toward a global economy which optimizes human wellbeing delivered by high-performing provisioning systems, the G7 as a group can come together to create ambitious visions of what new value creation in dematerialized economies of the future could look like. All G7 countries have tremendous innovation capacity, amazing talent and substantial public and private capital. If this group can paint a clear vision of an economy based around decarbonized and dematerialized provisioning systems, clean business models and frontrunning industries of the future, the necessary investments are highly likely to follow.


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3 Define the North Star: integrate resource reduction-related targets into climate strategies

A target sets a clear orientation, provides concrete guidance and helps prioritize actions to achieve a policy objective. If properly enforced and supported by an appropriate mix of policy measures to ensure fair global market conditions and a level playing field, it can be a powerful approach to addressing environmental issues.

Numerical targets are also the clearest way to galvanize government and business action. The climate change agenda has shown this with the 1.5°C target limit set out in the Paris Agreement—a target which has led to the definition of "carbon budgets" that provide guidance on the amount of GHGs that can still be emitted. Countries that have set clear targets have seen spikes in innovation, as this has created concrete ambitions while also reducing risk for innovators and investors (need source). Carbon emissions targets have made low-

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carbon and carbon-negative solutions attractive to investors. Resource efficiency solutions would benefit in the same way from the introduction of relative reduction targets on material footprints.

Policymakers should thus complement energy and GHG-related targets with the introduction of resource use-related targets in their NDCs.[16] Ultimately, this involves translating their climate commitments into implications for resource consumption. These should be applied across provisioning systems in order to identify which production and consumption areas within each will be phased down, which will be phased out and which will flourish in order to achieve them.

Climate plans should integrate resource efficiency strategies across all four dimensions. All G20 countries have at least one target relating to energy efficiency in their NDCs or long-term plans, yet only a few link these to broader quantified targets for resource efficiency. Climate change mitigation could be accelerated by integrating solutions currently implemented on small scales into national policy. For example, the EU specifies that member

16 Material footprint is one possible metric that could be used to monitor and control the use of natural resources at both company and country level.

states' climate plans must include energy strategies; ideally, it should also mandate the inclusion of resource use strategies. Also, the EU's energy efficiency strategies—and related impact assessment modeling—do not consider all four dimensions of resource efficiency and therefore miss significant potential for mitigation and social benefits; so any energy-efficiency and resource-efficiency plan should take all four dimensions into account.

The G7 countries should further convene ministries to define the plans needed to meet their natural resource reduction-related targets, such that each country can ultimately present its strategies in a pre-defined timeframe.

In parallel, to advance the feasibility and legitimacy of absolute resource reduction targets, the G7 should mandate further work with a well-funded group across science panels to define absolute targets.

4 Global collaboration on resource efficiency

By definition, transforming sectors and systems to deliver wellbeing equitably and with significantly fewer resources will require cross-border cooperation in today's globalized world. All countries stand to benefit from a more resource-efficient society, and as such should come together to arrive at a shared understanding of sustainability and solutions which do not disadvantage specific countries. It is crucial that multilateral solutions for long-term planetary stability do not reinforce historic international power dynamics and are genuinely collaborative.

The first need is detailed scientific monitoring and reporting of cross-border resource flows and their environmental impacts. The resulting coherent and transparent global resource use data would form the bedrock of further collaboration efforts. It is an essential prerequisite to identify critical supply chains or impact hotspots resulting from unsustainable resource use, for which multilateral solutions can be developed. This in turn would enable targeted funding that could transform resource value chains with precision: based on coherent and transparent global data, dedicated funding could be used to deliver positive social and environmental outcomes, while maintaining livelihoods which currently rely on resource extraction (IRP Co-Chairs, 2022; SYSTEMIQ, 2022).

G7 governments can take the first steps toward making such coherent and transparent data a reality. They can lead the way by funding world-class resource tracking and impact science; building international capacity in contexts where data collection is a challenge; and convening other governments that wish to demonstrate their ambitions for the resource agenda.

G7 governments could work toward such a new governance model by strengthening multilateral cohesion between themselves and advocating for international coordination through groups such as the Global Alliance on Circular Economy and Resource Efficiency. As well as demonstrating their unified ambitions on resource governance, G7 and G20 governments could use their platform to shift the international dialogue toward multilateral resource agreements with a broader range of governments. To this end, they could use existing high-level platforms (e.g., conferences and high-level roundtables) to leverage support for the necessary shift in resource use and create coherent governance for it.

5 Support implementation of resource efficiency solutions across all four dimensions through regulatory and fiscal policies

