GoNaturePositive!

Funded by
the European Union

Towards Blueprints for interventions and instruments in Policy & Regulation, Finance & Investment, Technology, and Social Change

MS7

IKED
International Organisation for Knowledge Economy and Enterprise Development

www.gonaturepositive.eu

Document Identification

Project Information

Project Acronym	GoNaturePositive!
Contract Number	101135264
Start Date	Jan 2024
Duration	48 months
Project Website	www.gonaturepositive.eu

Deliverable Information

Deliverable Number	M7
Deliverable Title	Draft Blueprints for interventions and instruments in Policy & Regulation, Finance & Investment, Technology, and Social Change
Work Package Number	WP3
WP/Task Leader	IKED
Lead Author(s)	Thomas Andersson, Leo Foldvari, Marcelo Gerlach, David Cooke, Samuel Lara Arciniegas
Deliverable Type	Milestone
Dissemination Level	Public

Funded by the European Union

Table of Contents

Funded by the European Union

Funded by
the European Union

Executive Summary

The modern economy is associated with the systematic exploitation and mismanagement of the natural world. It is urgent to identify ways of activating and leveraging drivers of transformational change towards a Nature-Positive Economy (NPE). In Chapter 1, the present document outlines the framework and methodology applied to identify, assess, and pursue opportunities in this regard. Conditions leading to continued degradation of economy–nature relations are contrasted with openings for shifting towards alternative development paths. On this basis, attention turns to ways of activating four specific drivers of transformational change: government policy, finance and investment, technology, and social change. Building on the work undertaken thus far, directions are set for the next stage which includes identifying, advancing, and testing concrete initiatives relating to each driver category. The results and lessons drawn will inform actionable Blueprints, featuring interventions and instruments for mobilising each driver towards a NPE.

Chapter 2 examines how policy and regulatory frameworks can drive transformative change towards an NPE. Key barriers include fragmented governance, weak regulatory signals, misaligned incentives, limited integration of nature into economic and financial decision-making, and weak monitoring and accountability. GoNaturePositive! shows that governments can accelerate the transition by providing stronger regulatory direction, aligning incentives, mainstreaming nature across policy domains, and strengthening governance, participation, and adaptive learning. Going forward, the Nature-Positive Pioneer Programme will use the Policy Self-Assessment Tool (SAT) and the Policy and Regulation Blueprint to translate these insights into practical action and generate implementation evidence from over 60 cities and regions worldwide.

Chapter 3 addresses the role of finance and investment. Mobilising private capital is essential to closing the nature finance gap and advancing towards a NPE. Key barriers include limited project bankability, difficulties in valuing and monetising nature-related benefits, and wider market failures. Improved mechanisms for valuation, monetisation, and risk-sharing can strengthen investment prospects. The insurance sector can contribute by shifting finance from ex-post compensation towards ex-ante resilience and adaptation. Building on this analysis, the next stage of the GoNaturePositive! project will develop and test a practical Bankability Toolbox to identify and monetise nature-related value, strengthen investment cases, facilitate access to appropriate financial and risk-sharing instruments, and mobilise private finance for nature-positive solutions.

Chapter 4 introduces the principal building blocks influencing technology's role in economy–nature relations. It outlines the main issues and opportunities identified in the work undertaken thus far. This includes a characterisation of the prevailing impetus across major technology sub-categories, together with prospective turning points that may open pathways for transformational change towards a NPE. The next stage will further examine actionable initiatives in these domains and draw lessons from efforts to overcome roadblocks and activate enablers associated with specific technological breakthroughs of high relevance to the NPE.

Chapter 5 shows that social legitimacy, fairness, participation and trust are essential for policy, finance and technology to deliver

Funded by
the European Union

durable nature-positive outcomes. It connects four social and ethical questions to nine social levers and practical engagement tools. Consultations highlight participatory governance, local stewardship, social innovation and readiness for collective action. Going forward, the Social Change Blueprint will test context-specific combinations and strengthen feedback mechanisms interacting with the other drivers of transformational change. Further consultations through the sectoral roadmap workshops and the Ghent Food Act case aim to further determine how participatory governance, peer learning and community-led action can build readiness for change and thus facilitate the implementation of policy, finance and technology interventions.

Finally, Chapter 6 reflects on and synthesises the overriding context and main directions for the next stage, taking further note of interactions and synergies between the various drivers of transformational change towards a Nature Positive Economy. It concludes on timelines and the pathways going forward.

Funded by
the European Union

Chapter 1: Framework and Methodology[1]

1.1 Introduction

Economy–Nature Relations are in a state of systemic malfunction. The rapidly expanding economy keeps degrading the natural world, with major harm caused through climate change, the breakdown of ecosystems, biodiversity loss, pollution, exploitation of natural resources, ever-expanding waste flows, and so forth.

Despite numerous international commitments, policy initiatives, corporate strategies, technological advances, and societal efforts, environmental degradation is not only continuing but, in many respects, accelerating.

Because of the interwoven relations between economy and nature, where the former ultimately depends on the latter, the damage inflicted on nature inevitably feeds back into the economy through declining productivity, growing risks, rising adaptation costs, and weakened resilience. In parallel, short-term concentrated benefits accrue to particular sectors, firms, and interest groups

Breaking this self-reinforcing vicious circle cannot be achieved through piecemeal measures operating at the margin. It calls for identifying the conditions under which ***transformational change*** can be initiated and sustained. Forming part of the EU-funded *GoNaturePositive!* project, this introductory chapter of Milestone 7 elucidates the ***framework and methodology*** applied to operationalise advances towards a ***Nature Positive Economy (NPE)***.

Work is structured around four key drivers: Government Policy; the Private Sector, Finance, and Investment; Technology and Innovation; and Social Factors. Each plays an important role in shaping economy-nature relations. At the same time, none operates outside the prevailing system. Each is de facto embedded within - and constrained by - the prevailing structures reinforcing unsustainable development.

The core objective of this task is to identify actionable "turning points", capable of offering openings for shifting economy–nature relations from conflict to alignment.

The framework has been developed through extensive desk-based research, including reviews of the scientific literature, existing analytical frameworks[2], and inputs based on practical and expert experience relating to each of the four driver categories. This work has been complemented by exchanges within the GoNaturePositive! consortium, including interactions with sectoral pilot projects and roadmap development activities, together with consultations at conferences, workshops, and multilateral events. On this basis, the methodology places particular emphasis on assessing alternative development

[1] This chapter has been authored by Thomas Andersson and Leo Foldvari, IKED.
[2] The present section represents a summary of the more extensive analysis available in the technical, not yet published, background report (Andersson, 2026), and associated data files.

pathways, identifying barriers and leverage points, and examining how turning points can be catalysed through combinations of mutually reinforcing interventions.

This Milestone reports on the progress made in developing this framework while outlining the principal analytical tracks that will guide the subsequent work. These will be subject to further research, stakeholder engagement, refinement, and testing as the project advances. In this regard, each of the ensuing chapters outlines how the corresponding driver may contribute to transformational change, thereby providing the basis for strategies and practical guidelines to be elaborated in the forthcoming Blueprints.

The chapter first introduces the conceptual framework and methodology, before reporting on work undertaken within each of the four driver categories and providing references to supporting background studies, event reports, datasets, and related material. On this basis, this Milestone sets directions for the continued work to arrive at Blueprints setting out practical pathways for each of the drivers to support transformational change towards the NPE.

1.2 Foundations for the Methodology

The world is not lacking sustainability initiatives. **Governments** have adopted national strategies, introduced regulatory and market-based instruments, agreed to green policy schemes on a regional basis as in the EU, and entered into numerous international agreements, frameworks, and partnerships aimed at protecting climate, biodiversity, and natural resources. Policy interventions have helped establish environmental standards, price or constrain harmful activities, protect ecosystems, and create incentives for cleaner technologies and more sustainable production and consumption.

Businesses increasingly report on environmental performance, while financial institutions integrate sustainability considerations into investment decisions. **Technical progress** improves the capacity to observe, measure, and understand changes in natural systems and the environmental consequences of economic activity. Alongside technological innovation, businesses provide opportunities for cleaner production, resource efficiency and circularity, substitution away from environmentally harmful materials and processes, and new solutions for conserving, managing, and restoring natural assets. Digital technologies, remote sensing, AI, biotechnology, and other advances further create possibilities for monitoring ecosystems, verifying environmental outcomes, and integrating the value and condition of nature more effectively into economic decision-making.

Among the **public**, awareness and concern about environmental issues have increased, accompanied by a growing willingness to pay for nature conservation and sustainable products, and to support social and environmental good (Bouman and Steg, 2019; Barbett et al., 2020; Bauer et al., 2021; Buijs et al., 2025). Such preferences increasingly influence markets: environmentally conscious consumers encourage firms to adopt cleaner technologies (Gil-Moltó and Varvarigos, 2013; Capstick et al., 2015), while in domains ranging from land and real estate to landscape architecture and interior design, environmental quality tends to translate into higher market values. Social factors,

operating through cities, communities, and civil society, can help leverage public engagement and bring societal concerns to bear on the decisions and priorities of businesses, investors, and policymakers.

Nature-based Solutions (NbS) and **Nature-based Enterprises (NbEs)** demonstrate how these different forces may come together, allowing ecological restoration, biodiversity conservation, climate resilience, and economic development to be pursued in mutually reinforcing ways. They illustrate the wider prospect of shifting economy–nature relations from the exploitation of natural assets towards investment in their long-term vitality and associated value creation.

Yet despite these efforts and advances, aggregate environmental degradation continues. The explanation lies less in the absence of initiatives than in a blend of information failures, misaligned incentives, institutional weaknesses, and systemic complexity. Environmental impacts often remain difficult to observe, quantify, compare, and attribute with confidence. Scientific uncertainty, imperfect measurement, and incomplete valuation of nature's multiple benefits complicate decision-making, while misinformation and greenwashing obscure the distinction between genuine progress and superficial claims. Differences in policy ambition, implementation capacity, enforcement, and international coordination further limit the aggregate impact of government action.

Among the consequences, **private investment** is insufficiently engaged in establishing and scaling NbS and NbEs, which are frequently perceived by investors and financiers as inherently risky and characterised by long payback periods. A shift in direction is widely viewed as contingent on environmental and social outcomes generating more credible, measurable, and lucrative value streams. Yet green investment often remains at a disadvantage because many environmental benefits are difficult to internalise, compounded by political short-termism, macroeconomic volatility, high capital costs, and discounting that downplay future benefits, particularly in developing countries.

At the same time, nature degradation subjects the private sector to worsening risks affecting productivity, stability, supply chains, and asset values. Although advances in data and monitoring technologies enable improved assessment of such risks, pricing, risk premiums, and lending practices are slow to adjust. Banks and financial institutions likewise show limited engagement in developing vehicles capable of channelling finance towards many emerging green and nature-positive opportunities.

The **insurance industry** has similarly made little effort to adapt its pricing and underwriting practices or to advise clients on how to address sustainability risks, thereby hampering market adaptation. As things stand, a combination of market and institutional failures enables insurers to continue providing coverage for a wide range of assets on inherently unsustainable terms, allowing short-term profit-seeking to persist for as long as conditions permit[3]. Nevertheless, the insurance industry is coming under mounting pressure to adopt more proactive approaches to measuring and pricing prospective

[3] ***Time inconsistency and moral hazard*** are pointed to as explanations, as insurers may count on ceasing protection down the road, and/or being bailed out by governments once the costs of environmental decay get out of hand, thereby reducing motivations for preventive action in the first place (Anthoff and Hahn, 2010; UNEP, 2021).

losses, while also recognising the benefits of enhanced resilience. In doing so, it could help incentivise measures that reduce nature-related risks and ensure that deteriorating asset values are more accurately reflected in insurance pricing and underwriting decisions.

Technology faces corresponding limitations. Improved data, monitoring, and analytical capabilities do not automatically translate into changed incentives or behaviour. R&D and innovation remain shaped predominantly by expected commercial returns rather than by wider ecosystem services of natural systems. Established technologies, infrastructure, and capital stocks create lock-ins that favour incumbent production methods. Cleaner alternatives may face high upfront costs, uncertain markets, skills gaps, and difficulties in diffusing and reaching scale. Even where efficiency improves, lower costs and expanding demand may generate rebound effects that offset environmental gains. The long-term and widely dispersed benefits generated by technologies supporting conservation and regeneration remain difficult for individual investors and firms to capture commercially. In the aggregate, the direction and application of technological change thus continue to intensify resource use and pressures on nature, despite growing countervailing opportunities for technology to support more constructive economy–nature relations.

Social change is similarly characterised by a gap between potential and realised impact. Despite rising environmental awareness, actual consumer and investment behaviour remains mixed, varying considerably across countries, social groups, and product categories. Positive attitudes towards green products do not consistently translate into purchasing behaviour, while greater environmental knowledge does not in itself ensure more sustainable choices (Midden et al., 2007; Dangelico et al., 2022). A persistent **"value-action" gap** is at hand, with growing public concern outpaced by unsustainable consumption growth and waste accumulation (Dauvergne, 2008).

At the heart of this complexity, a key distinction applies between the exploitation of environmental assets for short-term financial gain and investment and management safeguarding their long-term vitality. Returns from exploitation are often realised quickly, with gains relatively certain and concentrated among the few. Safeguarding natural assets, by contrast, involves coping with risk and uncertainty and coordinating diverse interests over time (Olson, 1965; Hardin, 1968). The modern economy, marked by secularly rising productivity, resource use and output flows, remains disproportionately locked into, or tilted towards, the former.

Against this backdrop, worsening environmental degradation coincides with rising income differences, inequality, and polarisation. Misinformation forms part of the picture, including efforts, whenever politically expedient, to place the blame for economic hardship on nature conservation. Adding to these issues, stark asymmetries in responsibility, economic burden, vulnerability, and capacity to reduce risk create perverse incentive structures at opposing ends of the income ladder (Hallegatte et al., 2020). Unless actively countered, this undermines the political feasibility of nature conservation policies. All in all, multiple forces weaken incentives and the scope for collective action while reinforcing short-term economic behaviour. A vicious circle is at risk, here associated with the **quagmire**, as returned to below.

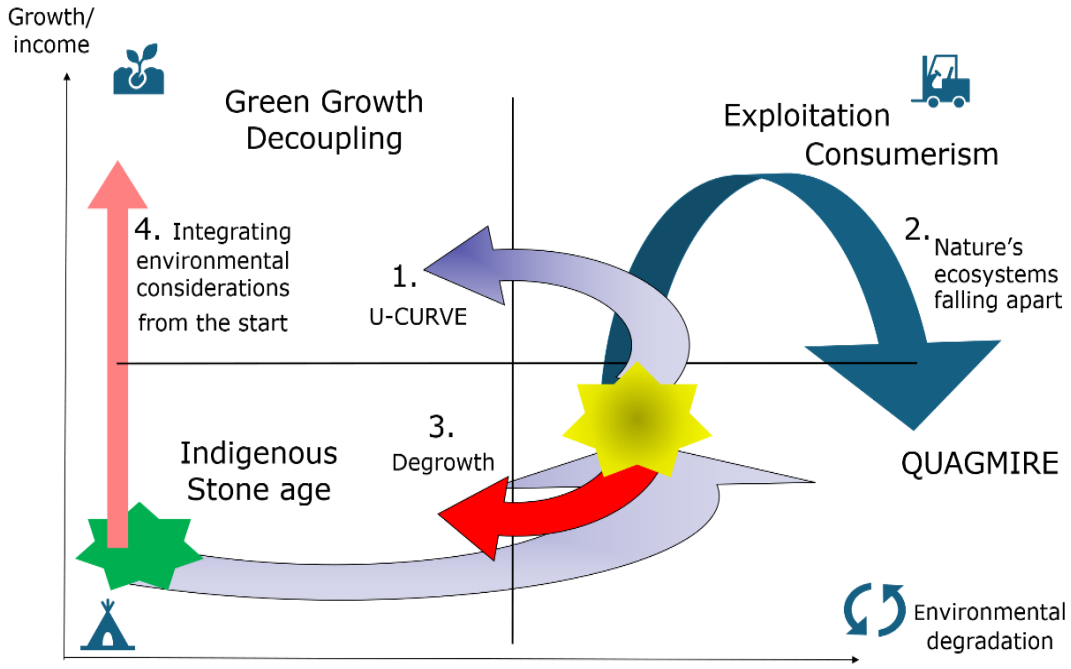
The principal **roadblocks** to achieving sustainability thus appear institutional, technological, economic, and political rather than geophysical (Matthews and Wynes, 2022). As economy–nature relations depend on multifaceted, non-linear processes, lacking central control and inherently difficult to measure and evaluate, effective counterstrategies must identify and mobilise those leverage points capable of instigating and sustaining broader transformational change.

In this context, a host of issues, actors, policy arenas, technologies, business models, and institutional arrangements are under consideration for further examination and testing. Particular emphasis will be placed on deriving broader lessons that may be transferable across sectors and geographical contexts.

1.3 National Pathways and International Dynamics

Economy – nature relations vary markedly according to country characteristics, including development level, social preferences, and political factors. Figure 1 illustrates stylised alternative relationships between economic growth and environmental degradation. The traditional Environmental Kuznets Curve suggests that environmental pressures initially increase before declining at higher income levels, illustrated by arrow 1. Gradually it has become obvious, however, that new forms of environmental degradation continue to emerge, suggesting an N-shaped relationship as illustrated by arrow 2 (Grossman and Krueger, 1991; Tanaka et al., 2025). The trajectory, representing the predominant manifestation of the contemporary world, leads gradually down-right in Figure 1, to a state in which environmental harm sinks the economy as well.

Figure 1: Growth – Environmental Degradation Scenarios



Source: GoNaturePositive! (2026)

A third perspective advocates degrowth as the principal remedy, denoted by arrow 3. States of depressed growth, as during the pandemic of the early 2020s, have been observed to reduce some forms of environmental damage. In general, however, a faltering economy gives rise to higher unemployment, inequality, fewer resources and less public support for environmental protection (Lecombe, 1979; Stern and Stiglitz, 2023).

Finally, alignment between environmental stewardship and economic development from the outset is illustrated by arrow 4. The experiences of Costa Rica, Bhutan, and Rwanda demonstrate that prioritising environmental conservation early in the development process need not come at the expense of economic growth[4].

Country performances are not determined in isolation but are related in various ways. Production, investment, technologies, finance, and political decisions in many countries may have consequences that spill across jurisdictions. In the same vein, the effectiveness of national sustainability strategies depends not only on domestic action but also on international responses.

Environmental improvement in one country may be reflected by corresponding damage in others, due to a shift in the location of activities that pollute, or in other ways harm the environment. High-income countries rely for instance on imports of commodities such as timber, minerals, palm oil, soy, and beef – driving biodiversity loss in producer countries. This phenomenon is frequently referred to as ***"leakage"*** or the "outsourcing" of environmental degradation via international supply chains (Duan et al., 2021). Most empirical evaluations, e.g., of the European carbon market, find limited evidence of *leakage effects* as higher carbon prices primarily induce innovation in clean-tech and energy-efficiency (Calel and Dechezleprêtre, 2016). Interdependencies in environmental policy operate through additional channels, however. One government's disregard or downplaying of nature's value-streams may lower the scope for others to protect the environment, due to enhanced leakage, meaning that government failure itself tends to become contagious (Andersson, 1991; Anthoff and Hahn, 2010). Such contagion may explain the limited observations of pollution-intensive production actually relocating across borders in response to varying country policies (Dechezleprêtre and Sato, 2017). Contagion effects may run in the opposite direction as well, however, as early adopters of environmental policy reduce uncertainty regarding costs and benefits, facilitating adoption by others and accelerating the diffusion of environmental policy (Ly et al., 2026).

Such cross-border spillovers gain further traction as environmental policies become intertwined with industrial policy, technological leadership, trade, energy security, and geopolitical competition. National sustainability strategies are not just shaped by domestic environmental priorities, but also by evolving international perceptions regarding competitiveness, strategic autonomy, resilience, etc. Changes in one economy

[4] These countries perform relatively well judged on the basis of conventional economic growth indicators as well as, e.g., the Environmental Performance Index (EPI) of Yale University, ranking environmental health and ecosystem vitality by the UNDP, or when it comes to assessments by the WWF of national ecological sustainability.

influence policy choices elsewhere, whether by encouraging stronger environmental ambition or by cutting back.

In many ways, the EU assumes the lead role in advancing a comprehensive approach to climate and nature protection. The Green Deal[5], the EU Biodiversity Strategy for 2030[6], and associated EU legislation arguably represent the world's most ambitious agenda to address the prime sustainability challenges of the contemporary era. The Clean Industrial Deal, the Affordable Energy Action Plan, and the EU Emissions Trading System (ETS)[7] exemplify schemes that stimulate demand for low-carbon products and reward decarbonisation[8]. This momentum has been partly reflected in progress in multilateral fora based on a cohesive "whole-of-society" approach underpinned by legally binding environmental legislation and enforcement mechanisms, cutting across national and sectoral boundaries (World Bank, 2023). The momentum is reflected in the rapid advance of private-sector disclosure, reporting, and Environmental, Social, and Governance (ESG) related compliance systems.

By contrast, China has pursued the world's most ambitious strategy for integrating industrial development with the expansion of green technologies and infrastructure. Its approach combines technological development, strategic investment, long-term industrial policy, the securing of critical raw materials, and effective control over key supply chains. Through large-scale deployment and manufacturing, it has dramatically reduced the costs of photovoltaic cells, batteries, electric vehicles, and related products, attaining industrial lead in underpinning the green transition. It also meets with accusations of unfair competition, particularly from the US which has adopted trade barriers as well as countered the green transition itself. This has in effect redirected exports notably to the EU, where a massive influx of low-cost imports exposes domestic industry to fierce competition. Impressions of environmental policies standing in conflict with industrial competitiveness have thus gained traction.

India and several other emerging economies increasingly demonstrate that low-cost green technologies need not be confined to advanced economies. At the same time, countries differ fundamentally in their priorities and constraints. Resource-rich economies may continue to benefit from incumbent industries, while small island states and least-developed countries often bear disproportionate environmental costs despite contributing relatively little to global degradation. Such diversity reinforces the need for context-sensitive rather than universal pathways towards a NPE.

By contrast, a significant backlash to sustainability is unfolding, primarily in the US but also in part more broadly. The Inflation Reduction Act, pursued by the previous Administration under President Biden, aimed for economic revitalisation through green industrial policy, including trade barriers and protection against imports from China and low-cost countries. Unfolding in 2025 under President Trump, that policy has given way to fixation on resource exploitation and consumerism parallelled by rollbacks of environmental

[5] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[6] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en
[7] EU Emissions Trading System https://climate.ec.europa.eu/eu-action/carbon-markets/eu-emissions-trading-system-eu-ets_en
[8] https://commission.europa.eu/topics/eu-competitiveness/clean-industrial-deal_en

protection, interwoven with skyrocketing inequality. Accelerated environmental degradation is now associated with severe economic damage already in the short to medium term, while the most well-off are effectively shielded from the downsides.

