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For a green and just transition in Europe

Recommendations for EU environmental and climate policy for the years ahead

German Environment Agency
Federal Agency for Nature Conservation



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For a green and just transition in Europe

Recommendations for EU environmental and climate policy for the years ahead

by

German Environment Agency, Dessau-Roßlau, Germany

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Dear readers,

The European Green Deal is a historic milestone. It is the first holistic framework for generating wealth and social equity within our planetary boundaries. While many key steps were realized in the past years, not all sectors have progressed as necessary. These differences in speed – and sometimes even differences in direction of travel – are critical since the respective policies are closely interlinked. Tackling the great challenges of our time requires immediate and simultaneous action on climate protection, biodiversity conservation, circular economy and pollution prevention. Therefore, future environment and climate policy should be guided by a systematic and integrated approach.

To achieve this, we need to preserve the momentum in European legislation introduced by the European Green Deal. Doing so will go a long way toward enhancing our economic, social, and environmental resilience against future challenges. With several severe crises requiring urgent attention, there is a risk that the ambition of the European Green Deal will wane. In order to adapt to these crises and to increase acceptance by all stakeholders, including the private sector and civil society, the European environmental and climate policy must stay on track. This report aims to show how the European Green Deal can be better linked with social development, competitiveness and the modernisation of the public sector. In particular, institutions and procedures must be adapted to modern requirements. Cooperation within and across institutions should be strengthened to overcome silos and increase policy coherence. A twin transition of digitalisation and sustainability is a chance to reduce bureaucracy while maintaining environmental standards. Only with this prerequisite will the transformation towards sustainability in all sectors be successful. To this end, it is also key to communicate about how the European Green Deal plays out in our daily lives. The same holds true for better communication about our goals and initiatives to our global partners and for stabilising and developing Europe's globally and sustainability-oriented investments. Taking onboard European citizens and partners from across the globe has received too little attention so far.

With this report, we make recommendations for future European environmental and climate policy, e.g. related to the 8th Environment Action Programme, which sets comprehensive targets for 2030. We are open for discussion on these topics and are eager to share our expertise in nature conservation and environmental protection to reach our common goal: a European Union where we can live well, within our planetary boundaries.

A handwritten signature in black ink, appearing to read 'Sabine Riewenherm'.

Sabine Riewenherm
President of the Federal Agency for Nature Conservation

A handwritten signature in black ink, appearing to read 'Dirk Messner'.

Dirk Messner
President of the German Environment Agency

Executive Summary

by the European Green Deal in 2019. This historic framework was the first of its kind, integrating environment and climate goals across sectors. Even though significant progress has been made in the past years, it is crucial to continue this effort in order to ensure a liveable planet. With this Scientific Opinion Paper, we would like to offer recommendations to guide EU climate and environmental policies in the second half of the EU's 8th Environment Action Programme for a sustainable, safe and resilient future.

Enabling principles

To enable effective environmental and sustainability policies, key principles are needed to follow an integrated approach; this includes, the improvement of sustainable cooperation and global partnerships to build alliances and strengthen transformation; investments in research and education; identification of backlashes, and at the same time maintain openness to dialogues; strengthening of the social dimension, the integration of the sustainability and digital transformations, and finally, paying attention to sustainability oriented economic policies and innovations.

Policy recommendations

Zero Pollution Ambition

Pollutions, particularly from chemicals and noise, have detrimental effects on human health and the environment. At the same time chemicals are needed for a green and digital transition. A systemic shift in production and consumption by advocating for partnerships across different stakeholders, fostering innovation and revising the regulatory frameworks would facilitate achieving the Zero Pollution Ambition. Revisions are needed for chemicals legislations like REACH or the Sustainable Use of Pesticides Directive. Mixture effects needs to be addressed in the future. Also, regulations on cars and construction products need to be revised to realise the Zero Pollution Ambition. Additionally, institutionalising of monitoring programs and effectively implementing the Global Framework on Chemicals are drivers to tackle pollution comprehensively.

Biodiversity and ecosystem services

Nature, landscape and biodiversity are to be protected, maintained and developed on the basis of their inherent value. In addition, biodiversity and intact ecosystems are essential for human well-being, including food security and climate change mitigation and adaptation. However, biodiversity is declining rapidly in the EU due to various pressures. To address this, the EU has adopted the Biodiversity Strategy for 2030, which focuses on conservation, restoration, and sustainable use of biodiversity, complemented by legislative efforts such as the yet to be adopted Nature Restoration Law and a regulation on deforestation-free products. Urgent action is needed to pass and implement these policies effectively, integrate biodiversity targets into other policy sectors, and scale up ecosystem restoration efforts. This is also key to reach the EU's global commitments under the Kunming-Montreal Global Biodiversity Framework.

Sustainable agriculture and food system

Agriculture is dependent on intact environmental and climate conditions and provides crucial societal services, most importantly food production but also energy production. At the same time, it contributes itself to multiple crises. The transition to ecologically sustainable agriculture poses a major challenge and needs to be pursued, especially by revising the Common Agricultural Policy

(CAP). An integrated approach to sustainable agriculture and food systems is crucial to address interconnected challenges like climate change, biodiversity loss, and pollution while ensuring fair treatment of farmers and equitable access to healthy, sustainably produced food for everyone.

Circular Economy, Resource Conservation and Sustainable Consumption

The concept of a circular economy aims to conserve resources and is an overall economic concept that takes the entire product life cycle and its materials into account as well as urgently needed absolute reductions in final demand. To accelerate progress towards circularity, measures such as implementing the Ecodesign for Sustainable Products Regulation and improving extended producer responsibility schemes are essential, along with aligning regulations like the Construction Products Regulation with circular economy principles. Additionally, fostering a circular and environmentally beneficial bioeconomy can contribute to achieving the goals of the European Green Deal.

Climate Mitigation and Energy

The urgency of addressing climate change is underscored by the global average rise of temperatures, nearing critical tipping points. Immediate and comprehensive measures across all sectors are necessary. Key initiatives include actions such as an ambitious emission reduction target for 2040 and legislation on energy efficiency. Emissions trading schemes and the Effort Sharing Regulation need to be prepared for the years after 2030. Considering the necessities of partner countries around the globe is crucial for successful climate and energy policy, international cooperation is also important for the implementation of the Carbon Border Adjustment Mechanism. Especially in energy-intensive industries green lead markets for climate-neutral and circular products must be supported. Carbon Capture and Storage infrastructures need to be developed, but should only be used for unavoidable emissions. Social, environmental and climate impacts of negative emissions need to be considered.

Climate adaptation

Climate adaptation is essential for addressing the increasing risks posed by climate change, such as heatwaves and water scarcity. Existing EU strategies and laws aim to make adaptation smarter and more systemic, emphasizing collaboration and promoting nature-based solutions. Recommendations include strengthening and financing climate adaptation instruments, promoting nature-based solutions for climate and biodiversity, ensuring water resilience, and boosting urban resilience through green-blue infrastructure.

Key mechanisms

Reaching the goals of the 8th Environment Action Programme requires targeted use of various instruments by stakeholders at different levels. Four key enabling mechanisms for the period 2025-2030 are sustainable finance, digitalisation, cohesion policy, and research funding.

The New European Bauhaus: Best Practice Case for an integrated approach

It is a challenge to incorporate an integrated approach involving different disciplines, topics and stakeholders into coherent legislations. To highlight the progress that already has been achieved in Europe in this regard, the present Scientific Opinion Paper ends with a successful example of such integration: The New European Bauhaus. It is a model for how the transformation of a sector can be addressed as part of an integrative initiative that combines, not only, social and aesthetic aspects with environmental and climate protection.

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A Introduction

The elections to the new European Parliament in June 2024 and the appointment of the new European Commission in autumn 2024 present an opportunity for providing impetus for the discussion on EU climate and environmental policy in the coming years. This paper is intended to serve this purpose. It is aimed at both the members of the new European Parliament and the members of the new European Commission. It also targets interested stakeholders who wish to advance the discussion on a future-oriented EU climate and environmental policy.

Crucial discussions on the future shape of the modernisation process in the European Union (EU) lie ahead. The European Green Deal established by the European Commission in 2019 plays a key role. From our perspective, it is historically the EU's most ambitious project aimed at a comprehensive transition of the European economy and society in order to tackle the climate, biodiversity and pollution crisis and promote sustainable development. It represents a paradigm shift that puts environmental and social aspects at the forefront of the modernisation process. In view of the appointment of a new European Commission at the end of 2024, we believe that the upcoming debates must therefore focus on the question of how the modernisation process initiated by the European Green Deal can be successfully continued.

The implementation of the European Green Deal is associated with many opportunities, challenges, obstacles and uncertainties. Its future and reshaping depend on many factors – such as the outcome of the elections to the European Parliament in June 2024, the priorities set by the new European Commission to be appointed at the end of the year, the attitude of the Member States, but also the stance of the USA, China and the Global South towards Europe, the reaction of the private sector and, last but not least, the attitude of EU citizens towards EU policies.

The 8th Environment Action Programme (EAP) will play a key role in shaping the EU's future climate and environmental policy. The program is based on the European Green Deal and contains a 2050 objective of living well within planetary boundaries as well as binding, priority targets up to 2030, which serve as orientation for climate and environment-related measures in the second half of the decade.¹ It also forms the EU's basis for achieving the United Nation's 2030 Agenda and its Sustainable Development Goals.

In March 2024, the European Commission presented a mid-term review of the 8th EAP. It states that achieving the climate and environmental targets for 2030 is within reach if the planned measures are fully implemented. The European Commission also emphasizes the importance of achieving the targets not only for a clean environment, but also for the long-term resilience of the economy and society.² The first monitoring report of the European Environment Agency (EEA), published November 2023, also shows positive developments, but points to the need for further action, as the EU may not achieve the majority of its EAP targets by 2030.³

In his highly regarded and action-guiding report from April 2024 on the future of the European Single Market, former Italian Prime Minister Enrico Letta emphasized, among other things, the need for the European Union to achieve its ambitious green goals, as the future of the EU

¹ Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022D0591>

² European Commission (2024): 8th Environment Action Programme Mid-Term Review. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52024DC0123>

³ European Environment Agency (2023). Monitoring report on progress towards the 8th EAP objectives - 2023 edition. Available at: <https://www.eea.europa.eu/publications/european-union-8th-environment-action-programme>

depends on these commitments. The consequences of inaction would be complex and include environmental, economic and geopolitical dimensions.⁴

Against this backdrop, we have formulated recommendations for EU climate and environmental policy in the second half of this decade. We regard this as a contribution to the discussion on a modernisation process in the EU that is taking an integrated approach for realising a sustainable and resilient transition. A transition that is ecologically oriented, socially just society with a competitive economy.

⁴ Enrico Letta (2024): Much more than a market - Empowering the Single Market to deliver a sustainable future and prosperity for all EU Citizens. Available at: <https://www.consilium.europa.eu/media/ny3j24sm/much-more-than-a-market-report-by-enrico-letta.pdf>.

B Enabling principles for effective environmental and sustainability policy

Recent scientific assessments underline the importance of the European Environment Action Programme (EAP) and its overarching aim of European citizens living well, within the planetary boundaries. The European Green Deal shaped the EAP in the first half of the decade. Developing further its approach in the second half of this decade is crucial to give orientation on how to counter the escalation of environmental crises. For a successful follow-up and effective implementation of the 8th EAP, we recommend considering the following enabling principles. Sustainable finance, digitalisation and artificial intelligence, cohesion policy and EU Horizon Europe and research funding as important key mechanisms are discussed in chapter D.

Take the European Green Deal goal system seriously: from silos to integrated approaches

The European Green Deal has succeeded in bringing all sustainability issues into a manageable system of objectives: climate neutrality, circular economy, zero pollution, halting biodiversity loss and fostering ecosystem services. In different transformation arenas, like the energy system, the transport system, the chemical industry, policies are often designed to optimise towards one of the mentioned objectives. The next step requires an integrative approach. Societies and environment will only be resilient and secure if the interdependent goals are mainstreamed and integrated into all sectorial policies. Mobilisation of co-benefit and synergy potentials as well as management of trade-offs are important aspects of such an integrative approach.

One promising example for an integrative approach is the Planetary Health concept. It refers to the limited resilience of ecosystems and the consequences for human activities on our planet. Its goal is the achievement of justice, well-being and the best possible health through a prudent approach to political, economic and social systems. By considering and linking human health and the protection of natural ecosystems, synergy effects are created that enable both adaptation to environmental changes that have already occurred and mitigate further environmental changes.

An integrated approach also needs to be accompanied by a modernisation of the institutional framework and by ensuring good governance principles. For decision-making processes good governance is needed. It includes transparent, accountable, open and responsive decision-making processes which ensure that all measures are implemented effectively and consider the interests of citizens. Good governance also promotes the involvement of all levels of society, from local communities to the private sector, and helps to ensure that the green and digital transition is equitable and inclusive. An integrative approach is relevant for activities of all stakeholders. These stakeholders are often part of organisation structures which are not yet prepared for such a new approach. Therefore, innovative policy solutions might also require reforms of organisational structures.

Improve sustainable cooperation and global partnerships to build alliances and strengthen transformation

The European Green Deal should be the beginning of a new era of cooperation that goes beyond Europe's borders and strengthens and modernises the global economy. Cooperation with entrepreneurs, academia, civil society, trade unions, local communities and cities across the EU is just as crucial as the involvement of stakeholders at national and international levels. Even more potential can be utilised here, for example by extending and strengthening the Global Gateway Initiative towards the goals of the European Green Deal.

The 2030 Agenda with its Sustainable Development Goals (SDGs) provides a framework at the global level for tackling economic, social and environmental challenges in a holistic manner. It serves as a compass for European policy to promote planetary health. A systematic mechanism to review EU legislative initiatives for their contribution to the SDGs, based on the European Commission's impact assessment, could further strengthen coherence between science and policy.

Gender-specific aspects are an integral part of sustainable environmental policy and contribute to equity and effectiveness. Promoting gender equality and empowering women and girls is essential for a future worth living for all.

The global implications of the European Green Deal, particularly in relation to the Global South and geopolitical realities, necessitate careful consideration going forward. Policy development, strategies, trade agreements and legislation must account for direct and indirect impacts on the global economy and societies of the Global South. Close communication and cooperation with global partners are crucial to ensure that European progress in environmental policy has the potential to be recognised and serve as a role model.

Improve the European Green Deal through democratic dialogue and social empowerment for sustainable progress

The European Green Deal stands for a comprehensive structural change of our economies and societies that should consider the voices of citizens and the private sector. Their input offers valuable insight that should be carefully reflected in the revision of legislation and the development of next generation of European Green Deal-oriented policies. Identifying and discussing infrastructure and skills gaps as well as research and development gaps are just as important as fighting disinformation and strengthening genuine dialogue. Sustainable economic goals require not only clear targets to protect planetary systems, but also significant investment in areas like infrastructure, skills and research, as well as the modernisation of institutional systems through digitalisation, artificial intelligence, and lean and smart governance structures. Bureaucratic burdens should be identified and reduced.

A strong democratic consensus on the core aspects of the European Green Deal is crucial to avoid backlashes and shape successful economic policies that prioritise the environment and climate. The social dimension of the European Green Deal must be strengthened in the next period to address fears and uncertainties among the population. Economic instruments should be used to cushion the economic costs of transformation, especially for socially disadvantaged citizens. The benefits of change must be clearly communicated in order to make the improvements visible in everyday life and convey a sense of security. This contributes to the resilience of society and promotes acceptance and support for the European Green Deal. The security aspect should generally be included in debates on resilience.

Integrate sustainability and digitalisation

Digitalisation creates new opportunities for implementing the next phase after the European Green Deal, the 2030 Agenda and the UN's sustainability goals. Connecting the sustainability and digital transformations mutually must be put higher on the agenda to reap co-benefits. Both are fundamental to our societies. The European Commission and the Member States need to develop transformation pathways towards sustainable digital societies. In addition, it is imperative for companies to concurrently contemplate both transformations to effectively capitalise on the opportunities they present. This has yet to gain traction in the mainstream. Expanding research capacities in the realms of digital sustainability and sustainable digitalisation, while simultaneously

enhancing capabilities for more effective and equitable implementation, as well as nurturing multi-actor global partnerships, would be beneficial.

Develop an encouraging economic policy and innovation environment

We are at a crossroads. The next wave of investments of companies and businesses in Europe will either put Europe on a sustainable pathway or deepen the environmental and climate crisis. Investments in machinery and technology, for example, do have a lifespan and impacts of 20 years, meaning that they still will be in place by mid-century – at the moment when climate neutrality and other sustainability goals are to be achieved. Changing production systems before the end of their lifespan will incur huge costs. It is therefore important to focus innovation funding and policy support much more strongly and coherently on sustainability goals. This applies to technological, but also to social, institutional and organisational innovation. In addition, public investments and policy frameworks should encourage support for green endeavours, from start-ups to the transformation of major players in traditional and emerging industries, such as green steel through hydrogen use, battery factories, and new chemical plants.

