GREEN INDUSTRIES

IMPACT VISION



SHIFT

FOREWORD

SHIFT Invest's mission is to fight climate change, biodiversity loss and natural resource depletion. SHIFT invests in four high burden sectors: Food & Agriculture, Energy, Mobility & Logistics and Green Industries. In this document, we share our impact vision for Green Industries.

The purpose of this document is **to outline key drivers of negative impact along the value chain on the one hand, and solutions** that have been shown to have the **greatest magnitude and importance**, collated from key academic institutions, interest groups, and (non)governmental organisations[1] on the other hand. Exact numbers vary between sources (e.g. the GHG emissions associated with industry) depending on the methodology and scope used by the source. The goal is not to provide the most accurate assessment of various impact and mitigation potentials, but to demonstrate the relative importance and magnitude of each.

This strategy is by no means exhaustive as the problems posed to nature by the green industries sector are complex, interconnected, and also dependent on action taken in the public sector and international arena.





1. For example, the Intergovernmental Panel on Climate Change (IPCC), Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), European Environmental Agency (EEA), Food and Agriculture Organisation (FAO), World Wildlife Fund (WWF), Ellen MacArthur Foundation (EMF).

EXECUTIVE SUMMARY

GREEN INDUSTRIES

The impact challenge for Green Industries

- A new sustainable industrial revolution is needed, as the previous one drove us into the Anthropocene and has pushed multiple planetary boundaries past their limits.
- Impacts, and especially emissions, have grown more rapidly than those of any other sector, making industry the fastest-growing contributor to environmental degradation.
- Although the EU has introduced numerous policies targeting industry, concerns remain about the lack of ambition and tangible progress—particularly regarding emissions reduction, hazardous chemicals and microplastics, green hydrogen, and circularity.
- A handful of sectors are responsible for most industrial emissions, notably iron and steel, (petro)chemicals, waste, and cement.
- Biodiversity impacts are varied: from the physical impacts of material and resource extraction such as mining and water use, the ecotoxicity of chemicals, industrial process emissions/pollution, to contamination from poor waste management.



SHIFT's view on the required transition

- Mitigation is challenging due to the long lifespan of infrastructure, the slow pace of innovation, perceived economic impacts such as carbon leakage risks, and an overemphasis on energy efficiency measures that often comes at the expense of developing other sustainability solutions.
- Climate change mitigation in industry requires deep industrial electrification and decarbonization solutions to be deployed for the main emissions drivers and industrial feedstocks. Additionally, holistic circularity measures, including ecodesign, demand reduction, material efficiency, and waste management, are essential.
- In terms of natural resources, the built environment has a high material footprint. Effective measures include resource efficient construction, natural housing solutions, reduced floor space, increased housing durability, and circular construction materials.
- Biodiversity impact mitigation involves both sustainable production and consumption practices, such as minimizing waste and pollution.
- Some solutions offer substantial mitigation potential across domains, such as decarbonizing industrial processes, improving product efficiency, extending lifecycles, and implementing waste solutions. However, others may involve trade-offs depending on the mitigation approach; for example, certain bio-based solutions can have a much higher water and land footprint compared to alternatives.

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01. SETTING THE STAGE



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WHY INVESTING IN THE INDUSTRY MATTERS

A NEW SUSTAINABLE INDUSTRIAL REVOLUTION IS NEEDED

Industry has contributed to the transition to a new geological epoch

The industrial revolution and Great Acceleration following WWII are widely agreed to be the major drivers[1] of the onset of the Anthropocene, fueled by access to energy dense fossil resources.

Pressures will grow

The use of materials is deeply coupled with economic development and growth. Emissions in industry have been growing faster since 2000 than emissions in any other sector due to increased material extraction and production[2]. Any improvements in energy efficiency and non-combustion GHG emissions intensity (from industrial processes and waste) have been offset by population and consumption growth[2]. Of all materials, demand for plastic has grown the strongest, with high adverse impacts related to its 99% reliance on fossil feedstocks, low recycling, and high emissions from petrochemical processes.

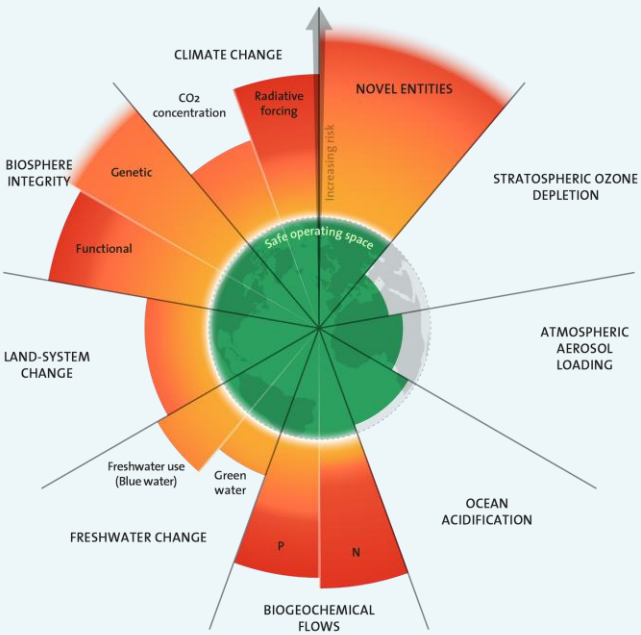
Overall, industry has significant impacts on several of our planetary boundaries

The extraction and use of fossil fuels for energy and industrial processes contributes to climate change, while industrial activities can also alter biogeochemical cycles such as nitrogen and phosphorus. Industrial land use, such as deforestation, can lead to land-system change, and industrial pollution can harm biodiversity and ecosystem functioning, affecting biosphere integrity.