Jockeying for economic advantage at the expense of nature has attained unprecedented intensity with the tactics enacted by the US Administration to influence the policies of other countries as well. The push for expanding heavily polluting mining and manufacturing operations in the US is paralleled by pressures on other countries to dismantle environmental protection in consumption and user markets. While the impacts are far-reaching, it remains to be seen how extensive and long-lasting the impetus will prove to be, applying to government policies, investment decisions, stakeholders, public opinion, consumption, and so on. This picture is not uniform, however. Many US states, firms, investors, and research institutions continue to advance green technologies and industrial innovation despite the changed direction of federal policy.

In the EU, the Green Deal met with resistance from early on. A shifting geopolitical context has been accompanied by hardening internal resistance as well, pitting competitiveness and sustainability against each other. Concerns have been aired over industrial competitiveness, particularly among SMEs facing rising compliance costs associated with environmental regulation and reporting. Insufficient coordination has been called out between environmental regulation and industrial, infrastructure, innovation, and research policies (Draghi, 2024). Europe's position in skill-intensive and technology-intensive industries, including clean technologies, is a case in point. Spanning energy equipment, batteries, machinery, chemicals, motor vehicles, and related value chains, European firms face intensified competition, compressed profit margins, and delayed investment.

Taken together, at a time when energy security, technological leadership, and economic resilience have attained high strategic priority, major elements of the EU's green policy framework are being reassessed and recalibrated. The Omnibus simplification agenda has substantially reduced the scope and reporting requirements of corporate sustainability regulation, while environmental rules and the EU Deforestation Regulation have been subject to delays, simplification and adjustments. The ETS, which underpins EU carbon pricing, remains firmly in place but is undergoing further recalibration amid pressures concerning industrial competitiveness and the pace and distribution of future tightening. CBAM, following measures to reduce administrative burdens particularly for SMEs, entered its definitive implementation phase in 2026, while proposals are advancing to extend its coverage and strengthen safeguards against circumvention. A certain rebalancing is thus in motion.

These adjustments partly reflect legitimate demands to reduce excessive administrative burdens, particularly for SMEs, and to better align industrial and environmental policies while promoting green technology and innovation. At the same time, recalibration carries risks of weakening incentives for economic restructuring and disadvantaging firms and technologies that have invested early in the green transition. While the core objectives of the Green Deal formally remain intact, there is no basis for assuming that weakened or delayed environmental requirements will in themselves generate more vibrant growth and investment. There is a serious risk that sustainability ambitions are diluted, economic

restructuring is delayed, and a misleading narrative – casting economic competitiveness and environmental sustainability as fundamentally in conflict – gains further ground.

1.4 Towards a Methodology for Transformational Change

National development stages, institutional capacity, resource endowments, geopolitical pressures, and cross-border spillovers influence what actors, interventions, and pathways offer realistic scope for change. Rather than prescribing uniform solutions, the present work seeks to identify which interventions, under what conditions, can advance transformational change towards a NPE.

Working out remedies to destructive economy–nature relations requires a ***holistic*** approach, drawing on ***transdisciplinary and trans-sectoral*** considerations. Analysis of natural systems is paralleled by consideration of social, cultural, and institutional aspects. ***Ecological economics*** and ***financial risk analysis*** shed light on systemic crises arising from interactions between natural, societal, and technological dynamics (Lachman, 2013; Levin et al., 2013).

Feedback loops operate across long time horizons and multiple spatial scales, obscuring causal relationships, diffusing responsibility, and increasing the risk that short-term adaptation reinforces rather than resolves underlying sources of degradation (North, 1990; Fukuyama, 2014). ***Panarchy theory*** and ***complexity analysis*** exemplify frameworks generating insights into mechanisms of operational relevance, spanning organisational learning, adaptive-cycle thinking, behavioural change, and resilience (Holland, 1995; Gunderson and Holling, 2002; Clark and Harley, 2020). ***Planetary phase shift theory*** similarly calls for reorganisation across governance, the economy, and politics, taking culture and value systems into account (Ahmed, 2024).

Key in the present case is to arrive at an operational approach for progression towards the NPE. Central tasks include the identification of prospective turning points, capable of opening for shifts away from prevailing degradation pathways towards aligning economy–nature relations. Addressing **roadblocks**, often lock-ins propelled by the dominance of short-term interests, forms part of the picture.

To advance on this basis, methods suitable for analysing complex economy–nature relations and identifying opportunities for transformational change have been taken into consideration. Building blocks include integrated assessment modelling, scenario analysis, and pathway analysis, which provide means for comparing alternative trajectories and examining opportunities for shifting from destructive or conflict-ridden patterns towards more sustainable and mutually reinforcing economy–nature relations under varying technological, economic, institutional, and policy conditions. For identifying and assessing concrete opportunities to alter prevailing trajectories, ***Integrated Assessment of Alternative Paths (IAAP)***[9] is combined with principles of ***Minimum Input***

[9] IAAP builds on traditions of integrated assessment modelling (IAMs) and scenario analysis (Alcamo, 2001; Weyant, 2017). Economy-environment interactions are examined along alternative pathways, with the aim of identifying ways to shift from conflict and trade-offs towards alignment and complementarity.

for Maximum Output (MIMO)[10], with particular attention to interventions capable of overcoming roadblocks and triggering turning points towards transformational change.

The crossroads of prevailing ***pathways in economy–nature relations***, on the one hand, and openings for alternative future routes on the other hand, can in this way be considered as anchor points susceptible to impetus by the identified drivers - individually or in synergy. Combinations of ***issues, actor categories, arenas***, and ***instruments*** may play a part in instigating change, as to be explored and ***tested*** going forward, for the purpose of drawing ***lessons*** aimed for wider applicability.

The ***timing*** of effectuating remedial action warrants special attention. Environmental degradation must be recognised early enough to build support and initiate action before irreversible thresholds are crossed (Daly and Farley, 2011). Conversely, investment in R&D, innovations, and restructuring processes typically require time to adjust. At the same time, however, conflicting actor interests coupled with imperfect information and agency problems raise risks of parties shifting strategy over time, which may lead to consecutive delays and perpetual failure to address the issues at hand.[11] Taking account of such considerations is central to devising solutions that are both credible and effective.

1.5 Dual Pathways towards the NPE

The findings of this report support neither conventional growth optimism nor resorting to degrowth as a solution to the presently dominating destructive economy-nature relations.

The ongoing economic expansion is incompatible with long-term ecological stability. At the same time, lower growth tends to tilt demand - final consumption - away from eco-friendly goods and services, hurting NbEs and activities supportive of the environment (Miftari, 2025). Reduced access to resources implies budget pressures and a loss of affordability, countering demand for environmentally beneficial goods and services along with “green” investment, research and innovation.

While degrowth meets with such issues, not just the “level of growth” but “what growth”, and “growth for whom”, carry consequences. What kinds of economic activities expand and for what purpose? How is success measured, and how are costs and benefits distributed? At stake here is the ***orientation*** of growth.

The considered potential drivers of transformational change are all embedded in the poly-crisis at hand - being part of the problem as well as potentially part of the solution. They may reinforce the status quo but may also be key to inducing transformational change in support of aligning economy and nature.

[10] MIMO draws on the principles of Multi-Criteria Decision Analysis (MCDA) (Keeney and Raiffa, 1993) and system dynamics (Sterman, 2000), applied in search of effective combinations of inputs and actions capable of overcoming roadblocks and triggering turning points towards transformational change in economy-nature relations.

[11] For empirical examples of such situations, marked by delays and subsequent broken commitments, see Gersbach and Glazer (1999) and Moner-Colonques and Rubio (2015).

Broad-based political support, sound governance, and *agency* capable of mustering transformational change towards sustainability tend to go together[12]. This is as material well-being underpins public appreciation for nature as well as frees up resources and invokes technologies and organisational capabilities that may be needed for its protection (Lecombe, 1979; Stern and Stiglitz, 2023).

By contrast, the contemporary situation fuels a narrative that green policies undermine business performance. When markets tighten and firms struggle to maintain profitability, pressures to reduce costs intensify, including those associated with environmental compliance. As noted, economic hardship makes the public susceptible to misinformation and environmental policies can come in handy as scapegoats for social and economic struggles arising for other reasons. While green policies are not, in themselves, the cause of economic stagnation or declining competitiveness, their design and implementation require consideration of efficiency, fairness, and adaptation (Benatti et al., 2024).

As is, the EU is subjected to a series of external shocks and competitive pressures, subjecting the energy system along with a broad range of industries to high stress. The call is on for relaxing green policy requirements, leaving industry more time to adjust. The EU must double down on efforts to ensure framework conditions - across investment, infrastructure, competence development, entrepreneurship, innovation, and so on - make green growth possible. Allowing retraction of the green agenda, however, will leave economy-nature relations on a slippery slope of decline. Misinformation and paralysed decision-making will accelerate this trend, threatening to realise the ***quagmire***, a point of no escape despite spiralling losses for all.

While realising green growth must be part of the answer to avoiding this kind of outcome, there has been little progress thus far in decoupling growth from environmental degradation. To realise a viable change of direction, the framework laid out in the present report opens for another avenue - a Dual Pathway approach - to achieve leverage in countering the prevailing unfavourable direction of economy – nature relations.

To this effect, building on Figure 1, Figure 2 reframes the alternative trajectories as two complementary pathways towards the NPE. Consider the implicated alternative pathways:

(2a): Growth through exploitation → Quagmire

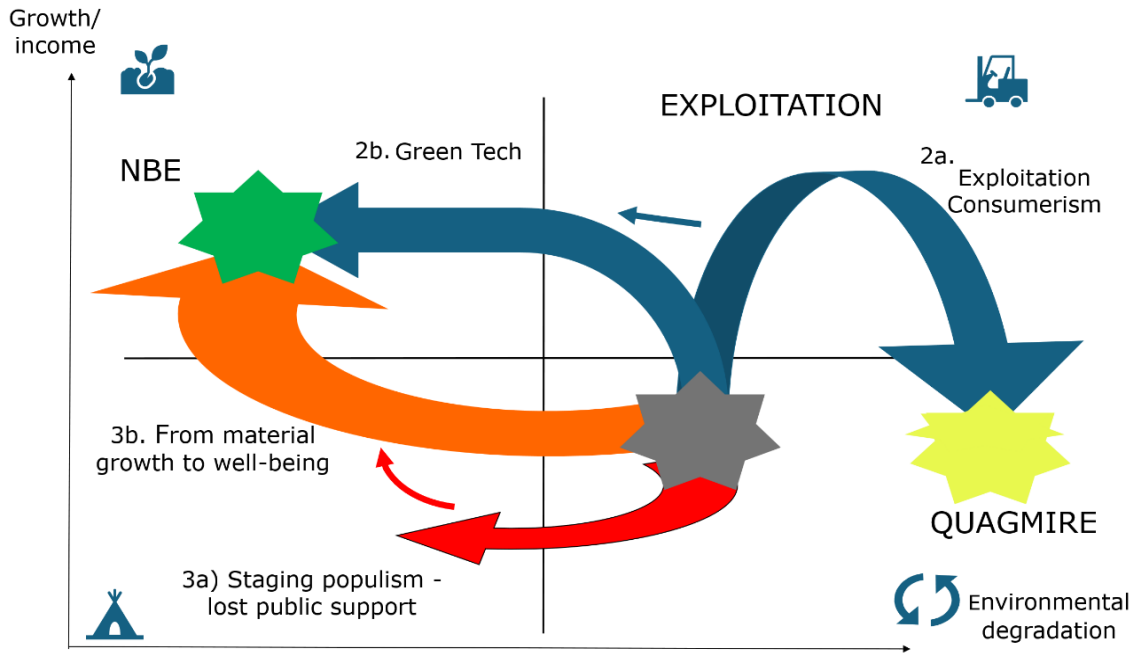
(2b): Green growth → technological decoupling

(3a): Constraining growth → endangering public support, polarisation

(3b): Redefining growth → wellbeing and natural capital

[12] For arguments what appears required, see Moore et al. (2014), Westley et al. (2013), or de Haan and Rotmans (2018).

Figure 2: Remedial Paths in Support of the NPE



Source: GoNaturePositive! (2026)

In essence, neither technological greening (**2b**) nor the redefinition of growth (**3b**) appears sufficient on its own, much less capable of enabling transformational change. Technological reorientation without corresponding changes in incentives, valuation systems and institutions will struggle to scale up. Conversely, redefining growth without viable technological and business solutions will struggle to gain traction. At the same time, wellbeing and prosperity are far from equivalent to material intensity and gross consumption (Jackson, 2017). A dual-pathway approach is therefore warranted and arguably offers the best available means of breaking away from the prevailing perception of an inevitable conflict between the economy and nature.

1.6 Capacity Building

The four transformation dimensions at stake in the present document represent complementary levers for accelerating the transition towards a NPE. Each is associated with a specific driver, addressed through a dedicated work process to help identify openings and initiatives capable of advancing transformational change.

Work on each driver, further elaborated in the ensuing chapters, is leading forward towards the development of a driver-specific Blueprint. Drawing on the associated research findings, practical observations, and experience from testing where applicable, the objective is to arrive at actionable guidance, tools and recommendations.

Taken together, the Blueprints are on course to identify practical pathways and options for the purpose of assisting target audiences in translating NPE principles into practice.

Funded by
the European Union

They span the domains of governance and policy, finance and investment, technology and innovation, and social engagement methods that support collaboration and coordinated action across sectors.

Going forward, the Blueprints may be complemented by GoNaturePositive! capacity-building toolboxes and further tailored to the needs and opportunities of specific target groups. Social engagement methods can be mobilised where relevant, to strengthen communication, alignment, and coordination across sectors and actor categories.

In such ways, the Blueprints are intended to support practical learning processes through implementation guides, facilitation materials, case studies, workshops, and train-the-trainer modules tailored to different users.

1.7 Why Blueprints for Transformational Change?

Ways to mobilise the drivers, individually and/or collectively, will be examined, tested, and evaluated. Drawing on these exercises, lessons will be drawn and presented by way of **Blueprints** including actionable recommendations for transitioning towards an NPE.

As elaborated above, the ambition is for the Blueprints to contribute to integrated efforts linking knowledge generation with practical experimentation, capacity development, and real-world application.

The subsequent chapters outline the current status of work and the planned next steps for each driver. Attention will be paid to key roadblocks, potential turning points, and those target audiences that are most relevant in the specific case. Along the way, complementary actions will include:

- Continued stakeholder consultations, workshops, and expert panels, e.g., involving members of the project's High-Level Impact Board;
- Contributions from discussions at international conferences and policy forums, including the COPs, WEF, Global Forum, Building Bridges, and related events;
- Lessons emerging from case studies, pilot activities, experimental testing, and associated learning processes.

While a Blueprint is developed for each driver, efforts will be pursued to identify, examine, and utilise synergies between them, with the aim to maximise their combined momentum in realising transformational change towards a NPE. Prospective such synergies are taken note of where relevant through the report and returned to in the concluding section.

Chapter 2: Policy and Regulations Driver[13]

2.1 Introduction

The present chapter addresses the policy and regulatory conditions needed to move the *NPE* from ambition to practice. It synthesises evidence emerging from project work and consultations and provides the analytical basis for a practical assessment tool that can help cities and public authorities understand how their policy frameworks support or hinder the transition.

Despite growing recognition that biodiversity loss and ecosystem degradation generate systemic ecological, social, and economic risks, a persistent gap remains between high-level ambition and implementation. Closing this gap requires more than incremental improvements. The systemic nature of the economy–nature crisis requires strategies and initiatives capable of enabling transformative change towards a more biodiverse and climate-resilient future.

In the modern economy, prevailing policies and regulations play an ambiguous role. Some reinforce or perpetuate environmentally harmful practices (Koh et al., 2025). In other respects, they shape incentives, accountability, governance, and market conditions through which NP economic activities can emerge, scale, and contribute to a NPE.

Achieving more favourable outcomes will require progress at multiple governance levels. International and European frameworks establish common objectives and regulatory direction, while national governments create enabling conditions through legislation, strategies, fiscal policies, and economic instruments. Regional and local governments, in turn, play a critical role in operationalising these frameworks through spatial planning, public procurement, investment decisions, stakeholder engagement, and cross-sectoral coordination. While recognising the complementary roles of all governance levels, this chapter places the focus on ways that GoNaturePositive! can help underpin transition by cities and regions. A successful transition to a NPE ultimately depends on the effective operationalisation of European and national policy and regulatory frameworks at the local and regional level, where implementation takes place.

Among other sources of inspiration and inputs, the analysis draws insights from five GoNaturePositive! pilot sectors - agroecology, forestry, the built environment, tourism, and the blue economy[14] - on the practical context for developing regulatory transformation pathways towards an NPE.

[13] This chapter has been authored by Marcelo Gerlach, ICLEI.
[14] In this report, “blue economy” refers to activities connected with oceans, seas and coasts that generate sustainable economic and social value, including restoration of marine and coastal ecosystems.

2.2 Concept and Framing

Role of governance levels

Progressing toward sound and effective multilevel governance is of high importance for transformative policy and regulatory change in support of a NPE. International and European policy frameworks matter greatly for strategic direction, regulatory architecture, binding targets, and common objectives for the transition, while national governments are key for creating enabling conditions through legislation, governance systems, fiscal policies, and economic instruments.

Local and regional governments play a pivotal role in operationalising these frameworks through spatial planning, regulation, public procurement, NbS implementation, investment decisions, and stakeholder engagement (Salvador and Sancho, 2021; Smedby and Quitzau, 2016). Across sectors, examples include landscape planning, ecosystem restoration, and Payments for Ecosystem Services (PES) in forestry and agroecology; land-use planning, green infrastructure, and procurement in the built environment; and coastal planning, NbS implementation, community engagement, and sustainable destination management in the blue economy and tourism. Their ability to integrate policy across governance levels and sectors makes them essential for translating policy ambition into transformative change.

Table 1: Governance, roles and responsibilities

Governance level	Primary role in enabling a Nature-Positive Economy	Examples of responsibilities
International & European	Establish the strategic direction, common objectives, regulatory architecture, and enabling framework for the transition.	International agreements and EU legislation; biodiversity and climate targets; sustainable finance frameworks; common standards; funding programmes; regulatory requirements.
National	Translate international and European objectives into national policy and create enabling conditions for implementation.	Legislation; national biodiversity and sectoral strategies; fiscal policy; public budgeting; subsidy reform; economic instruments; natural capital accounting; public investment priorities; governance systems.
Regional & local	Operationalise policy frameworks through place-based planning, implementation, and stakeholder engagement.	Spatial planning; land-use regulation; public procurement; NbS implementation; restoration projects; infrastructure planning; investment decisions; permitting; stakeholder engagement; cross-sectoral coordination.

Funded by the European Union

Four complementary analytical streams

The conceptual framing of policy and regulatory transformation towards a NPE draws on four complementary analytical streams of work: i) policy landscape analysis; ii) guiding principles and indicators; iii) the European NPE roadmap, and; iv) the policy imperatives stream. Together, these elements provide a structured understanding of why current policy and regulatory systems remain insufficient to drive systemic change, while also defining the broader direction and conditions required for transformative policy action towards the NPE.

- **Policy landscape analysis:** A first foundation is the policy landscape analysis, the analytical backbone for understanding the current policy environment. Its purpose is not simply to catalogue instruments, but to identify systemic gaps and misalignments across European, national, regional and local policy frameworks that limit the effectiveness of existing governance arrangements. Four main problems arise: (1) many nature-positive objectives remain weakly binding or dependent on voluntary action; (2) funding for nature-positive initiatives is insufficient while harmful subsidies persist; (3) conflicting priorities and trade-offs weaken impact; and (4) private-sector accountability remains weak. Policy instruments contribute to transformative change through four interconnected functions: (i) reducing harmful activities, (ii) generating additional benefits for nature, (iii) strengthening knowledge and information systems, and (iv) enabling broader systemic transformation (Kupilas et al., 2025).
- **Guiding principles and indicators:** Measuring progress towards a NPE remains a critical challenge, as existing nature-positive metrics are often fragmented across sectors, actor groups, and environmental dimensions. In response, an integrated framework grounded in strong sustainability is proposed, structured around five guiding principles: (1) full recovery of nature, (2) prosperity for all, (3) respecting ecological limits, (4) transforming economic systems for nature and equity, and (5) ensuring a social foundation. Beyond defining desired outcomes, this framework also establishes a common basis for assessment, enabling policymakers to evaluate whether policies and governance frameworks are effectively shifting economic activities towards nature-positive outcomes. It recognises that policy-makers across governance levels influence not only their own institutional performance, but also the wider conditions that shape action across markets, businesses, and other actor groups (Magnolo and Desair, 2026).
- **European NPE roadmap:** The European roadmap for a NPE further strengthens this framework by connecting long-term strategic direction with practical transformation pathways. The analysis highlights that the transition is not constrained by a lack of vision, but rather by persistent misalignments between policy design, financial flows, and implementation capacity. Several structural tensions emerge repeatedly: (1) public budgets can simultaneously finance both restoration and degradation; (2) financial flows remain poorly aligned with nature-positive objectives; (3) Europe demonstrates relatively strong policy design but weaker transformational delivery and scaling capacity; and (4) while nature degradation is increasingly recognised as a systemic economic challenge, nature

is not yet sufficiently integrated into firm-level practices and mainstream decision-making systems. Together, these insights reinforce the need for policy transformation to be closely linked with (i) economic incentives, (ii) implementation capacity, and the (iii) integration of nature into broader governance and economic systems (Kapletia, 2025).

- **Policy imperatives:** The Policy Imperatives for a Competitive and Resilient Nature-Positive Economy stream shifts the focus from diagnosis to action by identifying the priority areas needed to accelerate the transition towards a NPE. This perspective highlights that nature-positive objectives remain insufficiently embedded across economic and policy systems, limiting their capacity to drive systemic transformation. Recurring priorities emerge: (1) the integration of nature into economic and financial decision-making, (2) the removal of harmful subsidies and misaligned incentives, (3) stronger policy coherence and accountability, and (4) the establishment of more binding nature-positive obligations across governance levels (McQuaid et al., 2025).

2.3 Interactions and Consultations

The analytical work is further complemented by insights emerging from project interactions and consultation processes, particularly through the Delphi Panel, the Breakfast at Sustainability event and the NPE Pilot Roadmaps. These exchanges help validate, refine, and contextualise the policy directions identified in the broader analytical framework, while also incorporating perspectives from different stakeholder groups and governance contexts.