Invest in research and education

Research focused on integrating the goals of the European Green Deal across sectors is instrumental in addressing multiple crises. It enables us to develop innovative approaches to preserve biodiversity and understand the causes and consequences of pollution. Through inter- and transdisciplinary studies, we can promote sustainable practices that not only reduce greenhouse gas emissions, but also protect natural habitats and minimise the impact of pollutants on the environment and conserve resources. Research thus makes a decisive contribution to harmonising the three pillars of sustainability – ecology, economy and social issues – and ensuring a resilient future for generations to come. EU Missions in Horizon Europe, the EU research and innovation programme, directly support research dedicated to the European Green Deal's goals. This helps provide a foundation for transformation pathways addressing a systematic integration of European Green Deal goals in all sectors.

In addition, it is important to step up information, education and capacity-building measures to mainstream the necessary knowledge for the transformation beyond the research community into all levels of decision-making and society.

C Policy Recommendations

The following recommendations are listed in no particular order.

1 Zero Pollution Ambition

Chemicals play a crucial role in our daily life. They are essential for supporting a green and digital transition and a circular economy. At the same time, our health and livelihood are affected by pollutions from chemicals and noise. Premature death and increased rates of cancer or other diseases are examples of these negatives effects.⁵ Exposure to harmful pollutants not only occurs in direct contact with chemical products but can also happen via the environment, where pollutants contaminate ecosystems and can enter the food system and drinking water. The general population is often affected by pollution. For example, per- and polyfluoroalkyl substances (PFAS) have been found in children's blood at levels where health consequences cannot be ruled out with sufficient certainty.⁶ Furthermore, health burdens as a consequence of pollution are unevenly distributed, at least in Germany. People with low incomes and little education are more affected by pollution compared to other people.⁷

The European Green Deal elevated the issue of pollution to the highest political level, placing it on par with the fight against climate change, recognizing the global multiple-crisis. The Zero Pollution Ambition – aimed at minimizing pollution to levels no longer harmful to human health and the environment – is a long-term vision. Consequently, the Zero Pollution Action Plan for air, water and soil⁸, as well as the Chemicals Strategy for Sustainability⁹, are long-term projects which must be sustained and continued. Some actions have already been initiated and continuation of their ambitious implementation is needed; for example, for the “Safe and Sustainable by Design” concept, for the new Industrial Emissions Directive or the revised Classification and Labelling Regulation. The revised pharmaceutical legislation is on its way, with improvements for the environment and fighting against anti-microbial resistance.

Beyond individual actions for safe and sustainable chemicals, it is clear that a transition to achieve a Zero Pollution Ambition requires a systemic change of production, use and consumption patterns which are linked through value chains stretching across different sectors, both within and beyond the European Economic Area. This implies that systemic change relies on mainstreaming and cross-sector collaboration as essential prerequisites (see box on integrated approach).

Another challenge is to incentivise innovation in the supply of zero pollution products. While it is certainly important to address hazardous materials by phasing them out in value chains, this does not automatically mean that innovation and diffusion of safe and sustainable products into markets is effective. Establishing markets for safe and sustainable products is a pivotal aspect in

⁵ European Environment Agency (2023): Zero pollution monitoring assessment. Available at: <https://www.eea.europa.eu/publications/zero-pollution>

⁶ Umweltbundesamt (2023): PFAS excessively high in blood of children and adolescents in Germany. Available at: <https://www.umweltbundesamt.de/en/press/pressinformation/pfas-excessively-high-in-blood-of-children>

⁷ Umweltbundesamt (2022): Environmental justice – Environment, health and social conditions. Available at: <https://www.umweltbundesamt.de/en/topics/health/environmental-impact-on-people/environmental-justice-environment-health-social#environmental-justice-environment-health-and-social-conditions>

⁸ European Commission (2021): Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee and the Committee of the Regions. Pathway to a Healthy Planet for All EU Action Plan: “Towards Zero Pollution for Air, Water and Soil”. Available at: https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en

⁹ European Commission (2020): Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee and the Committee of the Regions. Chemicals Strategy for Sustainability Towards a Toxic-Free Environment. Available at: https://environment.ec.europa.eu/strategy/chemicals-strategy_en

achieving a successful transition. Moreover, ongoing support for research and innovation will be important for future progress.

On the legislative side, one of the tasks ahead is improving the relevant regulatory framework for guiding a transition, ensuring a healthy environment and an innovative and competitive economy. The missing cornerstones for improving the legislative framework include two crucial aspects: the revision of Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), and the revision of legislations governing plant protection products and biocides. Additionally, adopting cross-regulatory approaches such as the 'One Substance, One Assessment' approach is vital. Cross regulatory work would help to transcend sectoral limitations where necessary, enhancing legislative efficiency for all stakeholders. Recommendations for improving the regulatory framework for achieving a Zero Pollution Ambition are given in the following sub-chapters. Also, the global dimension is addressed further down and is of importance because pollutions is moving across borders. Especially the global dimension shows the need for complementing an efficient legislative framework by supporting voluntary action with deeply integrated strategic cooperation of all relevant stakeholders, across sectors.

Further information:

The Zero Pollution Action Plan as a chance for a cross-regulatory approach to pollution prevention and reduction: www.uba.de/publikationen/the-zero-pollution-action-plan-as-a-chance-for-a

An integrated approach to foster the Zero Pollution Ambition

The future of the Zero Pollution Ambition must be considered and dealt with even more strongly in the context of the necessary green and digital transformation of society, including (chemical) industry. Resource scarcity and high energy prices are currently fostering innovations. This does also offer opportunities for avoiding future pollutions, for example by making the handling and use of chemicals more sustainable. Integrating measure to avoid pollution into measures which are originally targeting at climate protection is key for a holistic transformation. All sectors need to work together for achieving this transformation which makes it necessary to take life-cycle based approaches for assessing chemicals including e.g. its energy and resources demands.

The issue of pollution needs to be mainstreamed in other policy fields to avoid pollution even though the measure within these other policy field are targeting at e.g. protection of climate. Measures to prevent pollution are often originated in policy fields outside the environmental portfolio. For example, to achieve WHO guideline values for air pollutants in Germany requires, among other things, a successful change in residential heating without, as far as possible, the use of biomass, a change in transport to significantly reduce individual passenger transport (since all electric vehicles also emit particles through abrasion) and a significant reduction in livestock. At the same time, avoiding pollution can support other goals of environmental and climate policy, for example protecting biodiversity by reducing air pollutants.

The Zero Pollution Member State Steering Group as well as the Stakeholder Platform could be further developed for promoting the mainstreaming.

1.1 ENHANCE EFFICIENCY AND EFFECTIVENESS OF CHEMICALS REGULATION BY REVISING REACH

REACH (Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals) is one of the corner stones of chemicals regulations within the EU. It focuses on the responsibility of industry for the safe production and use of chemicals. REACH

aims at a high protection of human health and the environment and at fostering innovation and competitiveness. The aims have not been reached to their full potential and the need for improvements have already been identified in 2018¹⁰. A revision would need to address several areas:

- ▶ the lack of information on substances by at least extending the information requirements for hazardous substances in particular on use and exposure, including information on alternatives and by implementing registration and notification obligation for polymers.
- ▶ the investments in safe and sustainable chemicals needs to be fostered by speeding up regulatory processes and providing planning security. This can be achieved by restricting the use of the most harmful substances for consumer uses and partly also for commercial applications only with exception of essential uses. Furthermore, own categories are needed for persistent, mobile and toxic (PMT); very persistent and very mobile (vPvM) and for endocrine disrupting (ED) substances as substances of very high concern.
- ▶ the co-exposures and combination effects of chemicals by introducing a mixture allocation factor (MAF).

Further information:

The Revision of the REACH Authorisation and Restriction System: www.uba.de/publikationen/the-revision-of-the-reach-authorisation-restriction

1.2 INCREASE ENVIRONMENTAL PROTECTION ALSO IN THE USE PHASE OF PLANT PROTECTION PRODUCTS AND BIOCIDES

The European Commission has published a draft regulation on the sustainable use of plant protection products (SUR) to provide a legally binding framework for the objectives of the European Farm-to-Fork Strategy. The strategy, which is part of the European Green Deal, includes the goal of reducing the use and risks of pesticides in agriculture by 50 % by 2030.

In November 2023, the attempt to adopt the SUR in the European Parliament failed. The Directive 2009/128/EC on the Sustainable Use of Pesticides (SUD) therefore remains in force. However, the SUD has not yet led to a significant reduction in the use of pesticides, due to the fact that it does not contain any specific legally binding reduction targets and measures and incentives listed can be implemented voluntarily by the Member States.

- ▶ The European Commission should therefore present a revised draft regulation that, for example, puts more emphasis on incentives and funding to support farmers in converting their farming practices to an environmentally friendly, low-input cultivation system. Therefore, the CAP should be used to fund the transition to farming systems that depend less on pesticides. Further, a new draft should contain binding criteria for integrated plant protection measures that only allow the use of synthetic pesticides as the very last option to prevent economic yield loss. An extensive and centralised recording of all plant protection measures would guarantee controllability. Further, strong links to the Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) and the yet to be passed Nature Restoration Regulation should promote the use of low risk plant protection products especially in protected areas under agricultural production.

¹⁰ European Commission (2018): Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee. Commission General Report on the operation of REACH and review of certain elements. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0116>

As they are toxic-by-design like plant protection products, the sustainable use of biocidal products is of great importance in order to minimise the negative effects on the environment. Until now, the European Biocidal Products Regulation (EU) No 528/2012 only deals with the approval of biocidal active substances and authorisation of biocidal products.

- ▶ In order to ensure a high level of environmental protection, more detailed regulation of the use phase is necessary. This could include provisions on training of users, sales restrictions, general principles for a sustainable management of harmful organisms or the reduction of biocide use in sensitive ecosystems.

1.3 ADDRESS THE CONVERGENCE OF RNAI-BASED PESTICIDES AND GENETIC ENGINEERING

RNA interference (RNAi-) based pesticides share the same sequence-based molecular mechanism as RNAi-applications in genetically modified plants (GMPs). As such, both applications of RNAi – as sprays or in GMPs – bring up highly similar potential environmental risks, whereas their mode of action differs fundamentally from both chemically synthesised and microbial pesticides.

However, RNAi-based pesticidal applications and RNAi-based GMPs are regulated differently in terms of environmental risk assessment:

On the one hand, RNAi-based pesticides are currently treated as conventional pesticides. Data requirements for the evaluation of plant protection products are laid down in Regulation (EU) 283/2013 setting out the data requirements for active substances and Regulation (EU) 284/2013 setting out the data requirements for the plant protection products. The data requirements for evaluating biocidal products are laid down in Regulation (EU) 528/2012, which governs their placing on the market and use.

On the other hand, risk assessment of RNAi-based GMPs is regulated in Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms, following a case-by-case approach. However, the current regulatory initiative by the European Commission¹¹ proposes to deregulate a subset of plants obtained by new genetic techniques (NGT) and would not ensure appropriate environmental risk assessment¹². This might include certain RNAi-NGT plants, despite their potential environmental risks comparable to those of other RNAi-based GMPs and RNAi-based pesticides.

The following points should be considered in regards to RNAi-based pesticides and RNAi GMPs including NGTs:

- ▶ Synergies should be used between risk assessments of comparable genetic engineering approaches and RNAi-based pesticidal applications (GMPs and pesticides).
- ▶ The data requirements for RNAi pesticides (plant protection products and biocidal products) need to be adapted accordingly to ensure that potential risks from their use can be excluded and the claimed high specificity can be scientifically demonstrated. Additionally, guidance for the environmental risk assessment of RNAi pesticides has to be developed at EU level.
- ▶ Regulation that requires robust risk assessment in line with the precautionary principle needs to be ensured for the increasing range of genetic engineering applications (including

¹¹ European Commission (2023): Proposal for a regulation of the European Parliament and of the Council on plants obtained by certain new genomic techniques and their food and feed. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0411>

¹² Finja Bohle et al (2024): Where does the EU-path on new genomic techniques lead us? In: *Frontiers in genome editing* 6, S. 1377117. DOI: 10.3389/fgeed.2024.1377117

RNAi-based pesticides and other transient applications) that are expected to reach the market in the near future.

Further information:

For a science-based regulation of plants from new genetic techniques – Deregulation of NGT plants contradicts the precautionary principle: www.bfn.de/publikationen/policy-brief/science-based-regulation-plants-new-genetic-techniques

1.4 ENSURE HUMAN HEALTH PROTECTION ALSO INDOORS BY REGULATORY MEASURES

We are spending most of our time indoors, nevertheless there is a lack of regulatory measure to ensure indoor air has no negative effects on human health. In addition to items such as furniture, it is primarily construction products that emit potentially harmful substances into indoor air. Harmonised methods for measuring these emissions have been available since 2018. A health assessment of the measurement results is also possible with the now complete EU LCI list (LCI short for "lowest concentration of interest")¹³. Hence, manufacturers of indoor air-relevant products now have a basis for developing low-emission products. It is also possible to develop criteria for labelling, such as environmental labels. However, there is no standardised EU-wide limitation and labelling of material emissions.

For a high-level protection of human health, indoors labelling of products or regulatory limit values for construction products, furniture and decorative objects is imperative. The necessary instruments to do so are available and should be used, e. g.

- ▶ by declaring at least volatile organic compound emissions in the so-called declaration of performance of construction products and complementing the CE marking.

This way, the EU Lowest Concentration of Interest values would be mandatory.

1.5 IMPROVE PROTECTION FROM NOISE THROUGH SOURCE-BASED REGULATIONS

Noise is the second most important source of environmental health problems after air pollution. Chronic exposure to high levels of noise can have serious health effects, including hypertension, cardiovascular disease and premature death, and can have a significant impact on both physical and mental health and general wellbeing. The Zero Pollution Ambition also includes traffic noise. The action plan aims to reduce the number of people chronically disturbed by traffic noise by 30% between 2017 and 2030.

However, according to the estimates in the first monitoring and outlook report¹⁴, it is highly unlikely that the number of people exposed to chronic road traffic noise will decrease by 30 per cent by 2030. This would require substantial additional action at national, regional and local level through noise action planning.

The results of noise mapping in Member States provide information necessary to implement improved EU measures in all relevant transport sectors. Source reduction measures are needed, especially in road transport. This can be achieved by:

- ▶ revising regulations such as Regulation (EU) No 540/2014 for cars, vans, buses and trucks and Regulation (EU) No 2020/740 on tyre labelling as these still have significant unrealised

¹³ European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, List of "Lowest Concentration of Interest" (LCI) values 2023, Publications Office of the European Union, 2023, <https://data.europa.eu/doi/10.2873/88989>

¹⁴ European Environment Agency (2023): Noise pollution and health. Available at: <https://www.eea.europa.eu/publications/zero-pollution/health/noise-pollution>

potentials. The most cost-effective noise reduction could be achieved by mandating the use of low-noise tyres for newly manufactured vehicles.

- ▶ a more effective and integrated approach in Regulation (EU) 2020/740 on tyre labelling, which should extend its scope to include re-treaded tyres in addition to new tyres. The effectiveness of the directive in convincing consumers to choose low-noise tyres could also be improved by an awareness-raising campaign at European level.

1.6 CONSIDER THE MIXTURE EFFECTS OF CHEMICALS

The co-occurrence of various chemicals in the environmental media and the human body and the so-called “cocktail effect” may pose risks for the environment and human beings. The assessment and regulation of such unintentional mixtures is still unresolved as most chemicals legislations focus on single substances, or in some cases only consider joint risks of well-defined product formulations or specific groups of substances during assessments. This was also recognised by the Chemicals Strategy for Sustainability referring to the need to address mixtures in legislations also beyond REACH such as water, food additives, toys, food contact material, detergents and cosmetics. As this is still open, overarching approaches across prospective and retrospective legislations are warranted – also to approach the Zero Pollution Ambition. Here, substance-oriented legislations are key providing and assessing prospective data while media- and emission- oriented legislation focus on co-exposures and emissions.