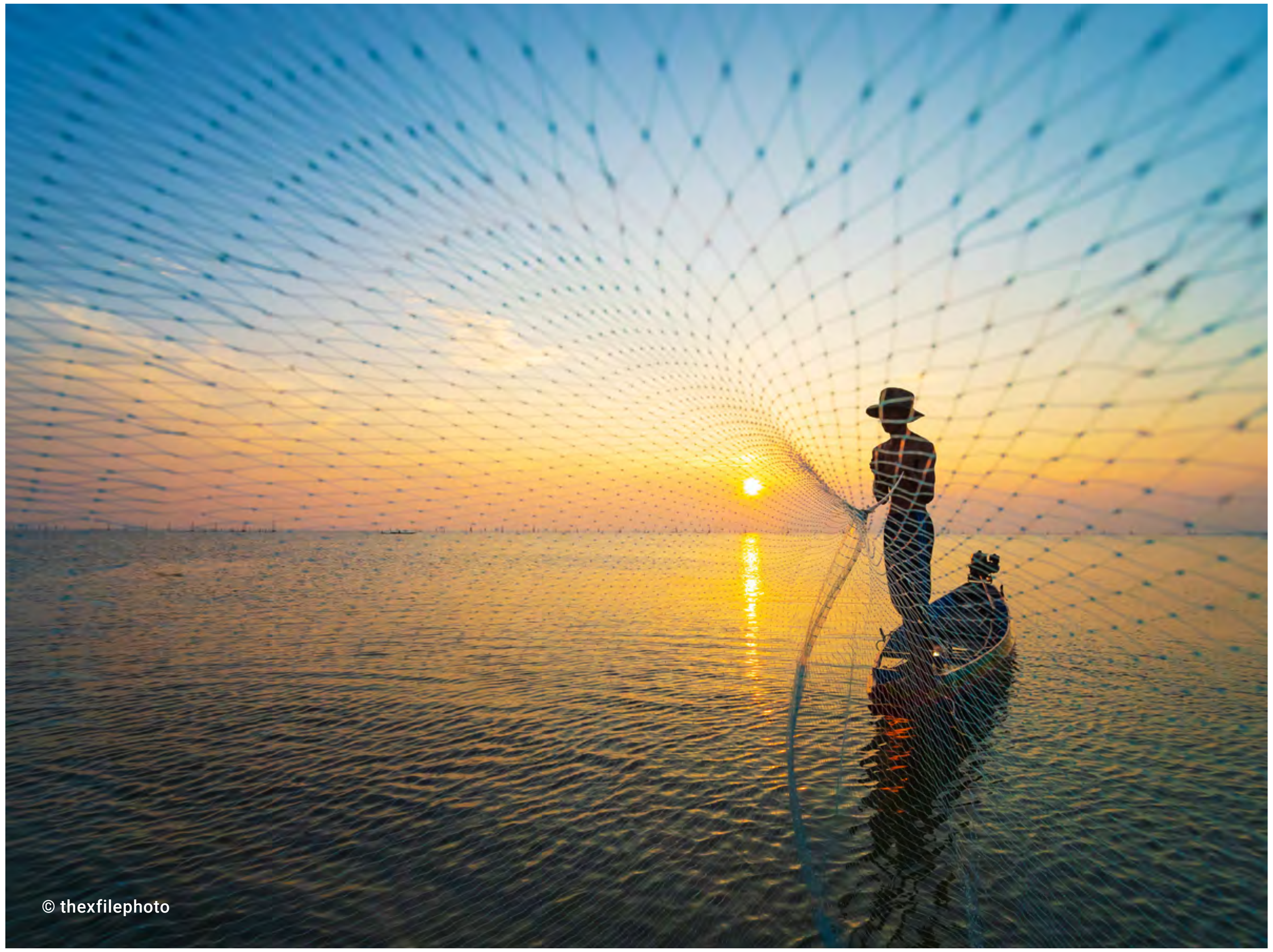
If patterns of production and consumption are to change, the rules that governments set and enforce must also change. To this end, policymakers should define and monitor metrics; work closely with industry and communities to support new business models; and ultimately invest and remove adverse fiscal incentives which drive uncontrolled resource consumption.

A Metrics to track progress against targets and create transparency

In order to track progress against resource reduction-related targets while delivering on wellbeing, metrics across the four dimensions of resource efficiency must be defined (e.g., utilization, recycling rates). The next Global Resources Outlook will use indicators that show how provisioning systems are delivering human needs.

With a narrowing window of opportunity for change, policymakers must measure progress at a national level to effectively steer the transition. Metrics will allow policy proposals to be assessed based on both their GHG and resource impacts, enabling countries to properly account for and limit the impact of natural resource use. Metrics are also key for both societal and business operationalization.

B Inclusive innovation: engagement across industry, science and government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Governments—and multilateral platforms like the G7 and G20—can play an active role in making the economy of the future more tangible, to encourage the mainstream investment that will promote the more resource-independent, resilient business models of tomorrow. In the past, public actors have inspired deep innovation and scaling through mainstream investments—for example, through strategic innovation funds and programs (e.g., Silicon Valley and COVID-19 vaccines), and through vision-building roles such as the European Commission's innovation alliances between industry and science for batteries. One of the main challenges with implementing the first dimension of resource efficiency—pursuing a redefined value of societal performance at minimal resource input—is that the business models to deliver this can be different from those that currently exist and hard to imagine within existing economic and regulatory paradigms. Even highly innovative investors struggle to find business and projects at a sufficiently large scale—for example, in integrated shared urban mobility or space-efficient, fair, vibrant neighborhood living services—to shift their investments from resource-intensive models to more resilient investments. Public players—locally, nationally and internationally, such as at the G7 and G20 level—can play a crucial vision-building role by convening cross-sector groups to develop resource-decoupled business models in all provisioning systems and bringing together scientists, civil society and industry in strategic problem-solving exercises to develop pathways to transform economic value creation at scale.

C Accelerate innovation through investments and financial instruments

Markets are already achieving some degree of resource efficiency; but left as they are, they will not achieve what is needed in future, because they seek to economize on what is currently highly valued—produced capital and human capital. Policymakers must help markets do their job in promoting resource efficiency, which in turn will provide financial security. For instance, too frequently, the resource-efficient option is the economically inefficient option and vice versa. For consumers to be able to make "sustainable" choices, the businesses that provide them must be supported by policy. We need to stop signaling to producers that natural capital can be destroyed free of charge and stop confusing consumers by asking them to behave responsibly—for example, by paying more for food with a low environmental impact and less for food with a higher ecological footprint.