Delphi Panel: The Delphi Panel was conducted between October and November 2025 with members of the GoNaturePositive! Impact Board, bringing together experts from policy, research, business, finance, and civil society. The process combined an anonymous online survey (Round 1) with an interactive online workshop held on 25 November, 2025 (Rounds 2 and 3), providing a structured expert-based process for identifying priority policy instruments, systemic barriers, and enabling conditions across sectors and governance levels. Through the survey and participatory workshop exercises, participants explored policy priorities, future sectoral visions, and the governance conditions required to enable transformative change (Gerlach, 2025).

- **What policy instruments matter?** Participants identified three complementary clusters of policy instruments: (1) regulatory frameworks providing legally binding targets and obligations (e.g. NRR, EUDR, GBF); (2) financial and disclosure frameworks capable of redirecting capital flows (e.g. SFDR, CSRD, EU Taxonomy); and (3) mechanisms for integrating nature into economic decision-making (e.g. natural capital accounting and Payments for Ecosystem Services).
- **What characteristics make these instruments transformative?** Participants highlighted five recurring characteristics: (1) clear and binding targets; (2) alignment of financial incentives with ecological outcomes; (3) influence on economic behaviour through pricing, disclosure, or planning mechanisms; (4)

incentives for nature-positive actions; and (5) applicability across sectors and governance levels.

- **What barriers matter most?** Four major barriers emerged: (1) competing short-term economic priorities; (2) limited institutional capacity and technical complexity; (3) insufficient political commitment and changing political priorities; and (4) risks of greenwashing in the absence of clear standards and enforcement. Reform of environmentally harmful subsidies emerged as the most frequently identified enabling condition for accelerating the transition.
- **Recurring themes for the Blueprint:** Across sectors and governance levels, five recurring themes emerged: (1) spatial planning and land-use governance; (2) reform of environmentally harmful subsidies and nature-positive incentives; (3) ecosystem service payments and biodiversity net gain approaches; (4) natural capital accounting and disclosure frameworks; and (5) integration of nature considerations into procurement, finance, education, and broader economic decision-making systems.
- **What governance levels matter?** Discussions consistently highlighted that transformative change requires complementary action across local, national, and international governance levels. While EU and national frameworks establish common objectives, standards, and economic incentives, participants repeatedly identified cities and regions as key actors for translating these ambitions into place-based action through spatial planning, stakeholder engagement, procurement, and community stewardship. This reinforces the importance of multilevel governance, where different policy levels perform complementary functions to accelerate the transition towards a NPE. Across sectors, local and regional authorities were consistently recognised as central actors: in forestry and agroecology through landscape planning, ecosystem restoration, and Payments for Ecosystem Services; in the built environment through land-use planning, green infrastructure, and procurement; and in the blue economy and tourism through coastal planning, NbS implementation, community engagement, and sustainable destination management.

Breakfast at Sustainability: The Breakfast at Sustainability took place on 3 February 2025 in Brussels, bringing together around 40 invited participants from research, business, finance, policy, advocacy, and land management. Through panel discussions and facilitated breakout sessions, participants reflected on the proposed framework for measuring progress towards a NPE, identifying practical challenges, implementation needs, and priority governance actions across sectors (Gerlach, 2026).

- **Operationalising the NPE concept.** While participants broadly supported the vision of a NPE, discussions highlighted challenges in translating the concept into practice. Three recurring points emerged: (1) existing frameworks are often perceived as too abstract; (2) stakeholders require clearer sector-specific guidance and practical use cases; and (3) implementation pathways need to be adapted to different sectoral and territorial contexts.

- **Indicators and measurement.** Measurement was identified as one of the main bottlenecks for implementation. Participants highlighted: (1) an overwhelming number of indicators and reporting requirements; (2) the need for a limited set of common metrics to support comparability and decision-making; and (3) the importance of balancing standardisation with context-specific indicators relevant to different sectors and users.
- **Embedding nature into economic decision-making.** Discussions also emphasised the need to strengthen the integration of nature within economic and financial systems through: (1) natural capital accounting and nature-related disclosure frameworks; (2) innovative and blended finance mechanisms capable of addressing the biodiversity finance gap; and (3) stronger governance and accountability mechanisms to support implementation across governance levels.

Pilot Roadmaps: The GoNaturePositive! pilot roadmapping process demonstrated the value of participatory, cross-sectoral, and place-based collaboration in shaping pathways towards a NPE. Working across six regional pilot contexts - green buildings, food systems, blue economy, tourism, forestry, and apiculture - stakeholders co-developed long-term visions, identified systemic barriers, and designed practical transformation pathways tailored to their territorial contexts. The roadmaps provide real-world insights into how policy, governance, and stakeholder collaboration can support the transition towards a NPE across diverse sectors and regional settings (Cecchinato and Kapletia, 2026).

- **Policy standards and measurable outcomes.** Stakeholders highlighted the need for (1) explicit and mandatory performance metrics for NbS; (2) standardised indicators and valuation methods for biodiversity and ecosystem services; and (3) policy and regulatory frameworks capable of supporting consistent implementation and accountability across different regional contexts.
- **Fragmented policy and implementation.** Consistent with the Delphi Panel and Breakfast at Sustainability, stakeholders concluded that (1) the transition towards a NPE is not constrained by technical capabilities, as the necessary technologies and business practices largely already exist. Instead, (2) experiences across the regional pilots consistently identified policy and regulatory fragmentation, together with misaligned economic incentives, as the key systemic barriers to transformative change. These findings are consistent with recent evidence from transformative governance initiatives, such as the EU Cities Mission, which highlights that accelerating systemic change depends less on developing new technical solutions than on overcoming institutional silos through integrated planning, cross-sector collaboration, and multilevel governance (Buylova et al., 2025).
- **From isolated initiatives to systemic integration.** Despite differences in sectors and regional contexts, three recurring priorities emerged: (1) embedding NP approaches within mainstream planning and governance systems; (2) integrating NP approaches into investment and decision-making processes; and (3) supporting long-term implementation through coherent policy frameworks.

Taken together, the literature review, stakeholder consultations, and pilot roadmaps demonstrate a strong convergence around the key policy and governance conditions required for a NPE. Across analytical and participatory processes alike, the challenge is not only defining what a NPE looks like, but creating the policy, regulatory, financial, and governance conditions that make it measurable, actionable, and scalable across sectors and governance levels.

Five recurring barriers consistently limited progress across sectors and governance levels:

I. competing short-term economic priorities and misaligned economic and financial incentives;
II. fragmented governance, limited institutional capacity, and implementation challenges;
III. weak regulatory signals, insufficient policy coherence, and limited long-term political certainty;
IV. nature remains insufficiently integrated into economic and financial decision-making; and
V. fragmented measurement, monitoring, and accountability systems, limiting transparency and increasing the risk of greenwashing.

2.4 Cross-sectoral Pathways

While the consultations identified what policy conditions matter, they also demonstrated that these conditions operate through several cross-sectoral transformation pathways. These pathways provide the practical entry points through which policy influences the transition towards a Nature-Positive Economy.

- **Sustainable public procurement** is a key pathway for accelerating the transition towards a NPE because it can: (1) translate biodiversity, climate, and Circular Economy (CE) objectives into procurement standards and targets; (2) create demand for nature-positive products, services, and infrastructure through environmental and social criteria in public contracts; and (3) stimulate innovation and NbEs by supporting emerging NbS. However, its transformative potential is often constrained by fragmented governance, limited technical capacity, short-term budget priorities, and insufficient standardised procurement criteria and monitoring systems.
- **Financing and financial regulation** influence how risks, opportunities, and value creation are reflected in financial and investment decision-making. Their transformative potential lies in: (1) redirecting capital flows towards nature-positive activities; (2) integrating nature-related risks, dependencies, and impacts into financial decision-making; and (3) creating incentives for long-term ecosystem stewardship through disclosure, reporting, and regulatory frameworks. Examples of broader public/private finance mechanisms include Payments for Ecosystem Services, green infrastructure finance, and restoration

investments. Central banks, financial supervisors, and financial regulators contribute to system-level regulatory and supervisory conditions by promoting the integration of climate- and nature-related risks into financial regulation, supervision, and decision-making.

- **Technology and innovation** are critical enablers of economic growth as well as for transformational change. Whether technology is applied for exploitation of nature in the short term or for managing nature's value streams for the long term is strongly influenced by policies. At the same time, modern technology enhances the availability, quality, and accessibility of information needed for decision-making and implementation. Policy-making and technology are interwoven in shaping the transformative potential of: (1) monitoring, reporting, and verification of nature-positive outcomes; (2) transparency and traceability across value chains and governance systems; and (3) restoration, resource efficiency, and ecosystem management. Together, advances in these respects improve the effectiveness of policy and regulatory action in support of a NPE.
- **Social transformation** critically influences the ability of policy and regulation to achieve durable and equitable nature-positive outcomes, while public policies create the conditions that enable participation, stewardship and community innovation. Its transformative potential lies in: (1) strengthening Participatory Governance & Co-Creation, enabling more legitimate and inclusive decision-making while improving the design and implementation of public policies; (2) fostering Local Stewardship & Community Action by recognising local knowledge, empowering place-based governance, and supporting communities as long-term stewards of nature; and (3) creating enabling conditions for Social Innovation & Community Economy through adaptive policy frameworks, incentives, and institutional support that allow community-led initiatives and new economic models to emerge and scale. Together, these social levers reinforce the effectiveness and legitimacy of policy and regulatory action.

While these pathways describe where policy influences the transition towards a NPE, they also point towards a broader set of enabling conditions that determine whether policy interventions are capable of delivering transformative change. These conditions form the basis of the transformative policy dimensions presented below.

2.5 Tapping into Policy Levers for Transformative Change

Drawing together the theoretical foundations, consultation findings, identified barriers, and cross-sectoral interactions presented in the previous sections, six policy and regulatory dimensions are proposed as key policy levers for driving transformative change towards a NPE.

- **Stronger Regulatory Signals:** Consistent and credible regulatory signals provide the basis for the certainty and accountability that is needed to align public and private action with nature-positive objectives. Binding frameworks such as the Nature Restoration Regulation (NRR), the EU Deforestation Regulation (EUDR),

and the Global Biodiversity Framework (GBF) illustrate how legally binding targets can reduce uncertainty, strengthen implementation, and encourage long-term investment. However, these frameworks will only provide long-term certainty if they are implemented on time, supported by sufficient administrative and technical capacity, and not weakened through loopholes, delays, or reduced ambition. For local and regional governments, stronger regulatory signals provide the long-term certainty needed to embed nature-positive objectives into spatial planning, public procurement, investment decisions, and local implementation. This requires: (1) strengthening implementation and enforcement of existing frameworks; (2) establishing clear and measurable targets across sectors; (3) improving policy coherence between biodiversity, climate, agriculture, forestry, and economic policies; and (4) providing long-term certainty capable of supporting investment and behavioural change.

- **Alignment of Economic and Financial Incentives:** Economic and financial incentives need to align with nature-positive outcomes, which requires rewarding ecosystem stewardship rather than environmentally harmful activities. Reforming environmentally harmful subsidies emerged as one of the strongest recurring priorities, alongside strengthening sustainable finance and disclosure frameworks to redirect capital towards nature-positive activities. For cities and regions, this means creating the conditions to mobilise public and private investment for restoration, NbS and ecosystem stewardship. This requires: (1) phasing out environmentally harmful subsidies and redirecting public finance towards nature-positive activities; (2) strengthening sustainable finance, disclosure, and reporting frameworks; (3) expanding incentives for restoration, ecosystem stewardship, and NbS; and (4) integrating nature-related risks, dependencies, and impacts into financial regulation and decision-making.
- **Nature Mainstreaming:** Achieving a NPE requires nature considerations to be systematically integrated across policy domains, governance processes, and economic decision-making rather than being addressed through isolated environmental policies. Mainstreaming nature ensures that biodiversity objectives are embedded within planning, investment, procurement, finance, infrastructure, and sectoral policies, enabling more coherent and effective implementation across governance levels.
- **Effective regional and local government**: Stewardship is required locally in order to enable: (1) integrating biodiversity objectives into spatial planning, public procurement, and investment decisions; (2) embedding nature-related risks, dependencies, and impacts within economic and financial decision-making; (3) strengthening policy coherence across biodiversity, climate, agriculture, forestry, tourism, and economic policies; and (4) promoting cross-sectoral collaboration that embeds nature considerations throughout public administration.

Table 2: "Nature mainstreaming" at governance levels

Governance level	What "nature mainstreaming" means
EU	Integrate biodiversity into EU legislation, funding programmes, Common Agricultural Policy, Cohesion Policy, Sustainable Finance framework, Taxonomy, procurement rules, accounting standards, restoration targets, etc. The EU sets the strategic direction and common rules.
National	Translate these into national legislation, fiscal policy, budgets, subsidy reform, natural capital accounting, national investment priorities, planning systems, sectoral strategies (agriculture, transport, energy, tourism, forestry), and guidance for public authorities. Finance ministries are important because they influence how public money is spent
Regional & local	Apply these frameworks through spatial planning, zoning, procurement, infrastructure investments, restoration projects, NbS, permitting, municipal budgets, local development strategies, stakeholder engagement, etc. This is where policies become concrete projects and land-use decisions.

- **Governance and Implementation Capacity:** Effective implementation hinges on governance systems capable of translating policy ambition into coordinated action across governance levels. While international and national frameworks establish strategic direction, cities and regional governments play a central role in operationalising policy through planning, investment, regulation, and stakeholder engagement. Strengthening implementation therefore requires: (1) improved coordination across local, national, and European governance levels; (2) stronger institutional capacity for implementation, monitoring, and enforcement; (3) enhanced collaboration across sectors and stakeholder groups; and (4) adaptive governance approaches that support learning and continuous improvement.
- **Societal Legitimacy and Participation:** Policy effectiveness depends not only on technical design but also on public legitimacy, stakeholder ownership, and societal support. Meaningful participation strengthens implementation by improving policy acceptance, incorporating local knowledge, and building long-term stewardship. Transformative change therefore requires: (1) inclusive participation and shared decision-making processes; (2) equitable distribution of costs and benefits; (3) recognition of local knowledge systems and stewardship practices; and (4) transparent governance arrangements that strengthen trust and accountability.

Funded by the European Union

- **Measurement, Learning, and Adaptive Monitoring:** Robust measurement, monitoring, and verification systems are essential for demonstrating progress, strengthening accountability, and enabling continuous policy improvement. At the same time, indicator systems must remain practical and proportionate if they are to support implementation rather than create unnecessary reporting burdens. Transformative change therefore requires: (1) practical indicator frameworks that enable cities and regions to assess policy alignment and monitor progress over time; (2) monitoring systems capable of supporting accountability and learning; (3) a balance between common and context-specific indicators; and (4) adaptive policy approaches that can evolve as new evidence emerges.

2.6 Actions and Initiatives Under Way

The findings presented in this section are already being translated into practical tools and engagement processes within GoNaturePositive!. These initiatives aim to support cities and regions in assessing, testing, and advancing transformative policy and regulatory change towards a NPE.

- **The Nature-Positive Pioneer Programme** is the main engagement and testing platform for the policy and regulatory transformation work. The programme engages 63 cities and regions globally, with a spotlight cohort of 10–12 pioneers participating in a one-year learning and experimentation process, including dedicated in-person exchanges. Through peer learning, capacity building, policy reflection, the programme will generate implementation insights into how the transformative policy dimensions can be operationalised. Working with the Blueprint and the Policy Alignment Self-Assessment Tool (SAT), participating cities and regions will identify and address key barriers to transformative change, including fragmented governance and institutional capacity, weak policy coherence and long-term policy certainty, misaligned economic and financial incentives, limited integration of nature into economic decision-making, and fragmented monitoring and accountability systems, while testing practical policy responses such as sustainable public procurement and support for NBEs.
- A key component of the Blueprint is the **Nature-Positive Policy Alignment Self-Assessment Tool (SAT)**, a practical assessment tool that enables cities and regions to evaluate individual policies against NPE principles. Rather than benchmarking performance, the tool is designed to support learning and dialogue by helping local authorities identify strengths, gaps, trade-offs, and opportunities for policy improvement. As the starting point of the Pioneer Programme, participating cities and regions will use the SAT to assess their local policies, identify gaps and priority areas for transformative change towards a NPE, and shape the capacity-building, peer learning, and policy experimentation activities undertaken during the subsequent stages of the programme.
- **The Policy and Regulation Transformation Blueprint** synthesises the findings from the policy landscape analysis, roadmap, guiding principles, stakeholder consultations, and transformative policy dimensions presented in this milestone

into a practical framework for cities and regions. Building on the results of the City SAT, the Blueprint will guide participating cities and regions in addressing identified policy gaps and priority areas by translating the six transformative policy dimensions into practical actions adapted to their local context. Through the Pioneer Programme, cities and regions will apply and test these approaches, generating practical insights into how policy and regulatory change can accelerate the transition towards a NPE.

The policy and regulatory work is closely connected with other GoNaturePositive! outputs, particularly the **Guiding Principles and Indicators framework and the parallel transformation pathways on finance, business, technology, and social change.** Combinations of actions and measures capable of generating synergies can help overcome roadblocks and accelerate transformational change in support of a NPE. Recognising that decisions often need to be made despite incomplete or context-specific evidence, the framework should apply the precautionary principle by encouraging adaptive decision-making, taking action where credible risks to nature exist, while continuously strengthening monitoring and knowledge over time.

Chapter 3: Finance and Investment Driver[15]

3.1 Characterisation of the issues

The vast majority of nature-positive projects are currently undertaken and financed by public authorities, notably regions and municipalities (UNEP, 2023; EIB, 2023). As public entities are often limited by constrained budgets, overwhelming fiscal burdens and insufficient technical capacity, attracting private investment into nature restoration is crucial for transitioning towards a NPE.

At the same time, financial institutions influence markets through their role as capital providers, lenders and advisors and can therefore play a decisive part in driving system-wide action.

Aligning public as well as private financial flows with the objectives of a NPE will require mechanisms that effectively enable a reallocation of financial flows from activities contributing to the degradation of ecosystems towards those that are beneficial for nature and society. This in turn will matter greatly for catalysing sustainable change throughout economic sectors and value chains.

[15] This chapter has been authored by David Cooke, Guillaume Lorentz, and Lisa Bacon, SFO.

3.2 Tapping into readiness for change

Financial institutions are affected by nature degradation through two broad routes: *direct exposure* to nature-dependent assets and counterparties and *indirect exposure* through the wider economy, policy, markets and financial system feedback loops. Direct effects include those related to credit risk, market and valuation risk, insurance underwriting risk and operational and legal/reputational risk. Indirect effects include macroeconomic damage, supply chain contagion, sovereign/municipal risk and broader systemic financial risk (NGFS, 2024; OECD, 2023). As a result, risks linked to various aspects of nature degradation, including climate change and biodiversity loss, propagate through financial systems. All financial market participants from institutional investors and banks to retail clients are collectively exposed to the systemic risk posed by ongoing nature degradation, with the potential to trigger broader financial instability and macroeconomic disruption. Those that fail to account for this nature degradation expose their financial assets to escalating risks that threaten future growth. On the other hand, those that proactively manage asset exposure to high-risk sectors and invest in nature restoration benefit from an improved capacity to hedge risk and capture new opportunities.

Despite the growing recognition of nature's value among financial institutions, private finance for nature remains far below the levels required to meet biodiversity targets and financial institutions struggle to translate commitments into real action (UNEP, 2023; World Bank, 2020).

This nature-finance gap derives from a number of barriers that undermine the mobilisation of private finance for nature. These include impediments to internalising returns intertwined with difficulties in measuring societal benefits, short investment horizons, high transaction costs, lack of trust, misinformation, the influence of vested interests, and the heterogeneity of nature projects complicating replication and scaling (EIB, 2023).

Adding to these challenges, there are also questions about the appetite of financial institutions to invest in nature. Some evidence suggests that financial intermediaries can act as a bottleneck to investment in nature-based projects and NbEs, including where suitable financial vehicles are not available or are not offered at scale (Hartzmark and Sussman, 2019). Other evidence points to some investors demonstrating a substantive willingness to pay for impact investment (Barber et al., 2021). This implies that there is no uniform lack of demand but a need to distinguish between financial institution appetite, perceived risk and supply of suitable investment opportunities.

3.3 Progress on unlocking finance and investment for nature

The present work examines these barriers with the objective of identifying actionable roadblocks impeding the shift of financial markets towards a NPE. Through literature review, policy mapping and consultations with financial institutions and other stakeholders, we identified and analysed existing market, policy and regulatory

mechanisms incentivising private finance for nature, as well as guidance tools and frameworks supporting the supply of financially viable nature-positive projects.

This work has cast further light on the key challenges and gaps that need to be addressed for private finance for nature to be mobilised to realise transformational change towards an NPE.

Lack of bankability has emerged as a critical limitation for many nature-positive investments, including both nature-positive projects (e.g. NbS) and NbEs. Perceived high risk, small ticket sizes (i.e., each individual transaction is low in monetary value), uncertain revenue streams and limited monetisation pathways often deter private finance in early stages, Private capital may become more accessible once a project can demonstrate a track record. A fundamental challenge, however, relates to the extent that NbS offer public goods it becomes difficult or even impossible to exclude users from their co-benefits. The resulting difficulties to price and sell NbS hamper their ability to generate revenue streams, and hence to attract private funding (Martin et al., 2025). NbEs may face additional barriers, including limited collateral and investor expectations placing focus on short-term revenue rather than the longer time horizons often required for nature-positive strategies (Tedeschini et al., 2024).

The majority of financial institutions still lack the required nature literacy to fully understand the risks and opportunities as well as the necessary tools to value and monetise nature benefits and incorporate these into investment and lending strategies. A standardised approach to nature-related risk assessment is notably absent, and existing risk assessment frameworks tend to focus on direct impacts and dependencies to the detriment of a more comprehensive understanding of the economic and societal value of ecosystem services. This results in a poor understanding of the financial and economic implications of nature-related risks and opportunities which fails to trigger adequate action (Trinomics, 2024; World Bank, 2020).

More fundamentally, the presence of significant negative externalities from economic activities also contributes to the current inertia. While the degradation of nature generates substantial societal and macroeconomic costs, these costs are far from internalised by economic agents, including investors. As a result, although there is a collective economic benefit to investing in nature protection, such investments may remain privately costly and therefore underprovided.[16] From a theoretical perspective, this situation reflects a market failure that can be analysed through both Coasean and Pigouvian frameworks. In the Coasean view (Coase, 1960), the absence of clearly defined property rights and the presence of transaction costs prevent efficient bargaining between agents, meaning that those responsible for environmental degradation are not directly confronted with its costs. Meanwhile the Pigouvian interpretation (Pigou, 1920) highlights the absence of corrective mechanisms - such as taxes, subsidies, or regulation - that would internalise these externalities by aligning private incentives with social welfare. Consequently, in the absence of both effective market-based coordination and

[16] The issue here is also the public good nature of regulating ecosystem services as the costs are borne by one economic agent while the multiple benefits are enjoyed by many other economic agents and society at large, so incentives of market and societal structures do not make protection and regeneration the first economic choice.

adequate public intervention, capital is not efficiently allocated towards biodiversity preservation. This reinforces the systemic nature of risks associated with nature degradation, as financial institutions, their corporate clients, and investors remain collectively exposed to the cascading effects of nature-related shocks.

