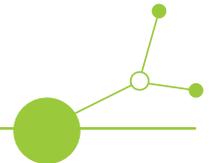




RE-ENFORCE

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Review of economic instruments related to forest restoration



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SUMMARY

European forests are fundamental to achieving the EU's climate neutrality, biodiversity, and rural development goals. Yet, in Central Europe, accelerating degradation, driven by climate-induced disturbances, pests, and historical management legacies, has exposed the limits of traditional, subsidy-based restoration models. This report provides an evidence-based assessment of how economic instruments are being deployed across Austria, Germany, Czechia, Slovenia, Hungary, Poland, Italy, and Croatia to restore degraded forests and enhance their resilience.

Central European countries are increasingly diversifying their restoration finance portfolios beyond public subsidies. A broad mix of market-based, fiscal, regulatory, and hybrid mechanisms is emerging, including payments for ecosystem services (PES), carbon and biodiversity credits, green and climate bonds, and public-private partnerships (PPPs). Together, these instruments signal a policy shift from short-term project interventions toward systemic, performance-based restoration strategies that align ecological outcomes with financial incentives.

Across Central Europe, fiscal instruments, particularly through the Common Agricultural Policy (CAP) and Rural Development Programmes (RDPs), remain the backbone of restoration finance. Austria and Germany illustrate mature, integrated frameworks combining fiscal incentives, certification systems, and voluntary carbon markets supported by robust monitoring and verification structures. Czechia has taken a significant legislative step by introducing statutory payments for forest ecosystem services, while Poland and Slovenia continue to strengthen co-financing models through national and EU mechanisms. Italy demonstrates how restoration can be linked to social forestry, cooperative models, and regional innovation, whereas Croatia's Fee for Forest Ecosystem Services (OKFŠ) represents a novel parafiscal mechanism for sustaining public ecological functions.

Despite this diversification, the report identifies persistent barriers: fragmented governance, administrative complexity, limited private-sector participation, and uneven monitoring frameworks. These constraints hinder investment flows and risk undermining environmental integrity in emerging credit markets. The findings underscore the importance of harmonized national frameworks that integrate fiscal and market-based tools, ensure transparent monitoring, and provide clear policy signals to de-risk private investment. New EU-level regulations, particularly the Carbon Removals Certification Framework (CRCF), the EU Taxonomy for Sustainable Finance, and the Nature Credit Roadmap, offer unprecedented opportunities to strengthen the credibility and comparability of economic instruments. Aligning national policies with these frameworks can help Central European countries attract private capital, avoid duplication of public spending, and ensure that restoration finance delivers measurable ecosystem outcomes. Achieving a transition from reliance on subsidies toward investment-driven restoration requires coordinated policy design, standardized monitoring systems, and the integration of restoration finance into national climate, land-use, and rural development strategies. Economic instruments, when embedded in coherent governance frameworks, can provide the missing link between Europe's environmental commitments and their implementation on the ground.



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1. Introduction

Forests are central to Europe's environmental, social, and economic capital, covering nearly 40% of the continent's land area and delivering a vast array of ecosystem services, including carbon sequestration, water regulation, soil protection, recreation, and biodiversity conservation (Forest Europe, 2024; European Commission, 2025). They play a critical role in mitigating climate change by acting as carbon sinks and regulating hydrological cycles, while also supporting rural economies and providing renewable raw materials for the bioeconomy (Nabuurs et al., 2023). Yet, despite their recognized importance, European forests are increasingly threatened by degradation driven by multiple stressors. These include climate-induced disturbances such as droughts, windstorms, and bark beetle outbreaks, as well as historical legacies of intensive forest management, land-use conversion, and fragmentation (Seidl et al., 2021; Ceccherini et al., 2020).

Over the past two decades, forest degradation in Central Europe has accelerated in both spatial extent and severity. A combination of biotic and abiotic stressors, amplified by climate change, has weakened forest resilience. For instance, the bark beetle epidemic (*Ips typographus*) between 2018 and 2022 resulted in massive mortality of spruce forests in Germany, Czechia, and Austria, converting extensive areas from carbon sinks to carbon sources (Hlásny et al., 2021). Similarly, prolonged drought events and rising temperatures have exacerbated fire risks in Southern and Central Europe, while flood events have altered soil stability and nutrient cycling (Bastin et al., 2019). The European Environment Agency (2023) estimates that over one-quarter of European forests are now degraded or vulnerable to degradation, particularly in lowland and mountain regions of Central Europe, where management intensity and climate pressures intersect. These developments threaten not only biodiversity and ecosystem functions but also the long-term socio-economic viability of forest-dependent communities.

In response, restoration of degraded forests has emerged as a strategic priority within the European Union's climate and biodiversity policy architecture. The EU Green Deal (European Commission, 2019), EU Biodiversity Strategy for 2030 (EC, 2020), and the EU Nature Restoration Regulation explicitly call for large-scale restoration of forest ecosystems, improved resilience, and sustainable management practices. The LULUCF Regulation complements these initiatives (EU 2018/841, amended by EU 2023/839), which establishes binding national targets for carbon sequestration from land use and forestry sectors. Together, they set an ambitious framework for member states to align restoration efforts with climate mitigation, adaptation, and ecosystem service goals.

Central European countries such as Austria, Germany, Czechia, Slovenia, Hungary, Poland, and Italy have diverse forest governance systems and socio-economic contexts but share common restoration challenges. These include fragmented ownership structures, limited financial resources, and complex administrative procedures that constrain restoration at scale (BfN, 2025; EEA, 2023). Public funding remains the primary driver of restoration activities, often through the Common Agricultural Policy (CAP) and Rural Development Programs (RDPs), but fiscal constraints and increasing restoration demands have intensified the search for innovative financing mechanisms (DG AGRI, 2023). In this context, economic instruments (EIs), policy tools that influence financial incentives and behaviour, have gained prominence as essential complements to regulatory and voluntary approaches (OECD, 2019).