Economic policies are based on the "fiscal triangle" of spending, taxation and borrowing. The G7 can redesign each of these to support innovation and thus promote sustainable natural resource use, as described below. While innovation should target all four dimensions of resource efficiency, a specific focus should be on ensuring the first system design dimension is prioritized, as it has been largely neglected to date.

Public investments (e.g., subsidies, tax reliefs) can accelerate innovation and prioritize sustainable activities.

At present, governments across the world are "paying businesses and consumers more to exploit Nature than to protect it, and to prioritize unsustainable economic activities" (Dasgupta, 2021). Currently, at least $500 billion per year is invested in subsidies that damage natural capital (OECD, 2019). These harmful subsidies should be completely eliminated and redirected to support long-term planetary stability—for example, through accelerating innovation by helping businesses overcome cost barriers in each of the four dimensions of resource efficiency. Examples of areas for potential investment in the transition to sustainable resource consumption are shown in Figure 11. Innovators (e.g., XAAS providers) must typically pass through a critical transition phase from a financial and risk perspective (SYSTEMIQ, 2021). An innovation fund could be set up to help unblock financial barriers, pilot new solutions and provide targeted financial support to critical supply chains that have been identified (as described under Step 4, "Global collaboration", above).

Additionally, revisions to labor and tax regulations could help drive all dimensions

Figure 11 Select investable champions for resource efficiency across all dimensions and systems

BUILT ENVIRONMENT	INTERMODAL MOBILITY	HEALTHY FOOD	CONSUMER GOODS
Smart urban planning	Fast charging infrastructure	Organic food and beverages	Product-as-a-Service models
Rethink built environment ownership	High-speed railway infrastructure	Regenerative agriculture	Maintenance and value retention in products
Repurpose underused buildings	Modern and adapted transit infrastructure	Sustainable aquaculture and fishing	Peer-to-peer product sharing platforms
Retrofit existing buildings	Car and ride-sharing models	Reduce and valorize food waste	
Fluid and sufficiency -oriented space management	End-of-life management for vehicles	Urban agriculture	
Circular and net-zero housing	Electric and autonomous vehicles (AVs)	Product reformulation for nutritious food	
	Infrastructure to improve traffic flow and AV adoption	Alternative proteins	
	Green aviation		
	Green shipping		
	Walking/cycling infrastructure		

Source: SYSTEMIQ and The Club of Rome, 2020

of resource efficiency. For example, according to a recent Eurobarometer survey, 77 percent of people would like to have items repaired, but tend to replace them instead because repairs are too expensive (European Parliament, 2017). In Sweden, this has been addressed through a tax refund for the labor segment of household repair bills for white goods and electronics; while Austria has made repair more affordable by providing tax relief and reimbursing the costs of repair for electrical appliances (Piringer and Schanda, 2020).

Taxation This is another powerful instrument that can disincentivize resource-intensive consumption and accelerate innovation by levelling the playing field. One major barrier to improved material consumption is the cost structure of the economy. Virgin materials are usually less expensive than secondary ones. Potential interventions include the following:

- **Governments currently tax labor**—which is a desired feature of economies—rather than taxing resource use and environmental damage, which are not. Environmental tax reform would allow resource use and pollution to become more expensive. This would include removing tax perversities that promote resource use.

- **Governments should promote extended producer responsibility**—an approach supported by industry, as demonstrated by the Consumer Goods Forum's Coalition of Action on Plastic Waste (Consumer Goods Forum, 2020).

Public procurement mandates increase competitiveness in price between companies while also helping to set high product standards. For example, the Netherlands has integrated lifecycle analysis into public procurement processes, which apply 11 environmental impact parameters that ultimately convert into a monetary value such that resource efficiency is taken into account when awarding tenders. On completion of the work, the contractor is then held responsible for ensuring this is realized; otherwise, a penalty is imposed (OECD, 2016).

Finally, social security spending is important to ensure people are supported through a transition that will inevitably cause some industries to shrink and make others obsolete. It is essential for long-term planetary stability and human prosperity that this transition takes place and does not lose human capital in the process. This would include income support and investment in skills for new career opportunities.