Existing incentive mechanisms fail to shift private finance towards nature-positive investment. Nature-related risks remain only partially priced into financial markets and thus do not trigger a reallocation of financial flows (Jiang et al., 2025). Even within the EU policy landscape (which is more advanced than many other jurisdictions), there is a lack of solid regulation that supports consistent reporting of nature-related impacts by financial institutions and incentives for the design and implementation of nature-positive strategies remain weak. Although there is some coordinated action undertaken by groups of financial institutions and businesses, which aim to act for nature by collectively engaging with their investees (FAIRR collaborative engagements, Ceres Investor Network, ICRR Shareholder Exchange), the absence of any policy and regulatory support limits scaling and thus the ability of collective actions to drive structural and transformative change in financial markets.

This evidence reveals a critical need to strengthen the bankability of nature positive investments to facilitate their access to private finance. This entails developing and mainstreaming new economic evaluation tools that measure, value and communicate the benefits of ecosystem services to furnish the financial sector with reliable information to guide investment decisions (Ruangpan et al., 2024; Le Coent et al., 2021; Tedeschini et al., 2024). Measuring and valuing nature-related impacts - enabled by innovative monitoring technologies such as satellite imagery and environmental sensing, and by rigorous verification standards - can help broaden the conception of economic returns. However, measurement and valuation of nature-related impacts are not sufficient to ensure their monetisation. Translating these nature-related impacts into monetary terms requires not only the estimation of their economic value. There is a need of economic agents willing and able to pay to avoid or compensate for the associated costs, and also of institutions capable of processing these values through financial assessment. This raises fundamental transaction cost challenges including definition of property rights, coordination among multiple stakeholders, and design of credible contractual arrangements. For example, recent academic work highlights that the effectiveness of mechanisms such as Payments for Ecosystem Services critically depends on contract design and incentives, as transaction frictions and strategic behaviour can significantly affect cost-effectiveness (Izquierdo-Tort et al., 2024). In parallel, international reports stress that most of nature's benefits lie outside markets because of their public good characteristics, limiting private sector incentives and complicating the mobilisation of finance (EIB, 2023; OECD, 2025). As a result, high transaction costs and incomplete market structures obstruct the internalisation of environmental externalities and the emergence of scalable financing pathways for ecosystem services, leaving nature values largely absent from the business models of financial institutions and corporations.

A key area in strengthening the bankability of nature positive projects relates to insurance aspects. Climate risk assessment must move beyond traditional linear approaches toward probabilistic and non-linear modelling that captures extreme events

and deep uncertainty. By combining environmental, financial and meteorological data, along with tools such as digital twins or machine learning, risk can be expressed as a distribution of potential losses rather than a single estimate. This provides a more realistic foundation for decision-making and opens the door to integrating forward-looking adaptation strategies into financial frameworks.

A comprehensive approach to estimating climate risk impacts should consider both the owners of physical assets and the users of those physical assets, as well as direct and indirect losses, including business interruption and supply chain effects. Damage functions can translate hazard intensity into economic loss while factoring in mitigation measures such as preparedness or adaptive infrastructure. In this context, insurance is not only a compensation mechanism but also a structuring element of risk, as coverage conditions and premiums directly shape exposure and incentives.

A key shift is to move from ex-post compensation toward ex-ante adaptation financing. By quantifying avoided losses with sufficient confidence, investments in resilience become economically viable, reducing expected damages and stabilising financial outcomes. This dynamic extends to the broader financial system, where climate risks translate into credit risk, asset devaluation and capital constraints, encouraging banks and investors to integrate adaptation into their core decision processes.

Finally, regulatory pressure is accelerating this transformation. Stress tests, disclosure requirements, and prudential frameworks are pushing financial institutions to internalise climate risks and strengthen resilience. This creates a strong opportunity to position adaptation, and more broadly NbS, as a lever for both risk reduction and financial performance, provided that impacts are measurable and shared across stakeholders. At the same time, the NPE requires that attention is paid to involving local communities in the co-design of nature restoration projects and integrating social equity dimensions, as nature restoration projects driven purely by market mechanisms and economic growth opportunities can result in an unfair distribution of benefits, thus exacerbating social inequalities (Thompson et al., 2023; McDermott et al., 2013).

This focus on bankability and insurance aspects is supported by the findings in the GoNaturePositive! pilot roadmaps. Across all pilots, the main identified finance and investment problem relates to creating the conditions for nature-positive investment to take place at scale. These pilot roadmaps further highlight the same common barriers as were noted above, including high upfront costs, weak or unclear returns on investment, undervalued ecosystem services, fragmented public support, limited access to appropriate finance, and market incentives that still reward lowest-cost or short-term profit over long-term natural-capital value. The roadmaps therefore converge on a shift from one-off grants toward more systemic public, private and blended finance mechanisms, including green credit lines, tax incentives, green loans, payments for ecosystem services, carbon or biodiversity credits, microloans, certification-linked premiums, and dedicated investment frameworks. They also emphasise the need for better valuation tools, such as true-cost accounting, lifecycle cost-benefit analysis, natural-capital accounting and ecosystem-service baselines, so that banks, investors, public authorities and businesses can price nature-positive outcomes into decisions.

3.4 Advancing a toolbox to strengthen private finance for nature

In the continued work, several identified activity tracks will be subject to further analysis, consultation with stakeholders and structuring with a view to concrete testing and experimentation. A practical toolbox will be developed for strengthening the bankability of nature positive investments to help address the frictions where ecosystem-based value propositions are not currently accommodated by conventional financial appraisal frameworks. This is a critical gap that needs to be addressed for private finance to be mobilised to realise transformational change towards an NPE. As part of the toolbox development, we will have a specific focus on how current work by insurance firms can be oriented towards the NPE principles and seek to cooperate with key insurance firms to push practice in this direction.

The toolbox will be structured around a limited number of modules – each with a clear user, input data requirement, output and test case. The modules set out below will be consulted upon with the stakeholder panel before they are developed in detail, to ensure that the approach remains responsive to market needs. All of them may not be developed within the remit of the current project, or form part of the blueprint, but all merit serious consideration for advancement in support of transformational change towards a NPE.

Potential modules for the broader bankability toolbox:

1. Building the investment case through value identification. Long-term financial viability is a prerequisite for durable nature-positive outcomes and requires systematic identification of all environmental, social and economic co-benefits, supported by recognised metrics, robust monitoring methodologies and evidence-based value indicators. Specific value drivers could be further analysed to determine their relevance as potential revenue streams, cost savings, risk reduction or strategic advantages.

2. Transforming value identification into value ratification and monetisation. Beyond identifying co-benefits, credible pathways are needed for converting demonstrated impacts into monetisable value. This requires identification of metrics, monitoring methods, verification processes and safeguards needed to support credible claims. Particular attention should be given to the link between performance certification, validation and monetisation, ensuring that measurable outcomes can ultimately support financial transactions and investment decisions.

3. Mapping financial instruments and risk allocation mechanisms. Nature-positive projects rarely fit within traditional financing models and therefore require innovative approaches. This module will develop a comprehensive mapping of financing instruments which fit different use cases - including grants, technical assistance, concessional debt, first-loss or junior capital, guarantees, risk-sharing facilities, syndicated loans, development finance institution (DFI) portfolios, thematic bonds and sustainability-linked instruments. The module will identify the key actors involved including providers of catalytic public capital, financial structuring entities, development finance institutions, commercial financiers and market-making platforms.

4. Demonstrating monetisation pathways through pilot ecosystems. For a small number of pilot use cases, concrete monetisation pathways will be developed to

demonstrate how identified value drivers can be translated into financing opportunities. These pilot applications will provide quantitative examples of potential revenue streams, funding sources, investment structures and financial performance indicators, offering practical evidence of how nature-positive outcomes can support project bankability.

5. Addressing governance and enabling conditions. This module will cover regulatory and policy frameworks, governance arrangements, stakeholder alignment, ownership structures, measurement and verification challenges, market barriers and investment risks. The objective is to provide project developers and investors with a clear understanding of the critical success factors and key information required to facilitate investment decisions and project implementation.

The insurance-focused part will be framed as a subset of the toolbox and will be progressed according to where our consultation with insurers confirms they can provide actionable input. Current priorities are:

A. Quantifying nature-related risk and resilience benefits. This will promote the use of forward-looking risk assessment methodologies combining climate hazards, ecosystem condition, exposure and vulnerability analysis. By moving beyond historical loss data and integrating probabilistic climate and nature scenarios, this can establish an evidence base for investment decisions.

B. Translating ecosystem performance into avoided losses. The bankability of nature-positive investments depends on their ability to demonstrate measurable reductions in physical and economic losses. This module will explore methodologies linking ecosystem restoration and NbS to avoided damages, business continuity improvements, asset protection and enhanced resilience for asset owners and users.

C. Testing insurance as a signal of risk reduction. This will explore how verified ecosystem improvements can influence underwriting decisions, insurance availability, coverage conditions and premium levels, and identify the evidential thresholds insurers would require.

D. Connecting reduced physical risk to financing conditions. This will explore how reduced expected losses and lower default probabilities could plausibly translate into better financing conditions through reduced credit risk, improved collateral quality, lower cost of capital and increased access to lending. Adaptation and ecosystem restoration therefore become drivers of creditworthiness rather than simply environmental expenditures.

E. Aligning insurers, banks, regulators and project developers. Achieving large-scale bankability requires a common framework connecting risk modelling, insurance, finance and regulation. This module will use consultations to clarify the respective roles of insurers, banks, regulators, project developers, public authorities and beneficiaries, and to identify where a common framework could reduce transaction costs and improve confidence.

Funded by
the European Union

This work will draw on, and seek to complement, a growing body of initiatives in areas such as natural capital accounting, impact measurement and verification, blended finance and sustainable finance taxonomies.

The immediate next steps are to: (a) consolidate stakeholder consultation performed up to this point into a stakeholder panel and consultation plan for intended users of toolbox materials; (b) synthesise SFO's existing expertise and content developed on bankability aspects to define the content for Modules 1 and 2 above; (c) shortlist the financial instruments and risk allocation mechanisms that will be included in the mapping referred to in Module 3 above; (d) test the modules with relevant stakeholders; and (e) convert the findings into the content and recommendation for the final report. This approach would also leave room to explore longer-term ideas including a Biodiversity Stewardship Code, biodiversity impacts of asset management and links to platforms showing the biodiversity impact of investment funds accessible to EU investors. In this way, the toolbox will become part of a broader process, helping to bridge gaps in understanding, reduce transaction costs, and support more effective engagement between financial institutions, insurance firms and nature positive investment.

Chapter 4: Technology Driver[17]

4.1 Introduction

Technology is widely recognised as the principal determinant of productivity growth and, hence, of long-term economic development. Beyond influencing the ***rate*** of growth, however, technology also shapes its ***orientation***. It strongly influences whether economic activities primarily serve to exploit natural assets for short-term gain or instead support their long-term stewardship and regeneration. At the same time, technology itself draws on nature as a source of materials, energy, biological inspiration, ecosystem services, and ultimately economic value creation.

Technology occupies a unique position among the drivers of transformational change. It can effectively exploit and run down nature but also leverage and further expand its value flows. It responds to economic incentives and policy but also reshapes the opportunities available to governments, businesses, and society, thereby influencing the direction and pace of wider systemic change.

Limited work has been undertaken thus far, for the purpose of sorting out the role of technology in determining economy–nature relations, and how change can be brought about in this respect. Work in GoNaturePositive! addressing these aspects commenced at an early stage of the project, to help fill the gap. In this regard, an extensive literature review has been undertaken, to examine which aspects have been covered and lessons

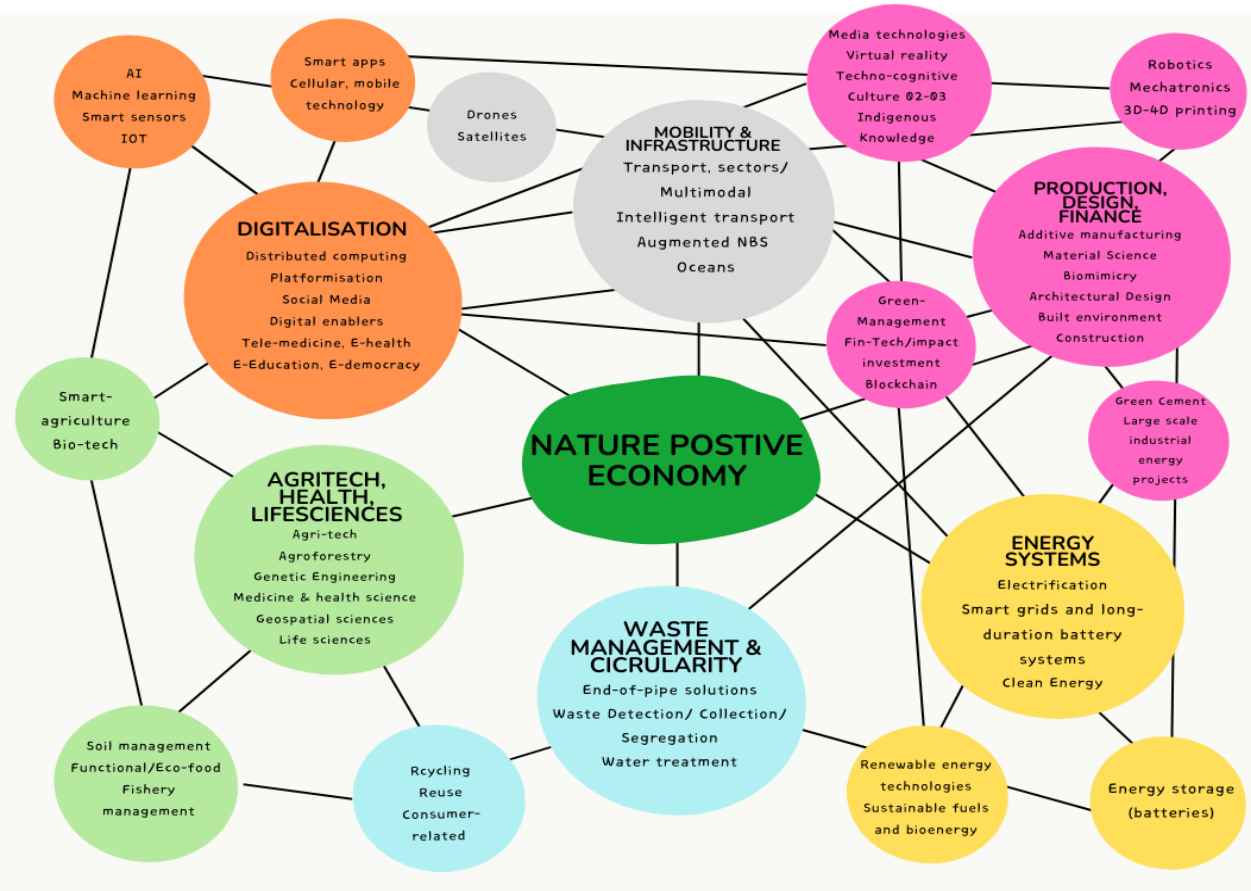
[17] This chapter has been authored by Thomas Andersson and Leo Foldvari, IKED.

learned thus far. Delineating the relevant arenas, interlinkages between technology categories have been summed up in an Excel file[18]. This in turn was followed by a mapping of prospective relationships between various technologies and their role in relation to nature's major asset classes[19].

In this context, it should be noted that progress towards an NPE encompasses technologies that directly support ecosystem restoration, as well as those that halt or reduce related costly environmental pressures associated with biodiversity loss, climate change, pollution, and so forth, thereby creating the conditions in which natural systems can recover and regenerate.

Following on from this original mapping, further work has been undertaken to arrive at a structured assessment of technology's role in relation to the NPE, both at a generic level and across major technology domains and sub-technologies. The bulk of this work is documented in a background report, (Andersson, 2026). Figure 3 visualises the main technology domains assessed.

Figure 3: Main and sub-technology domains mapping



Source: Andersson (2026)

[18] Lit Tech 11dec.xlsx
[19] Technologies list: VA Technologies.xlsx

Along the way, a major focus has been placed on identifying viable turning points for technology's role to shift from presently destructive towards support of nature-positive trajectories. Extensive inputs have been received from the pilot projects in a background report undertaken as part of the project (Andersson et al., 2026), as well as through external networking, consultations and interactions with stakeholders.

Given the novel analytical territory ventured into, further examination, testing and validation of the results obtained thus far will be warranted. Going forward, the suitability of candidate activities in this regard is under review. The purpose is to arrive at a set of cases well suited for demonstrating how technological progress, applications and innovation can be catalysed, leveraged, diffused, and scaled in support of the NPE. Together, this work aims to arrive at stronger analytical as well as practical foundations as incorporated in the Technology Blueprint to be submitted in October 2026.

The remainder of this chapter is organised as follows: Section 2 introduces the principal building blocks for understanding technology's role in economy–nature relations. Section 3 summarises the main patterns and trajectories identified through the work undertaken thus far. Section 4 presents specific cases, with roadblocks and indicated actionable agendas, to be subjected to further examination and testing. The process leading forward towards the blueprint is commented on along the way and summed up in Section 5.

4.2 Technology in Economy – Nature Relations

Given the overwhelming continued dominance of nature's demise at the hands of the modern economy, "business as usual" won't turn the tide! Work on the potential drivers of an NPE – the focus of the present report – seeks to shed new light on what it takes to instigate **transformational change**, i.e. unlocking a beneficial shift. This presents a particularly strong challenge in the case of technology which, following the dramatic acceleration of technical progress over recent centuries, coupled with the rise of ***innovation*** as a major force to put technology to use, carries an almost endless capacity to destroy nature, as well as to resolve the issues at hand. This underlines the critical importance of how, for what purpose, technology is put to use.

Previous studies aimed for "gap analysis" addressing technology's role in international competitiveness (Eulaerts et al., 2025; IMD, 2021) or linked technological innovations and sustainable development (Vos and Alarcon, 2016; IEA, 2021). In arriving at a definition of technology that is relevant in this context, we have strived for practical applicability for examining activities on the ground. On this basis, new ground has been broken in examining the interaction between the economy and natural systems, notably by:

- explicitly linking technology to economy–nature relations,
- visualising the direction of technological influence, and
- identifying and characterising prospective turning points towards the NPE.

In the same vein, the ongoing work characterises the conditions under which major technologies shift from reinforcing trade-offs towards enabling complementarity between economic and environmental gains. Such transitions depend not only on

technological advances themselves, but depend on the actions of entrepreneurs, financiers, consumers, and policymakers, whose combined decisions influence whether green technologies progress from niche applications to mainstream deployment.

Where policies impose high compliance costs without generating genuine environmental additionality - or constrain firms without enabling upgrading - they risk becoming counterproductive, eroding both competitiveness and environmental credibility (Farooq et al., 2021). By contrast, well-designed regulation can stimulate innovation, offset compliance costs, and enhance productivity, enabling favourable business and environmental outcomes in tandem (Porter and van der Linde, 1995; Jaffe and Palmer, 1997; Jefferson et al., 2013). Performance standards that are flexible and forward-looking, rather than static or technology-prescriptive, facilitate experimentation and learning (Lanoie et al., 2011). Renewable energy subsidies have been observed to spur emissions reductions both domestically and internationally through a “reverse leakage” effect, as cost reductions and technological diffusion spill across borders (Kotchen and Giovanni, 2025). Finally, coherence and credibility across the broader policy regime remain critical. This applies strongly in the context of future planning, the perceived feasibility of green technologies, and the outlook for shifting growth trajectories.

Rather than piecemeal policy measures, combinations of R&D support, carbon pricing, emission caps, clean electricity standards, and emerging nature-credit markets can generate mutually reinforcing effects when aligned coherently (Jaffe et al., 2005; Fischer and Newell, 2008; Hua et al., 2023; Donald, 2024; Meissner et al., 2026; Aghion et al., 2025ab). Studies across European countries find that public R&D support strengthens solar PV innovation, with further leverage when combined with demand-pull instruments such as Feed-in Tariffs and Renewable Energy Certificate schemes (Palage et al., 2019; Popp, 2019). China's experience likewise illustrates how sustained and coordinated policy support can accelerate both technological diffusion and cost reductions.

Yet, coherent policy portfolios alone are insufficient. Firms undertaking high-risk innovation depend on stable and credible expectations regarding future market conditions. Contradictory or frequently changing policies create uncertainty, discouraging firms from incurring upfront costs in exchange for long-term returns. The effectiveness of innovation policy therefore depends not only on its ambition, but also on ***consistency, timing, and strategic alignment*** (Liang and Fiorino, 2013).

Cleantech and other technologies conducive to decarbonisation, circularity, biodiversity monitoring, and advanced materials development associate precisely those high-risk, high-tech sectors most sensitive to regulatory design. Regulatory environments that stifle entrepreneurial dynamism may therefore slow not only aggregate productivity growth but also the pace at which green technologies mature and diffuse (Draghi, 2024). Conversely, regulatory frameworks that combine flexibility with clear long-term direction can accelerate both technological upgrading and environmental transformation, helping to reposition economies toward more sustainable growth paths (Bănică et al., 2024).

Moving towards the blueprint, continued work will further examine where technological advances, policy reforms, financial innovation and behavioural change reinforce one

another most strongly, thereby helping to identify the combinations of interventions with the greatest potential to trigger transformational change towards an NPE.

4.3 Patterns of influence

The approach outlined above underpins scenario analysis identifying possible openings for transformational change. Figure 4 illustrates whether particular influences do - or do not - contribute to decoupling between economic growth and environmental degradation. In this case, first, arrows (**1**) extend from imagined points of departure (denoted ⬭) to characterise the predominant contemporary influences of the technologies under consideration. Second, each figure denotes a stylised present state of affairs, marked by a blue star (*), from which arrows (**2**) depict mainstream scenarios going forward, i.e., what continued influence on economy – nature relations is envisaged to prevail given "business as usual". Third, each figure displays additional scenarios (**3 - 5**) which depict alternative paths, resulting from shifting impetus of the specific technology under consideration, although often in tandem with synergetic influences originating in other technologies, or in the other potential drivers of an NPE.