Industry will play a crucial role in addressing these environmental challenges

Through the adoption of sustainable practices and the use of innovative technologies, the industrial sector has the potential to mitigate its negative impacts on the environment and contribute to a more sustainable future.

The planetary boundaries framework[7]



1. Other key human activities include intensive agriculture ad deforestation; 2. IPCC (2022); the industrial sector includes ores and minerals mining, manufacturing, construction, and waste management

POLICY LANDSCAPE - OUTLINE

A GROWING WEB OF EU LEGISLATION TARGETS A WIDE VARIETY OF INDUSTRIAL SECTORS AND IMPACTS

The industry is regulated by the EU's Green Deal, Clean Industrial Deal, ETS & CBAM, Critical Raw Materials act, and many others



In recent years, the EU has started to weave sustainability into the fabric of its industrial policy. This is part of a strategic reimagining of Europe's economic future, where climate action, competitiveness, and resilience are inseparable threads.

At the heart is the **EU's Green Deal**, which is a sweeping agenda with the core goal to achieve Net Zero by 2050 and decouple economic growth from resource use. Under this overarching strategy, the **Clean Industrial Deal** was presented in 2025 as a transformational business plan that combines climate action and competitiveness[1]. This approach reframes environmental objectives as means for Europe to increase its resilience and maintain its industrial heritage. It mobilises funding for clean manufacturing, provides European industry with a stronger business case for climate-neutral investments, and accelerates renewable energy deployment.

The clean energy transition, under the **REPowerEU** plan, is fundamental to industrial sustainability, as access to affordable energy is important for the competitiveness and decarbonization of European industries.

Pricing and market mechanisms like the **EU Emissions Trading System** and **Carbon Border Adjustment Mechanism** are essential to drive industrial decarbonisation from a financial perspective, while protecting domestic producers from carbon-intensive imports.

Another key component is the **Critical Raw Materials Act**, which addresses a critical vulnerability in Europe's sustainability transition by ensuring secure and sustainable supply of materials essential for clean technologies[2]. It identifies a number of critical and strategic raw materials, and establishes targets reduce import dependency for these. Projects that are important to realise these targets can be fast tracked under the CRMA. This legislation works in tandem with the **Net Zero Industry Act**, which specifically targets 19 net-zero technologies like CCS/U, heat pumps, and electrolysers and fuel cells, to accelerate their deployment.

Another pillar of the industrial sustainability framework is the **Circular Economy Action Plan**, which targets the entire lifecycle of products and promotes circular economy practices[3]. For example, digital product passports are introduced to enhance traceability and transparency.

Also looking to improve industries through transparency is the **Corporate Sustainability Disclosure Regulation** and **EU Taxonomy**, which will require many companies to disclose how sustainable their operations are[4].

Under and around these core initiatives are targeted strategies on specific domains like hydrogen, chemical safety and pollution control, plastics and textiles- all of which are aimed at driving sustainability across key value chains.

This integrated approach creates a comprehensive ecosystem where environmental objectives, industrial competitiveness, and economic security reinforce each other. The framework aims to ensure that Europe's industrial base can thrive during the sustainability transition and maintain global leadership in clean technologies.

1. European Parliament (2025); 2. EUR-LEX (2024); 3. European Commission (2023); 4. European Commission (2025)

POLICY LANDSCAPE – CRITIQUE

…HOWEVER, THERE ARE AREAS OF CONCERN AND IMPROVEMENT IN EUROPEAN INDUSTRIAL SUSTAINABILITY POLICY

POLICIES ARE INSUFFIENTLY AMBITIOUS AND SOME TARGETS ARE FAR FROM BEING MET

While European legislation on industrial sustainability is among the most comprehensive and ambitious in the world, recent assessments reveal a complex landscape of progress, setbacks, and growing tensions between competitiveness and sustainability objectives.

The European Commission's Joint Research Centre published a comprehensive assessment[1] in 2025, revealing mixed progress on the Green Deal's 154 targets across seven thematic areas. Of these targets, 64 require acceleration to meet deadlines, 15 are not progressing or regressing (e.g. green hydrogen, circularity, and plastic pollution) and 43 lack sufficient data for assessment.

Greenhouse gas emissions continue their downward trajectory, bringing total reductions to 50% below 2005 levels and maintaining the path toward the 2030 target of 62% reduction[2]. However, this was largely driven by the power sector, while industrial emissions remained stable overall, where e.g. gains in the fertiliser sector offset reductions in cement production. Studies found that free allowances and a low carbon price in the **EU ETS** do not incentivize the level of required (industrial) emission reductions[3]. The **Carbon Border Adjustment Mechanism's** effects will only become apparent post-2026, when it is fully implemented. But there are already concerns over its omission of key downstream products and sectors like chemicals. Watchdogs are also concerned about the European Commission's proposed 2040 climate targets, which introduce flexibility mechanisms like offsets, that risk weakening the GHG target's effectiveness[4].