Concrete actions are still missing and it is important to:

- ▶ Enable mixture assessments by generating “fit-for-mix” data on (spatio-temporal) co-occurrences, (eco)toxicity values, effect-biomarker, body concentrations, and biomonitoring values.
- ▶ Accessibility of data according to the “One Substance, One Assessment” approach via EU wide data bases that are accessible across legislations and actors.
- ▶ Consideration of various options to address mixtures, i.e. component-based approaches for mixture assessments for scenarios when data are available, or generic approaches such as a mixture allocation factor (MAF) as a basis “safeguard” for potential cocktail effects if specific assessments and measures are not available.
- ▶ Promote the development of simple to use mixture tools for prioritisation, assessments and also the communication of combined exposures, emissions, uses, and hazards for different actors (authorities, companies, applicants/user of chemicals, or research).
- ▶ Introduce explicit mandates in relevant media-, substance- and emission-oriented legislations for the consideration of simultaneous or sequential co-exposure and their effects/risks.
- ▶ Open discussion on feasible risk management options for unintentional mixtures together with societal needs and willingness for a reduction of combined impacts of chemical use.

1.7 ESTABLISH HUMAN BIOMONITORING PROGRAMS AND TRANSFORM ENVIRONMENTAL MONITORING PROGRAMMES

Regulatory monitoring programmes should be an integral part of chemicals management for reviewing the effectiveness of measures, describing the current status with regard to selected indicators and providing early warning of emerging stressors. Policymakers and authorities should define transformation goals in order to update environmental monitoring programmes by considering the development of so-called new approach methodologies, like biomarkers, the

recording and evaluation of chemical mixtures and the use of digitalisation. This can help the research community to better understand what is needed for what purpose. Also, a better understanding of the effects of substances in a multi-stressor environment, including the impacts of climate change, is needed.

So far, human (bio)monitoring (HBM) is completely based on research funding, e.g. from the European Commission and Member States. The same is partly true also for environmental monitoring. Important examples are the completed “European Human Biomonitoring Initiative” (HBM4EU) and the EU Research Partnership on Chemical Risk Assessment (PARC), which runs from 2022 to 2029. However, in order to protect humans and the environment effectively, to inform the public, to generate recommendations and also to monitor the improvements brought about by chemicals legislation, monitoring needs to be consolidated and institutionalised to ensure long-term funding. Therefore, the following measures are needed:

- ▶ Establish a sustainable human (bio)monitoring system in Europe, including reporting obligation similar to environmental legislation such as the Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive).
- ▶ Further develop centralised data platforms for chemical monitoring data from e.g. human populations, the environment and products. These data collections should comply with the EU FAIR principles and include data from both regulatory monitoring and research programmes.
- ▶ Current use of targeted, cumulative and screening methods, including high resolution mass spectrometry non-target screening and effect-based methods should be further developed in support of monitoring programmes. Lighthouse laboratory stations should be explored for real-time chemical monitoring to establish effective early warning system infrastructure in support of environmental and chemicals legislation.
- ▶ Promote revision of guidance documents regarding methodologies, validity, interpretation, possibilities and limitations of using monitoring data at different levels at risk assessment and management under the different EU chemical regulations e.g. based on results from PARC. These should address the practical application of chemical monitoring data in the screening, assessment and management of contaminants.

Further information:

HBM4EU: European Human Biomonitoring Initiative: www.hbm4eu.eu/about-us/about-hbm4eu/

PARC: Partnership for the Assessment of Risks from Chemicals: www.eu-parc.eu/

Our Artificial Intelligence Use Case: Non-target screening of environmental samples

High-resolution mass spectrometry non-target screening goes beyond analysing target substances in e.g. water samples by providing non-specific results for chemical mixtures. Non-target screening signals are referred to as spectra, and within these spectra each peak represents a feature whose identity may be unknown in a first step. Supported by artificial intelligence for temporal and spatial trend analysis, striking features can be assigned to specific chemicals and their mixtures and prioritised for further assessment. Furthermore, artificial intelligence can help to make non-target screening data from different laboratories comparable and to model concentrations for previously only semi-quantitative data.

As computational non-target screening is a promising tool for the digital transformation of environmental monitoring, several European countries, including Germany have already started to

set up digital sample archives and assessment concepts at national level. To ensure consistency and common assessment options, a European data platform for non-target screening results is needed. In the long term, this would lay the foundation for the inclusion of non-target screening data in European chemicals and environmental legislation, including early warning systems.

1.8 IMPLEMENT THE GLOBAL FRAMEWORK ON CHEMICALS (GFC) EFFECTIVELY AND AMBITIOUSLY

The new “Global Framework on Chemicals – For a Planet Free of Harm from Chemicals and Waste”¹⁵ (GFC) is a major milestone in realising the vision of globally sound management of chemicals and waste. With its five strategic objectives, 28 targets, the High-Level Bonn Declaration, and 11 additional resolutions, it aims to fully integrate this vision into achieving the Sustainable Development Goals. The GFC needs effective and ambitious implementation within the EU while it is clear that weak integration, partial, fragmented or slow policies will not work. Therefore, the GFC targets expressly address all relevant stakeholders, in particular governments and the private sector, in urging them to take comprehensive and strategy-orientated action by defined and close timelines, see e.g.

“Target D2- By 2035, Governments implement policies that encourage production using safer alternatives and sustainable approaches throughout the life cycle, including best available techniques, green procurement and circular economy approaches.”

“Target D3- By 2030, the private sector, including the finance sector, incorporates strategies and policies to implement the sound management of chemicals and waste in its finance approaches and business models and applies internationally recognized or equivalent reporting standards.”

At United Nations level, initial work includes preparing guidelines for GFC National Focal Points, establishing the GFC fund, developing processes to create the GFC measurability structure, a gender action plan, and interlinkages with measures addressing other planetary crises such as climate change and biodiversity loss. All these activities illustrate well the global dimension of the challenges and of the required resolute cooperation, both within the EU and with other regions and countries. Thus, the EU and its Member States must now allocate significant resources and expertise to effectively implement GFC targets by measures such as:

- ▶ specific roadmaps, action plans, partnerships and programmes on concrete tasks specified in the targets;
- ▶ defining clear roles and responsibilities for the different actors;
- ▶ identifying links of the targets to existing EU and national policies;
- ▶ creation and maintenance of an environment that supports advancing policies in line with the ambitions of the GFC.

¹⁵ UN Environment Programme (2024): Global Framework on Chemicals. Available at: <https://www.chemicalsframework.org/page/text-global-framework-chemicals>

2 Biodiversity and ecosystem services

Nature, landscapes and biodiversity have a value of their own. At the same time, biodiversity and intact ecosystems, including healthy soils and waters, also provide countless benefits for human health and well-being. Over half of the global gross domestic product (GDP) is moderately or highly dependent on nature and its services¹⁶, and EU and global food security directly rely on them. Nature is also a vital ally in the fight against climate change, sequestering and storing carbon and helping people adapt to its impacts. However, biodiversity is declining rapidly in the EU and worldwide, endangering our natural life support system. According to the World Economic Forum's Global Risk Report, five out of the ten most severe risks expected for the next decade are environmental risks, with extreme weather events, critical change to Earth systems as well as biodiversity loss and ecosystem collapse listed as the top three¹⁷.

In the EU, over 80 % of protected habitat types are in poor condition.¹⁸ The most significant pressures include unsustainable farming and forestry, urban sprawl and pollution¹⁹, while climate change impacts also intensify continuously²⁰.

To bend that curve, there is an urgent need to scale up the conservation, restoration and sustainable use of biodiversity across the EU. Protecting, preserving and restoring marine, terrestrial and freshwater biodiversity inside and outside protected areas is a priority objective of the 8th Environment Action Programme for 2030. The EU Biodiversity Strategy for 2030, adopted in 2020, presents actionable targets for putting biodiversity on a path to recovery. Implementing these will also contribute to reaching the EU's international commitments under the Kunming-Montreal Global Biodiversity Framework.

In the past years, the EU worked on several new pieces of legislation on nature restoration, soil and forest monitoring aimed at enhancing biodiversity protection. These laws complement existing directives such as the Birds and Habitats Directives, Water Framework Directive and Marine Strategy Framework Directive. In 2022, the European Commission proposed a Nature Restoration Law, which sets specific targets to restore degraded ecosystems in the EU. This regulation holds the potential to become a new cornerstone of EU environmental legislation. Its ambitious and swift adoption will be vital to safeguard ecosystem services and meet EU and global environmental commitments. Moreover, a strong Nature Restoration Law will also contribute to protecting the livelihoods of farmers, ensuring long-term food security, reaching climate neutrality and increasing resilience of people and ecosystems to climate change.

Other legislative proposals relevant to these objectives include the Soil Monitoring and Resilience Law, the first European legislation addressing soil as the foundation of our lives, as well as the Forest Monitoring Law. Furthermore, the recently adopted Regulation (EU) 2023/1115 on Deforestation-free Products represents a pivotal tool in mitigating global biodiversity impacts of European consumption. Further promising developments include the EU Corporate Sustainability Reporting Directive (CSRD, Directive (EU) 2022/2464) and its associated European Sustainability Reporting Standards (ESRS), which include reporting requirements on biodiversity and ecosystems for businesses, as well as the Delegated Act to the

¹⁶ World Economic Forum (2020): Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy. Available at: http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

¹⁷ World Economic Forum (2024): Global Risks Report 2024. Available at: <https://www.weforum.org/publications/global-risks-report-2024/>

¹⁸ European Environment Agency (2020): Report: State of Nature in the EU. Available at: <https://www.eea.europa.eu/publications/state-of-nature-in-the-eu-2020>

¹⁹ European Environment Agency (2020): Report: State of Nature in the EU. Available at: <https://www.eea.europa.eu/publications/state-of-nature-in-the-eu-2020>

²⁰ Details on the links between biodiversity and climate change are provided in: Pörtner et al. (2021): Scientific Outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change. Available at: <https://zenodo.org/records/5101125>

EU Taxonomy Directive regarding the four non-climate-related environmental targets, that presents biodiversity criteria for private investments for certain economic activities. The Urban Waste Water Treatment Directive, the Industrial Emissions Directive and the National Emission Reduction Commitments Directive aim at reducing pollutants as a threat to biodiversity.

With some of this legislation still being negotiated at European level and others requiring implementation, the topic needs to be kept high on the agenda in the upcoming years. We are still far from reaching the targets of the EU Biodiversity Strategy for 2030, and the threat that biodiversity loss presents must not be underestimated. Therefore, laws that have entered into force need to be implemented effectively. At the same time, it is important to rigorously integrate biodiversity targets into other policy sectors and to set these targets as binding requirements to tackle the drivers of loss. It is estimated that each Euro invested in ecosystem restoration in the EU yields between 8 and 38 Euros of economic benefits²¹.

An integrated approach for biodiversity and ecosystem services

Protecting and restoring nature provides essential contributions to many other targets of EU environmental policies, including climate change adaptation and mitigation, food security, water resilience, human health and well-being. Biodiversity and ecosystem services should therefore not only be a priority objective of the EU's green and just transition, but also serve as a catalyst. In turn, policy coherence and a whole-of-government approach are key for successful nature conservation. Many drivers of biodiversity loss are directly linked to sector policies that permit or even incentivise unsustainable use of land, water and natural resources. To address these drivers effectively, coherent and ambitious policy action across sectors and across borders are needed.

2.1 ADOPT AN AMBITIOUS NATURE RESTORATION LAW

An ambitious Nature Restoration Law needs to enter into force without further delay, to successfully combat the increasingly disastrous effects of the biodiversity and climate crises on nature and societies. The law must set ambitious and legally binding targets to restore degraded ecosystems both inside and outside protected areas in the EU, in order to provide a significant and lasting added value to existing EU environmental legislation. Therefore, we call on the European Council and the European Parliament to honour the accord reached in the triilogue negotiations in November 2023, and adopt the Nature Restoration Law as quickly as possible. The EU needs to take a firm stand against misinformation and recognise that any loss in ambition to this law would do a great disservice to European citizens – including farmers whose livelihood directly depends on a functional biodiversity and healthy soils.

Recommendations

- ▶ European Commission, European Council and European Parliament should focus their efforts on adopting an ambitious Nature Restoration Law swiftly, based on an ecologically viable consensus supported by society at large. Avoiding further delays is crucial to still reach targets set for 2030.
- ▶ Effectively communicate that the regulation should not impose additional obligations for individual farmers; instead, the targets should be met through existing obligations and supplemented by incentive systems and fair compensation for efforts to restore ecosystem services.

²¹ European Commission (2022): Commission staff working document - Impact Assessment accompanying the Nature Restoration Law. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022SC0167>

- ▶ The Member States and the European Commission should step up their communication with stakeholders in order to explain the objectives of the Regulation and emphasize the added value for society. Emphasize in arguments that restoration of ecosystem services can offer people security, by safeguarding, among others, natural resources such as groundwater, soils and pollinators, enhancing the resilience of forests and fields, and promoting biodiverse recreational spaces vital for the physical and mental well-being of people.
- ▶ Significantly scale up EU spending for nature, to ensure meeting the target of dedicating 10% of the 2021-2027 Multiannual Financial Framework to biodiversity objectives in 2026 and 2027 – and ensure easy access as well as long-term availability of these funds for nature restoration.
- ▶ Develop ambitious yet actionable guidelines for the national implementation of the Nature Restoration Law, promoting measures both inside and outside protected areas.
- ▶ Develop evaluation concepts for national implementation that focus on the long-term effectiveness of restoration measures and ensure manageable reporting.
- ▶ Encourage Member States to develop national restoration plans with ambitious targets and effective restoration measures both inside and outside protected areas, which ensure meaningful stakeholder engagement, recognise potential trade-offs and guarantee socially responsible implementation.
- ▶ Support Member States in developing economic incentives (e.g. payments for ecosystem services) for integrating effective restoration measures with sustainable land use forms and mobilising private investments in effective and long-lasting ecosystem restoration.

2.2 STEP UP IMPLEMENTATION OF EXISTING EU NATURE CONSERVATION POLICIES

The Directive 2009/147/EC on the conservation of wild birds (Birds Directive) and Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) provide the backbone of the EU nature conservation policy. They contain commitments to protect threatened and typical habitat types and species in the EU and form the legal basis for the Natura 2000 network of protected areas. In the EU, 39% of birds and 63% of other protected species face a poor conservation status.²² The EU Biodiversity Strategy for 2030 calls for a better management and increased connectivity of protected areas in the EU. It also sets the target of legally protecting a minimum of 30% of the EU's land area and sea area respectively (combining Natura 2000 and other national protected area types), in line with the EU's global commitment under the Kunming-Montreal Global Biodiversity Framework. Moreover, it calls for strict protection of at least a third of the EU's protected areas, including all remaining EU primary and old-growth forests.

Recommendations

- ▶ Substantially reduce intensive farming in Special Areas of Conservation (SACs) designated under the Habitats Directive ensuring social responsibility, and establish sufficient buffer zones around SACs to exclude negative impacts of intensive farming.
- ▶ Call for compliance with the critical loads and critical levels for the most nitrogen-sensitive habitat types and species in all Natura 2000 areas and develop and apply EU-wide

²² European Environment Agency (2020) Report: State of Nature in the EU. Available at: <https://www.eea.europa.eu/publications/state-of-nature-in-the-eu-2020>

standardised regulations on ammonia pollution, including monitoring and reporting obligations.

- ▶ Ensure pollinator-friendly management of Natura 2000 areas.
- ▶ Assist Member States in implementing the EU Biodiversity Strategy's protected area targets on land and at sea.
- ▶ Make better use of new digital technologies for monitoring biodiversity inside and outside protected areas.

2.3 MAINSTREAM BIODIVERSITY TARGETS ACROSS EU POLICIES AND SECTORS

To halt biodiversity loss in Europe, a transformative change is needed. Joint and consistent action across sectors is crucial to incentivise biodiversity-friendly practices, phase out harmful subsidies and curb further nature degradation. This includes reforming key land and sea use policies like the Common Agriculture Policy, the Common Fisheries Policy and the EU Forest Strategy, as well as effectively mainstreaming biodiversity into the finance sector, energy sector, water sector, climate policy, urban planning, pollution control, trade and consumption, etc. The comprehensive targets of the EU Biodiversity Strategy for 2030 can guide this transformation, yet EU institutions and Member States will have to significantly scale up implementation action.