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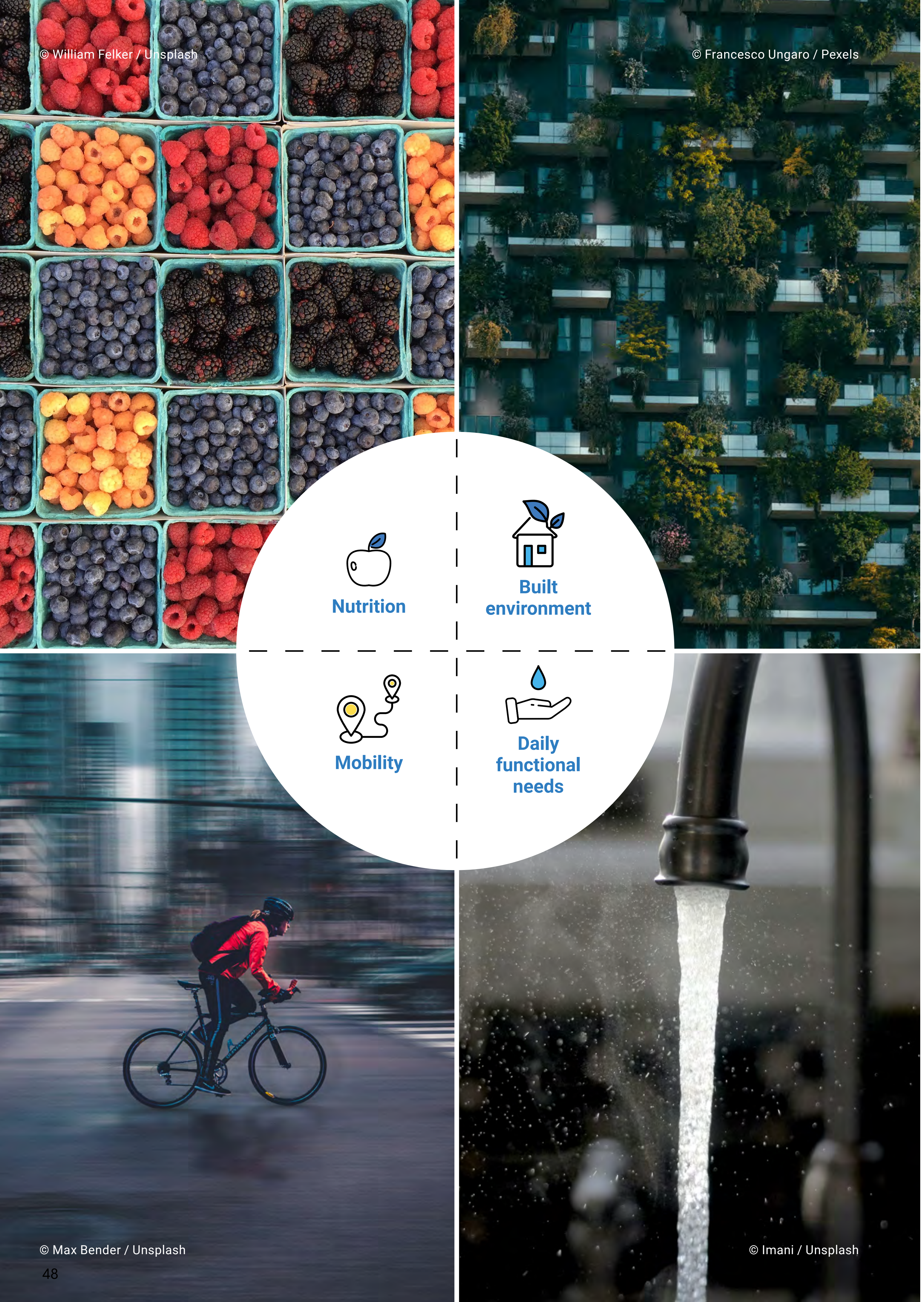

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6.

INNOVATIVE SOLUTIONS ALREADY EXIST ACROSS ALL DIMENSIONS OF RESOURCE EFFICIENCY TO BUILD A RESILIENT ECONOMY FOR SOCIETAL WELLBEING

Although most national policies have not adequately harnessed the potential of resource efficiency by optimizing the systems that meet essential needs, solutions are nonetheless being implemented on a variety of scales, with a host of attendant environmental and societal benefits. Consumption trends and citizen surveys also reveal shifts in societal demand which present opportunities for policy and business interventions to drive sustainable transitions across all four dimensions of resource efficiency.

The innovative solutions discussed below span the range of provisioning systems identified in the *System Change Compass* report. The primary focus is on opportunities that relate to system design, as this is the dimension of resource efficiency which is most often overlooked. For further examples of the other three dimensions, please refer to sources such as the Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2022); the Platform for Accelerating the Circular Economy (PACE, 2022); and IRP reports (IRP, 2018a, 2018b, 2020).

In addition, the examples are focused on innovations across G7 nations, since high-income countries contribute disproportionately to current emissions and therefore have major opportunities for significant absolute emission reductions (IPCC, 2022). The examples were selected merely to illustrate potential measures and interventions, and are not intended to suggest any geographical superiority. The authors are aware that many positive examples exist both across and beyond G7 nations; and that not all solutions are globally applicable.

Consumption trends and citizen surveys also reveal shifts in societal demand which present opportunities for policy and business interventions to drive sustainable transitions across all four dimensions of resource efficiency

Built environment

The built environment currently generates 39 percent of global energy-related carbon emissions (IEA and UNEP, 2019). It presents abundant opportunities to apply the system design dimension in order to rethink the status quo. With 75 percent of the world's population expected to live in cities by 2050, better urban planning and neighborhood design would reduce upfront demand for resources and help achieve resource efficiency.