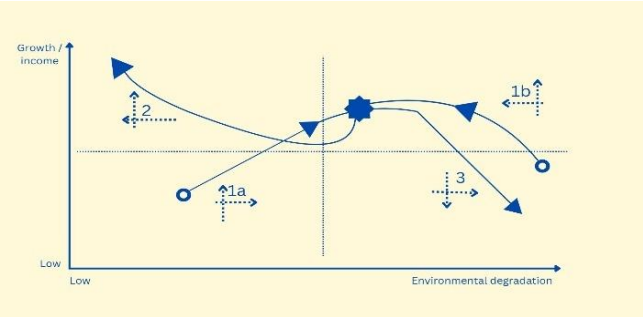
Having compared and further examined the dynamics unfolding across each of the considered domains, the work undertaken has unravelled technology-specific patterns. All main categories are dominated by unsustainable (**1**) paths, marked by economy – nature conflicting relations. Five are reckoned as leading towards higher economic growth in a conventional sense, coupled with environmental damage. In one case (waste and circularity), the prevalent trajectory is rather viewed as damaging both nature and the economy, marked by costly waste disposal and side-effects, whereas the potential value-generation of a CE remains under-developed. In all subfields, however, we observe parallel specific contributions of technology moving in the opposite direction, framing support for transitioning towards the NPE.

Energy systems stand apart as cost reductions in relatively environmentally-friendly clean tech, storage, electrification and smart grids reinforce one another. Although fossil fuel lock-ins remain influential, technical progress is shifting economic incentives in favour of sustainability. Beyond reducing GHG emissions, pressures on nature associated with fossil-fuel extraction, processing and pollution, are alleviated. Renewable energy systems carry downsides too, however, and must be designed so as to minimise adverse impacts in terms of resource extraction, land, habitats, and biodiversity.

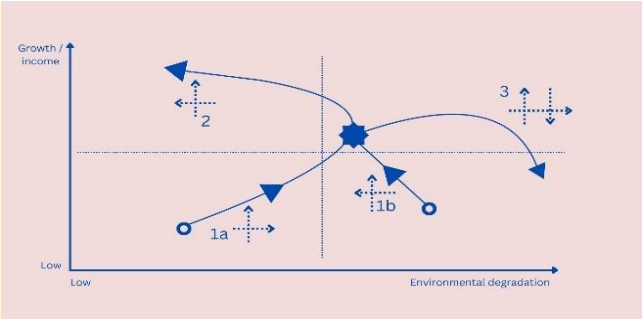
Digitalisation is presently associated with rising energy and material demand, a high environmental footprint of digital infrastructure, and rebound effects that reinforce economic growth at the expense of the environment. Yet, AI, sensing technologies, digital platforms and monitoring systems increasingly enable improved resource efficiency, system optimisation and environmental transparency. Enhanced capabilities for observation, traceability and verification offer improved mechanisms for participatory processes and integrating nature's value streams in decision-making across sectors.

Figure 4: Overview Economy–Nature Scenarios, Specific Technologies*

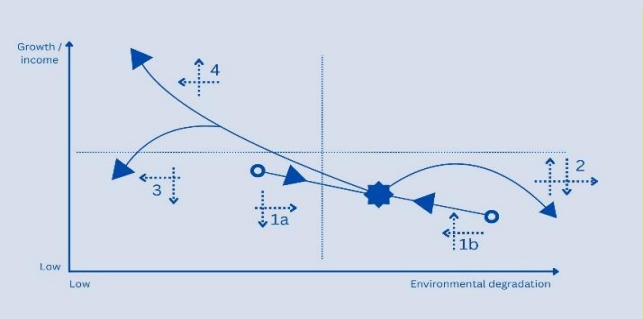
Energy



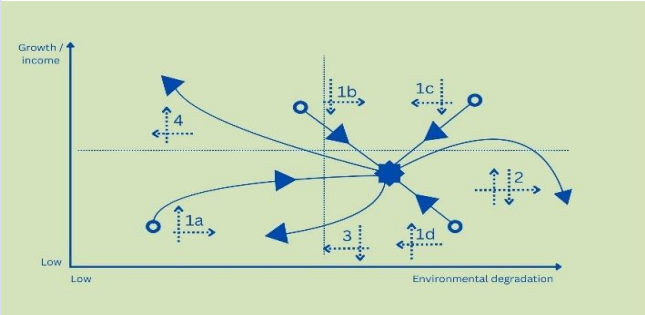
Digitalisation



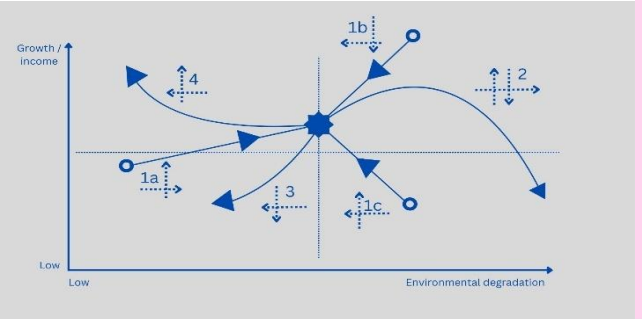
Waste and Circular Economy (CE)



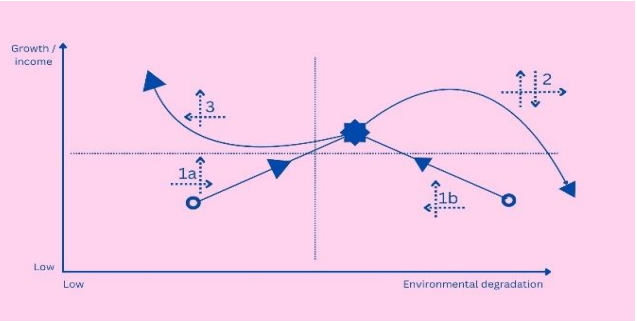
Agri-tech, Health and Lifesciences



Mobility and Transport



Production, design, funding



* The numbered pathways represent alternative directions of influence: (1) characterising predominant historical trajectories, (2) indicating the expected direction under prevailing conditions, and (3–5) representing alternative trajectories that may become feasible where technological and complementary driver conditions change.

Source: Andersson (2026)

Waste management and circularity feature technical advances that enable both economic and environmental benefits; yet, their impetus remains relatively marginal in scope. In the aggregate, this domain is marked by economic losses alongside environmental damage, under the weight of expanding waste streams, pollution and a failure of recycling to keep up with resource exploitation. Technological mobilisation in

support of waste recovery and circular value creation remains hampered by market failures, institutional inertia, fragmented value chains, and weak demand.

Agri-tech, health, and life sciences are dominated in the mainstream by capital-intensive, scalable technologies geared towards short-term productivity growth, while forests, wetlands, soils, fisheries, and biodiversity suffer massive losses. In parallel, precision technologies, improved monitoring, traditional knowledge, and the adoption of ecologically sustainable practices offer alternative pathways towards more sustainable and resilient management of natural systems. Their prospects are strengthened by changing patterns of demand, including growing awareness of nutrition and more holistic approaches to human health, animal welfare, and environmental well-being. Yet, momentum remains insufficient to enable significant upscaling and diffusion of such alternative practices, or to break the dominance of prevailing production modes.

Mobility and transport benefit from rapid advances in electrification, digital optimisation and alternative fuels. Nevertheless, long asset lifetimes, infrastructure lock-ins and continued growth in transport demand imply that environmental improvements are likely to emerge only gradually. The implications for nature extend beyond climate change. Transport infrastructure and operations contribute to habitat fragmentation, land conversion, air and water pollution, underwater noise, wildlife disturbance and mortality, while the extraction and production of fuels and infrastructure materials generate additional pressures on ecosystems and biodiversity.

Production, design and finance possess considerable leverage, reflecting influence on investment decisions, material choices, and industrial production across the economy. Decisions taken at the design and financing stages influence resource requirements, environmental impacts, product durability, and circularity over entire lifecycles, while production technologies determine how intensively materials and natural assets are used. Established production systems, long-lived capital stock, prevailing standards and financial incentives continue to favour conventional pathways. Shifting this trajectory will require that technological innovation is matched by changes in design practices, investment criteria and market incentives capable of directing capital and production towards less nature-degrading and ultimately regenerative alternatives.

In two domains - energy and digitalisation - the balance of current developments suggests a switch towards economy-nature alignment is looming. For those, the pathways perceived as most likely going forward - numbered (**2**) – thus point left up in Figure 4. The main technologies advancing in each case, renewables, smart grids, storage and AI respectively, are anticipated to combine economic benefits with alleviation of environmental damage. In the case of energy, the nature-degrading intensity of economic growth is on the decline, reflecting the rise of renewables and greater energy efficiency, reducing climate-related pressures on ecosystems as well as environmental damage associated with fossil-fuel extraction and use. Thus far, the change process is dampened by public subsidies disproportionately supporting fossil fuels and grey infrastructure. Rapid technological advance and falling costs are on course to boost electrification and green energy, although advancing the transition takes time. Meanwhile, novel technologies, interlinked with NbS, are on course to dramatically cut the costs of biofuel,

lowering the environmental imprint of jet traffic, maritime transport, etc. The benefits of digitalisation and energy further temper economy–nature degradation indirectly across other industries too. Yet, in the domains of waste management and the circular economy, agriculture, soil management and the oceans, mobility and infrastructure, and also production, design, and finance, the prospects are for the prevailing nature-degrading trajectories to remain dominant, unless significant impetus can enter the picture and realise turning points setting alternative scenarios in motion.

While green technologies hold promises across all domains, our ongoing work points to the importance of progressing a ***Dual Pathway approach***. Unless growth metrics, incentives, and distributional outcomes evolve, gains are likely to be offset by rebound effects and continued resource exploitation. Conversely, redefining prosperity without enabling innovation and productivity improvements is unlikely to secure broad political support. Invoking pathways towards a NPE should therefore consider openings for synergistic combinations, where ***technological decoupling*** and a ***broader conception of value creation*** can go together.

Major natural assets and ecosystem dynamics, along with associated value streams of nature, are under mounting pressure. The damage caused to multiple wider such systems are on the verge of passing critical thresholds. Conversely, counter-forces and practically effective solutions are on the rise. Relatively modest advances in technological deployment and innovation, if more effectively diffused and absorbed in conjunction with supportive market responses, behavioural adaptation, institutional credibility, or public engagement, may substantially re-balance what longer-term trajectories are set to dominate. This creates both heightened risks and openings for intervention.

Determining where intervention is likely to make the greatest difference nevertheless remains challenging. Sustainability problems differ in their dynamics, reversibility, and interaction with technological and economic change. Equally, technologies differ markedly in their maturity, commercial readiness, institutional setting, and dependence on complementary developments. Rather than assuming that identical strategies can be applied across all domains, the challenge lies in identifying where relatively limited but well-targeted actions may help remove key bottlenecks and increase the likelihood that favourable trajectories become self-reinforcing.

The following section therefore shifts from identifying trajectories to examining concrete opportunities for action. The selected cases represent technological developments that are already advancing towards more nature-positive economy–nature relations but whose wider impact remains constrained by identifiable roadblocks. In line with the dual-path perspective outlined above, the emphasis is not on technology alone, nor on broad systemic reform as such, but on examining how targeted interventions may help unlock ongoing processes of technological change while simultaneously strengthening the wider conditions that enable their diffusion and impact. Going forward, these cases will be further examined and, where opportunities arise, supported directly or through collaboration with relevant partners. The resulting experience will help inform the Technology Blueprint on transformational change towards the NPE.

4.4 Candidate Action Cases

Consultations, workshops and stakeholder engagement over the past two years have established a network of actors and a pool of candidate cases in which promising technologies have not yet realised their full nature-positive potential. Some engagement has taken place within the project, as noted above. The principal external platforms include:

- Workshops prepared for the presidency of COP 29, hosted by the ADA-Academy, Baku, June 5- 11, 2024, along with sessions held at COP29 itself, November 11-22, 2024;
- Future of Climate Summit, Vol. II, back-to-back with the UN Climate Week, New York, September 20, 2024;
- The Eastern Mediterranean and Middle East Climate Change Initiative (EMME-CCI) conference in Larnaca, September 26-27, 2024;
- Building Bridges, Geneva, December 9-12, 2024; WWF Economic Forum, Stockholm, May 5, 2025; and IUCN World Conservation Congress, Abu Dhabi, October 9-15, 2025;
- World Economic Forum, Davos, January 20-24, 2025, and 19-23, 2026.

Through these exchanges, a portfolio of technology initiatives offering combined economic and environmental benefits has gradually taken shape. The four cases below are not presented as proven solutions. They are candidate action cases selected because targeted interventions may help overcome identifiable roadblocks, strengthen enabling conditions and generate lessons that are transferable to the Technology Blueprint.

Each case is presented using a common structure: solutions context; potential for transformational change; roadblocks and a possible GoNaturePositive! contribution; and key driver elements. The cases cover (A) energy and transport: algae-based cost-parity biofuel; (B) digitalisation and fintech: a user-centric platform for mobilising impact finance; (C) waste and the circular economy: plastic collection and recycling in coastal regions; and (D) oceans: technology-enabled marine stewardship.

(A) NbS-generated Cost-Parity Biofuel - *domains i) and v)*

Solutions context: Electrification and a progressively lower-carbon electricity supply can reduce the environmental footprint of many forms of energy use, but some heavy-transport applications will remain difficult to electrify in the near term. Aviation, maritime transport and long-haul road freight are prominent examples. These sectors are expanding rapidly and are expected to account for a growing share of global anthropogenic GHG emissions, making scalable low-carbon fuels an important part of the transition.

Extensive effort has been directed toward developing more environmentally friendly fuel for heavy transport. The main option is biofuel, championed by individual countries as well as by multilateral organisations, such as IATA and IMO. While several sources of biofuels

exist, generally with a carbon footprint of about 20% of fossil fuels, progress has been negligible thus far, for several reasons. Most fundamentally, many conventional biofuels face practical and economic constraints, including high production costs and performance or compatibility concerns, which limit acceptance among industry and consumers. In addition, many rely on feedstocks cultivated on arable land, competing with food, feed, and other crops and thus contributing to indirect land-use change. The net environmental gain is often uncertain and, given the economic cost, contributions to the NPE are even more in doubt.

These limitations are relevant not only to food security and climate change mitigation but also to biodiversity. Where biofuel production drives agricultural expansion, monoculture, intensive water and chemical use, or indirect land-use change, it can add to habitat loss and ecosystem degradation. A biofuel pathway capable of avoiding dependence on arable land and freshwater could therefore offer wider nature-positive benefits, provided that its own impacts on marine and coastal ecosystems are carefully assessed and managed.

An envisaged way out, known for decades, is to produce biofuel using algae from the ocean. Despite several large-scale research projects, however, efforts in this regard have failed thus far. This is as algae populations – when grown in high volume and concentration - have proven susceptible to contamination and collapse.

Applying a novel methodology, a decade-long research programme led by researchers at the University of Cambridge identified a previously unknown strain of algae with properties suited to warmer and more carbon-rich conditions. When cultivated under controlled conditions with sunlight, seawater and CO2, the organism produces an oil-rich biomass that can be refined into fuel, together with co-products of potential value to agriculture. Cultivation in closed, above-ground systems is intended to maximise sunlight exposure, limit contamination and avoid discharge into the surrounding environment.

Scope for transformational change towards the NPE: If validated and deployed at scale, the solution could supply biofuel at or near cost parity with fossil fuels while substantially reducing lifecycle GHG emissions. Its relevance to the NPE extends beyond decarbonisation. By relying on seawater-based algae cultivation rather than terrestrial energy crops, it could reduce pressures associated with land conversion, freshwater use and competition with food production. These benefits, together with possible impacts on marine and coastal systems, will need to be independently tested and quantified through lifecycle assessment.

Roadblocks and GoNaturePositive! contribution: IKED invited HutanBio, the company behind the solution, to participate in a panel hosted as a World Economic Forum side event in Davos on 22 January 2026 and has since remained in contact with the company. Moving towards full-scale implementation requires independent performance and lifecycle validation, demonstration opportunities, credible offtake arrangements, international partnerships, and policy and financing support for large-scale deployment. GoNaturePositive! can contribute through communication, advocacy and coordinated stakeholder engagement, helping build acceptance for shifting investment from grey

infrastructure, assets and fuels towards lower-carbon alternatives that also avoid the land-use and biodiversity impacts associated with many conventional biofuel pathways.

Driver elements: Technology, energy, heavy transport, biofuels, cost parity, lifecycle assessment, infrastructure development, offtake arrangements, asset conversion from grey to green and carbon mitigation.

(B) ***User-Centric Fintech Platform for Mobilising Impact Finance -*** domains ii) and vi)

Solutions context: A central obstacle to transformational change towards the NPE is the persistent gap between citizens' stated environmental preferences and their actual financial and consumption behaviour. Many citizens and consumers express a willingness to support verified climate action, biodiversity and ecosystem restoration, and projects that combine environmental and social benefits. Yet trusted and accessible mechanisms for translating this willingness into recurring financial support remain scarce. At the same time, NbS, nature-based enterprises and local communities safeguarding natural assets often struggle to secure early-stage and flexible finance.

Several nascent initiatives have responded by using digital platforms to match users and investors with impact opportunities, sometimes complementing or bypassing conventional intermediaries. Innovative mobilisation, outcome verification and certification can help distinguish genuine transition capacity from superficial claims. Examples include: ***Pachama*** which applies remote sensing and AI to verify forest carbon projects; ***NCX*** which facilitates landowner participation in carbon and conservation markets through dynamic pricing and contractual mechanisms; ***TreesAI*** which supports co-investment in nature-based assets - ranging from urban forestry to flood mitigation infrastructure. Similarly, ***Team for the Planet*** pools small-scale contributions from individuals and businesses to finance scalable climate and nature-related innovations, linking everyday financial transactions to longer-term environmental outcomes[20].

Impact Card provides a concrete action case for examining how this gap might be narrowed. The agenda is deliberately phased. The initial focus is a curated digital marketplace through which users can select a project or portfolio, contribute directly, and follow delivery through dashboards and verified reporting. Card-linked functionality can be added subsequently to automate contributions through round-ups or a small share of eligible transactions, extending participation without making card issuance a prerequisite for early deployment.

On the project side, onboarding requires a clear intervention, budget, timetable, delivery team, partners, risks, impact indicators and verification plan. Funding is linked to verified impact: resources may be ring-fenced by a trusted intermediary and released in stages against agreed milestones and independently reviewed evidence. This architecture can help combine small user contributions with philanthropic, public or catalytic capital while protecting integrity and reducing early-stage risk.

[20] https://app.wedonthavetime.org/posts/cd7ae9b6-a217-45c6-93d5-4ff998e40c12

Digital interfaces and transaction-processing systems can aggregate numerous small contributions into meaningful funding flows at relatively low administrative cost. Users can choose the themes or projects they support and receive accessible feedback on implementation, outputs and verified outcomes.

The technological function therefore extends beyond transferring money. A secure project ledger and fit-for-purpose measurement, reporting and verification (MRV) can connect each contribution to project activities and results through an auditable chain. Eligible projects need credible baselines, additionality criteria, proportionate reporting and, where appropriate, third-party verification aligned with established or emerging standards for carbon, biodiversity and nature-related claims.

Aggregated transaction and impact data can also support matching or blended-finance arrangements. Demonstrated demand, a verified project pipeline and transparent reporting may encourage development banks, companies, foundations and public institutions to provide complementary capital, enabling promising projects to progress beyond isolated pilots.

Scope for transformational change towards the NPE: The case addresses both sides of the contemporary finance-nature gap. On the demand side, it lowers participation barriers that have prevented environmental concern from becoming practical financial support. Users do not need to identify specialised investment products or pay a large green premium; they can start with a chosen contribution, receive feedback and retain a clear connection to the outcomes they support. This strengthens agency and counters the perception that individual contributions are too small to matter.

On the supply side, recurring micro-contributions can provide flexible early-stage finance motivated by impact rather than immediate commercial repayment. Curated project information, milestone-based disbursement and verified reporting strengthen credibility and can make smaller projects more visible to larger financiers. Environmental value that is normally external to routine economic transactions is thereby connected more directly to financial decision-making.

Roadblocks and GoNaturePositive! contribution: The main roadblocks are regulatory and operational as much as technological. They include payment and consumer-protection requirements, privacy and data integrity, the classification of contributions and claims, project-screening costs, and the need for a sufficient pipeline of credible projects capable of translating finance into measurable outcomes. The Impact Card agenda will examine how these barriers can be addressed through phased implementation and partnerships rather than by building every function from scratch. Engagement includes development banks such as BOAD, IUCN, financial institutions and regulators, payment providers, NbEs, users and trusted verification bodies. GoNaturePositive! can contribute by testing the project-selection and MRV architecture, assessing user response and behaviour, and examining how verified outcomes and aggregated demand can mobilise matching or blended finance.

Driver elements: Digital finance, impact investment, project curation, citizen participation, milestone-based disbursement, MRV, trusted intermediation and matching finance.

(C) ***Plastic Collection and Recycling in Coastal Regions –*** domain iii)

Solutions context: Plastic illustrates a stark form of harmful economy-nature relations. Low production costs, durability and versatility support widespread use, while disposal, leakage and uncertain health effects generate high environmental and social costs. Plastic waste is often dispersed, contaminated and individually low in value, making collection expensive and weakening incentives for municipalities, communities and recycling businesses. In many coastal regions, limited collection and processing capacity results in waste being burned, deposited in uncontrolled landfills or carried through rivers and drainage systems into marine ecosystems.

The problem is therefore not simply the absence of recycling technology. It is the failure of the entire value chain to function economically. Households and collectors require incentives to separate and return waste; collection operators require sufficient and predictable volumes; recycling facilities need reliable material quality and affordable energy; and producers must have access to buyers willing to purchase recycled materials or locally manufactured products. Where one link fails, plastic loses its economic value and once again becomes a cost imposed on communities and nature.

Plastic Odyssey, an international initiative centred on a laboratory vessel and the dissemination of decentralised plastic-recycling solutions, represents a practical approach to this systemic challenge. A vessel constructed and tailored to the task operates as a mobile laboratory, demonstrator, training facility, and convening platform. It tests and disseminates relatively simple and adaptable technologies for sorting, washing, shredding, compacting, extruding, and transforming plastic waste. The objective is not primarily to collect dispersed plastic from the ocean, but to transfer technical knowledge and establish land-based solutions capable of preventing plastic from reaching the sea and damaging nature.

The technologies can be configured as modular or containerised micro-factories located close to the sources of waste. Local entrepreneurs are supported in adapting the machinery, production model, and end products to local conditions. Depending on the available waste stream and market demand, recovered material may be transformed into boards, construction elements, furniture, containers, or other usable products. More demanding material streams may be prepared locally and transferred to larger regional facilities. The model thus combines decentralised collection and initial processing with more centralised functions where scale and technical specialisation are required.