Recommendations

- ▶ Assess how well current EU sector policies (especially those driving land and sea use changes, including the Common Agricultural Policy and the Common Fisheries Policy) are aligned with the targets of the EU Biodiversity Strategy for 2030, then promote reforms or revisions where necessary.
- ▶ Scale up EU investments that primarily contribute to biodiversity and ensure compliance with the interinstitutional agreement to dedicate 10% of the 2021-2027 Multiannual Financial Framework to biodiversity objectives in 2026 and 2027 based on a sound biodiversity tracking methodology.
- ▶ Accelerate action to reform subsidies across all EU sectors that are potentially harmful to biodiversity and the environment, including measures to eliminate, phase out and modify them.
- ▶ Ensure that all EU environmental legislation and policies work across silos, fostering synergies, preventing barriers, eliminating inconsistencies and contributing to the goals of the 8th Environmental Action Programme for 2030.
- ▶ Adopt an ambitious Soil Monitoring and Resilience Law and Forest Monitoring Framework with the goal to monitor, assess and effectively protect soil and forest biodiversity in the EU. Strive for mandatory measures in case biodiversity is in a bad status and keep track of progresses towards policy targets.
- ▶ Strengthen the European legal acts on chemicals (see chapter 1 on Zero Pollution Ambition) and air pollution to reduce negative impacts on biodiversity and ecosystems and align their protection targets with other environmental legislation, including the EU Birds and Habitats Directives, Water Framework Directive and the yet to be passed Nature Restoration Law. Ensure that prospective risk assessment of chemicals is contributing best to the goals of these legislation. For the upcoming review of the National Emission Reduction Commitments Directive and the Air Quality Directive after 2030, develop targets to protect biodiversity

from air pollution. Emphasize the value of cross-border cooperation to reduce the deposition of air pollutants effectively.

- ▶ Ensure that the EU's ambitions to strengthen its bioeconomy recognise and adhere to ecological boundaries, for example by focussing on sustainability, circularity and cascading uses, while striving to reduce primary resource demands.
- ▶ Ambitiously implement the EU Deforestation Regulation and expand its scope to cover additional products and ecosystems beyond forests.
- ▶ Step up information, education and capacity-building measures to mainstream the value of the EU's natural capital into all levels of decision-making and society.

3 Sustainable agriculture and food system

Agriculture is as dependent on intact environmental, biodiversity and climate conditions, as citizens are on food. Agriculture plays a crucial role in providing essential societal services, notably food and feed production, yet it also contributes to numerous environmental impacts. Intensive livestock farming, high land-take and the intensive use of arable land and grassland pollute surface and groundwater as well as the air, emit greenhouse gases, threaten soil fertility and contribute significantly to the loss of biodiversity. The shift from agriculture that prioritises production at the expense of the environment to an ecologically sustainable model presents significant challenges for agriculture, politics and society as a whole.

With regard to food production, the European Green Deal contains the Farm-to-Fork Strategy. The systemic view of the entire food value chain as it is presented in the Farm-to-Fork Strategy should be emphasized further, considering both production and consumption. However, this approach has not yet been sufficiently implemented in legislation. This is especially relevant for the Common Agricultural Policy (CAP) of the EU and the Framework for Sustainable Food Systems. The European Green Deal and the Farm-to-Fork Strategy were published after the latest CAP negotiations were already well advanced. As a result, there is currently no binding linkage or harmonisation between these strategies and the CAP. Conversely, current changes further weaken the European Green Deal targets within the CAP.

In the future, European policy must enhance long-term food security by safeguarding the productivity of agricultural land through resilient water supply, healthy soils, and rich biodiversity, all supported by sustainable agricultural practices. As climate change poses a major threat to agriculture, climate protection in agriculture is also key. In order to reduce greenhouse gas emissions and the amount of land required for agriculture, livestock numbers must be reduced and the of consumption animal-based foods minimized. If possible, agricultural land should also be used for efficient renewable energy production, also offering new income opportunities to farmers.

Measures guiding the transformation process of the agricultural system need to be fair for farmers and allow a just transition. It is important to take all stakeholders on board during this transformation, especially farmers. The contribution of agricultural practices for the common good need to be acknowledged financially. Measures also need to ensure the availability of healthy and sustainably produced food for everyone. From both an economic and an ecological perspective it is crucial that sustainability is firmly anchored as a long-term guiding principle from the farm level to the supermarket.

An integrated approach for sustainable agriculture and food systems

Food production is heavily affected by the crises – the changing climate and biodiversity loss. Both influence soil fertility, water availability, pollination and other essential ecosystem services and in consequence jeopardise yields. Furthermore, pollution – also by agricultural inputs – threatens food security and harvests and is a driver of biodiversity loss. The transition towards sustainable agricultural practices and sustainable diets can reduce the pressure of these stressors both by making production systems more resilient but also by reducing their own contribution to the crisis. Legislation, including the Common Agricultural Policy as major financial instrument, needs to leverage these synergies. If this is considered, a sustainable agriculture and food system can contribute to biodiversity protection, climate adaptation, zero pollution ambitions and clean energy production.

3.1 STRENGTHEN THE RECOGNITION OF SERVICES FOR THE COMMON GOOD IN THE CAP

The EU's Common Agricultural Policy (CAP) is a comprehensive steering and financing instrument for European agriculture and is also relevant for environmental protection. Measures to preserve biodiversity and to protect climate, soil and water must be consistently prioritized in the design of the CAP and allocated sufficient funding. A strengthening of environmental concerns in the "green architecture of the current CAP" is necessary, putting a systematic European focus on services oriented towards the common good. CAP targets should be adapted to contribute to the goals of the European Green Deal.

Recommendations

- ▶ Incorporate a mandate in the CAP to support the achievement of the Farm-to-Fork Strategy targets (incl. new targets in the area of climate protection, animal husbandry, nutrient losses and the use of fertilisers).
- ▶ Continue the gradual phase-out of direct payments, aiming for their complete elimination over time.
- ▶ Implement a stronger recognition of societal benefits such as the remuneration of agri-environmental and climate measures.
- ▶ Implement control and sanction mechanism at EU level that would take effect if targets were not met (e.g. reduction of EU funds).
- ▶ Include in CAP that the national Strategic Plans have to contribute to achieving the targets of the EU Biodiversity Strategy for 2030, with a special focus on the target of 10% biodiversity-rich landscape elements.
- ▶ Include in CAP that national Strategic Plans have to contribute to the targets of the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC).
- ▶ Adopt an ambitious Soil Monitoring and Resilience Law and Forest Monitoring Framework that help to monitor and effectively protect soil and forest biodiversity in the EU.

3.2 DEVELOP AND IMPLEMENT A LEGISLATIVE FRAMEWORK FOR SUSTAINABLE FOOD SYSTEMS

Europe's agricultural and food system is not ecologically sustainable and requires a transformation. Addressing problem areas in isolation is insufficient. Due to systemic interlinkages in the food system and the need for social acceptance, structural change must occur within the framework of long-term, coherent policies. This applies to specific problem areas within the context of agricultural production (e.g. greenhouse gas emissions from livestock, nutrient losses and use of plant protection products), the interaction and synergies between agricultural and health issues as well as to problem areas within the context of consumption (for example healthy diets need to be affordable for everyone).

Recommendations

- ▶ Implement an ambitious legislative framework for sustainable food systems (FSFS) to promote human and ecosystem health.
- ▶ Promote the importance of plant-based diets and reshape food environments to support them.

- ▶ Promote organic farming and food industry, including the further development of the organic standard.
- ▶ Ensure regulation that protects healthy soil biomes as a basis for sustainable food production, including protection in light of genetically modified microorganisms.
- ▶ Maintain regulation that ensures robust risk assessment in line with the precautionary principle for genetically modified plants, animals and microorganisms in food systems.
- ▶ Promote the avoidance of food leftovers and waste within food chains.
- ▶ Mitigate the social and societal impact of the transformation of the food system through accompanying measures.

3.3 TRANSFORM ENERGY PRODUCTION ON AGRICULTURAL LAND

Preferably, solar energies should be installed on already sealed surfaces, such as roofs and parking areas. However, given the challenges of expanding solar energies on and around buildings, a significant increase in ground-mounted-solar energy systems will likely be necessary to ensure rapid expansion. This should be designed to ensure it does not compromise food security, environment protection or nature conservation. Solar energy delivers significantly higher area-specific energy yields than the use of cultivated biomass and has a lower overall negative environmental impact. For this reason, we advise against promoting the use of cultivated biomass for energy. Photovoltaic generates the same amount of energy on a more than thirty times smaller area. Further benefits include the opportunity of ecological improvements (possible reduction of fertilizer and plant-protective agents, extensive crop cultivation) and reliable income diversification for farmers in times of crop failures due to climate change. Depending on the areas to be used, potential conflicts of use, rising lease prices or ecological impairments need to be considered by designating ecologically less valuable agricultural land for solar energy production. Furthermore, the increasing installation of agri-photovoltaics could help to maintain the agricultural use of an area, depending which crops and land use existed prior to the installation of the agri-photovoltaics and how it is handled afterwards. It also enables a multifunctional land use (food and energy production) – if adapted crops are used – and might decrease the competition for land use.

Recommendations

- ▶ Prioritise and urgently step up action to promote the expansion of solar energies on areas that are already sealed or built over, including roofs.
- ▶ When installing solar energies on agricultural land, ecologically valuable areas (protected areas, biotopes, habitat types, etc.) and areas of a high agricultural value should be omitted.
- ▶ Define specifications that prevent a deterioration of the biotope network (due to fencing of modules), e. g. via maximum size of module fields (migration corridors should be set up for side lengths of more than 500 m).
- ▶ Specify requirements that prevent the treatment of vegetation on, under or between the modules with plant protection products, biocides, fertilizer or other chemicals.
- ▶ Ensure that agricultural land to be used primarily for the production of solar energy can be returned easily to its original agricultural status after use as a photovoltaic site.

- ▶ Link photovoltaics funding with science-based requirements for more ecological management of the entire area or even increased funding if certain ecological requirements are met.
- ▶ Address climate change and biodiversity loss in synergy, recognising e. g. that large-scale bioenergy monocultures offer no ecologically viable solution to the climate crisis.

Further information

Environmentally compatible site management of ground-mounted solar installations:
www.uba.de/publikationen/umweltvertraegliche-standortsteuerung-von-solar-0 (in German, with extensive English summary)

Key points for nature-friendly solar energy expansion:
www.bfn.de/publikationen/positionspapier/eckpunkte-fuer-einen-naturvertraeglichen-ausbau-der-solarenergie (in German)

Our Artificial Intelligence Use Case: Areas suitable for photovoltaics and wind energy

Identifying suitable areas for wind energy and ground-mounted photovoltaic systems can facilitate the transition to renewable energy. An AI use case, for instance, focuses on automatically detecting and locating these systems from across Germany's federal territory (onshore) using satellite imagery. Accurate location data and system parameters are essential for modelling the potential yield of existing wind power and photovoltaic installations. Additionally, the area occupied by photovoltaic systems is of particular interest.

In addition, information on system parameters (system type, distances between individual modules for photovoltaics, hub heights and rotor diameters for wind turbines) is estimated automatically. The use of remote sensing data and analysis using AI-supported methods allow a very efficient evaluation of inventory data and research questions based on this, such as changes in land use after the construction of renewable energy plants or the impact on biodiversity. The methods are also intended to help accelerate planning and approval procedures without compromising environmental standards.

4 Circular Economy, Resource Conservation and Sustainable Consumption

The circular economy is part of a resource-efficient, sustainable way of life and management, encouraging the implementation of the UN's agenda 2030 for sustainable development and respecting planetary boundaries²³. In this way circular economy is intended to help conserve resources by preserving the value and functionality of materials. By minimising the exchange of materials and energy with the natural environment, it fosters environmental friendliness. This concept focuses not solely on waste and its recycling and recovery, but is understood as an overall economic concept that takes the entire product life cycle and its materials into account, as well as urgently needed absolute reductions in final demand. An overarching goal of a circular economy is the decoupling of raw material consumption from economic growth. This would contribute to many other environmental and social goals, including climate mitigation, a clean environment, securing regional water availability, preserving biodiversity, development opportunities, and a just transition. Global demand for raw materials will continue to rise, causing pollution, biodiversity loss and climate impacts. Hence, the EU must intensify its endeavours to transition into a genuinely circular economy, aligning its strategies and actions with findings from scientific reports like the recent Global Resources Outlook 2024 by the International Resource Panel.²⁴

However, the European economy has so far not been successful on its path towards circularity: In the past decade per-capita raw materials footprint has been slowly on the rise again²⁵, circular material use flatlined.²⁶ The quantity of new electrical and electronic equipment placed on the market has increased significantly, while the quantities collected and the quantities of waste electrical and electronic equipment prepared for reuse and recycled stagnated (or fell slightly, as in Germany)²⁷. While the Circular Economy Action Plan aimed at addressing these challenges, the legislation that followed often lacked the necessary ambition. Nevertheless, many legislative projects including the Ecodesign for Sustainable Products Regulation and Battery Regulation) were passed in the realm of circular economy during the last legislative period as part of the European Green Deal, potentially advancing its objectives. The implementing and delegated acts must now be adopted precisely and quickly. However, the successful implementation of legislation also requires consistent enforcement and prosecution of infringements. Efforts toward resource conservation and implementing a circular economy should encompass consumption patterns, product life cycles, their raw materials and substances, product-service systems, production methods and infrastructure. We must use fewer resources in absolute terms, make the extraction of primary raw materials that are still needed more environmentally and socially acceptable, and ensure that no undesirable substances enter the recycling cycle. It is also essential to remove problematic substances that are already in the cycle. Recycling efforts overall should be increased recognising the opportunity to reduce dependence on primary raw materials. Effective eco-design specifications can provide clear incentives for durable, reusable and easily recyclable sustainable products. We also need new resource-saving services, for example through more rental systems. Equally

²³ Umweltbundesamt (2020): 9 principles for circular economy. Available at: <https://www.umweltbundesamt.de/publikationen/9-principles-for-a-circular-economy>

²⁴ UN Environment Programme (2024): Global Resources Outlook 2024. Available at: <https://www.unep.org/resources/Global-Resource-Outlook-2024>

²⁵ Eurostat (2024): Material flow accounts. Available at: <https://ec.europa.eu/eurostat/databrowser/bookmark/515ccf64-6d9d-4a9f-befb-311e89627697?lang=en> (accessed on 24/04/2024)

²⁶ Eurostat (2024): Circular material use rate. Available at: <https://ec.europa.eu/eurostat/databrowser/bookmark/015aea6e-d96f-4242-9210-50cf647e78da?lang=en> (accessed on 24/04/2024)

²⁷ Eurostat (2024): Waste statistics - electrical and electronic equipment. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics_-_electrical_and_electronic_equipment#Electrical_and_electronic_equipment_28EEE.29_put_on_the_market_and_WEEE_processed_in_the_EU (accessed on 24/04/2024)

important is the consistent reduction of waste streams, the strengthening of product reparability and reuse and, only when this is no longer possible, high-quality recycling and the expansion of markets for secondary raw materials.

In addition to supply-side changes toward a circular economy, it is also important to consider demand-side changes towards sufficiency as these have been found to be central for reducing our environmental footprint and the impact on biodiversity. This requires a paradigm shift that puts a stronger emphasis on adhering to the planetary boundaries and human well-being vis-à-vis economic growth. One example is the reduction in per capita living space, which reduces demand for building materials and requires less energy for heating.

An integrated approach for Circular Economy, Resource Conservation and Sustainable Consumption

To effectively manage products within a circular economy, all stakeholders across the product lifecycle, from material sourcing and design to usage and potential recycling, require access to product information. The digital product passport serves as a fitting tool for providing this data.

The digital product passport is often viewed as game changer which could create transparency regarding any relevant aspect of a product for authorities and consumers, as well as businesses in the supply chain. It is a key instrument for a sustainable industry and the circular use of products and materials and has its origins in the new Ecodesign Regulation. The first implementations of the Digital Product Passport are planned for the areas of batteries (mandatory from February 2027 under the Battery Regulation), textiles, electronics, plastics and the construction sector.

4.1 ACCELERATE THE IMPLEMENTATION OF THE ECODESIGN FOR SUSTAINABLE PRODUCTS REGULATION

The new Ecodesign for Sustainable Products Regulation (ESPR) which comes into force in summer 2024 is a major step towards a circular economy. Its aim is to make products more environmentally friendly, recyclable and energy-efficient along the entire life cycle.

The ESPR lays the groundwork for the implementation of digital product passports and is to be welcomed in principle. However, there are still many unanswered questions regarding practical implementation, content, stakeholders involved, public/non-public information, etc. Further prompt action is necessary; for example, delegated acts must be drawn up for each product group under the ESPR. For this, sufficient staff must be available at the European Commission but also in national institutions. In order for all stakeholders to be able to utilise the potential of a digital product passport for the circular economy, information gaps must be closed and access and usage barriers overcome. It is also crucial that the data is made available in a suitable form, especially for the operators of waste treatment facilities. At the same time, a review of the information requirements in product and waste legislation is necessary to ensure that the data is available for new circular economy models that the digital product passport can enable.