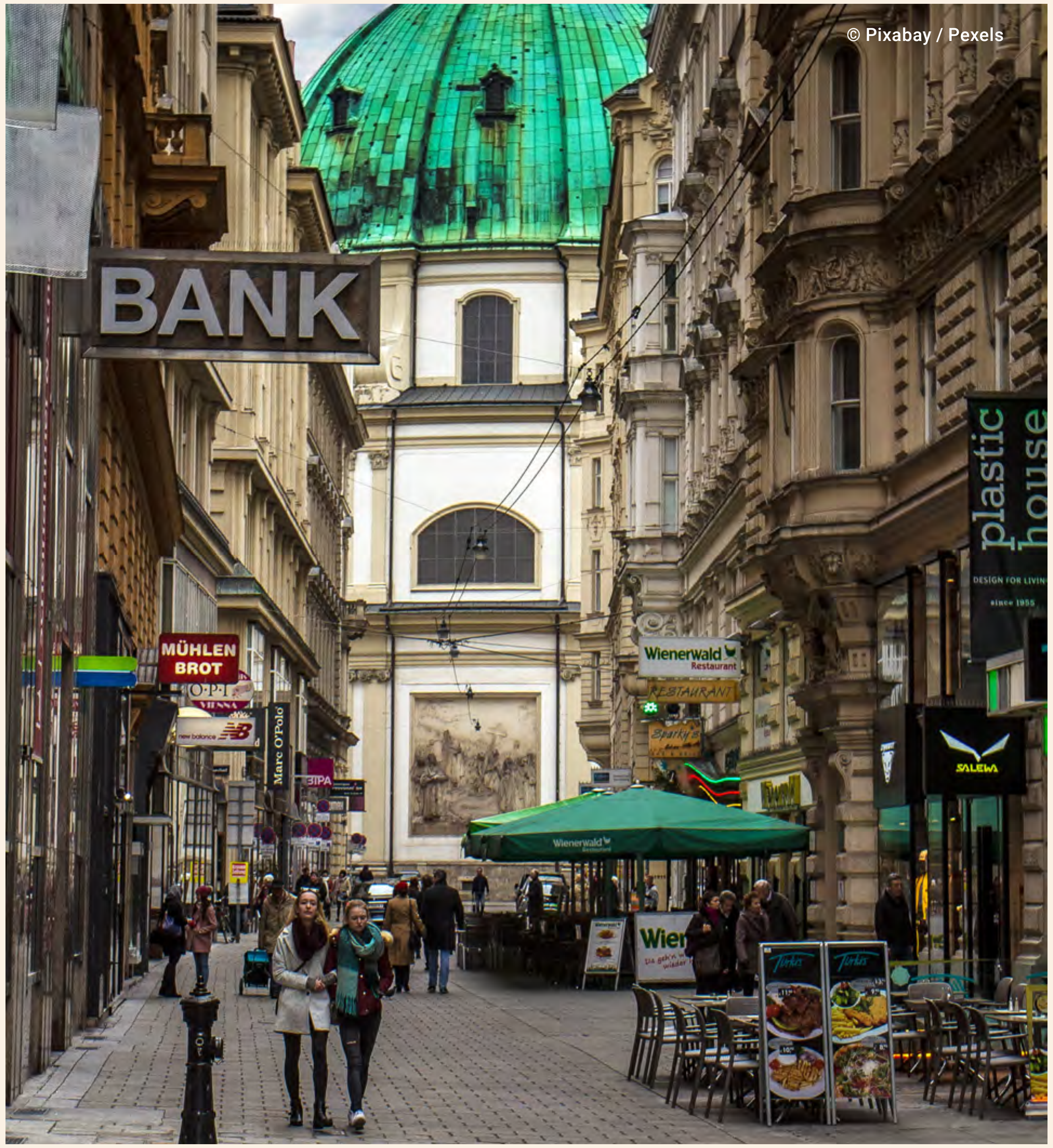
Applying the system design dimension to the built environment involves minimizing both the construction of new buildings and the land use of the built environment (e.g., by avoiding urban sprawl and using existing underutilized building more efficiently). The IRP's *The Weight of Cities* report shows that integrated neighborhood planning can improve social cohesion and provide societal benefits—like improved access to services, green or communal spaces and shortened transit routes—which increase the attractiveness of a shift to more efficient buildings of higher utilization (IRP, 2018b).

One successful example of this is the so-called "eco-neighborhood" of Vauban in Germany. Developed in early 2000, the neighborhood has the population density of a city while providing many benefits of a suburb, such as (shared) gardens and reduced traffic. The neighborhood attracted 5,000 new residents, who forwent the larger single-family homes on the outskirts of the city in favor of a close-knit, well-connected community (Scheurer and Newman, 2009).

Leipzig is another good example. Once Germany's fourth-largest city, it experienced a steep decline in population during the second half of the 20th century. Through a variety of initiatives, the city's planning office helped revitalize abandoned and underutilized building stock through exciting new housing and cultural projects, such as art galleries and meeting spaces in old industrial buildings (Čamprag, 2018). This has made Leipzig a desirable destination for many: it has been nicknamed "Hypezig" and the "New Berlin," and its population has returned to pre-decline numbers (le Blond, 2015). While not all building stock could be maintained, the redevelopment of vacant lots and brownfields has prevented new construction on undeveloped land.

Another approach to limiting new construction is preventing urban sprawl through zoning and urban growth boundary policies. In 1979, the US state of Oregon implemented such policies to promote land and material efficiency in the built environment. As a result, despite a significant population increase in Portland, all new construction has been contained within these boundaries, thus increasing the density of the city without compromising on urban green space or citizens' health (Rafferty, 2009; Green, 2015). Similar initiatives, regulations and policies are being rolled out across the US to combat urban sprawl and increase affordable housing options. In 2018, Minneapolis presented its vision for sustainable and just urban development up to 2040. By eliminating single-family zoning,[17] which affected 70 percent of Minneapolis' urban area, the city is tackling inflated land and housing prices, economic and racial segregation, and urban sprawl (City of Minneapolis, 2019).

17 Single-family zoning was a policy that made it illegal to build anything other than single-family homes in residential areas.



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While the causes of urban sprawl are certainly nuanced, the Austrian capital of Vienna may provide some answers. Hailed as one of the most livable cities in the world, it is nonetheless surprisingly affordable in terms of housing costs compared to other metropolises (Fitzpatrick, 2017). Vienna upholds eco-standards in multiple areas, including wastewater management, air quality and water supply, demonstrating that a holistic approach on the social and environmental fronts enhances livability (Fair, 2020). The fact that Vienna also has significantly less urban sprawl than other European capitals confirms that affordable housing, together with other indicators of livability and wellbeing, draws people to and keeps them in cities, thus reducing suburbanization and sprawl (Lechner and Maier, 2009).