Potential for transformational change towards the NPE: The transformational potential lies not only in reducing pollution but in creating a viable circular value chain in which environmental improvement and economic incentives reinforce one another. Preventing persistent plastic from entering terrestrial, freshwater and marine ecosystems reduces direct pressures on wildlife and habitats and improves the conditions for recovery. Although recycling is not itself ecosystem restoration, it tackles a continuing source of degradation that can otherwise undermine conservation and restoration efforts. A socially equitable and participatory model can also create livelihoods and maintain financial viability across collection, sorting, decentralised processing and regional recycling.

Unlike temporary clean-up campaigns, the approach seeks to establish a self-sustaining economic loop rather than rely primarily on public expenditure or voluntary effort. The innovation extends beyond machinery to modular production systems, entrepreneurship and technical training, quality assurance, supply-chain organisation and market development. Success depends on sufficient value creation throughout the chain: collectors receive reliable payment, operators earn sustainable margins, customers obtain competitive products, and municipalities benefit from lower waste-management costs and restored amenities. Digital traceability and impact measurement can document recovered volumes, avoided leakage, product destinations, employment and community benefits and, where feasible, reductions in pressure on sensitive habitats and biodiversity.

Roadblocks and GoNaturePositive! contribution: Roadblocks include heterogeneous and contaminated feedstock, variable polymer quality, limited technical capacity, safety and permitting requirements, uncertain demand for recycled products and insufficient finance for replication and scale.

Through IKED, GoNaturePositive! is connected with Plastic Odyssey and selected coastal partners. The next step is to examine how policy, finance and stakeholder coordination can accelerate replication. Relevant work may include assessment of local unit economics and lifecycle impacts, participation of informal waste workers, product and safety standards, securing offtakers, and the design of blended-finance, public-procurement or producer-responsibility mechanisms that distribute costs and returns fairly across the chain. Transferable guidance on the technical, economic and environmental viability of decentralised recycling, together with its institutional and financial requirements, can broaden uptake without creating long-term dependence on external support.

Driver elements: Circular-economy enterprises, plastic collection and recycling, local entrepreneurship, community participation, sustainable supply chains, pollution prevention, traceability and reduced pressures on marine and coastal ecosystems.

GoNaturePositive!

iv) Advancing the scalability of novel business models for sustainable decentralised collection and recycling of plastics

- **Plastic Odyssey**
  - Fleet of Boats
  - Mobile plastic collection
- **Recycling**
  - Supply chain
  - Layered facilities: local - centralised
  - Economically beneficial and sustainable for all parties

A **laboratory vessel** promoting plastic waste reduction and recycling worldwide

Source: https://plasticodyssey.org/

(D) Technology-Enabled Marine Stewardship **-** domain iv)

Solutions context: Marine ecosystems are among the world's largest providers of ecosystem services, yet they remain among the least monitored and most poorly managed. Rapid advances in sensing, genomics, autonomous systems, AI-assisted monitoring and digital twins create new opportunities to improve ecosystem understanding, restoration and sustainable resource management.

These technologies enable real-time identification of ecological risks, adaptive routing of vessels, monitoring of fishing practices, verification of conservation outcomes, and evidence capable of guiding investment and impact finance. They can support specialised data, monitoring and decision-support services while improving the capacity of public and private actors to protect and restore marine ecosystems.

The ocean also closely resembles a global public good. Its resources are increasingly accessed through powerful technologies, while pollution, acidification, overfishing, habitat degradation, coastal engineering and climate change create interacting pressures on marine life (FAO, 2022; WWF, 2025). Technology is therefore ambivalent: it can intensify exploitation, but it can also make previously hidden impacts visible and enable better management. To date, the resources devoted to monitoring, protection and sustainable use remain small compared with the scale of the pressures.

Following exchanges and strategic deliberations with experts and relevant organisations, GoNaturePositive! has identified a set of complementary action arenas through which technology, governance, industry practice and finance could jointly address the triple planetary crisis of climate change, biodiversity loss and pollution in the oceans. The following initiatives illustrate this emerging portfolio:

Particularly Sensitive Sea Areas (PSSA): An IMO instrument that mandates countries to protect ecologically, economically or culturally valuable marine areas from shipping impacts within a country's exclusive economic zone using internationally recognised measures that regulate navigation and operation of commercial vessels, see: https://www.imo.org/en/ourwork/environment/pages/pssas.aspx

World Shipping Council: Representing around 70% of the global shipping container fleet, this body acts as a bridge with governments in shaping practical and scalable maritime environmental initiatives. Advocacy of promoting uptake of green fuels by the shipping industry through the 'Green Balance Mechanism' and promotion of global whale-ship strike reduction measures through publishing of 'The Whale Chart' demonstrate industry commitment to nature positive initiatives, see: https://www.worldshipping.org/

Global Fishing Watch: An independent international NGO providing open source, public data tracking of over 70,000 industrial fishing vessels. AI algorithms using remote sensing data from satellites can spatially quantify fishing effort, instantly flag suspicious non-compliant behaviour such as vessels turning off vessel transponders, fishing in protected areas or signs of illegal transhipments. Improved transparency of global fishing activities provides stakeholders with the tools to understand fishing pressure and enforce management from the territorial waters through to the high seas. This is probably

one of the best examples of ocean technical innovations that is making direct change to marine resource management at scale, see: https://globalfishingwatch.org/

International Pole & Line Foundation (IPNLF): An international organisation that promotes artisanal pole-and-line fishing through technology transfer and capacity building, demonstrating how sustainable fishing methods can improve livelihoods of coastal communities, reduce bycatch, and deliver high-value seafood to global markets without increasing pressure on marine ecosystems, see: https://ipnlf.org.

Potential for transformational change towards the NPE: Taken together, these initiatives form an emerging cross-border architecture for ocean stewardship. They combine protected-area governance, industry incentives, monitoring of ocean use and technology transfer that can support coastal livelihoods. Their maturity and effectiveness vary, and each faces resistance from incumbent interests or countries that continue to prioritise short-term resource extraction. Applied within the same marine area, however, the measures can reinforce one another: better data supports enforcement, adjusted practices reduce ecological damage, and improved ecosystem resilience strengthens long-term economic security. The BBNJ Agreement, or High Seas Treaty, reinforces this direction by providing a binding international framework for protected areas in international waters, environmental impact assessments and the equitable sharing of benefits from marine genetic resources. It therefore creates a common mandate around which technological and institutional initiatives can be coordinated.

Roadblocks and GoNaturePositive! contribution: Principal roadblocks include resistance from incumbent countries and industries, entrenched operating practices, slow multilateral negotiations, fragmented competences and weak coordination across policy, technology, finance and conservation communities. At the same time, improved monitoring and communication are making ecological impacts and viable responses more visible. GoNaturePositive! is connected with experts supporting multilateral negotiations and frontrunner industry initiatives. The project can help identify a turning point by bringing these strands together around adjusted shipping routes, stronger measurement and reporting, reduced wildlife impacts, and impact finance for blue innovation and marine restoration.

Particular attention will be given to transferable lessons on how monitoring, smart sensing, data analytics and related technologies can work in conjunction with policy, finance and social participation. Application areas include route optimisation, wildlife-risk reduction, transparent fishing and shipping activity, improved conservation reporting, sustainable resource management, and the channelling of finance towards verifiable marine outcomes. Together, these interventions can reduce pressures on marine ecosystems, strengthen conservation and regeneration, and support economic activities that depend on long-term ocean health.

Driver elements: Marine ecosystems, global commons, wildlife protection, monitoring and data innovation, policy coordination, governance, business engagement, maritime transport and impact finance.

4.5 Towards the Technology Blueprint

The next stage will combine the analytical framework on economy-nature trajectories with lessons from the action cases introduced above. These insights will be synthesised in the Technology Blueprint, due at the end of October 2026. The Blueprint will focus on transferable principles and practical guidance: how to identify a technological turning point; assess its nature-positive potential and possible rebound effects; overcome technical, institutional, financial and behavioural roadblocks; align complementary drivers; and define evidence, partnerships and scaling pathways appropriate to different sectors and regions.

Chapter 5: Social Change Driver[21]

5.1 Characterisation of the issues

5.1.1 Why Social Change Matters for a Nature-Positive Economy

In this chapter, the focus is on the societal enabling conditions that allow the NPE to move from ambition to implementation by strengthening participation, legitimacy, fairness and collective learning. Its objective is to identify practical approaches through which citizens, communities and civil society can support the design, implementation and long-term durability of nature-positive transitions.

Achieving a NPE requires transformative change, understood as fundamental shifts in societal values, institutions and practices (IPBES, 2024). Policy, finance and technology alone are insufficient to deliver this transformation. Their success depends on social conditions such as trust, participation, legitimacy and the willingness of people and organisations to adopt and sustain new practices. Likewise, decisions over what constitutes “nature positive”, acceptable trade-offs, and the distribution of costs and benefits require inclusive processes that recognise diverse values, knowledge systems and lived experiences (de Luca et al., 2024).

Social change is therefore treated as an enabling dimension of the NPE; it is essential for creating the social conditions under which policy, finance and technology interventions can achieve durable and equitable outcomes. The following sections draw on the literature to identify the principal social and ethical challenges shaping the implementation of a NPE.

[21] This chapter has been authored by Samuel Lara Arciniegas.

5.1.2 Social & ethical questions shaping NPE transition

To operationalise the societal dimension of the NPE, the literature review undertaken has identified four recurring social and ethical questions that shape whether nature-positive interventions are adopted, resisted, or sustained. Together, they provide a social lens that complements the broader GoNaturePositive! measurement framework and guide the consultation process and the development of the Social Change Blueprint (cf. Table 3).

- **Fairness & Livelihoods** – How are the costs, benefits, risks and opportunities of the transition distributed across society?
- **Values, Traditions & Behaviours** – How do cultural values, identities and everyday practices influence support for nature-positive change?
- **Inclusion & Voice** – Who participates in decision-making, whose knowledge is recognised, and who can influence outcomes?
- **Accountability & Integrity** – How are transparency, trust and credible implementation ensured?

5.2 A Framework for Social Transformation towards a NPE

5.2.1 From Social Challenges to Social Levers

Building on the four social and ethical questions identified above, nine social levers were identified through the literature review as recurring mechanisms through which citizens, communities and civil society can accelerate the transition towards a NPE. These levers bridge diagnosis and action by identifying where social momentum can be strengthened and how social dynamics interact with policy, finance and technology. Rather than representing a single pathway, they operate across individual, community, institutional and structural levels of change and are mutually reinforcing.

5.2.2 Operationalising the Levers: Engagement Tools

The social levers identify where social transformation is needed. To translate these pathways into practice, a portfolio of engagement tools - that can be adapted to different contexts, stakeholder groups and implementation needs - is under development.

The tools are designed as modular interventions that support participation, behaviour change, trust-building, collective learning and community action. Rather than prescribing a single methodology, they can be combined according to the social challenges identified through the assessment process. Together, the broader evaluation methodology developed within the project, the social levers and engagement tools create a pathway from diagnosis to implementation.

Table 3: Social and ethical dimensions shaping implementation of a NPE

Social & ethical dimension	Why it matters for the NPE	Key mechanisms identified	References
Fairness & Livelihoods	Ensures that the costs, benefits and opportunities of the transition are perceived as equitable and socially legitimate.	- Fairness in outcomes (distribution of costs and benefits) - Fairness in process (participation in decisions) - Respect and recognition of rights and knowledge - Place-based sensitivity - Trust and reciprocity	Kaljonen et al. (2021); Crespy & Munta (2023); Molnár et al. (2023); Huntjens & Kemp (2022)
Values, Traditions & Behaviours	Strengthens long-term support by aligning nature-positive actions with cultural values, identities and everyday practices.	- Value alignment - Relational values - Cultural continuity - Social norm visibility - Cultural mediation	McCarthy & Meredith (2022); Kashima (2020); Fornara et al. (2020); Häyrynen & Hämeenaho (2020)
Inclusion & Voice	Improves legitimacy by ensuring affected groups can influence decisions and contribute knowledge.	- Procedural justice - Recognition justice - Empowerment and counter-power - Epistemic inclusion - Social learning and trust-building	Delgado & Perez Aleman (2021); Guibrunet et al. (2021); Larson et al. (2022); Nyssa et al. (2024)
Accountability & Integrity	Builds trust by ensuring nature-positive commitments are transparent, credible and resistant to greenwashing.	-Transparency with enforcement - Regulatory coherence - Technological traceability - Public oversight - Ethical governance	Mason (2020); Gupta et al. (2020); Buttigieg & Pulis (2024); Wong et al. (2021); Shukla (2025)

Public Pledges and Reminders

Public pledges encourage individuals, groups or organisations to translate intentions into visible commitments, while reminder mechanisms help maintain behaviour over time. By increasing accountability and making commitments visible, this tool supports the Everyday Choices & Social Norms lever and helps reduce the intention–action gap.

Peer-Mentor Micro-Cohorts

Peer-mentor micro-cohorts bring together small groups that meet regularly to exchange experiences, reflect on challenges and support mutual accountability. They strengthen peer learning, build confidence and create opportunities for experimentation and collaborative problem-solving. Within GoNaturePositive! this approach aligns closely with the peer-learning activities foreseen under the Nature-Positive Pioneer Programme.

Table 4: Nine social levers supporting social transformation towards a NPE

Social Lever	Primary Level of Change	Role in supporting the NPE	References
Everyday Choices & Social Norms	Individual & peer networks	Makes nature-positive behaviours visible, socially reinforced and easier to adopt by shaping everyday choices and social expectations.	Trujillo et al. (2021); Soliman et al. (2018); Doody (2015)
Education & Value Change	Individual & collective learning	Strengthens knowledge, agency and shared values through transformative learning, enabling long-term behavioural and societal change.	Jacobi et al. (2016); Bryant et al. (2021); Tillmanns (2020)
Local Stewardship & Community Action	Community & place-based systems	Builds trust, ownership and collective action by connecting nature-positive objectives to local landscapes, identities and livelihoods.	Bennett et al. (2018); Hasanov & Zuidema (2022); Bird & Fahy (2025)
Social Innovation & Community Economy	Organisational & economic systems	Develops collaborative economic models that strengthen local resilience, livelihoods and nature-positive value creation.	Kim & Lim (2017); Guarascio (2022); Morandeira Arca et al. (2021)
Participatory Governance & Co-Creation	Institutional decision-making	Improves legitimacy and solution quality by involving stakeholders in deliberation, decision-making and co-design.	Ross et al. (2021); Ruiz-Mallén (2020); Kersting (2021)
Advocacy, Voting & Market Pressure	Political & market systems	Influences policy and business practices through civic participation, consumer action and institutional accountability.	Grewal et al. (2016); Lightfoot (2019); Sylvia & Hasan (2025)
Digital Participation & Transparency	Information & accountability infrastructure	Expands access to information, participation and monitoring while strengthening transparency and accountability.	OECD (2022); Sharmin & Chowdhury (2025); Jopang et al. (2024)
Emotional Connection & Culture	Identity, norms & shared meaning	Strengthens motivation for action through identity, storytelling, place attachment and cultural values.	Whitburn et al. (2019); Lumber et al. (2017); Lovati et al. (2023)
Global Equity & Justice	Structural & distributive systems	Ensures that the benefits, responsibilities and decision-making power associated with the transition are distributed fairly across societies and generations.	Klinsky et al. (2017); Cairney et al. (2023); Sovacool et al. (2021)

Funded by the European Union

Story Harvesting and Ambassadors

Story harvesting captures local experiences of nature-positive action, while ambassador approaches empower trusted community members to communicate these experiences within their own networks. Together, they strengthen legitimacy, increase engagement and help translate abstract NPE concepts into relatable local narratives.

Interactive Scenario Simulations

Interactive scenario simulations enable participants to explore alternative pathways, assess trade-offs, and explore social, environmental, and economic consequences of various decisions. By making assumptions explicit and encouraging collaborative reflection, they strengthen systems thinking, dialogue, and informed decision-making. This tool is particularly useful where decisions involve competing priorities, uncertainty, or concerns regarding fairness and legitimacy. It supports the Education & Value Change, Participatory Governance & Co-Creation, and Global Equity & Justice levers by creating structured space for deliberation, collective learning, and co-design.

Peer-Champion Networks

Peer champions are respected individuals who demonstrate nature-positive practices and encourage their adoption within existing social networks. By providing visible examples and trusted leadership, this tool helps accelerate the diffusion of new behaviours and strengthens social momentum for change.

Community Events and Recognition

Community events create opportunities for collective participation, celebration and learning, while recognition schemes reinforce positive social norms by making contributions visible. Together, they strengthen local ownership, encourage participation and build a shared identity around nature-positive action.

Table 5: Proposed engagement tools supporting the Social Change Blueprint

Engagement Tool	Primary Purpose	Main Social Levers Supported
Public Pledges & Reminders	Reinforce commitments and support behaviour change over time.	Everyday Choices & Social Norms
Peer-Mentor Micro-Cohorts	Facilitate peer learning, reflection and mutual support.	Education & Value Change; Local Stewardship & Community Action
Story Harvesting & Ambassadors	Capture lived experiences and promote trusted local voices.	Emotional Connection & Culture; Local Stewardship & Community Action
Scenario Simulations	Support dialogue around trade-offs, uncertainty and decision-making.	Participatory Governance & Co-Creation; Global Equity & Justice
Peer-Champion Networks	Accelerate the diffusion of nature-positive practices through trusted peers.	Advocacy, Voting & Market Pressure; Everyday Choices & Social Norms
Community Events & Recognition	Build visibility, participation and collective ownership of nature-positive action.	Local Stewardship & Community Action; Emotional Connection & Culture

Funded by the European Union

Table 6: From Assessment to Action: Linking Social Challenges, Levers, and Engagement Tools

Assessment Finding	Relevant Social Lever	Example Engagement Tool
Limited awareness, agency, or shared understanding	Education & Value Change	Interactive Scenario Simulations; Peer-Mentor Micro-Cohorts
Weak visibility of nature-positive behaviours	Everyday Choices & Social Norms	Public Pledges & Reminders; Community Recognition
Low trust or weak local ownership	Local Stewardship & Community Action	Story Harvesting & Ambassadors; Community Events
Legitimacy concerns or limited participation	Participatory Governance & Co-Creation	Interactive Scenario Simulations; Peer-Mentor Micro-Cohorts
Weak accountability or transparency	Digital Participation & Transparency	Participatory Monitoring; Story Harvesting
Economic concerns or perceived unfairness	Social Innovation & Community Economy; Global Equity & Justice	Scenario Simulations; Peer Learning Cohorts
Slow diffusion of new practices	Advocacy, Voting & Market Pressure; Everyday Choices & Social Norms	Peer-Champion Networks; Public Commitments

5.2.3 From Assessment to Action: Linking Social Challenges, Levers and Engagement Tools

Together, the assessment framework, social levers and engagement tools provide the operational foundation of the Social Change Blueprint. Rather than prescribing a single intervention, the framework supports the selection of context-specific combinations of tools that can be adapted to different sectors, stakeholder groups and stages of the transition. The proposed tools will be further refined and validated through pilot implementation and stakeholder engagement activities.

5.3 Tapping into Readiness for Change

5.3.1 Consultation Process

The Social Change Blueprint is being developed through an iterative consultation process involving pilot activities and stakeholder engagement across GoNaturePositive!. To date, this process has drawn on two complementary sources of evidence.

The first consists of structured reflection exercises integrated into the GoNaturePositive! roadmap workshops, where participants explored the four social and ethical questions developed in the present strand of work on social change, to identify

the social conditions and forms of engagement considered most critical for achieving nature-positive futures across different sectors.

The second is an in-depth case study developed with the Voedsel Anders agri-food systems pilot in Ghent. Through participatory workshops, participants moved from reflecting on the strengths and limitations of the former Ghent Food Council, to exploring practical governance scenarios, and finally to co-designing an independent citizen-led food initiative: Ghent Food Act.

Together, these consultation processes provide both a cross-sector validation of the proposed framework and a practical demonstration of how social transformation can emerge through participatory governance. The findings presented here represent emerging insights that will be further refined through additional pilot activities and citizen engagement leading forward towards the Blueprint.

5.3.2 Emerging Social Priorities Across Consultations

Across the WP2 roadmap workshops and the Ghent pilot, participants consistently highlighted that nature-positive transitions depend not only on technical solutions, policy or finance, but equally on social acceptance, trust, participation and collective ownership. Despite the diversity of sectors represented, remarkably similar social priorities emerged. These domains can be bridged by applying the four social and ethical questions as a common assessment lens across sectors, then translating the priorities identified into context-specific combinations of social levers and engagement tools. This creates a shared structure for cross-sector learning while allowing implementation to remain sensitive to sectoral and place-based conditions.

5.3.3 Signals of Readiness for Change

Despite the challenges identified, consultations revealed substantial readiness for social transformation. Across sectors, participants consistently expressed a preference for practical experimentation, collaboration and visible action rather than additional conceptual discussion. The pilots also highlighted growing interest in community stewardship, peer learning and participatory governance as practical pathways for implementation.

The Ghent Food Act group further illustrates that readiness for change extends beyond positive attitudes. Following the consultation process, participants established thematic working groups, launched communication channels, organised a public validation event, and began implementing concrete activities around neighbourhood food initiatives, farmer-citizen relationships and Social Security for Food. This progression demonstrates how participatory processes can evolve into sustained collective action and durable community-led governance.

Table 7: Cross-sector insights emerging from the consultation process

Social & Ethical Question	Recurring findings across sectors	Illustrative evidence from consultations
Fairness & Livelihoods	Participants consistently emphasised that nature-positive transitions must improve both ecological outcomes and social wellbeing. Fairness was understood not only as the equitable distribution of costs and benefits, but also as ensuring viable livelihoods, fair value chains and economic models that reward nature-positive practices.	**Ghent Food Act:** discussions evolved from food affordability towards Social Security for Food, combining dignified access to food with fair farmer incomes and agroecological production. **Food systems:** concerns regarding unfair value chains and disconnection between producers and consumers. **Tourism:** balancing visitor economies with residents' quality of life. **Blue Economy:** developing viable business models that sustain coastal communities while restoring ocean health.
Values, Traditions & Behaviours	Behavioural change was recognised as essential but dependent on cultural values, local identities and everyday practices. Participants consistently highlighted the importance of awareness, education, storytelling and reconnecting people with nature through positive and locally meaningful experiences.	**Ghent Food Act:** participants proposed neighbourhood food initiatives, intercultural cooking, harvest events and stronger farmer-citizen relationships rather than awareness campaigns alone. **Tourism:** behavioural resistance to sustainable mobility and protecting local identity. **Blue Economy:** addressing societal "blue blindness". **Forestry & Pollinators:** increasing public understanding of biodiversity and ecosystem management.
Inclusion & Voice	Meaningful participation requires more than consultation. Across sectors, participants stressed representation, recognition of local knowledge and opportunities for communities to shape decisions and long-term governance.	**Ghent Food Act:** emphasis on connecting existing initiatives, involving farmers, citizens and vulnerable groups, and establishing open working groups rather than closed governance structures. **Tourism:** resident participation in destination planning. **Food systems:** involving people experiencing food poverty in designing solutions. **Other pilots:** strengthening the voice of local and coastal communities in decision-making.
Account-ability & Integrity	Trust depends upon transparent governance, credible implementation and long-term institutional commitment. Participants consistently highlighted the need for coordination, monitoring and governance arrangements capable of sustaining action beyond individual projects or political cycles.	**Ghent Food Act:** following the discontinuation of the Food Council, participants deliberately designed an independent governance structure to strengthen legitimacy while maintaining constructive relationships with public authorities. **Across pilots:** repeated calls for transparent communication, monitoring and confidence that nature-positive commitments translate into tangible outcomes rather than symbolic actions.