The deployment of **(green) hydrogen** is particularly far off the targeted 40 GW electrolyser capacity by 2030, estimated at 0.5 GW currently. The EU's policy framework has several key gaps hindering market development and does not go far enough to address issues such as high-cost entry barriers[5]. The EU also doesn't have any provisions to fully eliminate fossil fuel derived hydrogen from industry beyond 2035, which risks the long-term dependence on fossil derived hydrogen.

Aside from this, supply chain vulnerabilities in Europe remain acute and threaten the sustainability transition, particularly given ongoing trade tensions and geopolitical uncertainties. **Circularity** strategies to alleviate pressure on (critical) resources, like substitution, the sharing economy, and extending product lifespans, are particularly under-employed and recycling is still largely low-grade[5].

Additionally, several **hazardous chemicals and microplastics** in the EU have not been adequately regulated under REACH, the revision of which has been overdue since 2022. Targeted restrictions on microplastics and PFAS have been proposed and/or implemented in the meantime, but the broader overhaul of the regulation is still in progress and now expected in 2025. The future effectiveness of REACH will depend on the final content of this revision[6].

Finally, the EU's **transparency** architecture is under pressure following proposed modifications under the Omnibus Package, which simplifies the EU Taxonomy requirements and reduces (the scope of) reporting obligations[7].

Keep an eye out for the European Environment Agency's "Europe's environment 2025" report in September, which will provide the latest comprehensive and authoritative assessment of environmental progress in the EU.

1. European Commission (2025); 2. European Commission (2025); 3. Carbon Market Watch (2022); 4. Carbon Market Watch (2025); 5. CAT (2024). A study at provincial level in NL indicates that $^{1}/_{3}$ to ½ of waste streams could be put to higher value use; 6. European Commission (2023); 7. European Commission (2025); 8. Hydrogen Europe (2024)

BARRIERS TO CHANGE

INDUSTRY HAS HIGH INERTIA AND WILL REMAIN A MAJOR EMISSIONS DRIVER IN THE FUTURE



Slow pace of innovation

Improvements in GHG intensities of major basic materials have been stagnant over the past 30 years as there is a high degree of "lock-in" for current industrial infrastructures and processes, partly a result of the long lifetime of assets. Ranges of the typical lifetime of assets in the industrial sector range from 10-40 years (typically 25). On top of this, the deployment of sustainable technologies is capital intensive. These factors have and will continue to hinder the pace of and appetite for innovation[1]. As decarbonization will be slower in this sector than for many others, it will maintain a leading position as emissions-driver.



Economic strain and impact

Industry has been sheltered from environmental regulation and carbon pricing due to concerns for competitiveness and carbon leakage. Fossil fuel-based chemical feedstocks (e.g. hydrogen, ammonia, methanol) are inexpensive, and their sustainable biomass and electricity-based counterparts will be more expensive without adequate carbon pricing. Prices for biogenic carbon feedstock are also expected to increase due to its limited availability as a result of competing land-uses. As such, the industrial transition requires a high degree of international coordination regarding environmental and trade policy[4].



Tunnel vision on energy efficiency

The 'traditional' sustainability toolkit for industry is highly focused on energy and process efficiency, fuel switching, electrification and power decarbonization. These remain important but must be supplemented with newer solutions for material end-use demand management and efficiency, circular economy, fossil-free feedstocks, CCU, and CCS[2]. Compared to energy efficiency, these are poorly understood and regulated. Barriers to recycling are often specific to material loops or waste management systems (e.g. copper contamination in steel and poor economics for plastics), especially as new functions have increased the material complexity of products.

1. IPCC WGIII CH11 (2022); 2. CCU = carbon capture and utilisation, CCS = carbon capture and storage

GREEN INDUSTRIES AND SHIFT'S MISSION

INDUSTRY HAS A DIRECT NEGATIVE IMPACT ON ALL OF SHIFT'S IMPACT DOMAINS

SHIFT APPROACH

Industry has an important impact on all of SHIFT's impact domains. As such, these are all included in the scope of this impact strategy. As with our other impact strategies, it is also the case here that mitigation measures can address multiple impact drivers. There can be both synergies and trade-offs in mitigation measures for pressures faced by these domains. Aside from, but interwoven with, these three domains, novel entities is also a highly material planetary boundary in the context of industry.



CLIMATE CHANGE

Industry is the single largest energy user (followed by buildings and transport) and accounts for approx. 30% of global GHG emissions[1].

The production and use of cement, steel, and chemicals are some of the most carbon-intensive processes in industry, with the production of steel alone accounting for almost 8% of global GHG emissions.



BIODIVERSITY LOSS

Industrial activities contribute to habitat destruction and fragmentation, and the overexploitation of natural resources by industry leads to the depletion of species and ecosystems.

Pollution from industrial activities can have negative impacts on both terrestrial and aquatic biodiversity, with estimates suggesting that over 90% of freshwater bodies in the EU are at risk from pollution.



NATURAL RESOURCE DEPLETION

The global economy is using natural resources at a rate that is 1.7 times faster than the Earth's ecosystems can regenerate, and industrial sectors such as construction and manufacturing are the main culprits.

The global material intensity (in-stock use of manufactured capital, in tons per unit of GDP) grew by 3.4% per year between 2000-2019 and is still increasing. Although some decoupling of per capita material stock in developed countries is arising, demand for materials is projected to double between 2019 and 2060[2].