Economic instruments in the forestry context refer to fiscal, market-based, regulatory, or hybrid mechanisms designed to internalize the positive externalities of restoration and align private land management decisions with public environmental objectives. They function by creating financial rewards for conservation and restoration or by reducing the costs associated with sustainable forest management (FAO, 2020). Examples include payments for ecosystem services (PES), carbon and biodiversity credits, tax incentives, green bonds, and public-private partnerships. By mobilizing both public and private capital, such instruments can bridge the financing gap for forest restoration, which the European Investment Bank (2023) estimates at over €49 billion annually for achieving EU biodiversity and climate targets.



The appeal of economic instruments lies in their potential to provide flexibility, cost-effectiveness, and innovation in restoration financing. Unlike command-and-control regulation, EIs can tailor incentives to local ecological and socio-economic conditions, allowing landowners and communities to choose restoration strategies that best fit their capacities and landscapes. They can also leverage private-sector engagement and market mechanisms, thereby expanding the resource base beyond traditional public subsidies (Pagiola et al., 2021). In the Central European context, where ownership is highly fragmented, particularly in Austria, Slovenia, and Czechia, these instruments can offer scalable mechanisms to engage smallholders, cooperatives, and municipalities in restoration activities.

Recent policy developments have further strengthened the enabling environment for economic instruments. The EU Taxonomy for Sustainable Finance (Regulation 2020/852) and emerging EU Nature and Carbon Credit Frameworks (CINEA, 2025) establish standardized criteria for green investments and environmental outcomes, creating the legal and institutional basis for credible credit-based restoration markets. Likewise, the EU Forest Strategy for 2030 emphasizes closer-to-nature management, ecosystem-based restoration, and innovative finance as key pillars for forest resilience and multifunctionality (European Commission, 2021). These frameworks collectively signal a paradigm shift from restoration as a purely state-funded activity toward one embedded in broader market, fiscal, and financial systems.

However, the practical implementation of economic instruments for forest restoration in Central Europe remains uneven and nascent. While Austria and Germany have advanced fiscal and market-based models, including voluntary carbon and biodiversity credits, other countries such as Czechia and Poland are only beginning to formalize PES schemes or carbon certification frameworks (Forest Europe, 2024). Slovenia and Hungary are experimenting with public-private partnerships and eco-credit systems, while Italy integrates restoration into eco-schemes under CAP Strategic Plans. Across the region, pilot programs funded by the LIFE Programme, Interreg, and Horizon Europe are testing innovative finance mechanisms and governance models that combine regulatory compliance with market-based incentives (EEA, 2023; BFW, 2025).

The diversity of approaches underscores a broader transition from project-based interventions toward systemic, incentive-driven restoration strategies. Yet, significant barriers persist, particularly the lack of standardized monitoring, reporting, and verification (MRV) systems; limited awareness among landowners; and the risk of greenwashing in emerging carbon and biodiversity markets (zu Ermgassen et al., 2025). Addressing these challenges requires robust design principles ensuring additionality, transparency, and environmental integrity. Moreover, coordination among EU institutions, member states, and private actors is essential to align incentives, avoid policy overlap, and ensure that economic instruments genuinely contribute to long-term ecological restoration rather than short-term financial gains.

In this context, this report provides a comprehensive analysis of the economic instruments currently applied or emerging in Central Europe to finance and incentivize forest restoration. It examines their typologies, policy frameworks, implementation mechanisms, and performance drivers, with country-level case studies from Austria, Germany, Czechia, Slovenia, Hungary, Poland, and Italy. By comparing instruments across diverse governance settings, the report aims to identify enabling conditions, barriers, and opportunities for scaling up restoration through economically viable and ecologically effective means. Ultimately, understanding how economic instruments can align market incentives with ecological imperatives is crucial for achieving Europe's dual objectives of climate neutrality and biodiversity recovery by 2050.

2. Economic Instruments: Concepts and Classification

2.1. What Are Economic Instruments?

Economic instruments (EIs) are policy tools designed to influence behaviour through financial incentives or disincentives, aligning private actions with public environmental objectives (OECD, 2019). In the context of forest restoration, these instruments aim to internalize the social and ecological benefits, such as carbon



sequestration, biodiversity enhancement, soil stabilization, and water regulation, into economic and policy systems. By linking financial mechanisms to ecological outcomes, EIs can motivate landowners and managers to adopt restoration-friendly practices suited to local contexts. However, achieving the intended public outcomes depends critically on sound design, transparent monitoring, and robust enforcement. Poorly designed instruments can encourage minimal compliance, opportunistic participation, or short-term gains without delivering lasting ecological restoration. Therefore, the credibility and effectiveness of EIs rely on measurable ecological outcomes, fair compensation, and the avoidance of perverse incentives.

2.2. Typology of Economic Instruments for Forest Restoration

Economic instruments for forest restoration in Europe can be grouped into four categories (Table 1):

- i. Market-based instruments, which create tradable value for ecosystem services.
- ii. Fiscal instruments, which use public finance (subsidies, grants, or tax incentives) to stimulate restoration.
- iii. Regulatory instruments with economic incentives, which tie compliance obligations to financial mechanisms; and
- iv. Voluntary and hybrid instruments, which engage diverse actors through partnerships and innovation.

These mechanisms collectively form a mixed policy landscape that balances public funding, private investment, and regulatory enforcement to support restoration across European forests (DG AGRI, 2023).

Table 1: Overview of Economic Instruments for Forest Restoration in Europe

Instrument type	Description	Examples in Central Europe	Key benefits	Key limitations
Market-Based	Create financial value for ecosystem services or sustainable practices	PES in the Czech Republic, Carbon forestry in Germany	Leverages private finance; flexible	Requires strong monitoring & legal frameworks
Fiscal	Use of taxes, subsidies, and public grants	RDP funding in Poland, Tax deductions in Austria	Direct financial support; predictable	Risk of inefficiency or perverse incentives
Regulatory with Economic Incentives	Legal mandates combined with financial support or penalties	CAP conditionality: restoration obligations with co-funding in Slovenia	Promotes compliance with flexibility	It may be complex to administer



Voluntary/Hybrid	Collaborative, reputation-driven, or innovative finance tools	PPPs in Hungary; ESG-funded reforestation in Slovakia	Mobilizes diverse actors; adaptable	Requires monitoring, enforcement, and safeguarding compliance outcomes to be effective. Often small-scale or pilot-driven
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2.2.1. Market-Based Instruments

Market-based instruments harness market forces to encourage restoration by assigning financial value to ecosystem services. They are pivotal in bridging the gap between conservation goals and private economic interests, channelling private capital into ecosystem recovery.