5.4 Implications, Conclusions, and Next Steps

The consultation findings broadly validate the proposed Social Change Blueprint. Across sectors, the four social and ethical questions consistently proved effective in identifying barriers and opportunities for nature-positive transformation, while the Ghent case demonstrated how participatory processes can evolve into sustained community-led action.

Four social levers emerged as particularly relevant across the consultations:

- Participatory Governance & Co-Creation
- Local Stewardship & Community Action
- Social Innovation & Community Economy
- Emotional Connection & Culture

Participants also highlighted the importance of practical engagement tools, including community events, peer learning, storytelling and participatory deliberation, as well as the need for stronger coordination capacity to sustain collective action over time.

Overall, this milestone establishes the conceptual foundation of the Social Change Blueprint by linking social challenges, transformation levers and engagement tools into a practical pathway from assessment to action. The next phase of work will focus on testing and refining this framework through pilot activities and stakeholder engagement, informing the preparation of the Social Change Blueprint.

Chapter 6: Mobilising the Drivers and Moving towards the Blueprints

6.1 Mobilising the Drivers towards Transformational Change

The present report introduces complementary entry points for redirecting destructive economy–nature relations through transformational change towards a Nature-Positive Economy (NPE). Policy, finance, technology, and social change each exert major influence. In the aggregate, however, they remain embedded within economic and institutional structures that favour the short-term exploitation of natural assets for concentrated benefits over their management in support of long-term and widely distributed value.

This underlying imbalance is not new. What has changed is the scale and speed at which the modern economy expands, coupled with the power of human organisation and technologies capable of intensifying resource extraction, production, consumption, and associated environmental pressures. Economic and political influence is concentrated

among actors benefiting from prevailing arrangements, while the costs of nature degradation are dispersed across societies, ecosystems, and future generations. As long as immediate and appropriable returns outweigh longer-term benefits that are difficult to measure, capture, or defend, destructive economy–nature relations remain self-reinforcing.

The four drivers are all inherently ambivalent. Policy and regulation are uniquely poised to constrain harmful activity and support nature-positive alternatives; yet, they are equally at work protecting incumbent interests, subsidising exploitation, and weakening accountability. Finance and investment must essentially step up by directing resources towards restoration and resilience. Thus far, however, they predominantly continue to reward activities offering faster and more readily captured returns. Technology offers remarkable tools and capacity to realise cleaner production, circularity, improved monitoring, and ecosystem regeneration. In the aggregate, however, they expand the capacity to exploit natural assets. When technology enables enhanced efficiency, moreover, the resulting growth may further degrade nature through rebound effects. Social dynamics are critical for realising broad-based demand for a better future, and thereby help strengthen stewardship, legitimacy, and collective action. Yet, in the world we live in, social change equally reinforces unsustainable consumption, polarisation, responds to misinformation, and plays part in putting up resistance to action in support of sustainability.

The task at hand may thus appear overwhelming. Asking all to join hands in realising our common good won't lead far. Adjustments on the margin, "business as usual", will not change much. By contrast, in this Milestone, GoNaturePositive! has set out to examine the role of four identified key driving forces for transformational change towards a NPE and, from there on, identify how their prevailing impetus can be countered or redirected. At stake is the presence of turning points, where viable alternatives can be catalysed, supported, diffused, and scaled sufficiently to alter the trajectory of economy–nature relations.

Transformational potential arises where interventions change incentives, capabilities, expectations, market conditions, or the balance of influence among relevant actors. In such circumstances, mutually reinforcing effects across the drivers may help overcome roadblocks and enable initially limited advances to generate wider momentum.

6.2 Towards Four Drivers in Motion

Policy can contribute by constraining destructive options, removing incentives that favour environmental degradation, and providing credible direction for investment and innovation. Procurement, standards, planning, taxation, subsidy reform, and accountability mechanisms can strengthen demand for nature-positive goods, services, and infrastructure. Their impact, however, is conditioned by implementation, enforcement, political resistance, and the availability of viable alternatives. Regulation that is disconnected from technological, financial, organisational, or social realities may impose costs without changing the underlying trajectory.

Finance and investment influence whether emerging alternatives gain access to resources and whether nature-related risks and benefits enter economic decision-making. Improved valuation, risk assessment, insurance, blended finance, and monetisation mechanisms can strengthen the prospects of nature-positive initiatives. Yet making environmental benefits visible is not sufficient where no actor can capture them, no credible revenue stream exists, or financial institutions continue to favour short-term and familiar returns. Progress therefore involves not only developing financial tools, but identifying arrangements capable of changing how value, risk, and prospective returns are recognised and allocated.

Technology provides the means through which alternative pathways may become technically and economically viable. Cleaner energy systems, circular production, sustainable mobility, nature-supporting agricultural practices, monitoring technologies, and ecosystem-management tools can reduce environmental pressures while enabling economic and societal benefits. Their presence does not guarantee adoption. Incumbent infrastructure, established business models, vested interests, uncertain markets, limited finance, weak demand, and regulatory barriers may prevent promising solutions from gaining traction. The relevant challenge is to identify interventions capable of helping viable technologies move from isolated applications towards broader deployment and influence.

Social change shapes whether such processes are accepted, resisted, adopted, and sustained. Fairness, livelihoods, trust, participation, cultural values, and local ownership influence how policy, investment, and technology interventions operate in practice. Social engagement should not be viewed merely as a means of communicating predetermined solutions or securing consent. It can reveal conflicts, expose distributional consequences, strengthen the position of affected communities, and help shape alternatives around lived realities. It can also counter misinformation and narratives that portray environmental protection as the cause of economic or social hardship while obscuring the interests benefiting from continued degradation.

Synergies between the drivers should be understood in this light. They arise where an intervention in one domain strengthens the capacity of another to alter prevailing incentives or overcome resistance. Monitoring and verification technologies, for example, may make environmental outcomes more observable, but their wider contribution emerges when verified results affect regulation, investment, purchasing, insurance, or public accountability. A viable technology may reduce the economic cost of environmental improvement, but diffusion may be advanced through procurement commitments, risk-sharing finance, infrastructure investment, or strengthened demand. Community engagement may improve legitimacy and implementation, but its transformational significance is greater where local actors gain meaningful influence over decisions, benefits, and long-term stewardship.

The work undertaken for this Milestone combines analytical research with stakeholder consultations, pilot engagement, workshops, external networking, and interaction with practitioners and other relevant actors. These activities do more than confirm conclusions derived from desk-based analysis. They help reveal how interests, incentives, institutional constraints, and practical capabilities shape what can be achieved. They also

provide means of identifying prospective turning points and assessing whether proposed initiatives can withstand real-world resistance and uncertainty.

Active experimentation, testing, monitoring, and learning form an important part of this approach. The candidate action cases pursued in the technology strand, for example, are not presented simply as illustrations of promising solutions. Engagement with them is intended to examine how specific roadblocks may be addressed, which forms of support can strengthen uptake, and whether targeted interventions can catalyse wider processes of diffusion and scaling. Comparable learning processes are being advanced through policy experimentation with cities and regions, consultation with financial actors and intended users of the Bankability Toolbox, and participatory testing of social levers and engagement tools.

Such processes cannot provide universally applicable formulas. Relevant barriers, interests, technologies, institutions, and actor capabilities vary across sectors and places. Nor should individual cases be interpreted as proof that wider transformation will follow. Their value lies in generating grounded evidence on how change is initiated, obstructed, accelerated, or reversed, and on where relatively focused interventions may exert leverage beyond their immediate setting.

The need for such learning is accompanied by urgency. Environmental pressures are intensifying while institutional responses remain slow, contested, and vulnerable to reversal. Delays further strengthen incumbent pathways through continuing investment, infrastructure development, ecosystem degradation, and the normalisation of harmful practices. The work ahead must therefore focus not only on identifying desirable futures, but on actionable opportunities capable of shifting trajectories before critical ecological losses become irreversible.

6.3 From the Present Milestone to the Blueprints

The next phase will advance four driver-specific Blueprints covering policy and regulation, finance and investment, technology and innovation, and social change. Each will address different target audiences, instruments, and areas of action.

Each Blueprint should help users identify the prevailing economy–nature trajectory; the interests, incentives, and institutional arrangements reinforcing it; prospective alternative pathways; the principal roadblocks preventing their advancement; actors possessing relevant capacities or influence; and initiatives and interventions capable of overcoming particular bottlenecks. Attention should further be paid to possible counter-reactions, unintended consequences, rebound effects, and the conditions under which favourable changes may become durable and self-reinforcing.

The Blueprints will draw upon interaction and consultations with researchers, decision-makers, practitioners, and stakeholders. Cases and pilot activities will be used to examine how change processes unfold, which interventions prove effective, where they encounter resistance, and how approaches need to be adapted. Real life experimentation, testing, and learning will add further value and insight. Comparison across experiences will help distinguish context-specific features from lessons with wider relevance.

The **Policy and Regulation** Blueprint and the Policy Alignment Self-Assessment Tool will be applied through the Nature-Positive Pioneer Programme. Engagement with participating cities and regions will provide opportunities to examine how regulatory direction, procurement, planning, implementation capacity, and stakeholder involvement affect practical outcomes. The purpose is not merely to compare formal policy frameworks, but to learn how specific policy interventions can address prevailing barriers and activate feasible pathways in different institutional and territorial settings.

The **Finance and Investment** work will develop and test components of the Bankability Toolbox through consultation with financial institutions, insurers, project developers, public authorities, and other prospective users. Particular attention will be paid to how nature-related value can be identified and verified, how risks and benefits may be allocated, and how financial instruments can be matched to the characteristics of particular initiatives. Testing will help determine where improved information or valuation can influence decisions and where more fundamental market, contractual, regulatory, or institutional barriers remain.

The **Technology Blueprint** will combine further analysis of technology's role in shifting economy-nature trajectories with continued engagement around selected candidate action cases. These cases will draw lessons from targeted interventions aimed to strengthen technically viable solutions, overcome impediments to adoption, mobilise investment and demand, and support diffusion or replication. The Blueprint will also examine the Dual Trajectory approach, including how technical progress can support green growth while contributing to shifts in how growth and value creation are understood, measured, and rewarded. The lessons sought concern not only the technologies themselves, but how business models, monitoring and valuation systems, and complementary policy, finance, and social action can reshape incentives and improve the viability of nature-positive pathways.

The **Social Change Blueprint** will refine and test combinations of social levers and engagement tools through pilot activities and stakeholder engagement. This work will examine how fairness, trust, local stewardship, participation, cultural values, and collective action influence the advancement of nature-positive initiatives. It will also help identify circumstances in which social resistance reflects legitimate concerns over livelihoods and distribution, as opposed to misinformation, exclusion, or interests seeking to preserve prevailing arrangements.

The present work aims not only to cast light on individual initiatives, but also to generate an actionable understanding of how complementary interventions can shift the balance between competing pathways. Cross-driver synergies matter where they enable viable alternatives to overcome resistance, secure resources and legitimacy, demonstrate results, and expand their influence.

Learning across the four strands should help identify how forces operating through one driver may impede or reinforce progress through another. Policy experimentation may reveal the absence of investable alternatives, technical capacity, or public legitimacy, while also showing how regulatory clarity, procurement, and public direction can

stimulate demand and confidence. Finance cases may expose inadequate verification, weak revenue models, or regulatory barriers, but also demonstrate how risk-sharing mechanisms and improved valuation can enable viable initiatives to advance and scale. Technology cases may reveal constraints arising from incumbent interests, limited demand, or social resistance, while demonstrating how novel solutions, improved capabilities, reduced costs, and reliable monitoring and verification tools can underpin public demand, private investor behaviour, and policy action. Social engagement may expose distributional or legitimacy concerns, while helping build demand, accountability, and local ownership, thereby increasing the feasibility and durability of interventions across the other drivers.

The resulting Blueprints will neither offer uniform prescriptions nor serve as separate catalogues of instruments. Their ambition is to guide relevant actors in diagnosing the situations they face, identifying feasible entry points, and selecting initiatives and interventions suited to the roadblocks and opportunities at hand. Drawing on evidence generated through continued engagement and testing, they will provide actionable guidance on how the respective drivers—and synergies between them—can catalyse and leverage processes capable of instigating transformational change towards the NPE.

6.4 Timelines and Pathways Going Forward

The Technology Blueprint will be delivered first, with submission end-October 2026. The other three Blueprints, addressing the remaining drivers, are due by the end of 2026.

Their common purpose is not to prescribe a coordinated master plan, but to provide practical guidance on how each driver can be mobilised to counter destructive dynamics and strengthen viable pathways towards the NPE. Delivery of the Blueprints will not mark the end of the process. They will be published, showcased, and disseminated through relevant national and international fora, guided by a strategy for engaging decision-makers, practitioners, and other stakeholders in their application. Continued dialogue, practical experimentation, and learning from implementation will help refine the approaches, expand their uptake, and instigate transformational change in support of the NPE.

Applied individually or in combination, the Blueprints can help relevant actors identify where complementary action across policy, finance, technology, and society can remove persistent bottlenecks, reinforce viable alternatives, and translate advances in particular areas into broader transformational change. Experience gained through their application can, in turn, support their continued refinement and wider diffusion.

References

Aghion, P., Barrage, L., Donald, E., Helous, D. and Liu, E. (2025a). "Transition to Green Technology Along the Supply Chain", NBER Working Paper w33934, Cambridge. doi.org/10.2139/ssrn.5315754

Aghion, P., Boppard, T., Peters, M., Schwartzman, M. and Milioti, F. (2025b). "A Theory of Endogenous Degrowth and Environmental Sustainability", NBER Working Paper w33634, Cambridge. doi.org/10.2139/ssrn.5296504

Ahmed, N. (2024). "Planetary phase shift as a new systems framework to navigate the evolutionary transformation of human civilisation, *Foresight* 27(2), pp. 240-66. doi.org/10.1108/FS-02-2024-0025

Alcamo, J. (2001). "Scenarios as Tools for International Environmental Assessments", Environmental issue report 24/2001, European Environment Agency.

Andersson, T. (1991). "Government Failure – the Cause of Global Environmental Mismanagement", *Ecological Economics* 4, pp. 215-36.

Andersson, T., (2026). Advancing Methodology and Issues of Relevance to Drivers of a Nature-Positive Economy (NPE), with Special Focus on Technology, Technical Report, T3.1+3.4, GoNaturePositive!, IKED, Malmö. Full TEKN report July31.pdf

Andersson, T., O'Driscoll, C., Enzi-Zechner, V., Palha, P., Dostal, P., McCarron, I., Ramos, T., Aranguren, S., Goncález, A. and Bosco, F. (2026). Pilot Reporting on Technology Considerations for Progressing towards a Nature-Positive Economy, Background report for M7, GoNaturePositive! WP2 pilots final selection 12 July Subm.pdf

Anthoff, D. and Hahn, R. (2010). "Government failure and market failure: on the inefficiency of environmental and energy policy", *Oxford Review of Economic Policy* 26(2), pp. 197-224. doi.org/10.1093/oxrep/grq004

Bănică, A., Ţigănaşu, R., Nijkamp, P. and Kourtis, K. (2024). "Institutional Quality in Green and Digital Transition of EU Regions - A Recovery and Resilience Analysis", *Global Challenges* 8(9). doi.org/10.1002/gch2.202400031

Barber, B.M., Morse, A., and Yasuda, A. (2021). "Impact investing", *Journal of Financial Economics* 139(1), pp. 162–85. doi.10.1016/j.jfineco.2020.07.008

Barbett, L., Stupple, E., Sweet, M., Schofield, M., and Richardson, M. (2020). "Measuring Actions for Nature - Development and Validation of a Pro-Nature Conservation Behaviour Scale", *Sustainability* 12(12). doi.org/10.3390/su12124885

Bauer, R., Ruof, T., and Smeets, P. (2021). "Get Real! Individuals Prefer More Sustainable Investments", *The Review of Financial Studies* 34(8), pp. 3976-4043. doi.org/10.1093/rfs/hhab037

Benatti, N., Groiss, M., Kelly, P., and Lopez-Garcia, P. (2024). "Environmental regulation and productivity growth in the euro area: Testing the porter hypothesis", *Journal of Environmental Economics and Management* 126(6), doi.10.1016/j.jeem.2024.102995

Bennett, N.J., Whitty, T., Finkbeiner, E.M., et al. (2018). "Environmental stewardship: A conceptual review and analytical framework. *Environmental Management" 61*(5), pp. 597–614. doi.org/10.1007/s00267-017-0993-2

Bezin, E. (2019). "The economics of green consumption, cultural transmission and sustainable technological change", *Journal of Economic Theory* 181, pp. 497-546. doi.10.1016/j.jet.2019.03.005

Bird, L., Fahy, F., and Reilly, K. (2025). "Place-based learning and community stewardship: A framework for facilitating community engagement", *Gateways* 18(2). doi.org/10.5130/ijcre.v18i2.9192

Bouman, T. and Steg, L. (2019). "Motivating Society-wide Pro-environmental Change", *One Earth* 1(1), pp. 27-30. doi.org/10.1016/j.oneear.2019.08.002

Buttigieg, C.P. and Pulis, S. (2024). Strategic initiatives to address greenwashing, ERA Forum. doi.org/10.1007/s12027-024-00815-7

Buijs, A., Hoogstra-Klein, M., Boer, T., Dressel, S,. and Langers, F. (2025). Evidence for Increasing Public Support for Nature Conservation: A 15-Year Longitudinal Analysis of Nature Conservation Attitudes in the Netherlands, Leuven University. doi.org/10.2139/ssrn.5151817

Buylova, A., Nasiritousi, N., Bergman, J., Sanderink, L., Wickenberg, B., Casiano Flores, C., and McCormick, K. (2025). "Bridging silos through governance innovations: The role of the EU cities mission", *Frontiers in Sustainable Cities 6*, 1463870. doi.org/10.3389/frsc.2024.1463870

Cairney, P., Timonina, I., and Stephan, H.R. (2023). "How can policy and policymaking foster climate justice? A qualitative systematic review", *Open Research Europe,* 3. doi.org/10.12688/openreseurope.15719.2

Calel, R. and Dechezleprêtre, A. (2016). "Environmental policy and directed technological change: Evidence from the European carbon market", *Review of Economics and Statistics* 98(1), pp. 173-91.

Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N., and Upham, P. (2015). "International trends in public perceptions of climate change over the past quarter century", *Climate Change* 6, pp. 35-61, doi.org/10.1002/wcc.321

Cecchinato, G. and Kapletia, D. (2026). *Nature Positive Economy (NPE) Pilot Roadmaps (Deliverable D2.2)*, GoNaturePositive!, https://www.gonaturepositive.eu/resources

Clark, W.C. and Harley, A.G. (2020). "Sustainability science: toward a synthesis", *Annual Review of Environment and Resources* 45(1), pp. 331-86. doi.org/10.1146/annurev-environ-012420-043621

Coase, R. (1960). "The Problem of Social Cost", *Journal of Law and Economics* 3, University of Chicago Press, pp. 1–44. doi.org/10.1086/466560

Crespy, A. and Munta, M. (2023). "Lost in transition? Social justice and the politics of the EU green transition", *Transfer: European Review of Labour and Research* 29(3), pp. 235–51. doi.org/10.1177/10242589231173072

Daly, H.E. and Farley, J. (2011). *Ecological Economics, Second Edition: Principles and Applications* (2 edition), Island Press, Washington, DC.

Dangelico, R.M., Alvino L., and Fraccascia L (2022). "Investigating the antecedents of consumer behavioral intention for sustainable fashion products: Evidence from a large survey of Italian consumers", *Technological Forecasting and Social Change*, 185. doi.org/10.1016/j.techfore.2022.122010

Dauvergne, P. (2008). *The Shadows of Consumption: Consequences for the Global Environment*, MIT Press, Cambridge.

de Haan, F.J. and Rotmans, J. (2018). "A Proposed Theoretical Framework for Actors in Transformative Change", *Technological Forecasting and Social Change* 128, pp. 275-86.

De Luca, C., Calcagni, F., and Tondelli, S. (2024). "Assessing distributional justice around cultural ecosystem services (CES) provided by urban green areas: the case of Bologna", *Urban Forestry and Urban Greening* 101. https://doi.org/10.1016/j.ufug.2024.128556

Dechezleprêtre, A. and Sato, M. (2017). "The Impacts of Environmental Regulations on Competitiveness," *Review of Environmental Economics and Policy* 11(2), pp. 181-360.

Delgado, N. and Perez-Aleman, P. (2021). "Inclusion in global environmental governance: Sustained access, engagement and influence in decisive spaces", *Sustainability* 13. doi.org/10.3390/su131810052

Donald, E. (2024). "Spillovers and the Direction of Innovation: An Application to the Clean Energy Transition," Technical Report 2023, Boston University. www.bc.edu/content/dam/bc1/schools/mcas/economics/pdf/seminars/Spillovers%20and%20the%20Direction%20of%20Innovation.pdf

Draghi, (2024). *The Draghi report: A competitiveness strategy for Europe* (Part A), European Commission, Brussels.

Duan, Y., Ji, T., and Yu, T. (2021). Reassessing Pollution Haven Effect in Global Value Chains, *Journal of Cleaner Production* 284. doi.10.1016/j.jclepro.2020.124705

EIB (2023). *Investing in Nature-based Solutions, State-of-play and way forward for public and private financial measures in Europe*, European Investment Bank, Luxembourg.

Eulaerts, O., Grabowska, M. and Bergamini, M. (2025). *Weak signals in science and technologies 2024 – Technologies at an early stage of development that could impact our future*, European Commission: Joint Research Centre, Publications Office of the European Union. doi/10.2760/6571994

FAO (2022). *The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation*, Food and Agriculture Organization of the United Nations, Rome. doi.org/10.4060/cc0461en

Farmer, J.D., Hepburn, C., Ives, M.C., Hale, T., Wetzer, T., Mealy, P., Rafati, R., Srivastav, S., and Way, R. (2019). "Sensitive intervention points in the post-carbon transition", *Science* 364(6436), pp. 132-4. doi.org/10.1126/science.aaw7287

Farooq, U., Ahmed, J., Tabash, M.I., Anegre, S., and Subhani, B.H. (2021). "Nexus between government green environmental concerns and corporate real investment: Empirical evidence from selected Asian economies", *Journal of Cleaner Production* 314, 128089.