To speed things up, more work should be done on horizontal ecodesign requirements, which place requirements on more than just one product group. The ESPR as well as the previous Ecodesign Directive provide the opportunity for this. However, only a few horizontal requirements were implemented under the directive. In order to achieve these goals, a binding and ambitious working plan should be drawn up as soon as possible.

Another proposal to speed up and possibly simplify the processes in ecodesign is the front-runner approach. In contrast to the current approach to product regulation (setting minimum requirements for products), the front-runner approach sets minimum requirements based on the most efficient products on the current market. This means that the level of requirements is

always up to date and in line with product innovations and market developments. The approach is as dynamic as the market itself. This enables a more effective and efficient implementation of the product regulations, a significant reduction in the workload associated with the review procedures (including internal procedures) and better predictability of the overall process for the European Commission, market players and policy makers in the Member States.

However, it is not enough to offer repair-friendly and sustainable products if consumers prefer to buy new products instead of repairing. Without complementary measures such as education and public awareness as well as a change in social values, the impact of ESPR will remain limited. These measures are also important to avoid the rebound effect, in which the mass sale of sustainable products cancels out the original savings effect.

Further information

A Front-Runner Approach for EU product policy: www.uba.de/en/publikationen/a-front-runner-approach-for-eu-product-policy

4.2 IMPROVE THE EXISTING SYSTEM OF EXTENDED PRODUCER RESPONSIBILITY AND EXTEND IT TO OTHER MATERIAL FLOWS

The environmental policy concept of the extended producer responsibility (EPR), founded on the principle of the polluter pays, extends the producer's responsibility for the product to the waste phase. This framework aims to incentivise producers to incorporate environmental considerations into product design. The existing EPR-schemes (such as waste electrical and electronic equipment, batteries, end-of-life vehicles, packaging) must be improved. As part of the European Green Deal, some regulations have already been tightened and optimised in several material flows, such as packaging and batteries. In particular, the new Regulation (EU) 2023/1542 concerning batteries and waste batteries lays down environmental and social due diligence obligations and focuses on the entire life cycle of batteries. This regulation should serve as a blueprint for the upcoming revisions of the other directives. It is imperative to expedite the processing of the implementing and delegated acts to ensure the success of these efforts.

- ▶ **Examination of ecological meaningful new EPR systems for additional products:** The EPR principle is rightly being introduced at EU level for used and waste textiles by extending the Directive 2008/98/EC on waste. Producers will be responsible for their products after their utilisation phase. In some Member States there are EPR systems for other products, such as vehicle tyres (for example in Estonia and France), household chemicals, unused medicines, end-of-life boats and furniture (for example in France). In France, at national level in total 10 new EPR schemes will be added by 2025 (Article L541-10-1 of the French Environment Code). It should be assessed whether these national regulations have the desired positive impact on the circular economy, and if so, whether they merit implementation across all Member States.
- ▶ **Online-platforms and fulfilment service providers as new actors with own obligations in EPR systems:** In the case of existing EPR systems and those to be introduced, new but very relevant players such as online platforms and fulfilment service providers should be considered in addition to those already obliged. Online platforms and fulfilment service providers enable the offer of a large number of products onto the European market whose producers are not based in Europe, making it difficult or impossible to enforce European standards against them. Online platforms and fulfilment service providers play a decisive

role here. They should be responsible for ensuring that products that enter the European market through them are compliant with EU law.

- **Improve the collection and recycling of e-waste:** The upcoming revision of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE Directive) needs to consider the management of waste equipment. In addition to the promotion of high-quality recycling (especially of technical plastics, but also of special and precious metals), the objects of the revision should be a better collection of WEEE. To facilitate the improvement of WEEE collection rates, we advocate for a clear allocation of financial responsibility for WEEE collection to electrical and electronic equipment producers. In addition, we propose to ensure the responsibility to fulfil the collection target is assigned to appropriate actors involved in the EPR system (for example producers, collectors). Efforts must be made to achieve high-quality recycling of waste electrical and electronic equipment. However, the quantity of appliances that are prepared for reuse must also be increased.

4.3 BAN LANDFILL FOR UNTREATED WASTE IN ALL MEMBER STATES

The landfilling of untreated municipal solid waste is banned in Germany since 2005. Between 1990 and 2021, annual methane emissions from landfills in Germany were reduced by 93 %.²⁸ The main reason is that treated waste landfilled after 2005 is not generating methane, and the amount of methane generated from untreated waste landfilled before 2005 is decreasing over time. This demonstrates that a ban on landfilling untreated waste or bio-degradable waste in all Member States will curb methane emissions in the EU's waste sector effectively, reduce leachate, odour as well as other environmental impacts and shorten after-care periods of landfills. Such a ban that reduces the methane formation in the landfill body, may either be included in a revision of the Landfill Directive 1999/31/EG or introduced through best available techniques (BAT) Conclusions for Landfill under the Industrial Emission Directive (IED).

4.4 ALIGN THE CONSTRUCTION PRODUCTS REGULATION WITH ESPR

The construction sector is one of the most resource intensive sectors of the economy. More than a third of all waste generated in the EU is from construction, and its increasing both in absolute terms, per capita and relative to other sectors.²⁹ In order to reduce the amount of waste in general, it is important to promote a genuine circular economy in this sector. Some measures that are crucial, both for new buildings and renovations, include increasing the share of secondary mineral and metallic building materials, excluding substances of concern from being used in building materials, and making building parts more easily reusable and recyclable. All these measures are available for the European Commission to enforce under the revised Construction Products Regulation. A vigorous setting of rules, implementing them and following up the implementation are needed to get the process of circular design in the construction sector started. Here the European Commission Directorate-General Internal Market, Industry, Entrepreneurship and SMEs must be supported by the European Commission's experts for ESPR in order to bring change about.

4.5 EXPAND GREEN PUBLIC PROCUREMENT

Public procurement should also be leveraged to cultivate lead markets for climate-neutral, biodiversity-friendly and circular products and intermediate products. This should entail assessing the significance of these intermediate products for the ecological footprint of

²⁸ Umweltbundesamt (2023): Submission under the United Nations Framework Convention on Climate Change and the Kyoto Protocol 2023. Available at: <https://www.umweltbundesamt.de/publikationen/submission-under-the-united-nations-framework-8>

²⁹ Eurostat (2023): Generation of waste by waste category, hazardousness and NACE Rev. 2 activity. Available at: https://doi.org/10.2908/ENV_WASGEN (accessed on 24/04/2024)

purchased goods, and considering the timeframes required to transform respective supply chains.

Recommendations

- ▶ Develop mandatory product specific ambitious environmental procurement requirements, including feasible biodiversity criteria.
- ▶ Continue work on (further) voluntary environmental criteria, especially for those product groups for which there are no binding environmental criteria.
- ▶ Strengthen Art. 43 of the Directive on Public Procurement (2014/24/EU) to ensure a harmonised use of eco-labels in all Member States in Europe in the context of call for tenders.

4.6 FOSTER A CIRCULAR AND ENVIRONMENTALLY BENEFICIAL BIOECONOMY

The bioeconomy can significantly contribute to the objectives of the European Green Deal by substituting raw materials that have a negative environmental impact and fostering new innovative markets. In a circular bioeconomy nutrient losses during agricultural production are reduced, biomass replaces abiotic materials, bio-based products are made to last long in the economy and wastes and residues are used for the production of high value products. This contributes to decoupling raw material consumption from economic growth, climate protection and biodiversity. Creating new jobs in rural areas also facilitates a socially acceptable transformation. While most recent activities at EU level have focused on research into innovative bio-based products and processes, a more comprehensive bioeconomy policy would consider environmental and biodiversity impacts of an emerging bioeconomy and address the increasingly limited availability of sustainably sourced biomass.

Recommendations

- ▶ Revise the current Bioeconomy Strategy to adhere to planetary boundaries and principles of a circular economy.
- ▶ Address the limited availability of natural resources, i.e. land for biomass cultivation, and the impact of increased land use as well as the unsustainable consumption of bio-based products.
- ▶ Expand bioeconomy monitoring to better identify links between measures and environmental impacts.

5 Climate Mitigation and Energy

The global average temperature has already risen by around 1.2°C compared to pre-industrial times, placing the planet at key tipping points that could lead to severe and in some cases irreversible changes. To minimise the risks and impacts of climate change on people and ecosystems, global warming must be limited to 1.5°C. This requires immediate and far-reaching measures that affect almost all areas of social and economic life. By signing the Paris Climate Agreement, the EU has committed to becoming climate neutral by 2050. To achieve this goal, it has taken various legislative and political initiatives, such as the European Climate Law (Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality), which aims to reduce net greenhouse gas emissions by 55% by 2030 compared to 1990 levels. This target will also form the basis for the EU's new nationally determined contribution under the Paris Agreement, which must be submitted by 2025. Additionally, the European Commission has begun its process for finding an interim climate target for 2040. The initial proposal aims at 90% reduction in 2040, but has yet to be debated between the European Council and the European Parliament and, subsequently, written into the European Climate Law. However, a more ambitious target for 2040 is needed, as explained in section 5.1 below. Amongst other updates, the EU has revised its directives on renewable energy, energy efficiency and emissions trading and published a strategy for smart sector coupling. These measures aim to transform the energy sector and promote decarbonisation in other sectors such as buildings, industry, transport and agriculture. Examples for recently adopted relevant policies include the Net-Zero Industry Act, the Industrial Carbon Management Strategy or the “Fit for 55” Package. The adoption of these policies is welcome, some however still leave room for improvement.

The European Commission has set itself a major goal and identified far-reaching measures and instruments. The ambitions so far are to be welcomed, but the new Commission should continue to work very ambitiously towards the climate targets and introduce interim targets. In addition to the goal of providing a decarbonised energy system, sectoral targets should also be set for the individual sectors – efficiency and sufficiency must be increased in the individual sectors and instruments introduced to incentivise these. The sectoral targets must also be harmonised in terms of standards and instruments through further action.

However, the transformation of the energy system and the other sectors is not only a technical task, but also a social one, and it affects the EU and also the Global South. It requires consideration of social aspects, such as social norms, justice, acceptance, participation and education. Climate protection must be understood as a task for society as a whole that requires the commitment of all stakeholders. Therefore, the "Just Transition" should play a greater role in future EU climate policy. It should ensure that the transition to a climate-neutral economy is fair and inclusive. The social and economic impact of the transition on all citizens and regions must be considered, especially those most affected by decarbonisation. Digitalisation can play an important role in this by offering new opportunities to share information, learn and cooperate. It can also help to better understand, monitor and protect the environment. Beside this, digitalisation must be designed fairly and responsibly to avoid the risks of social inequality, invasion of privacy and damage to democracy. Digitalisation must always be used efficiently and sustainably to avoid wasting energy and resources (see chapter D2). Beyond this, the reorganisation of the energy system and other sectors always has an impact on many other areas, such as biodiversity. It is therefore crucial to take an integrated approach (see also chapter C2).

An integrated approach for Climate Mitigation and Energy

Climate change is one of the greatest challenges, threatening the lives and habitats of people, animals and plants around the world. To limit global warming and mitigate the consequences of

climate change, we need sustainable energy systems based on renewable sources such as sun, wind and water. These will not only reduce greenhouse gas emissions, but will also reduce dependence on fossil fuels, which can lead to pollution, resource scarcity and conflict. However, the reduction of climate-damaging emissions and the expansion of sustainable energy systems are not only a technical task, but require also a change in our consumption and production patterns, which are often not sustainable. A circular economy that avoids waste, utilizes resources efficiently and recycles materials is therefore essential. In addition, food systems and agriculture must become more sustainable, which in turn protect the climate and promotes biodiversity. Strengthening biodiversity in ecosystems can also help to protect the climate in a natural way. The reinforcement of biodiversity must therefore be considered as a strong pillar of climate mitigation measures.³⁰

5.1 STRENGTHEN EMISSION REDUCTION AMBITIONS BY 2040

The European Climate Law (Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality) mandates the European Commission to propose an emission reduction target for 2040 within six months following the first global stock take referred to in the Paris Agreement, i.e. by May 2024. Consequently, the European Commission proposed an interim greenhouse gas reduction target of 90% for 2040, which was accompanied by a detailed impact assessment, in February 2024.

The timely publication of the target is welcomed, however, a discussion that focuses only on the final figure of the 2040 target would have not adequately addressed the intricate nature of greenhouse gas reductions and the essential prerequisites for successfully achieving the target. Therefore, the 2040 climate target also needs to be supplemented with additional information by the European Commission. This allows political decision-makers and stakeholders to evaluate the ambition of different target options and it provides clear guidance on the architecture of the target, in particular regarding the relation of emission reductions and carbon sinks. Furthermore, it is important to address the burden sharing between sectors and Member States. Moreover, the 2040 target should not be understood as a single-year target only, but rather as a process of continuous ratcheting up of climate ambition with regular reviews and updates.

Recommendations

- ▶ The European Commission should aim for an ambitious 2040 net greenhouse gas emission reduction target of about 95%, considering the recommendations of the German Environment Agency (see further information below) and the European Scientific Advisory Board on Climate Change³¹.
- ▶ The target ambition should be assessed including the cumulative emissions up to 2040.
- ▶ Sinks should only be used to compensate for residual emissions and to achieve net negative emissions.
- ▶ Focus should be put on reducing greenhouse gas emissions and keeping emission reduction targets separate from negative emission targets (see further information below).
- ▶ Set separate targets for natural sinks and technical sinks.

³⁰ Details on the links between biodiversity and climate change are provided in: Pörtner et al. (2021): Scientific Outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change. Available at: <https://zenodo.org/records/5101125>

³¹ European Scientific Advisory Board on Climate Change (2023): Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050. Available at: <https://climate-advisory-board.europa.eu/reports-and-publications/scientific-advice-for-the-determination-of-an-eu-wide-2040>

- ▶ Development a sustainable and robust carbon sinks strategy, and a clear and robust governance structure for regulating carbon storage.
- ▶ Implement a clear and reliable monitoring, reporting and verification system (MRV) for sinks.
- ▶ Continue to strengthen EU-wide emissions trading and, at the same time, national responsibility for achieving the climate targets.
- ▶ The 2040 target should be understood as a process and not as a target for a single year, this includes a stocktaking and review process.

Further information

Setting an ambitious EU climate target for the year 2040: www.uba.de/publikationen/setting-an-ambitious-eu-climate-target-for-the-year

Strengthening synergies for biodiversity and climate: www.bfn.de/publikationen/hintergrundpapier/strengthening-synergies-biodiversity-and-climate

5.2 REINFORCE AND IMPLEMENT THE ENERGY EFFICIENCY FIRST PRINCIPLE BY ENSHRINING IT IN LAW

The International Energy Agency (IEA) notes a decline in efficiency increase in the EU from 8%/a to 5%/a.³² For a sustainable and secure energy system, the European Commission is called upon to fully establish and implement the Energy Efficiency First principle in order to increase energy security, to lower energy demand, to conserve resources, and to make energy efficiency the first fuel. This can only be achieved if the principle is systematically substantiated and implemented in all policy processes, policy fields and further legislation, from power plant strategies to energy market issues. Strengthening the principle also requires a continued ambitious and comprehensive energy efficiency legal framework, which includes overarching energy efficiency strategies (like Directive 2023/1791 on energy efficiency), a strong product policy, and advanced minimum standards in the building sector (e.g. the Energy Performance of Buildings Directive). Furthermore, the EU strategy for intelligent sector integration is already a concept that aims to better connect and optimise the various energy sectors (electricity, heat, transport, industry, etc.). For example, significant improvements can be achieved through more efficient use of renewable energy in all sectors, in particular through the promotion of electrification and better integration of energy infrastructures, including the development of smart grids, storage, sector coupling and digital platforms.

Recommendations

- ▶ The European Commission is asked to regulate and broaden existing regulatory frameworks through ambitious legislation.
- ▶ In the field of product efficiency, the approved ecodesign-standards should be expanded. In the medium-term, Europe should strengthen its leading position with a new Front-Runner Approach (see also chapter C4.1). Such a regulatory framework would enable a semi-automated, progressive adaptation of ecodesign minimum requirements for products, and thus also reduce the administrative burden.
- ▶ The concept of efficiency should also be applied to the consumption and production of hydrogen. The current supply of hydrogen is already in demand by sectors such as aviation

³² International Energy Agency (2023): Energy Efficiency 2023. Available at: <https://www.iea.org/reports/energy-efficiency-2023>

and shipping and certain segments of the metal and chemical industries that face challenges in electrification. This does not apply to large parts of the transport and heating sector where heat pumps and district heating are the more energy and cost-efficient technologies.