Mobility

Car ownership is increasing globally; and despite the trend toward electrification, the associated use of resources in car manufacturing and its operations has a significant impact on the 24 percent of global CO_2 emissions attributed to transport. Citizens should thus be offered convenient alternatives to private vehicles to support a shift toward multimodal shared mobility systems. This presents promising opportunities to apply the system design dimension of resource efficiency to rethink the solutions required to address mobility needs.

Cities (and city planners) are responding by paving the way toward innovative mobility systems. For example, Paris aims to make all essential amenities and green spaces available to all citizens within a 15-minute walk or cycle, thus reducing emissions, prioritizing active transport and improving overall quality of life. Measures to achieve this include the installation of 60 kilometers of cycle lanes and a car ban along the Seine river (Yeung, 2021). Similarly, a study by the Mercator Research Institute on the effect of cycle lanes found that the introduction of an average of 12 kilometers of provisional cycle lanes across 106 cities during the early stages of the COVID-19 pandemic increased cycling by up to 48 percent, and estimated this will generate between $1 billion and $7 billion in health benefits per year going forward (Kraus and Koch, 2021). Barcelona likewise plans to install 300 kilometers of new cycle lanes and car-free zones in a bid to reduce traffic by 21 percent and cut CO_2 emissions by 160,000 tonnes annually. In the meantime, it has established "superblocks"—neighborhoods in which low-speed roads are reserved for residents only (Bicycle Dutch, 2017). Meanwhile, the city of Freiburg in Southwest Germany is proof that infrastructure changes can translate into reduced vehicle ownership: well-connected neighborhood design, car restrictions and the removal of parking spots from residential streets have created an environment in which car ownership has become less attractive for residents, such that it now stands at just 20 percent, against a national average of 50 percent (Scheurer and Newman, 2009; Ramos, 2010) (see the "Built environment" section below for further details).

Convenient public transport systems also reduce the need for private vehicles. For example, Helsinki is implementing a revolutionary mobility-as-a-service concept through an app that plots convenient multimodal routes for users and allows them to pay per route or to purchase a subscription for unlimited bike and car sharing, public transport and even taxis (The Agility Effect, 2020). This is a key strategy in achieving carbon neutrality by 2050 while simultaneously combating an increase in traffic caused by anticipated population growth of 40 percent. Munich's public transport provider has likewise developed an app that integrates trains, buses, bike-sharing and car-sharing services (VCD, 2017). And US-based startup The Routing Company (The Routing Company, 2022) uses advanced technology to optimize the matching of shared pooled vehicles with customers. The algorithm can group up to 18 passengers into a bus or shuttle on demand and with short individual waiting times. The company aims to support cities in transforming their public transport systems and avoid underutilization of buses by replacing them with on-demand services (Kolodny, 2022).

It is clear that multimodal mobility systems can support the creation of car-free city centers without affecting convenience. The Belgian city of Ghent has been car free since 2017—not least thanks to a hugely popular car-sharing scheme, which has seen user numbers triple since its introduction. This has brought a host of benefits: air quality has improved by 18 percent; while in the first year alone, rush-hour traffic fell by 12 percent, the number of cyclists increased by 25 percent and public transport use rose by 28 percent (Müller, 2019). Similarly, since the Spanish town of Pontevedra went car free in 1999, walking and cycling have replaced 75 percent of car journeys. As a result, CO_2 emissions are down 70 percent and the town has gained 12,000 new inhabitants, bucking the downward trend across the region (Burgen, 2018).

More sustainable modes of intercity travel are also being championed. For example, France has prohibited domestic air travel if the same journey can be completed within 2.5 hours by train—effectively eliminating 40 percent of internal short-haul flights; and Austria plans to impose a minimum air fare of €40 to discourage non-essential flights (Wabl and Jasper, 2020). Trains have long served as a competitive alternative to domestic air travel in Japan: the country's superfast bullet trains are fully privatized and profitable; and the flexibility, time savings and convenience they afford have made them the preferred mode of intercity travel (Business Standard, 2018). As a result, while Japan has a similar per-capita income to the US, its annual transport emissions are only one-third as high (IPCC, 2014). In Europe, high-speed trains on international routes have also captured market share from airlines: while over 4.8 million passengers flew from London to Paris in 1996, this figure had fallen to 2.7 million in 2019 due to the Eurostar (Rowland, 2019).

Finally, and perhaps most importantly, the COVID-19 pandemic has proved that a significant proportion of business travel and commuting can easily be avoided through teleconferencing and remote working, cutting emissions, saving time and reducing congestion.

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Nutrition

The growing global population is increasingly putting stress on the existing food system. As the World Resources Institute points out, "without changing diets, agriculture alone could produce enough emissions to surpass 1.5°C of global warming" (Waite and Vennard, 2022). Shifting to a system that prioritizes the provision of healthy nutrition for all is imperative to ensure global food security in the future (FAO, 2021).

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According to the UN Food and Agriculture Organization, unconsumed food accounts for about 10 percent of global GHG emissions and 28 percent of all land used for agriculture (FAO, 2013). If food waste were a country, it would be the third-biggest emitter in the world, behind the US and China (Ritchie, 2020). In order to reduce wasted resources, major supermarket chains in Denmark have stopped offering quantity discounts that incentivize overbuying and instead discount products approaching their best-by date. In combination with other interventions, such as educational campaigns about the cost and environmental impact of food and the uptake of food waste apps like Too Good To Go, Denmark reduced food waste by 25 percent in the period from 2011 to 2016 (Bloom, 2016).