1. Our World in Data (2020); 2. IPCC (2022); 3. Global Chemicals Outlook (2019)

02. GREEN INDUSTRIES AND CLIMATE CHANGE

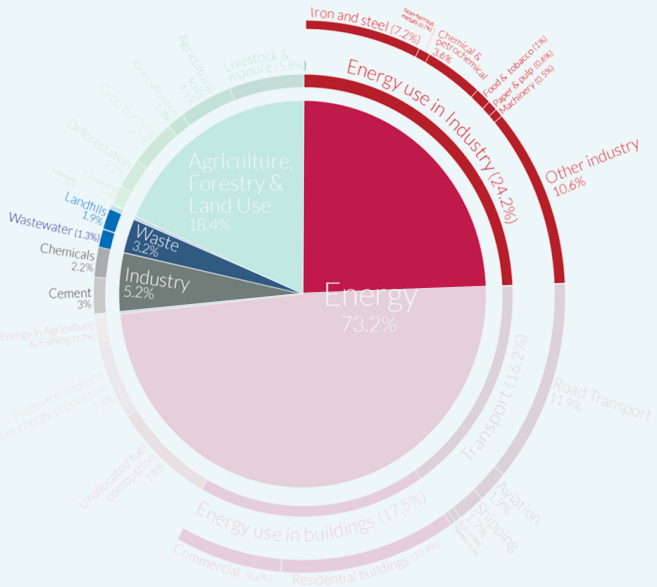


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GHG EMISSIONS IN INDUSTRY

INDUSTRY DRIVES GHG EMISSIONS AS THE LARGEST GLOBAL ENERGY USER

INDUSTRY ACCOUNTS FOR ALMOST 30% OF GLOBAL GHG EMISSIONS[1]...



Global GHG emissions by sector (2016)[2]

...WITH A FEW MAJOR IMPACT DRIVERS[2]

Iron and steel (7.2% of total GHG emissions): produced by high-carbon intensity due to the BF-BOF process[4], with emissions primarily from combustion. Carbon intensity has stagnated since 1995. 40% of steel is used for structures, 20% for industrial equipment, 18% for consumer products, 13% for infrastructure, and 10% for vehicles

Chemicals & petrochemicals (5.8% of total GHG emissions): GHG emissions are produced as a byproduct of chemical processes and energy related emissions from the manufacturing of certain chemicals. They are split between combustion (scope 1) and energy use (scope 2). Key contributors include ammonia (fertilizers), methanol (adhesives, fuels), and olefins (polymers) and chlorine.

Waste (3.2% of total GHG emissions): organic matter and residues can collect in wastewater systems, where they decompose to produce methane and nitrous oxide. Low-oxygen environments in landfills also produce methane.

Cement (3% of total GHG emissions)[5]: clinker production produces CO2 as a byproduct. As such, most cement emissions are scope 1 process-related emissions. Efficiency has improved, but safety concerns hinder innovation[7].

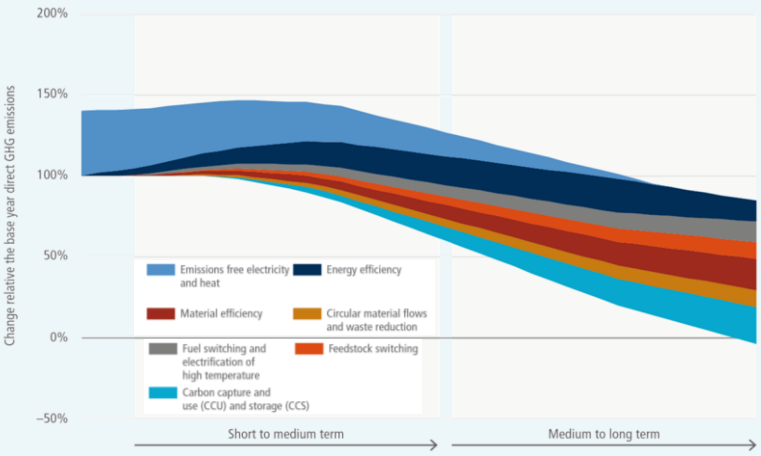
Other (10% of total GHG emissions): Includes emissions from various industries such as mining and quarrying, construction, textiles, wood products[6], and transport equipment (e.g. car manufacturing).

Scope 1 = direct emissions; Scope 2 = indirect emissions (from electricity). 1. IPCC (2022), via direct emissions and energy use; 2. Our World in Data (2020); 3. IPCC (2022), where COMB = direct emissions from combustion, IPPU = emissions from industrial processes and product use; 4. CarbonBrief (2021); 5. This excludes emissions from energy inputs used to produce cement; 6. E.g. the pulp and paper industry has significant biogenic carbon emissions (but relatively small fossil carbon emissions); 7. CarbonBrief (2018).