Payments for Ecosystem Services (PES)

PES schemes provide direct payments to landowners for maintaining or restoring ecosystem services such as carbon storage, biodiversity, and water regulation. In Central Europe, PES programs such as those in the Czech Republic compensate forest owners for water retention and habitat protection (Potschin et al., 2014). Despite growing attention, forest-related PES represent a small fraction of EU agri-environmental funding (EC, 2019; European Court of Auditors, 2020). New frameworks under the EU Forest Strategy for 2030 and Nature Restoration Law (2024) aim to enhance their uptake through result-based schemes, where payments depend on verified ecological outcomes rather than fixed practices (Süring & Lundhede, 2025). To be effective, these schemes must cover opportunity and transaction costs, ensure permanence, and align with broader EU biodiversity targets.

Voluntary Carbon Markets (VCM)

European forests are critical for achieving the EU's climate-neutrality target by 2050. To boost their contribution to carbon removal, the European Commission aims to increase annual land-based CO₂ uptake from 225 Mt today to 310 Mt by 2030. Public funds such as the EU's Agricultural and Rural Development programmes and the European Investment Bank's Natural Capital Financing Facility remain the main sources of restoration finance, but there is growing recognition that voluntary carbon markets (VCMs) can attract private investment to complement these efforts (Chiti et al., 2024; Lewis et al., 2019). In a VCM, companies and individuals purchase credits that represent verified carbon removals or reductions, allowing forest owners to earn income for restoration or improved management. Despite this potential, Europe's share in global VCM activity is still marginal, under 1 % of traded credits in 2022, because forest projects in the Global South tend to be cheaper and deliver biomass gains more quickly (Environmental Finance, 2024; Larjavaara, 2018). Yet European projects generally offer stronger governance, permanence, and monitoring, qualities that investors increasingly value after recent controversies over the credibility of tropical offset projects (West et al., 2023; Gill-Wiehl et al., 2024). The market overall has slowed since its 2021 peak, but demand for high-integrity, nature-based removals, particularly afforestation, reforestation, and revegetation (ARR), is growing. European credits already command premium prices of about €25 per tonne in 2023, versus a €7 global average (Forest Trends Ecosystem Marketplace, 2023), reflecting their transparency and biodiversity co-benefits. Looking ahead, the EU Carbon Removals and Carbon Farming Certification Regulation, entering into force in late 2024, will create the first EU-wide framework for verifying and trading removals. This step should strengthen trust in European forest-based credits, make restoration more investable, and help integrate public and private finance into a coherent strategy for large-scale forest recovery (Chiti et al., 2024; Mikolajczyk & Diaz, 2025).



Eco-Labeling and Certification

Certification schemes such as the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) incentivize sustainable forest management by granting market access and price premiums for responsibly sourced products (FAO, 2020). Certified forest restoration contributes to both ecological recovery and market competitiveness, especially as EU consumers and investors increasingly value verified sustainability credentials.

Biodiversity Offsets and Credits

Biodiversity offsets require developers to compensate for ecological damage by financing restoration elsewhere. European offset systems, such as the proposed [EU roadmap on Nature credit](#) and country-level mechanisms such as Germany's Eingriffsregelung and France's ERC mechanism, generate private finance for reforestation and habitat creation (European Environment Agency, 2020). More recently, England's Biodiversity Net Gain (BNG) regulation (2024) has mandated a 10% net gain in habitat value for new developments, spurring national offset markets (Rampling et al., 2024). However, ensuring true ecological equivalence and additionality remains a challenge. Emerging voluntary biodiversity credit systems seek to go beyond compliance by monetizing measurable biodiversity "uplifts," creating a new frontier for nature-positive investment (Wauchope et al., 2024; Wunder et al., 2025).

2.2.2. Fiscal Instruments

Fiscal instruments rely on direct public expenditure or tax mechanisms to promote restoration. They are particularly effective where private incentives are weak or markets for ecosystem services are underdeveloped. Major fiscal instruments around forest restoration are:

Subsidies and Grants

EU Rural Development Programmes (RDPs), LIFE projects, and Cohesion Funds finance forest restoration, erosion control, and biodiversity enhancement (DG AGRI, 2021). For example, RDP funding in Poland supports reforestation after pest outbreaks, while LIFE-funded projects in Southern Europe target post-fire recovery. However, evaluations show that forest biodiversity measures have historically received less than 1% of CAP spending, underscoring the need for greater resource allocation (European Court of Auditors, 2020).

Tax Incentives

Fiscal incentives can lower barriers for private forest owners. Austria, for instance, offers tax deductions for ecological forest management and reforestation, linking fiscal benefits to sustainable practices (Austrian Ministry of Agriculture, 2022). Such schemes help align private forest investments with restoration and climate objectives, but their effectiveness depends on long-term policy stability.

Environmental Levies and Funds

Levies on activities causing land degradation or habitat loss, though less common, can generate earmarked funds for forest restoration. For example, certain municipalities in Germany have piloted land-use fees that finance local reforestation (OECD, 2019). These instruments can complement PES or offset mechanisms by channelling public revenues into ecological recovery.

While fiscal tools ensure predictable funding, they risk inefficiency if not well-targeted. Future reform of CAP eco-schemes and EU State Aid rules may enhance their effectiveness by linking public payments more closely to verified biodiversity outcomes.