The corollary of overbuying is a trend of overeating and unhealthy eating. Staying within the planetary boundaries while feeding a future population of 10 billion will be impossible without a transformation in our eating habits. *What* we eat is more important than *how much* we eat in determining the amount of land required to produce our food—as reflected by the fact that livestock takes up nearly 80 percent of global agricultural land, yet produces less than 20 percent of the world's supply of calories (Ritchie, 2017). The highest-impact change to our diets would thus be to reduce our intake of meat, particularly beef and mutton. The EAT-Lancet Commission has proposed a "planetary health diet" that is predominantly plant based, but leaves flexibility for different preferences and cultural contexts by including a limited amount of animal-sourced proteins and dairy (EAT-Lancet Commission, 2019).

To support this shift, plant-based options must be attractive and easy to choose, in order to promote uptake. One study showed that when healthier options and more vegetarian meals were made available in workplace canteens, calorie intake and meat consumption both fell, even though meat and less healthy options were still available (Pechey *et al.*, 2019). Consumer appetite for this shift is evident in the booming vegetarian and vegan market, which is predicted to grow by 450 percent from 2020 to 2030 (Bloomberg Intelligence, 2021).

The public's desire for healthier food options is also reflected in the crucial role that citizens' assemblies have played in formulating the UK's National Food Strategy (National Food Strategy, 2021). Belying the idea that people do not want to "be told what to eat" or to have choices influenced by pricing, the feedback from these assemblies confirmed that people desire guidance on healthy sustainable diets and want pricing to promote healthy choices.

At a macro level, agricultural land should be cultivated in a way that restores the natural rhythms of ecosystems by improving soil health through crop rotation, increasing biodiversity, attracting natural predators of pests and integrating livestock (EIT Food, 2022). Policymakers should incentivize cultivation that delivers multiple ecosystem services. For example, in Brazil, the city of São Paolo is encouraging farmers in the surrounding areas to switch to regenerative practices by buying their produce at 30 percent above market value. Of the 160 farmers the city works with, around 40 percent have fully converted from conventional to organic or regenerative practices (Ellen MacArthur Foundation, 2021). Similarly, the UK is introducing an environmental land management scheme that pays farmers and other land managers for the delivery of ecosystem services (e.g., clean air, clean water, thriving wildlife) (UK Government, 2021a).

The food system can be further improved through a shift to local produce. In the US, the number of farmers' markets selling local produce increased fivefold from 1994 to 2017 (Bellemare, 2016). Technological innovations can also accompany dietary shifts and advance resource-efficient food production and distribution. For example, services connecting farmers with consumers in the surrounding regions are increasing, which is important to reduce food miles and waste—especially given 80 percent of all food will be consumed in cities by 2050 (Ellen MacArthur Foundation, 2019a) and 14 percent of food is lost between harvest and distribution on average (FAO, 2021).

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Daily functional needs

Finally, there is ample opportunity to apply the system design dimension of resource efficiency to our daily functional needs—an area that is plagued by overconsumption.

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Perhaps nowhere is this more evident than the fashion industry, which is responsible for 10 percent of all GHG emissions, 20 percent of industrial water pollution and 6 percent of freshwater use (Ellen MacArthur Foundation and Circular Fibers Initiative, 2017). Fast fashion has created a demand for 80 billion new garments annually—in the EU alone, a staggering 26 kilograms of clothes per capita are purchased each year; while just 1 percent of clothing materials are recycled. Adventure brand Patagonia—a pioneer of sustainable and ethical business models—recently launched a “buy less” campaign to promote its clothing and gear repair centers, online guides for at-home repairs and a marketplace for the sale of used and repaired products (Patagonia, 2020). Clothing rental models—stores, websites and apps offering everything from high fashion and event wear to workwear—also aim to reduce overconsumption. For example, Dutch manufacturer Schijvens rents out corporate uniforms made of 100 percent recycled yarn which, once outworn, are used to produce new uniforms, yielding savings of 99 percent for water use, 40 percent for CO_2 emissions and 40 percent for energy use (Schijvens, 2022).

Shifting from the sale of products to the delivery of services through so-called “product-as-a-service” models is seen as another promising way to reduce resource consumption. This shift inherently puts the real consumer “need” at the center of product design, incentivizes product longevity and ensures value is retained at end of life. These models are already available for many white goods, such as washing machines—the most resource-intensive household appliance. Producer-owned subscription-based models are a step in the right direction, as manufacturers take on more responsibility for the use phase and end phase of appliances; it is estimated that this could save 24 percent of emissions per washing cycle. Going further, however, a pooled pay-per-wash model—which is particularly feasible in apartment buildings, where amenities can be shared—increases the CO_2 reduction from utilization and results in a 35 percent savings potential. Technology can also increase the level of convenience: for example, an app designed by a Bosch spinoff allows users to check whether communal washing machines are available and reserve them for a specific time slots, and notifies them when their laundry is ready to collect (SYSTEMIQ, 2021).


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Philips—a successful pioneer with several XaaS models—plans to generate 25 percent of its sales from circular and service-based offerings by 2025. Amsterdam’s Schiphol Airport and Manchester Airport are two users of its Lighting-as-a-Service program, which has significantly cut energy use and associated emissions by using fewer and more efficient LED lights, while creating a pleasant environment for passengers (Philips, 2016). Another successful business-to-business XaaS model is the Equipment-as-a-Service offering of laser-cutting machine manufacturer TRUMPF. In addition to selling its machines, the company offers a pay-per-part model, which allows other businesses to access its machines to cut required metal parts without the risk of major upfront investment.