MITIGATING GHG EMISSIONS IN INDUSTRY

DECARBONISING PRODUCTION IS BECOMING POSSIBLE ALONGSIDE IMPORTANT CONTRIBUTION OF MORE CIRCULAR MATERIAL FLOWS

THE INDUSTRIAL TRANSITION PATHWAY[1]

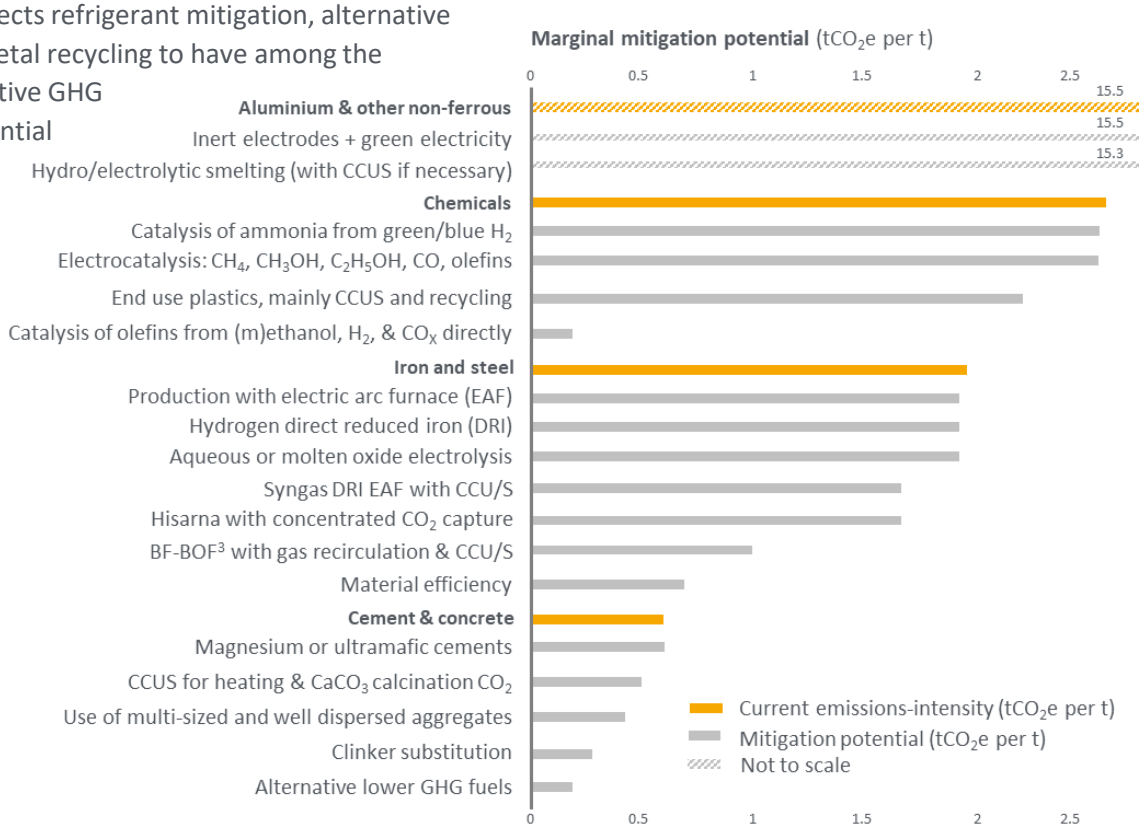


An industrial transition to net zero is possible when emissions associated with the material stock produced by our industries **approaches zero.**

Contributions from different drivers will vary over time. **Energy efficiency and decarbonisation** will dominate in the short and medium term, but deep decarbonization trajectories require contributions from the other drivers to steadily grow (as the share of non-energy sources in industrial emissions will rise and their mitigation technologies will mature).

SOME SECTORS HAVE THE TECHNICAL POTENTIAL TO ENTIRELY DECARBONISE…

…although the technical and economic feasibility of many mitigation options shown in the graph[1] is still unknown or highly uncertain (low TRL). Of existing known and commercially ready solutions, Project Drawdown expects refrigerant mitigation, alternative cement, and metal recycling to have among the highest cumulative GHG mitigation potential between 2020 – 2050[2].



 1. IPCC (2022); 2. Drawdown Review (2020), analysis by leading scientists and experts in the field

03. GREEN INDUSTRIES AND BIODIVERSITY LOSS



SHIFT

BIODIVERSITY AND GREEN INDUSTRIES

INDUSTRIAL POLLUTION IS A KEY DRIVER OF BIODIVERSITY LOSS

Nature is an integral part of our industrial system: nature plays a critical role in providing resources and services that are fundamental to our wellbeing. The extraction of natural resources has increased to double that of 1980. However, indicators of other contributions like soil organic carbon and pollinator diversity have declined, indicating that the gains in these material contributions have not been sustainable. Industry is an important driver of climate change and pollution, and to a lesser extent land/sea use change and direct exploitation.

INDUSTRIAL DRIVERS OF BIODIVERSITY LOSS (EXCL. CLIMATE CHANGE)

Extractive industries

Global harvests of **wood** are ~4 bn m^3, of which half is for industry[1]. Sustainable forestry *can* successfully maintain biodiversity, but only 1/5th of industrial wood is certified as such (under FSC). Meanwhile, a substantial proportion of the global production of forest products occurs in violation of national laws and standards[2].

Surface **mining**, while occupying less than 1% of global land area, significantly impacts the environment by driving land-cover change, polluting surface and ground water and degrading air quality[1]. The material pre-processing further increases the bioavailability of toxic metals. Problematically, deposits are often within zones with high biodiversity.