- ▶ Therefore, in the transport sector and in the building sector, incentives should be provided for increased electrification and energy efficiency measures instead.

Further information

A Front-Runner Approach for EU product policy: www.uba.de/en/publikationen/a-front-runner-approach-for-eu-product-policy

5.3 ADVANCE EU-WIDE EMISSIONS TRADING WHILE ALSO LEVERING NATIONAL RESPONSIBILITY FOR ACHIEVING CLIMATE TARGETS

Emissions trading is the cornerstone of the EU's climate policy. With the introduction of a second emissions trading scheme (EU ETS 2) for road transport and heating fuels from 2027, there is a regulatory overlap between the Effort Sharing Regulation (Regulation (EU) 2023/857, ESR) and the EU ETS 2 until 2030. A crucial area for action in shaping the post-2030 climate target architecture involves reviewing the interaction between EU ETS 1 and 2 and the ESR, with potential adjustments to their respective scopes.

Recommendations

- ▶ The European Commission is therefore called to analyse the abatement costs and market barriers in these sectors before merging EU ETS 1 and EU ETS 2.
- ▶ The European Commission is asked to assess in this context the possible steering effect of the carbon price in the various sectors.
- ▶ This review should also consider the option of a step-by-step integration of both systems via limited gateway mechanisms. The technical and regulatory challenges of a combination of an upstream and a downstream ETS must also be examined.
- ▶ The European Commission should evaluate the options for prolonging the coexistence of national targets under the ESR and EU-wide emissions trading.

Potential interaction and scope adjustments of the EU ETS 1, 2 and ESR aside, the European Commission needs to ensure that all EU climate targets/emission reduction targets are defined domestically within the EU). Cooperative approaches, such as accounting of offsets pursuant to Art. 6 mechanisms, should only be used to contribute to additional climate ambition abroad, not to ease the achievement of the EU's climate targets.

Further information

Setting an ambitious EU climate target for the year 2040: www.uba.de/publikationen/setting-an-ambitious-eu-climate-target-for-the-year

5.4 EMBRACE INTERNATIONAL COOPERATION AND LAY DOWN CLEAR RULES FOR THE IMPLEMENTATION OF CARBON BORDER ADJUSTMENT MECHANISM (CBAM)

As part of the "Fit for 55" package, the Carbon Border Adjustment Mechanism (CBAM) is being gradually introduced. Since October 2023, products from the electricity, cement, iron and steel, fertiliser, hydrogen and aluminium sectors have been subject to mandatory reporting during the transitional phase. Starting from 2026, there will also be an obligation to surrender CBAM certificates under the definitive regime.

Recommendations

- ▶ The European Commission is asked to promptly establish comprehensive rules for the implementation of CBAM under the definitive regime. Efforts should be made to extend the scope until the end of 2025 to ensure robust carbon leakage protection. Simultaneously, measures must be taken to ensure the system's manageability and minimise administrative complexity.
- ▶ In order not to jeopardise the objective of the system, the European Commission is also asked to investigate whether there are any reasons to believe that loopholes (carbon leakage) and circumvention practices exist in CBAM. And, if necessary, the European Commission should act against such practices.
- ▶ A successful introduction of the CBAM hinges on garnering acceptance for the system from third countries. The European Commission should actively foster cooperation on the CBAM, emphasizing the need for an internationally coordinated monitoring, reporting and verification (MRV) system for CO₂- emissions with all interested states, trading partners and within the framework of the international climate club. Support for capacity building and decarbonisation of emission-intensive industries in partner countries is also important and should be guaranteed by the European Commission. Another aspect to enhance acceptance could involve allocating financial resources to countries particularly affected by the CBAM, such as through earmarking CBAM revenues.

5.5 FOSTER LEAD MARKETS FOR CLIMATE-NEUTRAL AND CIRCULAR PRODUCTS IN ENERGY-INTENSIVE INDUSTRIES

Especially in energy-intensive industries (such as production of steel and cement) green lead markets for climate-neutral and circular products must be supported by push- and pull strategies with an effective and intelligent policy mix between funding instruments as well as regulation and standardisation.

Recommendations

- ▶ Reliable and comparable information on product-related carbon footprints, an appropriate categorisation of energy-intensive manufactured intermediate products into different levels of "circularity" or "climate-neutrality", as well as the establishment of related certification procedures are the basis for various regulatory approaches and thus essential for establishing "green" lead markets.
- ▶ The delegated acts for intermediate products under ESPR should include appropriate requirements regarding their environmental, climate and biodiversity impact, as well as their circularity characteristics. Potential quotas for "climate-neutral" or "circular" products in particular applications should reflect the timescales needed for the transformation of the respective industries, to ensure that the quotas will be achieved by the intended transformation rather than by redistributing existing "greener" products from other (non-regulated) applications.
- ▶ The related documentation and certification procedures should be digital only in order to reduce regulatory burden and enable data exchange, also internationally.

5.6 CREATE A STRAIGHTFORWARD GOVERNANCE STRUCTURE FOR CARBON STORAGE

The future energy system of the EU foresees that all zero and low carbon energy solutions including carbon capture and storage (CCS) are needed to decarbonise the energy system and

industry by 2040. The European Commission believes that CCS technologies should play an important role in achieving the EU's climate targets, particularly for the decarbonisation of industry and energy production. In contrast, recent studies and reports by UBA underline that CCS is not necessary and reasonable to achieve the decarbonisation of the energy system (see links under “further information”). Moreover, there is still insufficient knowledge on the potential negative impacts of CCS on biodiversity, e.g. the stability of natural carbon sinks as well as on water, soils and human health. CCS should therefore be limited to emissions that cannot be avoided.

Recommendations

- ▶ Despite ambitious emission reduction policies, emissions persist, particularly in sectors such as agriculture and certain industries. Therefore, natural and technical sinks are necessary to offset these unavoidable emissions. The European Commission is called upon to actively avoid the risk of lock-in effects for fossil technologies, and thus also not to use CCS as a false solution for energy-related fossil greenhouse gas emissions.
- ▶ The European Commission is urged to constantly champion technological innovations, aiming to progressively minimise unavoidable emissions based on the latest advancements in knowledge and research. Technical sinks should only be used for offsetting residual emissions that cannot be avoided in the long term. These unavoidable emissions will continue to exist, particularly in agriculture, but also in some industries, such as in lime and cement production, and in wastewater management.
- ▶ This requires a robust sink strategy, to be submitted by the European Commission, which should consider and weigh up the social, environmental and climate impacts, as well as the necessary compensation techniques for sustainable negative emissions.
- ▶ In addition to clearly identifying and limiting residual emissions, the European Commission should also promote the development of cross-sectoral mechanisms to link safe, sustainable and ecologically viable carbon removal measures on the one hand and the polluters of unavoidable emissions on the other. At present, the instruments and considerations are singular and sectoral, e.g. to promote CCS in industry or measures for natural climate protection.

Further information

Carbon Capture and Storage (CCS) – Contribution to the discussion on its integration into national climate action strategies: www.uba.de/publikationen/carbon-capture-storage-ccs-contribution-to-the

Short Typology of Carbon Dioxide Removals: www.uba.de/publikationen/short-typology-of-carbon-dioxide-removals

Sustainability criteria for carbon dioxide removals: www.uba.de/publikationen/sustainability-criteria-for-carbon-dioxide-removals

6 Climate Adaptation

Climate adaptation is an important pillar in dealing with the impacts of climate change by adjusting natural, human, and economic systems. Germany's climate risk assessment (2021) and monitoring report (2023) reveal that in particular, natural systems and resources (e.g. soil, water, species, and ecosystems) as well as economic systems that are directly dependent on natural resources (e.g. fisheries, agriculture and forestry, water management) may already be severely affected by climate change by the middle of the century. In the recently published European Climate Risk Assessment (EUCRA)³³ by the EEA similar findings have been identified with 'ecosystems' being the policy cluster with the highest number of risks in the categories 'urgent action needed' or 'more action needed' and a mostly catastrophic risk severity with climate risks that can often cascade to other societal systems. Moreover, according to the EEA's analysis, Europe stands out as the continent experiencing the most rapid warming, with temperatures increasing at approximately twice the global rate since the 1980s. These events, combined with environmental and social risk drivers, pose major challenges throughout Europe.

Existing EU strategies, laws and research projects as part of the European Green Deal already address many of the risks and challenges to transform Europe into the first climate-resilient continent by 2050. The EU Strategy on Adaptation³⁴, for instance, aims to make adaptation smarter, more systemic and faster, with the vision of reaching resilience in two decades time. The strategy calls for collaboration on all levels (Member States, public and private actors) to better prepare Europe for the increasing intensity and frequency of climate change's impacts. This includes calls for integrating adaptation into macro-fiscal policy, promoting nature-based solutions (NbS), and fostering local adaptation action. The EU Mission on Climate Change Adaptation is one of five prominent EU missions aimed at addressing significant challenges and mobilising action. It specifically emphasizes local solutions, preparedness and systemic transformations to safeguard human lives and assets. A further instrument and a key component to accelerate climate resilience in Europe is the European Climate Law (Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality) building the legal framework to implement and enforce the European Green Deal in Member States. The law obliges EU States to enhance "adaptive capacity, strengthening resilience and reducing vulnerability to climate change in accordance with Article 7 of the Paris Agreement". The law also states that the EU and Member States should implement coherent, mutually supportive adaptation policies and work towards an improved mainstreaming and integration of these policies into all relevant policy areas.

An integrated approach for climate adaptation

To achieve effective climate adaptation, the following needs to be considered. Integrating climate risks into financial markets is crucial to encourage investment in resilient infrastructure. Further strategies need to be developed that consider both climate change adaptation and mitigation according to its impacts. Local and regional adaptation plans should be supported to develop customised solutions that meet the specific needs of communities. Each plan must include measures for climate adaptation and mitigation as well as human and ecosystem health, including water and soil management and biodiversity. Research and innovation also play a key role in the development of new adaptation technologies, while international co-operation enables the exchange of best practices. Educational initiatives are needed to raise awareness of climate adaptation and prepare society for change. Finally, social justice must be at the heart of all

³³ European Environment Agency (2024): European climate risk assessment. Available at: <https://www.eea.europa.eu/publications/european-climate-risk-assessment>

³⁴ European Commission (2021): Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN>

adaptation measures to ensure that costs and benefits are distributed equally and no one is left behind. Both positive and negative side effects as well as trade-offs must be considered. Therefore, holistic approaches are crucial to strengthen resilience to climate change, provide security for people and ensure a sustainable future for all.

6.1 STRENGTHEN AND FINANCE (AD HOC) CLIMATE ADAPTATION INSTRUMENTS TO ACCELERATE THE IMPLEMENTATION OF MEASURES; AND ALSO IMPROVE COOPERATION AND RESEARCH

The European Climate Risk Assessment (EUCRA) shows that many of the climate risks analysed have already reached a critical level and could take on catastrophic proportions without urgent and decisive action. More and faster action is needed, for example to preserve ecosystems, protect people from heat and infrastructure from flooding, and preserve the resilience of European solidarity mechanisms in the event of natural disasters. The European Commission responded to the EUCRA with a communication³⁵. It is encouraging that the Commission intends to further increase its ambitions in the area of climate adaptation, building on the publication of the EU Adaptation Strategy published in 2021, and aims to embed preparedness and resilience across various policies. However, to enhance the effectiveness of European policy, better integration of adaptation into all relevant EU policy areas as well as more concrete policy measures at different levels (mainstreaming, see also chapter 2), are required. This also necessitates common monitoring instruments and shared principle as a planning objective, such as the ‘do-no-significant-harm’ principle.

Recommendations

- ▶ Prevent the exacerbation of climate risks and maladaptation by enhancing coordination and creating synergies between European and national adaptation measures, thereby strengthening adaptation efforts at all levels.
- ▶ Increase funding for climate adaptation: EU financial support is needed, including for the local level and the private sector, as there is a lack of financial investment in adaptation. This is particularly important in the areas of infrastructure and human health.
- ▶ Promote cooperation, collaboration and good governance: The cascading and spill over effects of climate change start at ecosystems and in the end pose particularly high risks to the economy and trade. Cross-border cooperation, improved information flows and well-trained administrative structures within the European Commission and with third countries in Europe, are particularly important and need to be enhanced.
- ▶ Strengthen research to accelerate the transformation to climate resilience: Further research on transformative adaptation measures, closing knowledge and data gaps and improving science-practice transfer are necessary, as well as an increased expansion of pilot projects. This has been started as part of the EU mission on adaptation to climate change and must also be taken up in other policy areas.
- ▶ Improve digitalisation efforts: Digitalisation can contribute to solutions (see also chapter D2), e.g. through smart farming in agriculture, where it can enable more precise farming methods that conserve resources and increase resilience to climate change; or through big data analytics, which can help identify patterns and make better predictions about climate impacts, improving the planning of adaptation measures.

³⁵ European Commission (2024): Managing climate risks - protecting people and prosperity. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52024DC0091>

6.2 PROMOTE NATURE-BASED SOLUTIONS FOR CLIMATE AND BIODIVERSITY

Nature-based solutions (NbS) are multipurpose and cost-effective solutions that simultaneously provide benefits to ecosystem services, resilience, human well-being and biodiversity.³⁶ NbS focussing on climate change can provide essential contributions to its mitigation (through natural carbon sinks and stores) as well as adaptation.³⁷ The umbrella term covers ecosystem-based adaptation and most blue-green infrastructure projects, but must not be misused to greenwash actions that do not meet the NbS definition (for example by being harmful to biodiversity). Numerous existing examples of NbS for adaptation include reconnecting river floodplains to reduce flood risk, creating urban green spaces to buffer heat waves, protecting wetlands to mitigate droughts, or increasing the resilience of forests and agricultural lands through a more sustainable and biodiversity-friendly management. Implementation guidelines and standards are available and currently being further developed.³⁸

Recommendations

- ▶ Action should focus on significantly scaling up NbS implementation by promoting strategic, integrated and long-term spatial planning that minimizes trade-offs and harnesses the multiple co-benefits of NbS.
- ▶ Ambitiously implement the EU Biodiversity Strategy's target of investing a significant proportion of the EU budget dedicated to climate action on NbS and biodiversity, and ensure accurate allocation, easy accessibility and long-term availability of these funds for the promotion, development, implementation, monitoring and evaluation of NbS.
- ▶ Set strong social and ecological safeguards for NbS that guarantee meaningful stakeholder engagement, adaptive planning and biodiversity net-gains, among other factors, in order to prevent greenwashing and maladaptation. Continue to build on existing standards such as the IUCN Global Standard for Nature-based Solutions.
- ▶ Improve target group-oriented promotion and uptake of guidance documents, knowledge exchange platforms and training modules for scaling up NbS implementation, for communicating their multiple social, economic and environmental benefits, and for integrating NbS into national policies.
- ▶ Strengthen the role of NbS in implementing the EU Strategy on Adaptation to Climate Change and associated climate adaptation plans, as well as other pertinent sector policies such as the EU Floods Directive and Water Framework Directive, the European Climate Law, and all existing or forthcoming EU policies on disaster risk reduction, water resilience, drought management, coastal protection, wildfire prevention, climate change mitigation.
- ▶ Explore potentials to effectively combine NbS with technical/grey infrastructure development, re-design and maintenance.

³⁶ An internationally agreed definition for NbS can be found in UNEA 5, Resolution 5: <https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-5-2>

³⁷ In Germany, the Federal Action Plan on Nature-based Solutions for Climate and Biodiversity supports NbS implementation: <https://www.bmu.de/en/publication/federal-action-plan-on-nature-based-solution-for-climate-and-biodiversity>

³⁸ E.g. IUCN Global Standard for Nature-based Solutions: <https://www.iucn.org/our-work/topic/iucn-global-standard-nature-based-solutions>

6.3 ENSURE WATER RESILIENCE BY SAFEGUARDING FRESHWATER ECOSYSTEMS AND WETLANDS

In the face of climate change, it is crucial to achieve water resilience that ensures access to water for citizens, nature and the economy, while also tackling catastrophic flooding and water shortages. In October 2023, the European Economic and Social Committee launched an initial plan for a new comprehensive EU water strategy³⁹ that takes a holistic approach towards water management and allows for the consideration of competing water use and functions (e.g. domestic, irrigation, habitat and industry, including hydrogen in future). Water bodies and wetlands play a key role in regulating water in the landscape, improving water quality and buffering floods and droughts.