2.2.3. Regulatory Instruments with Economic Incentives

These instruments combine legal mandates with financial or market incentives, providing a hybrid approach that ensures compliance while supporting restoration through economic mechanisms. Major regulatory instruments functional in Europe are listed below

Restoration Mandates with Subsidies

In countries such as Poland and Slovenia, forestry laws require reforestation after natural disturbances like windthrow or bark beetle outbreaks. Governments often co-finance these obligations through restoration grants or subsidies (UNECE, 2021). This approach integrates legal responsibility with state support, ensuring ecological recovery without imposing unsustainable costs on landowners.

CAP Conditionality and Eco-Schemes

Under the Common Agricultural Policy (CAP), compliance with environmental conditions is increasingly tied to eligibility for payments. The new eco-schemes encourage agroforestry, afforestation, and restoration of degraded lands (DG AGRI, 2023). This “green conditionality” approach rewards land managers who integrate forest restoration into productive landscapes, aligning agricultural policy with EU biodiversity targets.

Polluter Pays Principle

The EU Environmental Liability Directive (2004/35/EC) operationalizes the polluter-pays principle, requiring responsible parties to remediate environmental damage, including through reforestation (EC, 2022). When combined with insurance mechanisms or financial guarantees, this ensures that restoration costs are internalized by those causing degradation, providing both deterrence and funding for ecological repair. Regulatory instruments with economic incentives thus serve as a bridge between command-and-control regulation and market flexibility, providing a structured yet financially viable path for forest restoration.

2.2.4. Voluntary and Hybrid Instruments

Voluntary and hybrid instruments represent a collaborative, non-mandatory approach that mobilizes multiple stakeholders, businesses, public agencies, NGOs, and citizens, through partnerships and innovative finance models.

Public-Private Partnerships (PPPs)

In Hungary, PPP models enable corporations to co-invest with public agencies in forest restoration on public lands, combining private finance with technical and regulatory support (WWF Hungary, 2021). These partnerships often focus on urban and peri-urban reforestation, where visibility and community engagement enhance corporate reputations.

Corporate ESG and Impact Investment

In Slovakia and other EU states, companies are integrating forest restoration into Environmental, Social, and Governance (ESG) portfolios, aligning with EU Sustainable Finance Taxonomy requirements (EIB, 2022). Such investments provide measurable sustainability outcomes and help corporations mitigate climate and biodiversity risks.

Green Bonds and Climate Finance

Green bonds are emerging as a promising instrument to finance reforestation and land rehabilitation. The European Investment Bank (EIB) and national development banks have issued bonds tied to nature-based solutions, offering investors transparent returns linked to verified environmental impact (EIB, 2023). While still at pilot scale, they represent a scalable mechanism for channelling capital into long-term forest restoration.



Land Stewardship Agreements

In Germany and Austria, land stewardship pacts between landowners, NGOs, and municipalities promote ecological restoration through shared responsibility and co-financing (Landcare Europe, 2022). These agreements emphasize collaboration, local adaptation, and continuous monitoring rather than strict regulation.

Voluntary and hybrid instruments are particularly valuable for innovation, experimentation, and multi-stakeholder learning. However, their effectiveness hinges on credible monitoring and transparent reporting to avoid “greenwashing” and ensure genuine ecological outcomes.

3. Mapping Existing Economic Instruments in Central Europe

3.1. Austria

Austria combines robust direct subsidies with innovative market-based and fiscal incentives. Its Forest Fund supports afforestation and regeneration, while tax deductions reward sustainable management. Emerging climate bonds and voluntary carbon credit mechanisms allow Austrian landowners to participate in broader climate markets. Austria also leverages strong forest owner cooperatives to scale up certification and stewardship models.

Several private companies and start-ups in Austria, for example, [Pina Earth](#), and [ECS Climate Solutions](#) are developing market-based voluntary forest carbon projects that generate certified carbon credits based on additional carbon storage achieved through afforestation, reforestation, and adapted forest management. These projects enable companies to offset emissions while providing additional income for forest owners to invest in restoration and sustainable forest management. Although the voluntary carbon market in Austria is still evolving, it represents an emerging market-based mechanism that creates financial value for forest ecosystem services.

Austria has one of the highest shares of certified forests in Europe, with approximately 85% of its forests certified under the PEFC scheme (PEFC, 2024), with a smaller share under FSC. Certification systems establish sustainability and reforestation standards, ensuring that harvested areas are replanted in accordance with ecological criteria. However, certification in Austria does not create a direct additional incentive for reforestation, as replanting is already legally required under the Forest Act (Forstgesetz, 1975), Art. 13. Certification thus functions mainly as a market-based quality assurance mechanism rather than a restoration incentive.

Austria implements fiscal instruments such as contractual nature conservation agreements in which landowners voluntarily commit to habitat restoration or maintenance in exchange for public payments. Most of these agreements are financed by national, provincial, or EU funds and focus on biodiversity conservation. Recent examples include [connectPLUS](#) and [connectForBio](#).

Another long-standing initiative is the Natural Forest Reserves Programme, under which landowners receive compensation for setting aside forest areas to allow natural processes to recover. While not focused solely on reforestation, these measures contribute to ecological restoration and biodiversity enhancement.

The Austrian Forest Fund (Waldfondsgesetz, 2020), established by the Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management, is Austria’s most significant national funding instrument for forest restoration in recent years, with a total volume of €430 million. It consists of ten thematic packages, the first of which supports reforestation and tending measures



following damage events. The fund aims to ensure the long-term recovery of forests, foster climate-resilient and species-rich stands, and safeguard forest ecosystem services after disturbances.

Several publicly funded PES schemes and research projects explore how to establish markets for forest ecosystem services. Examples include [Forest EcoValue](#) and [NOBEL](#), Novel Business Models for Sustainable Supply of Forest Ecosystem Services. Although these initiatives are currently financed by EU and national research programmes, their long-term goal is to develop transferable PES models that attract private investment into forest ecosystem services.