Chemicals and basic materials

Many anthropogenic chemicals are **toxic** to living organisms and persist in nature for a long time. Aside from pesticides, groups of particular concern are heavy metals, volatile air pollutants, polyaromatic hydrocarbons, per- and polifueoalkyl substances, and other industrial chemicals like the highly divergent group of plastics additives, as well as chemicals used in consumer products, food packaging, or pharmaceuticals[3].

Manufacturing and construction

Water is a key input for many industrial processes. 19% of groundwater extraction has been attributed to industrial use[1]. Overall, water withdrawals are estimated to have grown faster than population growth. Overextraction leads, a.o., to lower water tables and saline intrusion, which destroy highly productive ecosystems[4].

Air pollution from industrial facilities can have significant impacts on ecosystems; with industries outside of power generation being responsible for 30% of costs associated with this pollution in Europe alone[5].

Waste management

Over 80% of urban and industrial **wastewater** is released into freshwater systems without adequate treatment, a volume six times as large as that in all the world's rivers[1]. Chemical processing typically generates **contaminants** like metals, solids, extreme pH levels, and hazardous substances. As a result, **coastal waters** hold high levels of metals and persistent organic pollutants from industrial discharge.

Marine **plastic pollution** in particular has increased tenfold since 1980, affecting a large percentage of marine, and increasingly also terrestrial species[1].

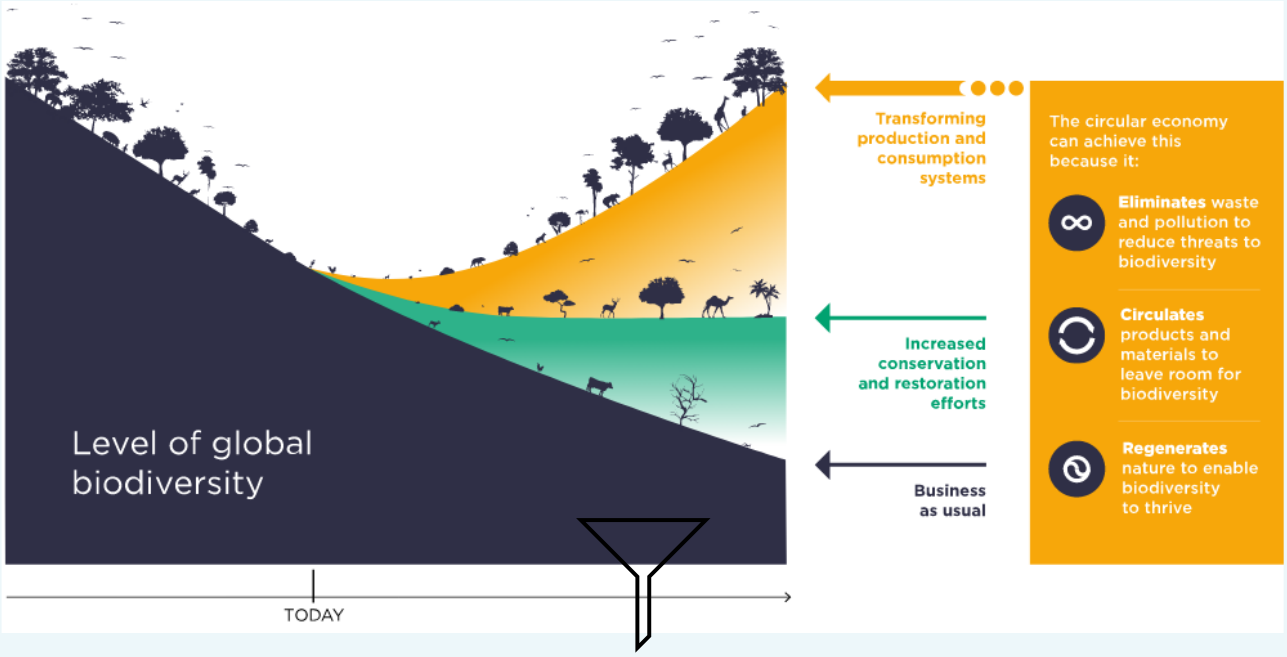
See previous section on climate change.

1. IPBES (2019); 2. WWF (2022); 3. Groh et al. (2022); 4. EEA (2020); 5. CBD (2018

MITIGATING BIODIVERSITY LOSS IN INDUSTRY

SOLUTIONS ARE NEEDED ACROSS THE INDUSTRIAL VALUE CHAIN TO MITIGATE VARIOUS PRESSURES TO SPECIES AND ECOSYSTEMS

MITIGATING BIODIVERSITY LOSS REQUIRES AN INTEGRATED STRATEGY COMBINING BOTH CONSERVATION ACTION AND TRANSFORMING PRODUCTION AND CONSUMPTION SYSTEMS[1]



WITHIN THE INDUSTRIAL SECTOR, THERE ARE A VARIETY OF SOLUTIONS THROUGHOUT THE VALUE CHAIN THAT CAN HELP REDUCE PRESSURES ON ECOSYSTEMS:

Green chemicals: developing low and non-toxic alternatives to persistent, bioaccumulative substances like PFAS

Clean industrial processes: technologies for reducing industrial pollution, such as advanced filtration, and water treatment

Circular economy and material innovation: redesigning industrial processes and products to use more circular materials and technologies that help facilitate closing the loop (e.g. biobased)