Fischer, C. and Newell, R.G. (2008). "Environmental and technology policies for climate mitigation", *Journal of Environmental Economics and Management* 55(2), pp. 142-62. doi.org/10.1016/j.jeem.2007.11.001

Fornara, F., Molinario, E., Scopelliti, M., et al. (2020). "The extended Value-Belief-Norm theory predicts committed action for nature and biodiversity in Europe", *Environmental Impact Assessment Review 81*, 106338. doi.org/10.1016/j.eiar.2019.106338

Fukuyama, F. (2014). *Political Order and Political Decay: From the Industrial Revolution to the Globalisation of Democracy*, Farrar, Straus and Giroux, New York.

Funke, M., Schularick, M. and Trebesch, C. (2016). "Going to extremes: Politics after financial crises, 1870-2014", *European Economic Review* 88, pp. 227-60.

Gaté, R., Legras, S., and Ly, T. (2026). "The Rise of Green Regions: Do Leaders Matter?", SSRN: 6703859. doi.org/10.2139/ssrn.6703859

Gerlach, M. (2025). *Expert Consultation: Delphi Panel Report (Task 3.2),* [Expert Consultation]. GoNaturePositive!

Gerlach, M. (2026). *Expert Consultation: From concept to measurement: Driving the Transition Towards a Nature-positive Economy (Task 5.5)*, GoNaturePositive!

Gersbach, H. and Glazer, A. (1999). "Markets and regulatory hold-up problems", *Journal of Environmental Economics and Management* 37(2), pp. 151-64.

Geyer, R., Jambeck, J.R. and Law, K.L. (2017). "Production, Use, and Fate of All Plastics Ever Made", *Science Advances Research* 3(7). doi.org/10.1126/sciadv.1700782

Gil-Moltó, M.J. and Varvarigos, D. (2013). "Emission taxes and the adoption of cleaner technologies: The case of environmentally conscious consumers", *Resource and Energy Economics* 35(4), pp. 486-504.

Grewal, J., Serafeim, G., and Yoon, A. (2016). Shareholder activism on sustainability issues. *Harvard Business School Research Paper*. doi.org/10.2139/ssrn.2805512

Grossman, G. and Krueger, A. (1991). "Environmental Impacts of a North American Free Trade Agreement", NBER Working Paper w 3194, Cambridge. doi.org/10.3386/w3914

Grossman, G. and Krueger, A. (1991). *Environmental Impacts of a North American Free Trade Agreement*; National Bureau of Economic Research: Cambridge.

Guibrunet, L., Gerritsen, P., Sierra-Huelsz, J.A., et al. (2021). "Beyond participation: How to achieve the recognition of local communities' value systems in conservation?", *People and Nature 3*. doi.org/10.1002/pan3.10203

Gunderson, L.H. and Holling, C.S. (2002). *Panarchy: Understanding Transformations in Human and Natural Systems*, Island Press.

Gupta, A., Boas, I., and Oosterveer, P. (2020). "Transparency in global sustainability governance: To what effect?", *Journal of Environmental Policy & Planning 22*, pp. 84–97. doi.org/10.1080/1523908X.2020.1709281

Hallegatte, S., Vogt-Schilb, A., Rozenberg, J. et al. (2020). "From Poverty to Disaster and Back: a Review of the Literature", *Economics of Disasters and Climate Change* 4, pp. 223-47. doi.org/10.1007/s41885-020-00060-5

Hardin, G.H. (1968). "The Tragedy of the Commons", *Science* 162(3859), pp. 1243-8.

Hartzmark, S.M. and Sussman, A.B. (2019). "Do investors value sustainability? A natural experiment examining ranking and fund flows", *The Journal of Finance* 74(6), pp. 2789–837.

Holland, J.H. (1995). *Hidden Order: How Adaptation Builds Complexity*, Addison-Wesley, Reading.

Hua, J., Lin, J., Wang, K., and Liu, G. (2023). "Government interventions in new technology adoption to improve product greenness", *International Journal of Production Economics* 262, 108924.

Huntjens, P. and Kemp, R. (2022). "The importance of a natural social contract and co-evolutionary governance for sustainability transitions", *Sustainability* 14(5). doi.org/10.3390/su14052976

Häyrynen, S. and Hämeenaho, P. (2020). “Green clashes: Cultural dynamics of scales in sustainability transitions in European peripheries”, *Palgrave Communications 6*, pp. 1–8. doi.org/10.1057/s41599-020-0472-x

IEA (2021*a*). "Mapping the Technological Frontier"; International Energy Agency, Paris.

IMD (2021). *World Digital Competitiveness Ranking Index,* International Institute for Management Development, Lausanne.

IPBES (2024). *Assessment Report on the Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity*, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn.

Izquierdo-Tort, S., Jayachandran, S., and Saavedra, S. (2024). “Redesigning payments for ecosystem services to increase cost-effectiveness”, NBER *Working Paper w*32689, Cambridge.

Jackson, T. (2017). *Prosperity without Growth, Foundations for the Economy of Tomorrow*, Routledge, London.

Jacobi, P., Toledo, R.F., and Grandisoli, E. (2016). “Education, sustainability and social learning”, *Brazilian Journal of Science and Technology 3*(1), pp. 1–8. doi.org/10.1186/S40552-016-0019-2

Jaffe, A.B. and Palmer, K. (1997). “Environmental regulation and innovation: A panel data study”, *Review of Economics and Statistics* 79, pp. 610-9.

Jaffe, A.B., Newell, R.G., and Stavins, R.N. (2005). “A tale of two market failures: Technology and environmental policy”, *Ecological Economics* 54(2), pp. 164-74

Jefferson, G.H., Tanaka, S. and Yin, W. (2013). “Environmental regulation and industrial performance: Evidence from unexpected externalities in China!”, SSRN 2216220.

Jiang, B., Sanin, M.E., Créti, A., Huang, Y. (2025). Biodiversity Physical Risk, Firm Performance, and Market Mispricing, Proceedings of the EUROFIDAI-ESSEC Paris December Finance Meeting. doi.org/10.2139/ssrn.4765039

Jopang, J., Aryatama, S., Muazzinah, M., Qamal, Q., and Ansar, A. (2024). “Exploring the relationship between e-government, transparency, and citizen trust in government services”, *Global International Journal of Innovative Research 2*(6). doi.org/10.59613/global.v2i6.206

Kaljonen, M., Kortetmäki, T., Tribaldos, T., et al. (2021). “Justice in transitions: Widening considerations of justice in dietary transition”, *Environmental Innovation and Societal Transitions*. 40, pp.474-485. doi.org/10.1016/j.eist.2021.10.007

Kapletia, D. (2025). *Towards a Nature-Positive Economy Roadmap for Europe*, GoNaturePositive! (Milestone 6). https://static1.squarespace.com/static/65ba3ad7e5452a2b57b46cbc/t/694949db232b120efcb9a9da/1766410715580/GoNP%21+Milestone+6+NPE+Roadmapping+22_12_2025.pdf

Kashima, Y. (2020). “Cultural dynamics for sustainability: How can humanity craft cultures of sustainability?”, *Current Directions in Psychological Science 29*(6), pp. 538–44. doi.org/10.1177/0963721420949516

Keeney, R.L. and Raiffa, H. (1993). *Decision with Multiple Objectives: Preference and Value Tradeoffs*, Cambridge University Press, New York. doi.org/10.1017/CBO9781139174084

Kersting, N. (2021). "Participatory democracy and sustainability: Deliberative democratic innovation and its acceptance by citizens and German local councilors", *Sustainability 13*(7), 7214. doi.org/10.3390/su13137214

Kim, D.-H. and Lim, U. (2017). "Social enterprise as a catalyst for sustainable local and regional development", *Sustainability 9*(8), 1427. doi.org/10.3390/su9081427

Klinsky, S., Roberts, J., Huq, S., Okereke, C., Newell, P., and O'Brien, K. (2017). "Why equity is fundamental in climate change policy research", *Global Environmental Change* 44, pp. 170–3. doi.org/10.1016/j.gloenvcha.2016.08.002

Koh, N.S., Zandersen, M., Bull, J., Desair, J., Kupilas, B., and McQuaid, S. (2025), *Framing the Nature-Positive Economy*, GoNaturePositive!, Zenodo. doi.org/10.5281/ZENODO.17494450

Kotchen, M. and Giovanni, M. (2025). "Carbon Taxes and Green Subsidies in a World Economy", NBER Working Paper No. w34080. doi.10.3386/w34080

Kupilas, B., Cuevas, N.B., Davis, M., Elkina, E., and McDonald, H. (2025). Mapping policy and co-operate initiative landscapes for systemic change towards a nature-positive economy, GoNaturePositive!. doi.org/10.5281/ZENODO.15309698

Lachman, D.A. (2013). "A survey and review of approaches to study transitions", *Energy Policy* 58, pp. 269-76.

Lanoie, P., Laurent-Lucchetti, J., Johnstone, N., and Ambec, S. (2011). "Environmental policy, innovation and performance: new insights on the Porter hypothesis", *Journal of Economics & Management Strategy* 20(3), pp. 803-42.

Larson, A., Sarmiento Barletti, J.P., and Heise Vigil, N. (2022). "A place at the table is not enough: Accountability for Indigenous Peoples and local communities in multi-stakeholder platforms", *World Development* 157. doi.org/10.1016/j.worlddev.2022.105907

Le Coent, P., Graveline, N., Altamirano, M.A., Arfaoui, N., Benitez-Avila, C., Biffin, T., Calatrava, J., Dartee, K., Douai, A., Gnonlonfin, A., Hérivaux, C., Marchal, R., Moncoulon, D., and Piton, G. (2021). "Is-it worth investing in NBS aiming at reducing water risks? Insights from the Economic Assessment of three European case studies", *Nature-Based Solutions* 1. doi.org/10.1016/j.nbsj.2021.100002

Lecombe, R. (1979). *The Economics of Natural Resources*, The Macmillan Press Ltd., London.

Levin, S.A., Xepapadeas, T., Crépin, A.-S., Norberg, J., De Zeeuw, A., Folke, C. et al. (2013). "Social-ecological systems as complex adaptive systems: Modelling and Policy Implications", *Environmental and Development Economics* 18, pp. 111-32. doi.10.1017/S1355770X12000460

Liang, J. and Fiorino, D. (2013). "The implications of policy stability for renewable energy innovation in the United States, 1974-2009", *Policy Studies Journal* 41, pp. 97-118. doi.org/10.1111/psj.12004

Lightfoot, E.B. (2019). "Consumer activism for social change", *Social Work* 64(4), pp. 301-9 doi.org/10.1093/sw/swz035

Lovati, C., Manzi, F., Di Dio, C., Massaro, D., Gilli, G., and Marchetti, A. (2023). "Feeling connected to nature: Validation of the connectedness to nature scale in the Italian context", *Frontiers in Psychology* 14, 1242699. doi.org/10.3389/fpsyg.2023.1242699

Lumber, R., Richardson, M., and Sheffield, D. (2017). "Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty as pathways to nature connection", *PLOS ONE 12*(5). doi.org/10.1371/journal.pone.0177186

Magnolo, F. and Desair, J. (2026). Guiding Principles and Indicators for a Nature-Positive Economy (Milestone 9), GoNaturePositive!, https://static1.squarespace.com/static/65ba3ad7e5452a2b57b46cbc/t/694949fb5892f028ff7379ef/1766410747822/GoNP%21+Milestone+9+Guiding+Principles+and+Indicators+for+NPE+22_12_2025.pdf

Martin, J.G.C., Scolobig, A., Linnerooth-Bayer, J., Irshaid, J., Aguilera Rodriguez, J.J., Fresolone-Caparrós, A., and Oen, A. (2025). "The nature-based solution implementation gap: A review of nature-based solution governance barriers and enablers", *Journal of Environmental Management* 388, 126007. doi.org/10.1016/j.jenvman.2025.126007

Mason, M. (2020). "Transparency, accountability, and empowerment in sustainability governance: A conceptual review", *Journal of Environmental Policy & Planning 22*(1), pp. 98–111. doi.org/10.1080/1523908X.2019.1661231

Matthews, H.D. and Wynes, S. (2022). "Current global efforts are insufficient to limit warming to 1.5˚C", *Science* 376(6599), pp. 1404-9. doi.org/10.1126/science.abo33

McCarthy, O. and Meredith, D. (2022). "You have to keep it going': Relational values and social sustainability in upland agriculture", *Sociologia Ruralis* 63(3), pp. 588-610. doi.org/10.1111/soru.12402

McDermott, M., Mahanty, S., and Schreckenberg, K. (2013). "Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services", *Environmental Science & Policy* 33, pp. 416-27. doi.org/10.1016/J.ENVSCI.2012.10.006

McQuaid, S., Zandersen, M., Brophy, M., Rizzi, D. and Lepori, P. (2025). *Policy imperatives for a competitive and resilient nature-positive economy*, Directorate-General for Research and Innovation, EC Commission (EC Expert Publication), Publications Office of the European Union. doi.org/10.2777/2961137

Meissner, L.P., Peterson, S., and Semrau, F.O. (2026). "It's not a sprint, it's a marathon: reviewing governmental R&D support for environmental innovation", *Journal of Environmental Planning and Management* 69(1), pp. 1–27. doi.org/10.1080/09640568.2024.2359442

Midden, C., Kaiser, F., and McCalley, T. (2007). "Technology's four roles in understanding individuals' conservation of natural resources", *Journal of Social Issues* 63(1), pp. 155-74.

Miftari, F., *et al.* (2025). "Digital Financial Inclusion and Institutional Quality as Drivers of Green Economic Growth: Pathways to Sustainable Development, *International Journal of Sustainable Development and Planning* 20(7), pp. 2859-6. doi.org/10.18280/ijsdp.200710

Molnár, Z., Fernández-Llamazares, Á., Schunko, C., et al. (2023). "Social justice for traditional knowledge holders will help conserve Europe's nature", *Biological Conservation* 285. doi.org/10.1016/j.biocon.2023.110190

Moner-Colonques, R. and Rubio, S. (2015). "The timing of environmental policy in a duopolistic market", *Economía Agraria y Recursos Naturales* 15(1), pp. 11-40. doi.org/10.7201/earn.2015.01.02

Moore, M.-L., Tjornbo, O., Enfors, E., Knapp, C., Hodbod, J., Baggio, J.A., Norström, A., Olsson, P., and Biggs. D. (2014). "Studying the Complexity of Change: Toward an Analytical Framework for Understanding Deliberate Social-Ecological Transformations", *Ecology and Society* 19(4), 54. doi.org/10.5751/ES-06966-190454

NGFS (2024). *Nature-related financial risks: A conceptual framework to guide action by central banks and supervisors*. Network for Greening the Financial System. https://www.ngfs.net/sites/default/files/medias/documents/ngfs-conceptual-framework-nature-risks.pdf

North, D.C. (1990). *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.

Nyssa, Z., Winkler-Schor, S., Lobo, D., et al. (2024). "A framework for promoting disciplinary diversity and inclusion through epistemic justice", *Conservation Biology, 38*. doi.org/10.1111/cobi.14409

OECD (2022). *OECD guidelines for citizen participation processes*, Organisation for Economic Cooperation and Development, Paris. doi.org/10.1787/f765caf6-en

OECD (2023). *A supervisory framework for assessing nature-related financial risks: Identifying and navigating biodiversity risks*. *OECD Business and Finance Policy Papers* 33. OECD Publishing. doi.org/10.1787/a8e4991f-en

OECD (2025), *Scaling Up Biodiversity-Positive Incentives: Delivering on Target 18 of the Global Biodiversity Framework*, Organisation for Economic Cooperation and Development, OECD Publishing, Paris. doi.org/10.1787/19b859ce-en

Olson, M. (1965). *The Wisdom of Collective Action*, Harvard University Press, Cambridge.

Palage, K., Lundmark, R., and Söderholm, P. (2019). "The innovation effects of renewable energy policies and their interaction: the case of solar photovoltaics", *Environmental Economics and Policy Studies* 21(2), pp. 217-54. doi.org/10.1007/s10018-018-0228-7

Pigou, A. C. (1920). *The economics of welfare*. Macmillan, London.

Popp, D. (2019). "Environmental policy and innovation: A decade of research", *Casio Working Paper* No. 7544r. doi.org/10.2139/ssrn.3352908

Porter, M. and van der Linde, C. (1995). "Toward a New Conception of the Environment Competitiveness Relationship", *Journal of Economic Perspective* 9(4), pp. 97-118.

Ross, A., Van Alstine, J., Cotton, M., and Middlemiss, L. (2021). "Deliberative democracy and environmental justice: Evaluating the role of citizens' juries in urban climate governance", *Local Environment 26*(12), pp. 1512-31. doi.org/10.1080/13549839.2021.1990235

Ruangpan, L., Vojinovic, Z., Plavšić, J., Curran, A., Rosic, N., Pudar, R., Savic, D., and Brdjanovic, D. (2024). "Economic assessment of nature-based solutions to reduce flood risk and enhance co-benefits", *Journal of Environmental Management* 352. doi.org/10.1016/j.jenvman.2023.119985.

Ruiz-Mallén, I. (2020). "Co-production and Resilient Cities to Climate Change", in: Nared, J., Bole, D. (eds.) *Participatory Research and Planning in Practice*, The Urban Book Series. Springer. doi.org/10.1007/978-3-030-28014-7_1

Salvador, M. and Sancho, D. (2021). "The Role of Local Government in the Drive for Sustainable Development Public Policies. An Analytical Framework Based on Institutional Capacities", *Sustainability 13*(11), 5978. doi.org/10.3390/su13115978

Sharmin, S. and Chowdhury, M. (2025). "Digital transformation in governance: The impact of e-governance on public administration and transparency". *Journal of Computer Science and Technology Studies* 7(1), pp.27–45.

doi.org/10.32996/jcsts.2025.7.1.27

Shukla, P. (2025). "Leveraging blockchain for ESG disclosure: Enhancing transparency and accountability in sustainability reporting", *International Journal of Engineering Technologies and Management Research* 12(3).
doi.org/10.29121/ijetmr.v12.i3.2025.1546

Smedby, N. and Quitzau, M. (2016). "Municipal Governance and Sustainability: The Role of Local Governments in Promoting Transitions", *Environmental Policy and Governance 26*(5), pp. 323–36. doi.org/10.1002/eet.1708

Soliman, M., Alisat, S., Bashir, N., and Wilson, A. (2018). "Wrinkles in time and drops in the bucket: Circumventing temporal and social barriers to pro-environmental behavior", *SAGE Open 8*, pp. 1–13. doi.org/10.1177/2158244018774826

Sovacool, B.K., Turnheim, B., Hook, A., Brock, A., and Martiskainen, M. (2021). "Dispossessed by decarbonisation: Reducing vulnerability, injustice, and inequality in the lived experience of low-carbon pathways", *World Development* 137.
doi.org/10.1016/j.worlddev.2020.105116

Sterman, J. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*, McGraw-Hill, Boston.

Stern, N. and Stiglitz, J. E. (2023). "Climate Change and Growth", *Industrial and Corporate Change* 32(2), April, pp. 277-303. doi.org/10.1093/icc/dtad008

Sylvia, M. and Hasan, M.M. (2025). "Exercising citizen's power: A review of social movements influencing urban forest governance", *IOP Conference Series: Earth and Environmental Science*. doi.org/10.1088/1755-1315/1447/1/012002

Tanaka, T., Nagashima, F., Guven, M., Luo, P., Güloğlu, B., and Erdal, F. (2025). "The Environmental Kuznets Curve Reconsidered: Assessing Direct and Indirect Energy Use in Global Grain Supply Chains", SSRN. doi.org/10.2139/ssrn.5397634

Tedeschini, F.R., Blaettner, D., Tuerk, A., Klinkenbergh, O., McQuaid, S., Brangan, E., Romanovska, L., Chen, W., Chakravorty, D. and Furuseth, I.S. (2024). Markets, financing and incentives for NbS, Invest4Nature Deliverable 3.3
doi.org/10.5281/zenodo.13997980.

Thompson, A., Bunds, K.S., Larson, L.R., Cutts, B. and Hipp, J.A. (2023). "Paying for nature-based solutions: A review of funding and financing mechanisms for ecosystem services

and their impacts on social equity", *Sustainable Development* 31, pp. 1991–2066. doi.org/10.1002/sd.2510

Tillmanns, T. (2020). "Learning sustainability as an effect of disruption", *Environmental Education Research 26*(1), pp. 14–26. doi.org/10.1080/13504622.2019.1682125

Trinomics (2024). Study for a methodological framework and assessment of potential financial risks associated with biodiversity loss and ecosystem degradation, Directorate-General for Financial Stability, Financial Services and Capital Markets Union (European Commission, Brussels.

Trujillo, C., Estrada-Mejía, C., and Rosa, J.A. (2021). "Norm-focused nudges influence pro-environmental choices and moderate post-choice emotional responses", *PLOS ONE 16*(3). doi.org/10.1371/journal.pone.0247519

UNEP (2021). *Finance Initiative,* UN Environment Programme, Nairobi.

UNEP (2023). "State of Finance for Nature: The Big Nature Turnaround – Repurposing $7 trillion to combat nature loss", United Nations Environment Programme, Nairobi. doi.org/10.59117/20.500.11822/44278.

Vos, R. and Alarcon, D. (2016). *Technology and Innovation for Sustainable Development*, (eds.), Bloomsbury Academic, ISBN: 978-1-4725-8076-4.

Westley, F.R., Tjornbo, O., Schultz, L., Olsson, P., Folke, C., Crona, B., and Bodin, Ö. (2013). "A Theory of Transformative Agency in Linked Social-Ecological Systems", *Ecology and Society* 18(3). doi.org/10.5751/ES-05072-180327

Weyant, J. (2017). "Some Contributions of Integrated Assessment Models of Global Climate Change*", Review of Environmental Economics and Policy* 11(1), pp. 115-37.

Whitburn, J., Linklater, W., and Abrahamse, W. (2019). "Meta-analysis of human connection to nature and pro-environmental behavior", *Conservation Biology* 34, pp. 180–93. doi.org/10.1111/cobi.13381

Wong, C.W.Y., Wong, C., Boon-itt, S., and Tang, A.K. (2021). "Strategies for building environmental transparency and accountability", *Sustainability* 13(16), 9116. doi.org/10.3390/su13169116

World Bank (2023). *Making the Green Deal work for People*, Washington.

World Bank, (2020). Mobilizing private finance for nature*,* A World Bank Group paper on private finance for biodiversity and ecosystem services, Washington.

WWF (2025). *Balancing Bankability and Integrity: Fostering the Bankability of Nature-Based Solutions*, World Wildlife Fund.