According to Article 37 of the Austrian Income Tax Act (Einkommenssteuergesetz, 1988), income derived from extraordinary timber harvests, for example, those resulting from natural disturbances such as storms or insect outbreaks, may be taxed at half the average income tax rate. This provision reduces the financial burden on forest owners after calamities and preserves liquidity for reinvestment in the reforestation activities required under Article 13 of the Forest Act. It therefore represents an indirect fiscal incentive supporting forest restoration through tax relief.

The Austrian Forest Act (1975) defines the concept of protective forests (Schutzwälder) and the obligations related to their maintenance. Protective forests serve to prevent erosion and maintain soil fertility (site protection forests), or to protect human settlements, infrastructure, and agricultural land (protection forests). Reforestation and stabilization of these forests are legally mandated and more strictly regulated than for general forest stands. In areas prone to torrents or avalanches, special forest management plans can be developed to enhance protective effectiveness.

Regional authorities may designate forests as special protective forests (Bannwald, under Articles 27-31 of the Forest Act). In such cases, revitalization measures necessary to maintain or improve the forest's protective function must be financed by the beneficiaries of that protection.

Furthermore, forests with high socio-economic importance, such as protective forests, are eligible for higher subsidy rates compared to purely productive forests. Together, these measures create a regulatory framework that combines legal obligations with financial incentives for forest regeneration and the enhancement of ecosystem services.

Public-private cooperation models in Austria enable joint implementation of reforestation and climate adaptation projects. The Austrian Federal Forests can, for example, collaborate with NGOs, companies, and public institutions to co-finance restoration projects. Although specific examples are not always publicly documented, such partnerships represent hybrid instruments that combine public and private resources to support forest restoration and resilience.

Eco-sponsoring initiatives, where private entities fund targeted ecological measures (such as reforestation or habitat restoration) in exchange for recognition or CSR visibility, can also be considered within this category.

[BIOSA](#) is an Austrian association dedicated to dynamic nature conservation. It acts as an intermediary between landowners and potential funders, linking biodiversity and restoration projects with public or private financing sources. BIOSA often participates as a project partner in research and conservation initiatives, providing expertise in biodiversity-friendly land and forest management. The association channels private and mixed funding into ecological restoration and biodiversity projects, including forest restoration measures. It therefore represents an innovative hybrid mechanism that combines applied research, stakeholder cooperation, and practical implementation.

3.2. Germany

Germany's economic instruments are diverse and multi-level. National and regional subsidies co-finance restoration, disaster recovery, and climate adjustment projects. Pilots in voluntary carbon credits link forest



restoration with corporate sustainability goals, and green tax deductions support investments in resilience. Germany also pioneers the use of conservation easements and advanced monitoring systems to underpin carbon and biodiversity credits.

The Federal Conversion and Reforestation Programs are a core instrument, with the Federal Government dedicating substantial program expenditure for the large-scale creation of species-rich and climate-resilient forests through targeted reforestation and structural conversion. These grants are often implemented in cooperation with the federal states of Germany (the *Laender*), such as Bavaria (StMELF 2025), Baden-Wuerttemberg (MLR 2021), Brandenburg (Forst Brandenburg 2025) or Saxony (SMUL 2023). Examples include the Joint Task for the Improvement of Agricultural Structures and Coastal Protection (GAK), or the Climate-Adapted Forest Management Program (Förderprogramm Klimaangepasstes Waldmanagement PLUS) (BMEL 2025; BMUV 2024). Complementing this, the EU Common Agricultural Policy (CAP) Strategic Plans and Rural Development funding (European Agricultural Fund for Rural Development, ELER) is explicitly linked to climate action and biodiversity enhancement. This includes financial support for essential long-term ecological goals, such as retaining the forest's genetic resources and ensuring the implementation of close-to-nature forest management practices (LM M-V). To reach the goals of the National Biodiversity Strategy of Germany (Nationale Strategie zur biologischen Vielfalt 2030, NBS), the Federal Program for Biological Diversity (Bundesprogramm Biologische Vielfalt) provides grants up to 75% of the budget for the restoration of forest habitats and biodiversity-oriented reforestation (BfN 2025; BMUKN 2024).

The binding LULUCF Targets under the German Climate Action Law (Klimaschutzgesetz, KSG) are a key driver. This law sets rigorous, mandatory national targets for the land use, land-use change, and forestry (LULUCF) sector to significantly increase its carbon sink capacity, mandating a reduction of at least 25 million tonnes CO₂ equivalent by 2030 (§3a KSG) (BMJV 12/12/2019). Additionally, the Environmental Liability Act (Umwelthaftungsgesetz) establishes strict financial liability for environmental damage caused by specific industrial installations (§1 in connection with §3 and §16 UmweltHG) (BMJV 2017). This legislation implements the EU Environmental Liability Directive and focuses on damage to natural resources, including protected forest areas. This mechanism forces polluters to internalize costs, ensuring that liable parties fund the necessary remediation and restoration, thereby protecting public budgets (European Commission 2004). Another compensation mechanism is the Ökopunkte-system (German eco-account system). It is based on §§ 13-15 of the Federal Nature Conservation Act (Bundesnaturschutzgesetz, BNatSchG) and implemented through state-level regulations. Infrastructure projects or other interventions that cause environmental damage must finance or implement compensatory afforestation or restoration measures. Private individuals or third parties can restore or afforest a piece of land in advance. After evaluation and crediting by the responsible nature conservation authority, the measure is recorded as eco-points (Ökopunkte), which can later be used or sold as compensation for environmental impacts (LU 2010; LfU 2025; BNatSchG).

Sustainable Timber Certification standards (e.g., PEFC, FSC) for timber and timber products aim to embed ecological quality into consumer decision-making. PEFC certified ~ 8 mio ha, whereas FSC with its slightly more restrictive rules covers ~ 2 mio ha in Germany. Both certification schemes intend to utilize market preferences and establish a potential premium price for wood derived from sustainably managed forests (FSC 2025; PEFC). In addition, a number of Voluntary Carbon Certificates are being developed. One example is the *eva-Zertifikat* from the Environmental Value Association. An *eva-Zertifikat* represents the climate effect of 1 tonne of sequestered CO₂-equivalent. The system is said to provide a verifiable, monetary commodity that offers a complementary revenue stream to encourage long-term, climate-beneficial forestry. However, critics argue that the reforestation financed is mandatory by law, which could be seen as greenwashing (eva 2025; Schroeder 2024).