Green infrastructure and nature-based solutions: innovations in the built and natural environment that help mitigate ecosystem disturbance and remediate and restore post-industrial landscapes

Biodiversity monitoring and reporting: eDNA, remote sensing, and other methods that enable industries to measure and manage impacts

Sustainable sourcing and traceability: digital platforms for traceability of raw materials to ensure supply chains are free from unsustainable extraction and ecosystem conversion

1. UNEP (2020)

04. GREEN INDUSTRIES AND NATURAL RESOURCE DEPLETION



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NATURAL RESOURCE DEPLETION

THE CIRCULARITY OF MATERIAL IN THE ECONOMY IS TOO LOW

Natural resource use has more than tripled since 1970, with the global average material demand per capita growing from 8.4 tonnes to 13.2 tonnes in 2024. Global material productivity has also stagnated in recent years: the global economy has focused on improvements in labour productivity at the cost of material and energy productivity.

Only 7.2% of all material input to the global economy is circular, meaning that it has come from recycled sources. This has dropped from 9.1% in 2018. Declining circularity is a result of increasing relative extraction of virgin materials that is put into stocks where it cannot be cycled.

Stock build up – 38% of input to the global economy[1]

Stock is composed of circular, non-renewable and renewable materials, but most notably construction materials. This is held in long lasting structures and vehicles/machinery. Mineral building materials (concrete, asphalt, bricks, aggregate, glass) dominate the stock volume by mass at 95%[2], followed by metals at 4% and wood at 1%.

Virgin renewable inputs – 25% of input to the global economy

Renewable inputs are largely biomass-based. Part of this can be ecologically cycled (21%) and is thereby carbon neutral, and part of this is non-renewable (4%). Biomass can be non-renewable when it is cultivated in a way that is not balanced with the carbon cycle (e.g. by draining wetlands). It is also unknown to what extent nutrients from renewable biomass inputs are cycled back into the economy or environment.

Virgin non-renewable inputs – 15% of input to the global economy

Non-renewable inputs are mostly composed of metals and non-metallic minerals. Metal ores represent about 1/10th of total extraction but have increased sharply due to the expansion of the built environment, manufacturing sectors, and clean energy. Nonmetallic minerals represent almost half of total material extraction, mainly due to the construction industry.

Virgin fossil inputs – 15% of input to the global economy

This refers exclusively to fossil fuel energy carriers, which cannot be regenerated in a meaningful (human) timeframe. They represent a relatively small share because they are lightweight, but they arguably have the largest adverse impact.

See next page for more information on virgin non-renewables

1. CGR (2023), percentage is based on mass; 2. IPCC (2022), note: share of concrete alone is 43.5%.

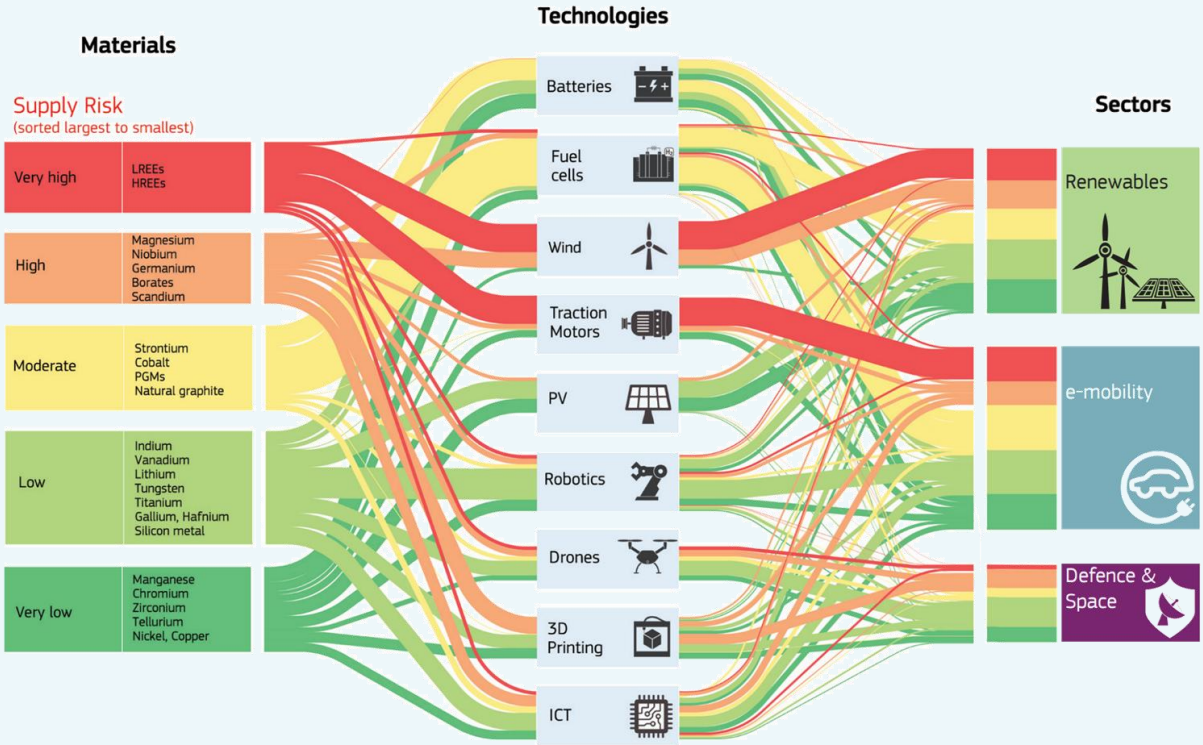
VIRGIN NON-RENEWABLE INPUTS

CRITICAL RAW MATERIALS ARE ESPECIALLY AT RISK DUE TO THE SUSTAINABILITY TRANSITION

There are a few critical raw materials that are naturally regenerated at a rate that is too low to be considered "renewable". These raw materials are crucial for the (future) industrial base and accelerating technological innovation cycles have led to increasing demand for these highly sought after metals and minerals[1].