Everything-as-a-Service (XaaS): how businesses can thrive in the age of climate change and digitalization

A recent report by SYSTEMIQ (SYSTEMIQ, 2021) highlights the economic, environmental and social benefits of moving to XaaS models. As fluctuating resource prices result in increasing cost volatilities for product-based companies, businesses are exploring opportunities to improve material efficiency and decouple their revenue from resource use through new service models. At the same time, consumers are demanding greater convenience and flexibility, and customizable, cutting-edge products—trends that are easier to respond to when ownership remains in the producer's hands.

The prevailing assumption is that owning products—like computers, clothes or household appliances—is imperative to the satisfaction of people's daily needs. More and more businesses are trying to steer consumers away from this assumption and toward the idea of using products as services with added benefits like maintenance services, cutting-edge products and reduced energy consumption. In the last decade, dematerialized digital business models have shown how rapidly innovation can disrupt existing business models. Companies in physical goods industries are thus increasingly offering service-based models for additional value creation, while also preparing for a resource-challenged future. This type of model reverses the incentives: since the producer retains ownership of the product, it is incentivized to design for longevity, repairability and ultimately the re-extraction of value from the product at end of life. The number of products produced and sold to consumers—which is currently the basis for its profits—becomes part of the producer's costs in this business model. The incentive is thus to reduce the use of natural resources, conserving resources and increasing service-related profits.

These promising XaaS models are being rolled out across all provisioning systems. For example, mobility-as-a-service models combine multiple modes of transport to reduce the need for private car ownership (see the "Mobility" section above). In the nutrition system, farms can rent agricultural machinery to reduce upfront investment costs and take advantage of the latest technological developments. Finally, the consumer goods system has demonstrated a multitude of business opportunities in which products ranging from clothes to technological devices are offered "as a service" through rental or pay-per-use offerings.


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As has been outlined in this section, innovative solutions not only exist across all provisioning systems, but are also being driven by society. Politicians often fear that they will lose political capital by putting their economies on a sustainable path, and that jobs and prosperity are inextricably intertwined with resource use and its harmful environmental impacts; and they assume their electorates think the same. However, as demonstrated by major global surveys (UNDP and University of Oxford, 2021), electorates care deeply about sustainability—whether as a concept in itself or in terms of the elements that lead to sustainability, such as a clean living environment; good air quality; road and mobility safety; food quality and health; reduced traffic; access to services and public spaces; and community amenities. While people might not be familiar with the term "resource efficiency," most aspects of healthy lives are closely interlinked to it. In addition, resource-efficient interventions often lead to solutions that promote equality. Whether by saving money on their heating, spending less time traveling or living healthier lives due to improved air quality, all segments of the population stand to gain from the co-benefits of a sustainable and fair society.

The examples of innovations across the different provisioning systems provide hopeful signs that change is possible. However, these solutions need to reach a tipping point to propel the rapid change needed at the scale required.

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7.

COUNTRIES SHOULD SEIZE THE OPPORTUNITY OFFERED BY THE FOUR DIMENSIONS OF RESOURCE EFFICIENCY TO DELIVER CLIMATE TARGETS AND BIODIVERSITY AND POLLUTION BENEFITS

The transition to sustainable—and ultimately lower—natural resource use is an economic, security and resilience imperative. To achieve climate and biodiversity targets and sustainability ambitions while staying within the planetary boundaries, the goal must be to use fewer natural resources while increasing societal wellbeing. A targeted approach and policies around all four dimensions of resource efficiency are indispensable to address the challenges we face.

We live in a world that champions consumerism and economic growth at an unacceptable environmental and social cost. The problem is that thus far, humankind has not separated economic growth from ever-increasing demand for resources. This is not an easy transition to make, but it is certainly possible. Examples exist of well-functioning cities with high quality-of-life scores. These provide high levels of active mobility; compact yet balanced neighborhoods; and easy access to locally produced, healthy and plant-based food. In other words, they deliver superior living standards through shifts in mobility, the built environment and nutrition—the shifts we need to reduce resource use at scale.

We should harness the abundant potential presented by demand and supply-side resource management solutions to address the triple planetary crisis of climate change, biodiversity loss and pollution. Policies that strive to create the fundamentally more resilient economy of tomorrow can afford opportunities for business innovation as well as societal and public entrepreneurship.

Applying resource efficiency holistically implies a fundamental redesign of resource-intensive systems. This requires innovation across policies, sectors and products to facilitate a shift in value creation. For example, we can shift from traditional mass production industries to new distributed manufacturing models and dematerialized service business models. We need to reject the assumption that the systems that provide us with food, shelter, mobility and daily functional needs must necessarily be so resource intensive.

Current resource patterns still reflect the shadows of an imperialist world, in which wealthy nations pursue their ambitions at the expense of others. A more stable and sustainably prosperous future demands a transition to an era of responsible resource use, in which benefits are more fairly shared, mitigating resource-related security risks and strengthening our collective preparedness and resilience. This would make the UN SDGs implementable in practice and keep them meaningful.

High-income countries must demonstrate to the world that they are willing and able to change the reality they have created, and to lead the essential transition of our value and use of natural resources—both domestically and globally. But this does not preclude all other countries from active participation in delivering the future we want. While responsibility for the past clearly rests more with high-income countries, responsibility for the future is shared and belongs to us all.

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