The rise of Corporate Environmental, Social, and Governance (ESG) Initiatives channels private capital into restoration efforts through specialized "tree planting as a service" models. These projects strategically focus on climate adaptation by planting tree species. Although the main area of operation remains the Global South, several initiatives started to incorporate Germany due to strong interest of companies and private finance (Click A Tree; Plant For The Planet 2025; treedom 2025; Green forest fund 2025; PrimaKlima 2025).



Finally, Local Association Fees act as a crucial hybrid financial mechanism. In certain northern German Laender, forest owners may face mandatory fees or charges levied by local water and/or soil associations. These compulsory contributions ensure a stable, dedicated funding stream for essential hydrological infrastructure and renaturation tasks, which are vital for supporting the success and resilience of newly restored forest ecosystems (BMJV 2002).

3.3. Czechia

Czechia is moving from a model based mainly on compensations and subsidies toward explicit payments for ecosystem services (PES). A major amendment to the Forest Act, adopted as Act No. 250/2025 creates a new statutory instrument called “payment for forest ecosystem services,” specifically granting forest owners the right to a payment for the climate function consisting of carbon storage and sequestration. The newly inserted paragraph (§ 46b) will take effect on 1 January 2027, with detailed implementation conditions to be determined by government decrees. These decrees have not yet been drafted, so the calculation method remains unknown. According to ministry materials and media briefings, the first PES-based disbursements are expected in 2028. The payments will be administered by the competent authorities, the Ministry of Defense in the case of military forests, the Ministry of the Environment in national parks, and the Ministry of Agriculture for all other forests. A specific factor in Czechia is the ownership structure: approximately 54% of forests are state-owned, 17% municipal, and 19% private, with additional shares belonging to churches and private companies. PES must therefore be applicable both to the large state forest enterprise Lesy ČR and to thousands of small-scale owners.

Alongside this new approach, there are already instruments that function similarly to PES, or more precisely as regulatory PES, since they are payments for achieving environmental outcomes by restricting economic activities. These include compensation for limitations on forest management in areas with higher levels of protection (national parks, protected landscape areas, national nature reserves, nature reserves, national nature monuments, nature monuments, water source protection zones, etc.) under § 58 of the Nature and Landscape Protection Act (No. 114/1992 Coll.). This compensation represents a claim for actual damage, determined individually based on documented evidence, and not a flat-rate payment per hectare. By contrast, payments under the Natura 2000 scheme are administratively simpler and provided as flat-rate payments per hectare.

In the past, large national subsidy programs were also applied, for example, state aid SA.57417, which provided direct grants amounting to a total of CZK 15 billion, aimed at maintaining or restoring forest ecosystems and biodiversity (in particular dealing with the consequences of bark beetle calamities). Although these subsidies were not purely results-based, they illustrate the role of public financing in supporting forest ecosystem services. They do not constitute PES in the strict sense, but they significantly reduce restoration costs and thus facilitate the provision of ecosystem services. In the Czech context, the issue of carbon markets is also developing. Forestry is not included in the EU ETS, but Czech forests are accounted for under EU LULUCF targets according to Regulation 2023/839. For Czechia, model studies suggest that with adaptation measures, forestry could return to the role of a stable sink of approximately 3 Mt CO₂-equivalent per year.

The new Carbon Removals and Carbon Farming Certification Regulation (CRCF, 2024/3012) will provide EU-level certification that Czech PES and carbon projects can build upon. Its main aim is to establish the first EU-wide standard for the assessment and certification of projects that remove CO₂ from the atmosphere or reduce emissions from soils. CRCF seeks to increase the credibility and transparency of carbon credits in Europe by standardizing criteria such as quantification and measurability, additionality, permanence, and sustainability.

In the voluntary carbon market, there are various activities in Czechia, including local platforms and consulting companies offering forest offsets. However, quality and prices vary considerably, and buyers face



credibility challenges (the risk of so-called greenwashing, activities presented as more environmentally beneficial than they really are). Globally, new standards are therefore being introduced, such as the CCP label by ICVCM or CRCF methodologies, which aim to improve the quality of projects. CRCF also addresses the issue of combining PES and (so far only voluntary) carbon credits linked to changes in management that increase carbon sinks, while avoiding the risk of double-counting.

3.4. Slovenia

Slovenia, with high forest coverage and strong public ownership, prioritizes regulatory incentives and EU funds for restoration. Fiscal supports, including rural development payments and state-managed subsidies, underpin large-scale restoration. There is growing experimentation with eco-credits for biodiversity, integration of Natura 2000 priorities, and pilot PPPs for watershed protection and rewilding.

National co-financing of works in forests under the Forest Act (Zakon o gozdovih, ZG) and the Rulebook on financing and co-financing investments in forests. The Slovenia Forest Service (ZGS) implements public calls for silvicultural, protection, and restoration works in privately owned forests when these are in the public interest. Rural Development and CAP Strategic Plan 2023-2027 measures support afforestation, forest restoration, fire and pest damage recovery, forest roads, and biodiversity conservation. Forestry-related interventions are financed through the European Agricultural Fund for Rural Development (EAFRD) and national co-funding.

Natura 2000 compensations and contracts are provided for management restrictions in designated forest areas. Payments are based on the Nature Conservation Act (Zakon o ohranjanju narave, ZON) and implemented through national programmes and CAP-funded measures.

Disaster recovery funding follows the adoption of multi-year Sanitation Plans after windthrows, ice damage, bark beetle outbreaks, and floods. Funding is allocated from the national budget and EU solidarity or recovery mechanisms.

Public forestry service funding is ensured through the state budget for the operation of the ZGS and for state-directed forest management tasks.

The LIFE Programme in Slovenia provides EU co-financed, project-based funding for forest restoration, habitat management, and Natura 2000 implementation, complementing national and CAP-supported fiscal instruments.