A foresight-based assessment of critical raw materials in the EU context finds that **light and heavy rare earth elements[2]** have the highest supply risk. Supply risk hereby also takes into account geopolitical factors that contribute to economic scarcity (e.g. if resources are highly concentrated in a single "high risk" country).

FLOWS OF RAW MATERIALS AND THEIR CURRENT SUPPLY RISKS FOR SPECIFIC SECTORS[1]



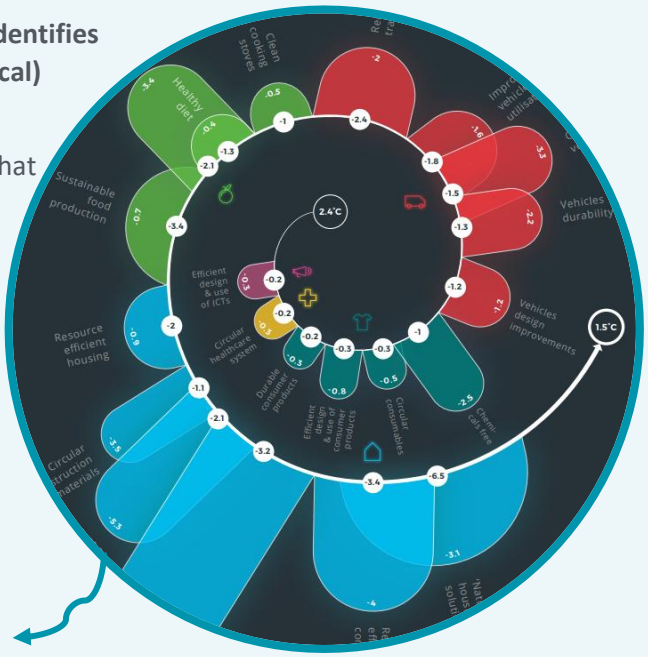
1. European Commission (2020); 2. LREEs (e.g. neodymium) and HREEs (e.g. terbium) are used in various applications like magnets, displays, LED, lasers, and circuit boards.

MITIGATING NATURAL RESOURCE DEPLETION IN INDUSTRY

SOLUTIONS TO IMPROVE CIRCULARITY ARE NEEDED ACROSS MANY INDUSTRIES, WHERE THE BUILT ENVIRONMENT HAS LOTS OF POTENTIAL

Overall, Ellen MacArthur's circularity framework[1] identifies strategies to close the demand-supply gap for (critical) resources and reduce reliance on virgin extraction:

1. **Designing out waste**: design products in a way that puts less pressure on resources (longevity, repairability, lightweighting, substituting non-renewable with renewable)
2. **Keeping materials in use**: reuse, refurbish and remanufacture
3. **Recycling**: at the highest possible use-value



The Circularity Gap Report's (CGR) Interventions Vortex[2] shows to what degree certain interventions, like reducing excess consumption, floor space, and using circular construction materials would improve global circularity and bring the planet on a 1.5-degree trajectory.

As highlighted by the CGR, one of the most important sectors to improve circularity is the built environment as it constitutes 40% to global emissions, has high material inputs, and low recycling.

- **Resource and floor efficient construction**: via lightweight and frugal design and utilization of local construction materials. Less living space/co-housing, multifunctional buildings, limit expansion of residential stock.
- **Natural housing solutions**: green roofs, passive houses, and production of own renewable energy
- **Increase housing durability**: focus on refurbishment and renovation of existing stock
- **Circular construction materials**: construction materials with recycled content, diversion of construction and demolition waste

The impact of the overall industrial system stem from two main factors: the scale of production (and consumption) and production processes themselves. Necessary mitigation pathways include:

- **Chemical-free:** use bio-plastic, use less plastic, use less chemicals
- **Circular consumables**: recycle plastics and paper, increased recycled materials in furniture, closed-loop recycling of synthetic fibers
- **Durable consumer products**: repair, maintain, share, and secondhand use of textiles/ appliances/ furniture/ machinery
- **Efficient design and use of consumer products**: more efficient paper, textile, furniture, and electronic goods use

1. Ellen MacArthur Foundation (2025); 2. Circularity Gap Report (2022)

CONTACT US

QUESTIONS, COMMENTS OR WANT TO CONNECT?



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"I want to talk about this report and impact (methodologies) in Green Industries."

→ *Contact Heleen at* heleen.de.jonge@shiftinvest.com

"I'm a startup with an innovative solution to a problem highlighted in this report."

→ *Fill out our form on the website to get funded:* https://shiftinvest.com/getfunded

GREEN INDUSTRIES INVESTMENT TEAM



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TURNING INVESTMENTS INTO IMPACT