Recommendations

- ▶ Adopt an integrated EU water strategy that aims at resilient freshwater ecosystems and wetlands, boosts the enforcement and implementation of the Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive), acknowledges the importance of a natural landscape water balance, and promotes nature-based solutions for water resilience.
- ▶ To achieve resilient freshwater ecosystems, an area target should be set for the appropriate development of rivers, streams and floodplains.
- ▶ As a means of climate change adaptation, restore the natural landscape water balance through ecosystem restoration and integrated water management that considers different usages, functions, stressors and sustainability criteria.
- ▶ Develop standards for efficient water use to reduce water abstractions for all sectors (agriculture, industry, public water supply, energy supply, mining industry, hydrogen production).
- ▶ Scale up the implementation of freshwater ecosystem restoration and wetland restoration by providing additional financial resources.
- ▶ Strengthen the role of wetlands in coastal management and flood risk management through the promotion of nature-based solutions, including coastal managed realignment and the reconnection of river floodplains.

Further information

Recommendations for restoring riverine and coastal wetlands in Europe, published by the European Network of Heads of Nature Conservation Agencies (ENCA):

www.encanetwork.eu/fileadmin/inhalte/enca/pdf/2023_enca-recommendations-wetlands.pdf

Project information on opportunities and synergies of a nationwide area target for the watercourse development: www.uba.de/sites/default/files/medien/2875/dokumente/mai_2024.pdf (in German)

6.4 BOOST URBAN RESILIENCE BY PROMOTING URBAN GREEN-BLUE INFRASTRUCTURE

Three-quarters of the EU's population live in urban areas. Urban climate change adaptation is therefore crucial to manage the risks of extreme temperatures, flooding, water scarcity, etc.

³⁹ European Economic and Social Committee (2023): Declaration for an EU Blue Deal. Available at: <https://www.eesc.europa.eu/en/documents/declaration-eu-blue-deal>

Hence, the links between climate change adaptation and disaster risk reduction activities must be strengthened at local levels⁴⁰. Besides local and regional climate adaptation plans need to consider and address the unequal exposure and vulnerability of different societal groups to ensure a just and integrated response. Urban nature-based solutions (NbS), such as blue and green infrastructure are key opportunities to boost urban resilience by enhancing biodiversity as well as climate adaptation through nature conservation and restoration. At the same time, NbS must also fit into the urban environmental context and the necessary infrastructure services, including gray infrastructures. Within this context, a preferably nature-based sponge city concept offers a foundation for transformative measures to make urban environments more resilient to changing precipitation patterns and increasing heat⁴¹. Implementing and governing measures that address the dual crisis of biodiversity loss and climate change can also reduce the adverse impacts of climate change, while also generating a wide range of co-benefits such as improved air quality, health benefits and enhanced quality of life.

Recommendations

- ▶ Dedicate a necessary share of EU funds to urban NbS and ensure that funds are made more easily accessible to community-led initiatives and local authorities.
- ▶ Scale up and scale out good practice examples for effective, just and integrated urban NbS through existing networks and platforms (e.g. Climate-Adapt, the EU Urban Greening Platform, the Berlin Urban Nature Pact, ICLEI, etc.).
- ▶ Strengthen the social dimension of urban adaptation planning, foster stakeholder engagement in its design, implementation and evaluation stages, and ensure a just and inclusive transition.

Further information

Scientific Opinion Paper on Urban Greening Plans: www.uba.de/en/scientific-opinion-paper-on-urban-greening-plans

⁴⁰ European Commission (2023): Guidelines on Member States' adaptation strategies and plans. Available at: https://climate.ec.europa.eu/document/download/46f37c35-9a10-412b-81cb-abf497bcfcf4_en?filename=Guidelines%20on%20MS%20adaptation%20strategies%20and%20plans.pdf

⁴¹ Umweltbundesamt (2023): Nachhaltigkeitspolitik erfolgreicher umsetzen: Entwicklung transformativer Policy Mixes am Beispiel der Klimawandelanpassung. Available at: <https://www.umweltbundesamt.de/publikationen/nachhaltigkeitspolitik-erfolgreicher-umsetzen> (in German)

D Key mechanisms

Implementing the recommendations above and achieving environmental and climate targets requires the targeted use of a wide range of mechanisms by the relevant stakeholders at European, national, regional and local levels. In this context, the 8th EAP refers to so-called enabling conditions to attain its priority objectives in Article 3. Examples of these conditions include: fully implementing existing legislation, achieving fairness and inclusiveness, phasing out fossil fuels and environmentally harmful subsidies, and mainstreaming biodiversity action. In the following, we examine four key enabling mechanisms that from our point of view will be pertinent for the years ahead and provide specific recommendations.

1 Sustainable Finance

Sustainable Finance is a central cornerstone of the EU's strategy to achieve its climate and environmental goals as set out in the European Green Deal. The EU anticipates requiring investments of €350 billion per year solely to meet the climate goal for 2030. Additional investments are needed to achieve other sustainability goals as well. The Member States of the EU cannot provide the necessary funding for investments of that level through public money alone. Private investors, however, have high investment funds which could potentially close the investment gaps. Hence, the EU has created several regulations and instruments to effectively redirect private investments towards sustainable activities (with a focus on climate change mitigation, climate change adaptation, circular economy, pollution prevention, biodiversity and ecosystems, and water and marine resources).

The EU Action Plan on Financing Sustainable Growth from 2018, which marked a central starting point for the EU Sustainable Finance Framework, has three central objectives: 1) redirecting financial flows towards sustainable investments, 2) managing financial risks arising from climate change and environmental degradation, and 3) promoting transparency and long-term orientation in financial and economic activities. While these objectives remain crucial, the revised EU Sustainable Finance Strategy from 2021 introduces additional priorities, including: 1) the necessity for genuine economic transition solutions, 2) addressing the specific financial requirements of SMEs and private individuals, 3) acknowledging the double materiality of the sustainability impacts of within financial sector, and 4) emphasizing the importance of promoting sustainable finance at the international and global levels.

These additions to the EU's Sustainable Finance Strategy reflect the breadth of the topics addressed in sustainable finance. They are also a testament to the importance sustainable finance has achieved in a comparatively short time for policy-making at the European and national levels. Nonetheless, important tasks await completion, given the increasing demand for investments as the European socio-ecological transformation continues to grow.

1.1 MAKE THE SUSTAINABLE FINANCE FRAMEWORK ACHIEVE ITS FULL POTENTIAL

The EU Sustainable Finance Framework has taken decisive steps in the last years. Its key instruments, the EU Taxonomy, the Sustainable Finance Disclosure Regulation (Regulation (EU) 2019/2088, SFDR), the Benchmark Regulation (EU) 2016/1011 and other instruments make an important contribution to achieving the EU's environmental objectives by effectively redirecting financial flows. There are, however, a number of aspects that would help the framework achieve its full potential:

Building competences: Due to the framework being established recently, market participants with little prior experience in sustainability reporting and supply chain or portfolio analysis, but also the market at large, would profit from support from European and national institutions.

European and national authorities would thus effectively support building competences in understanding the requirements and opportunities of the EU Sustainable Finance Framework.

Strengthening regulatory consistency: Uptake of the regulations would be improved if the remaining inconsistencies were reduced to a minimum and clarifications were added where necessary. This would help not only to align the regulations within the Sustainable Finance Framework (incl. the Corporate Sustainability Reporting Directive, CSRD) but also with related regulations, directly focusing on nature, like the Water Framework Directive. The EU Sustainable Finance Framework would benefit from simplifications introduced wherever this is possible while maintaining high ambition levels.

Making data available: Due to reporting requirements a lot of data is already available which should be used by financial institutions. There is still a pressing need to significantly enhance the public provision of data, such as through life cycle analyses. If scientific research shows that further data is necessary to achieve the targets of the European Green Deal, the reporting requirements should be adjusted accordingly. Digitalisation and AI should be used to improve these processes and lower the cost of data provision and analysis. This would reduce data collection costs in particular for smaller companies, allow SME to comply with the upcoming voluntary SME reporting requirement and thus strengthening the EU Sustainable Finance Framework's positive impact.

1.2 MAINTAIN STRONG AMBITION LEVELS IN THE EU SUSTAINABLE FINANCE FRAMEWORK TO MAKE POSITIVE IMPACTS ON THE EU ENVIRONMENTAL OBJECTIVES

The EU Sustainable Finance Framework introduces an entirely new sustainability dimension into financial markets. Its ambition level needs to be regularly updated in order to maintain positive impact on financial flows. Updates are essential to fully consider pathways necessary to achieve the EU's environmental objectives and stay aligned with technological advancements. Moreover, it's crucial for the EU Sustainable Finance Framework to attain broad coverage across various sectors and activities, ensuring a fair and level playing field across the economy. This will effectively incentivise investments in the socio-ecological transformation. This can be ensured by increasing the sectors covered under the Taxonomy, as well as other instruments, such as the sector specific European Sustainability Reporting Standards (ESRS).

Recommendations enabling sustainable finance to promote biodiversity

In order to halt the loss of biodiversity the following measures should be considered:

- ▶ Encourage financial institutions to consider biodiversity and ecosystem impacts in their investments and develop products that support nature restoration and improve biodiversity.
- ▶ Revise the EU Taxonomy Regulation to include biodiversity-relevant economic sectors such as agriculture and forestry.
- ▶ Promote the exchange between relevant experts from both Sustainable Finance and Biodiversity, to build expertise, knowledge and capacity.

2 Digitalisation and Artificial Intelligence

Ensuring the conservation and long-term protection of our natural environment requires a comprehensive understanding of ecosystems through cross-domain integration of data and knowledge. But current methods and reporting obligations used in environmental research and policy are not always sufficient to address the heterogeneity and dynamics of ecosystems due to a lack of data availability and interoperability. To fully harness the potentials of digitalisation, including artificial intelligence (AI) and machine learning algorithms, there is an urgent need to introduce suitable technologies and methods. These should focus on service-oriented data access, data provision and data processing. Recent developments in the field of digital information processing and AI enable powerful approaches for analysing complex data sets and open up new possibilities for data-driven environmental research, policy-making, governance and law enforcement (cf. box “AI use case”). Future earth observation approaches will have a much stronger coupling between the modelling and the data acquisition leading to increased spatial-temporal resolution with far-reaching consequences for environmental authorities.

Both the European Commission and the European Parliament have adopted or launched a number of digitalisation-relevant policies projects and strategies in connection with the European Green Deal. Early in 2020, the EU released a digital strategy to make Europe fit for the digital age, while ensuring a human-centred and sustainable digitalisation as well as using technology to achieve climate and environmental goals⁴². Based on that numerous activities followed: These include, for instance, the AI Act, the world's first AI regulation, which was unanimously approved by the Member States in December 2023 and sets rules for the use of trustworthy AI in Europe. Furthermore, the European Parliament initiated the "European Green Digital Coalition" (EGDC), a network of information and communications technology (ICT) companies, committed to a green and digital transformation of the EU⁴³. And last but not least, the Green Industrial Plan, a strategy to promote a competitive, green and digital industry in Europe.

The Coalition for Digital Environmental Sustainability (CODES)

The Coalition for Digital Environmental Sustainability (CODES) is mandated under the UN Secretary-General's Roadmap for Digital Cooperation to strengthen the environmental sustainability of digital transformation worldwide.

CODES stands for a global community of hundreds of active experts, researchers and practitioners working on digital sustainability and is co-championed by the German Environment Agency, Future Earth, the International Science Council, the International Telecommunication Union, the Kenyan Tech Envoy, the think tank Sustainability in the Digital Age, the UN Development Programme and the UN Environment Programme (see www.codes.global).

CODES has been instrumental in advocating for digital environmental sustainability in multiple global fora and processes such as UNEA, IGF, SDG Summit or the Global Digital Compact. It is a partner for aligning both transformations, building the digital backbone sustainably and promoting digital innovations for all of our sustainable development goals.

Further information: www.codes.global

⁴² European Commission (2024): Shaping Europe's digital future. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en (accessed on 24/04/2024)

⁴³ European Commission (2024): European Green Digital Coalition. Available at: <https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition> (accessed on 24/04/2024)

2.1 INTEGRATE SUSTAINABILITY ASPECTS IN LEGISLATIVE PROCEDURES RELATING TO DIGITALISATION

Recommendations

- ▶ The European Commission should introduce guidelines for sustainable digitalisation and AI development that ensure that these systems are energy-efficient and have a minimal environmental footprint.
- ▶ The European Commission should include sustainability aspects in the impact assessment of future projects related to digitalisation and AI.
- ▶ The European Commission should ensure that legislation on digitalisation is continuously updated to consider the latest technological developments and their impact on the environment.

2.2 STRENGTHEN PARTICIPATORY APPROACHES IN THE USE OF AI IN THE HANDLING OF ENVIRONMENTAL DATA

Digitalisation and artificial intelligence represent a paradigm shift in the handling of environmental data, especially when it comes to heterogeneous and unstructured data sets. In recent years, a discussion has emerged among scientists that deals with the question of how knowledge is generated in modern day science and in the future. In relation to data science, the so-called fourth paradigm is now a common term⁴⁴. It is apparent that current methods to collect scientific data far exceeds our current ability to analyse it. Therefore, the need has arisen to focus on developing technological approaches that can make sense of these large amounts of unstructured data. The discussion can serve as an impetus for the question of how we want to lead environmental research and policy into a digital future. A promising approach is to pursue a holistic strategy of digitalisation in the Earth system sciences in close coordination with modelling and empirical data collection. Since reliable models can only be based on trustworthy data, a suitable methodological approach requires the development of sophisticated hardware and suitable interfaces. AI complements digitalisation efforts by unlocking the potential of heterogeneous, unsorted data through advanced analyses and predictive models. Machine learning algorithms can analyse complex environmental data sets to identify patterns, detect anomalies and provide predictive approaches. The use of AI provides insights that help practitioners and policy makers anticipate environmental risks, develop adaptation strategies and optimise resource allocation to mitigate the impacts of climate change and biodiversity loss.

In order to obtain high-quality and trustworthy data in the context of AI, the integration of domain knowledge via participatory formats is crucial. This is necessary in order to give the data the required context to enable it as training data for AI applications, since data that is not labelled has to be elaborately pre-processed. Participatory approaches can add significant value by providing interactive visualisation tools, mobile applications and online platforms to effectively communicate complex environmental concepts and engage audiences in meaningful dialogue about sustainability and conservation. Through immersive experiences and data-driven narratives, individuals can gain a deeper understanding of the complexity of the Earth system, planetary boundaries and the importance of collective action to protect our planet for future generations.

⁴⁴ Tony Hey et al (2009): The Fourth Paradigm: Data-Intensive Scientific Discovery Published by Microsoft Research. ISBN: 978-0-9825442-0-4

Recommendations

- ▶ The European Commission should continue efforts to improve the interoperability of environmental data across different platforms and disciplines through the development of standards and protocols.
- ▶ The European Commission should incentivise investment in the education and training of professionals to create the necessary skills in the EU to work with digital technologies and AI in the environmental sector.
- ▶ The European Commission should further promote open data initiatives that facilitate free access to environmental data and its use by AI.
- ▶ The European Commission should consider establishing mechanisms that enable citizens to actively participate in the collection and analysis of environmental data.

Application Lab for Artificial Intelligence and Big Data (AI Lab) at the German Environment Agency

The Application Lab for Artificial Intelligence and Big Data (AI Lab) at the German Environment Agency adopts a participatory approach to integrating AI and big data in the environmental sector, making these methods accessible and usable for environmental and sustainability applications. It creates a space for innovation and experimentation, focusses on the added value of AI for people and the environment and identifies research questions on the sustainable use and operation of AI. The interdisciplinary team of 30 people includes experts from fields such as data science, data engineering, high-performance computing, remote sensing and AI ethics. The AI lab identifies and works on specific use cases to test and evaluate the use of AI and big data methods. The aim is to develop functioning prototypes that help to better analyse, link and understand complex and spatially and temporally distributed environmental data as well as the provision of working examples and open code.

Further information: www.uba.de/en/topics/digitalisation/uba-application-lab-for-ai-big-data

Artificial Intelligence Use Case: Detection of illegal online trade of protected species

Over-exploitation is one of the major drivers of biodiversity loss. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a multilateral agreement that regulates the international trade of about 37,000 protected species. However, enforcing CITES stipulations is challenging, partly due to the rise of illegal online trading of protected species and products thereof⁴⁵⁻⁴⁶. The Federal Agency for Nature Conservation (BfN) has therefore launched a collaboration with the AI Lab at the German Environment Agency to develop a prototype of an AI-supported tool that helps to detect potentially illegal online sale adverts and posts of protected species. The prototype AI tool will enable analysts at the BfN as a CITES management authority to screen large amounts of online information to identify, as a starting point, a limited number of protected species and to detect a preliminary set of red flags. In the future, this will facilitate the BfN's task to spot suspicious content, identify the authority with jurisdiction for the particular case, and to provide it with information regarding the relevant online add. This will make the fight against online wildlife crime more effective.