The Forest Act (ZG) sets obligations for forest management planning and allows financial support for works in the public interest. The Nature Conservation Act (ZON) provides a legal basis for management contracts and compensation payments for habitat conservation within forests, including Natura 2000 areas. The Environmental Protection Act (ZVO-2) incorporates the polluter-pays principle and establishes liability for environmental damage, including damage to forests and protected natural values. The Act on the Management of State Forests (ZGGLRS) regulates the management of state-owned forests by SiDG d.o.o., including financial mechanisms for sustainable management, investments, and revenues transferred to the state budget. Forest certification systems are operational: FSC certification applies to all state forests managed by SiDG and selected private owners and companies.

Management contracts between forest owners and the state or public institutes (ZGS, ARSKTRP) are applied for Natura 2000 habitats and non-productive forestry investments co-financed by CAP. Eko sklad (Slovenian Environmental Public Fund) provides financial instruments for energy efficiency and environmental projects, including wood-based biomass investments relevant to the forestry sector.

State-owned enterprise SiDG d.o.o. reinvests part of its revenues from timber sales into forest infrastructure, restoration, and silvicultural works according to approved management plans.



3.5. Hungary

Hungary's framework for economic instruments supporting forest restoration and climate-resilient forest management combines public subsidies, EU co-financed programmes, and emerging private and hybrid mechanisms. While several policy tools exist, their integration and coherence remain limited, and market-based approaches are still in their infancy.

The most significant economic instruments for forest restoration in Hungary are state and EU-funded subsidies. Within the Common Agricultural Policy (CAP) Strategic Plan 2023-2027, afforestation, forest-environmental measures, and climate adaptation investments are eligible for co-financing through the European Agricultural Fund for Rural Development (EAFRD) and national funds. These grants target afforestation of former agricultural lands, regeneration after pest or drought damage, and the conversion of monocultures into mixed, climate-resilient stands. Between 2020 and 2023, more than 23 000 ha of new forest were established with public support.

On March 20, 2024, the Managing Authority of the Common Agricultural Policy published the call for proposals entitled "Restoration of forest potential following abiotic or biotic damage" with code KAP-RD41-2-24 among the forestry calls for proposals for the 2023-2027 support period. Forest managers can submit a support application, which is also a payment application. Within the framework of the call, the beneficiary can submit a support/payment application for basic restoration activities and additional activities. The application can be submitted once a year till 2027. The aim of the support is to counteract the increasing and increasingly extreme abiotic environmental damaging conditions and events (such as forest and vegetation fires resulting from water shortages and droughts, frost damage and storm damage) as well as the spread of new biotic pathogens and pests by restoring them to a more resilient state. The available total funding budget until 2027 is EUR 25,000,000.

The National Forestry Strategy 2016-2030 sets the framework for subsidies, promoting close-to-nature forest management, soil and water protection, and sustainable use of forest resources. The Forest Act (Act XXXVII of 2009) and its implementing decrees (e.g., Decree 61/2017 FM) regulate financial support for afforestation and the protection of forest ecosystems, including compensation for restrictions in protected areas. Market-based mechanisms are still emerging. Pilot initiatives explore the use of forest carbon credits and climate certificates linked to voluntary corporate offsetting. Hungarian forestry research has demonstrated the cost-effectiveness of carbon pricing and payments for carbon sequestration in forest management, but there is no nationwide certification or registry system yet.

The national regulatory framework incorporates the polluter-pays principle through the Environmental Protection Act, requiring restoration or compensation for environmental damage, including forest loss. In addition, the Natura 2000 compensation scheme provides annual payments to forest managers for management restrictions in designated forest areas, financed by the national budget and CAP funds. The problem is that there is no strict, ecologically based criteria system. Although a forest manager receives Nature 2000 subsidies, they have to meet specific expectations, e.g., creating a close-to-nature forest or mitigating logging activities.

Public-private partnerships (PPPs) have recently gained traction. Corporate ESG-driven tree-planting initiatives (e.g., by WWF Hungary and forest companies) and local community reforestation projects complement state-funded restoration. These hybrid schemes combine environmental goals with education, tourism, or local development benefits. Private bodies (banks, universities) also finalised creating new forested habitats on former arable land, primarily to reduce the carbon footprint of the donor organization.

Despite the variety of instruments, Hungary's approach remains subsidy-driven. Market and performance-based instruments are underdeveloped, and coordination between forestry, climate, and biodiversity policies is limited. Carbon and ecosystem-service markets are still experimental, with uncertain monitoring, reporting, and verification (MRV) systems. Payments are often linked to activities rather than measurable outcomes, and private participation in restoration finance is modest.



3.6. Poland

Poland's RDP is a flagship for EU-funded afforestation and restoration. Grants target degraded forests, soil protection, and water retention. Fiscal incentives, such as reduced land tax for sustainable use, supplement direct payments. Innovative pilots link carbon credit generation with local governance and rural development. Complexities in administrative procedures remain a challenge for small holders. Poland is characterized by the predominance of public ownership of forests - around 80% of the country's forest area is publicly owned, with the State Forests National Forest Holding (Państwowe Gospodarstwo Leśne Lasy Państwowe, PGL LP) directly managing approximately 76.9% of all forests (GUS 2024). The remainder consists of private, church, and other forms besides municipal forests and national parks ownership. This ownership structure largely determines the mechanisms for financing forest restoration activities.

The most important instrument in state-owned forests is the Forest Fund, financed through internal transfers between forest districts. It serves to compensate for financial deficits among State Forests units and covers, among other things, afforestation, reforestation following natural disasters, protective measures, and support for forest districts operating in areas with difficult habitats. The Forest Fund also finances the preparation of forest management plans for private forests, as well as silvicultural activities within national parks. Another important element is small-scale water retention programmes in lowland and mountain forests, aimed at improving water management and increasing ecosystem resilience to droughts and floods. Under the lowland retention programme (2016 - 2023), 1,349 small retention facilities were constructed or modernized, with a total capacity of nearly 4 million m³, significantly enhancing the ability of forests to mitigate the effects of drought. The project, valued at approximately PLN 246 million, was co-financed by the European Union Cohesion Fund under the Infrastructure and Environment Operational Programme (POLiŚ) 2014 - 2020, with settlements continuing until 2023. The level of co-financing amounted to PLN 162.5 million, enabling the State Forests to carry out a wide range of water management investments supporting forest adaptation to climate change (CKPŚ, 2023).