⁴⁵ International Fund for Animal Welfare (2018): disrupt: wildlife cybercrime. Available at: <https://www.ifaw.org/international/resources/disrupt-wildlife-cybercrime>

⁴⁶ TRAFFIC (2020): Tackling EU wildlife cybercrime. Available at: <https://www.traffic.org/publications/reports/tackling-wildlife-cybercrime-in-the-eu-how-technology-can-help/>

3 Cohesion Policy

The EU's cohesion policy aims to strengthen social, economic and territorial cohesion across the regions of its Member States. Although the current cohesion policy (2021-2027) includes tools to support climate and biodiversity, these issues are not yet central to the policy. Significant portions of the policy objectives and funding are still be applied in traditional ways for supporting economic growth with increased resource use and uncoordinated support of small and medium enterprises (SMEs) and innovation. Although most measures do not cause significant harm, they often fail to actively support a green and just transition. In the worst cases, they create path dependencies that lock in people and regions into unsustainable practices, such as through the development of unsustainable road infrastructure or the use of machinery reliant on fossil fuels. In addition, the growing discontent of Europeans with the EU and the parallel rise of populist parties might have an indirect effect on the environmental and sustainability orientation of the cohesion policy. As an answer to populist voices including scepticism towards a green transition, the post 2027 cohesion policy might see an even stronger focus on more traditional topics such as job creation and economic growth and even less attention on environmental and sustainability topics.⁴⁷

Recommendations

- ▶ In the next iteration of the cohesion policy (post 2027), prioritising a green and just transition within the planetary boundaries should be central to the policy. Infrastructure, innovations, and jobs supported by the various funds should contribute to the transition rather than counteract it. Funding should guide Europe's regions towards a sustainable future that safeguards biodiversity and ecosystem services, ensures climate resilience and promotes well-being for all, rather than diverting them from these goals. Synergies between green and digital transitions should be actively encouraged. Support for these transitions is needed across all European regions, with particular emphasis on those lacking the economic dynamism to achieve these changes independently.
- ▶ Place-based approaches should be promoted. So far not enough attention has been paid to the diverse capabilities and circumstances of the different European regions. Studies⁴⁸ have shown that in Europe regions show varying levels of readiness and vulnerability concerning a green transition. Especially regions with CO₂-intensive industries and natural resource extraction as well as regions with low potentials of economic growth might face additional challenges in pursuing a green transition. Establishing region specific transformation plans would help to define place-specific goals and transition pathways.
- ▶ Addressing the increasing dissatisfaction of some Europeans with the EU underscores importance of prioritising citizens at the heart of policy-making and communication efforts. In addition to considering distributional justice aspects (allocation of costs and benefits), policy design should also integrate procedural justice (who participates in decision-making) and recognitional justice (engagement with and fair consideration of diverse cultures and perspectives). Such consideration could be demonstrated by mandating local stakeholder involvement in the design of transformation plans and decision-making regarding priority-

⁴⁷ European Commission (2024): Forging a sustainable future together: Cohesion for a competitive and inclusive Europe. <https://op.europa.eu/en/publication-detail/-/publication/c6e97287-cee3-11ee-b9d9-01aa75ed71a1/language-en>

⁴⁸ Ambre Maucorps et al (2022): The future of EU Cohesion. Effects of the Twin Transition on Disparities across European Regions. Available at: <https://www.bertelsmann-stiftung.de/en/publications/publication/did/the-future-of-eu-cohesion> and European Commission (2023): Regional vulnerability to the green transition. Available at: https://single-market-economy.ec.europa.eu/document/download/78a5cb8e-4834-4670-8a01-5f4d4706739e_en

setting and activity implementation. Policy should incorporate capacity building and compensate stakeholders for their time and efforts.

- ▶ Lastly, special emphasis should be placed on effectively communicating the objectives of the cohesion policy and the imperative for a green and just transition.

Further information

Strengthening Environmental Protection in EU Structural Fund support:

www.uba.de/publikationen/staerkung-des-umweltschutzes-in-der-eu-0 (in German, with English summary)

4 Horizon Europe and research funding

Science and research are vital for addressing the major global challenges, providing the understanding and evidence base necessary for sustainable socio-economic transitions. Joint research and innovation linking science, applied research and practical policy and decision making are essential for a more resilient, independent and sustainable Europe. The clear communication and direct integration of scientific findings into policy-making are key to fend off misinformation attempts and to ensure that policy targets are set and implemented effectively, suitably and transparently.

Horizon Europe, the European Commission's flagship research funding programme for 2021-2027, has established a comprehensive framework to support various research destinations. Pillar II of Horizon Europe, influenced by the Mazzucato Report⁴⁹, has been emphasizing mission-oriented research funding to tackle societal challenges through a combination of research, innovation and complementary policy and regulatory interventions. Following consultations with Member States, stakeholders, and the public, five mission areas have been identified, all aligned with the objectives of the European Green Deal.

To facilitate more sustainable policy, business and individual decisions, the best knowledge needs to be in the hands of those who need it. The following recommendations are intended to further strengthen the impact of research and innovation to achieve the objectives of the 8th Environment Action Programme. Whilst, the evidence base is broad enough to allow for well-informed decision-making, emerging knowledge gaps and data gaps should be covered by EU research funding.

Recommendations

- ▶ Prioritise funding for research, innovation projects and networks focusing on sustainability transformation to address escalating environmental and sustainability crises comprehensively to ensure long-term resilience and well-being.
- ▶ Further promote inter- and trans-disciplinary collaboration to tackle complex challenges and foster innovation across diverse fields of research and levels of application. The European Research Area should be a framework for strengthening science, research and innovation, with more support for transdisciplinary projects promoting applicable and actionable knowledge.⁵⁰ Many environment and nature protection agencies are willing to become more active partners in effectively linking knowledge demand and knowledge production.
- ▶ Champion open science practices and policies promoting open access to scientific data to enhance transparency and trust in scientific findings. Support projects and education highlighting the role of scientific evidence for policy and decision making, especially amidst growing challenges like populism and mistrust in science.
- ▶ Promote citizen science initiatives to engage the public in scientific research, data collection and decision-making processes, fostering community empowerment and participation. Recognise and integrate indigenous and local knowledge systems into research and policy-making processes to leverage traditional wisdom for sustainable solutions. Promote local,

⁴⁹ European Commission, Directorate-General for Research and Innovation, Mazzucato, M., Mission-oriented research & innovation in the European Union – A problem-solving approach to fuel innovation-led growth, Publications Office, 2018, <https://data.europa.eu/doi/10.2777/360325>

⁵⁰ European Environment Agency (2021): Knowledge for Action Empowering the transition to a sustainable Europe. Available at: <https://op.europa.eu/en/publication-detail/-/publication/0b5fd550-404a-11ec-89db-01aa75ed71a1/language-en>

network-driven resilience strategies to enhance community resilience and foster social cohesion in the face of environmental challenges.

- ▶ Foster an unlearning and exnovation mindset to actively discard outdated, harmful and inefficient technologies, practices and norms in favour of sustainable alternatives. Integrate sufficiency principles into research and policy frameworks to promote sustainable production and consumption and lifestyles, reducing environmental impact and promoting well-being and nature conservation.
- ▶ Ensure decisions are informed by scientific evidence to account for the true costs and consequences, avoiding inefficient resource use, nature depletion, environmental degradation and health risks.
- ▶ Identify and support cross-cutting research areas to avoid silos. Support projects that help identify and address the links of established research and policy domains.
- ▶ Actively support knowledge generation by catalysing efforts to address emerging knowledge gaps and data gaps, as identified in reports from organisations such as the European Environment Agency, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)⁵¹ and the United Nation Environment Programme (UNEP)⁵².

Further information:

Information on CASRI, a pioneering project uniting Environment Protection Agencies and partners across Europe to address sustainability challenges collaboratively: <https://casri.eu>

⁵¹IPBES (2024): Knowledge gaps identified within the Assessments. Available at: <https://www.ipbes.net/knowledge-gaps> (accessed on 26/04/2024)

⁵² UN Environment Programme (2024): Remaining Data and Knowledge Gaps. Available at: <https://www.unep.org/resources/assessment/part-d-remaining-data-and-knowledge-gaps> (accessed on 26/04/2024)

E Best Practice Case for an integrated approach: The New European Bauhaus

Cities, which are home to three out of four European citizens, are focal points for energy and resource consumption and contribute significantly to environmental pollution. However, municipalities as along with citizens and businesses in urban areas play pivotal roles in achieving environmental, climate and biodiversity protection goals, as well as resource conservation efforts, including the reducing of land take and environmental pollution. Moreover, cities represent the political level closest to people, making the socio-ecological transformation tangible and capable of enhancing people's quality of life.

The concept of the New European Bauhaus (NEB) integrates several of the principles described in chapter B, which serve as basic principles for the European Green Deal. The NEB promotes cooperation between different disciplines and stakeholders to achieve common environmental goals. It combines art, culture, social inclusion, science and technology to develop an attractive, shared environmental future. Although the NEB does not directly relate to the SDGs, it supports the overall goals of the 2030 Agenda by promoting climate neutrality, resource conservation and environmental protection. The NEB aims to be inclusive and involve all Europeans in the co-creation process, which implicitly supports gender equality and the empowerment of women and girls. The NEB recognises the global impact of urban life and aims to improve the quality of life in cities, which in turn has a global impact on the climate and the environment. The NEB is a model for an integrative approach that combines social and aesthetic aspects with environmental and climate protection. It considers the urban environment as a whole and promotes sustainable urban change. It promotes resilient urban spaces and sustainable mobility that contributes to planetary health by supporting the resilience of ecosystems and human health. The NEB also emphasises the importance of the origin of resources, especially renewable raw materials such as wood. In the context of resource extraction, it is crucial that for example, the use of wood in the construction industry respects ecological limits and supports the sustainable management of forests. The NEB could serve as a platform to support the modernisation of institutional frameworks through the exchange of best practice examples and the promotion of cooperation between municipalities and the EU. The NEB is thus an example of how the principles of the European Green Deal can be translated into a concrete approach to improving the urban environment and promoting a sustainable future.

The NEB aims to change the way in which buildings and entire neighbourhoods can be constructed and renovated with the aim of achieving climate neutrality by 2050. Demonstration and research projects play a key role in this and are intended to accelerate the transformation. It is therefore a co-creation process in which science, architecture, art, design and all Europeans should participate. The core question of the NEB is: "How and where do we want to live in the future?" It is a model for how the transformation of a sector can be addressed as part of an integrative initiative that combines social and aesthetic aspects with environmental and climate protection.

In the interdisciplinary research project "Advancing the New European Bauhaus: Sustainable mobility and resilient urban spaces for a better quality of life – AdNEB" UBA widens the scope of the NEB from buildings and the built environment to the entire urban area. Combining aspects of building and living, open and green spaces, health and well-being, climate change adaptation, environmental justice and active and sustainable mobility is of crucial importance for sustainable urban transformation. Initial findings of the AdNEB project underline the need for better integrated urban planning and a new approach to dealing with the scarce resource of land in the city – both in terms of built-up areas and in terms of transport, open and green spaces. To address the mentioned challenges, functions and uses in the city should be rethought and urban

spaces should be designed and used in a multidimensional way following the planning model of triple inner urban development ⁵³.

To bolster such approaches, the EU-initiative New European Bauhaus should persist as a platform and allocate resources for further research, in close cooperation with municipalities. At the European level, fostering a shared understanding of challenges is facilitated by the New European Bauhaus initiative. Sharing good practice examples enables mutual learning. In this regard the NEB sets an example for integrating sustainability approaches at EU level and could serve as a model for other policy areas.

At the same time, European strategies and regulations regarding climate adaptation, biodiversity, sustainable mobility and health in cities should be further developed. For instance, good examples include the EU Green Infrastructure Strategy, which encompasses urban areas the Nature Restoration Law, which targets the restoration of urban ecosystems, as well as the Urban Agenda for the EU.

Further information

Research Project AdNEB „Advancing the New European Bauhaus“: www.uba.de/en/research-project-adneb-advancing-the-new-european

Recommendations for Sustainable Housing and Urban Development – Protecting the Environment and Climate – Creating Living Space – Improving Quality of Life: www.uba.de/publikationen/protecting-the-environment-climate-creating-living

Resource efficiency and natural resources in an international context: www.uba.de/publikationen/ressourceneffizienz-natuerliche-ressourcen-im (in German, with extensive English summary)

⁵³ Susanne Schubert et al (2022): Triple Inner Urban Development - Definition, Tasks and Opportunities for an Environmentally Oriented Urban Development. Available at: <https://www.umweltbundesamt.de/publikationen/triple-inner-urban-development-definition-tasks>

Abbreviations

AdNEB	“Advancing the New European Bauhaus” project	IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
AI	Artificial intelligence	LCI	Lowest concentration of interest
BAT	Best Available Techniques	MAF	Mixture allocation factor
BfN	Bundesamt für Naturschutz / Federal Agency for Nature Conservation	MRV	Monitoring, reporting and verification
CAP	Common Agricultural Policy	NbS	Nature-based Solutions
CBAM	Carbon Border Adjustment Mechanism	NEB	New European Bauhaus
CCS	Carbon capture and storage	NGT	New genomic techniques
CO₂	Carbon dioxide	PARC	Partnership for the Assessment of Risks from Chemicals
CSRD	Corporate Sustainability Reporting Directive	PFAS	Per- and polyfluoroalkyl substances
EAP	Environment Action Programme	PMT	Persistent, mobile and toxic
ED	Endocrine disruptor	REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
EEA	European Environment Agency	RNAi	ribonucleic acid interference
EPR	Extended Producer Responsibility	SACs	Special Areas of Conservation
ESPR	Ecodesign for Sustainable Products Regulation	SDGs	Sustainable Development Goals
ESR	Effort Sharing Regulation	SFDR	Sustainable Finance Disclosure Regulation
ESRS	European Sustainability Reporting Standards	SMEs	Small and medium enterprises
ETS	Emissions Trading Scheme	SUD	Sustainable Use of Pesticides Directive
EU	European Union	SUR	Sustainable Use of Plant Protection Products Regulation
EUCRA	European Climate Risk Assessment	UBA	Umweltbundesamt / German Environment Agency
FSFS	Framework for sustainable food systems	vPvM	Very persistent and very mobile
GDP	Gross domestic product	WEEE	Waste from Electrical and Electronic Equipment
GMPs	Genetically modified plants	WHO	World Health Organisation
GFC	Global Framework on Chemicals		
HBM	Human (bio)monitoring		
HBM4 EU	European Human Biomonitoring Initiative		
IEA	International Energy Agency		

About us

The **German Environment Agency (UBA)** is Germany's national environmental protection agency and celebrates its 50th anniversary this year. Our mission is to ensure a healthy environment with clean air and water, and as little pollution as possible. Here at UBA, we deal with a wide range of issues, including waste prevention, climate protection and the authorisation of plant protection products.

At the heart of our work is the collection of data on the state of the environment, the study of its interrelationships, and the preparation of forecasts – and then, based on these findings, the provision of policy advice to federal bodies such as the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection. We also provide information to and answer questions from the public on the various issues we deal with. In addition to these activities, we implement environmental legislation by ensuring that it is applied in areas such as the emissions trading system and the authorisation process for chemicals, pharmaceuticals and plant protection products. Our mandate is set out in the Act Establishing an Environment Agency (UBAG).

Our overarching mission is to identify environmental risks and threats at an early stage so that we can assess them and find workable solutions in time. We do this by conducting research in our own laboratories and by commissioning research from scientific institutions at home and abroad.

We have around 1,900 employees at various locations, with our headquarters being located in the city of the original Bauhaus: Dessau-Roßlau. Further locations are situated in Berlin, Bad Elster, at the seven monitoring stations of our own air quality monitoring network and others. Prof. Dirk Messner has been president of UBA since 1 January 2020.

The **Federal Agency for Nature Conservation (BfN)** is a German higher federal authority providing professional, scientific and administrative expertise in nature conservation and landscape management. We enforce nature conservation law, advise policymakers, publish research findings and data on nature and the landscape, and support and oversee nature conservation and research projects. Our responsibilities are laid down in the Act Establishing a Federal Agency for Nature Conservation (BfNG).

BfN is one of four agencies under the auspices of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV). With a staff of around 430 and offices in Bonn, Leipzig and on the Isle of Vilm near Rügen on the Baltic Sea coast, we cover a range of policy areas surrounding biodiversity conservation and sustainable resource use. Sabine Riewenherm has been head of BfN since 1 September 2021.