In private and municipal forests, the main support mechanism remains budgetary subsidies granted by county starosts under Article 14 of the Forest Act. These funds may fully or partially cover the costs of afforestation of post-agricultural land, reforestation, tending of young stands, or the conversion of species compositions of forest stands towards more resilient species. The scheme operates in practice - every year, thousands of owners benefit across the country, with total support reaching several tens of millions of PLN. For example, in Hajnówka County in 2022, the local authority allocated over PLN 300,000 in subsidies for private forest owners, financing reforestation after wind damage and insect outbreaks, while in Limanowa County part of the funds was directed towards afforesting former farmland and converting of species composition of young stands. Poland has also been one of the main beneficiaries of forestry-related measures under the Rural Development Programme (PROW). Between 2004 and 2013, the most significant measures were "Afforestation of agricultural and non-agricultural land" and "Restoration of forest potential damaged by disasters and preventive measures". In the early years of EU membership, these schemes supported the afforestation of substantial areas of post-agricultural land. However, the attractiveness of this instrument was reduced by the introduction of high agricultural direct payments, which encouraged farmers to maintain even marginal land under cultivation. As a result, some of the land is potentially suitable for afforestation. Currently, PROW support focuses more on the protection and restoration of forests damaged by disasters, increasing stand resilience, and financing pro-environmental measures such as species composition conversion, payments under the Natura 2000 scheme, as well as compensation for non-harvested stands in national parks and nature reserves.

An important supplement is provided by funds from the LIFE programme, which supports, among other things, the restoration of forest habitats in protected areas. An example is the Kampinos WetLIFE project, aimed at restoring wetlands in the Kampinos National Park. Forest-related components also include Interreg and Horizon Europe projects, which facilitate knowledge transfer and co-finance applied research.



In terms of fiscal instruments, forest owners benefit from tax incentives. Young stands up to 40 years old are exempt from forest tax, while protective forests, reserves, and national parks receive a 50% reduction. In the event of natural disasters, municipalities may temporarily reduce tax levels for affected owners. Agricultural land afforested under PROW schemes is also treated preferentially or exempted from agricultural tax for a certain period. While these mechanisms do not generate new sources of funding, they reduce the maintenance costs of young forests and thus act as an incentive for afforestation.

A new direction of development involves initiatives related to forest carbon credits. This involves certifying CO₂ sequestration by forests and allowing the sale of such certificates as emission offsets. Pilot projects have been implemented in the Lower Silesian Forest and the Notecka Forest, often in cooperation with local authorities, the State Forests, and private partners. Since 2017, the State Forests have tested the concept of Forest Carbon Farms (Leśne Gospodarstwa Węglowe, LGW), based on additional silvicultural measures to increase carbon dioxide sequestration, such as extending the rotation age of stands or introducing fast-growing species. To date, these initiatives have been preparatory, as Poland still lacks a central certification system and carbon credits markets.

In summary, the system of financing forest restoration in Poland combines national instruments (the Forest Fund, county subsidies, tax incentives) with European mechanisms (PROW, Natura 2000, LIFE, Interreg). Its specificity stems from the dominance of state ownership and the self-financing model of the State Forests, alongside support for fragmented and less profitable private forests. Key challenges include complex administrative procedures and the absence of a framework for payments for ecosystem services (PES), which could provide owners with an additional source of income. Emerging new market mechanisms such as carbon credits, combined with planned PES schemes, may in the future create a more diversified, multi-pillar financing system, better prepared to meet the challenges of climate change and the need to strengthen forest resilience.

3.7. Italy

Italy leverages substantial EU and national funds for forest restoration, especially in the Apennines and vulnerable regions. The “Boschi Italiani” program utilizes tax incentives, targeted subsidies, and eco-scheme bonuses to incentivize reforestation and sustainable management. Regional pilots for biodiversity credits and carbon finance are underway, often linked to Mediterranean climate adaptation programs. Italy’s participatory and social forestry models, centred on cooperatives and local authorities, support bottom-up restoration and innovation.

The forestry sector in Italy receives significant support from public funding. Key contributors include the European Agricultural Fund for Rural Development (EAFRD) and the European Regional Development Fund (ERDF), along with the LIFE and INTERREG programs, which provide the foundation for financing large-scale interventions. As indicated in the national Report on Forests and Forestry Supply Chains (Cesaro et al., 2019), rural development policies co-financed by the European Union increasingly serve as the primary, and in many cases the sole, source of funding for the forestry sector. This funding is therefore crucial for forest restoration activities. To illustrate the scale of this funding, in RDP program 2007-2013 a total of €1.85 billion was allocated to forest-related measures. This amount decreased to €1.4 billion in RDP program 2014-2020. Specifically, for restoring degraded forests and implementing preventive measures for natural calamities, more than half a billion euros were disbursed between 2007 and 2013 (**Table 2**), supporting 3707 actions across 276000 ha. Of these actions, 549 focused on restoring areas damaged by wildfires on 2968 ha, while 389 aimed to restore forests after other natural calamities on 2803 ha. The remaining actions were preventive measures against both wildfire damage and other natural calamities. During the 2014-2020 programming period, over a quarter of a billion euros were allocated exclusively for restoring forests impacted by wildfires, natural calamities, and catastrophic events. However, various challenges, including overlapping jurisdictions, unclear regulations, procedural difficulties, and particularly the lack of a strong national body in the forestry sector, hindered the effective spending for some forest-related measures.



Consequently, both in the 2007-2013 and in the 2014-2020 programming periods a portion of the financial resources allocated for forestry was redirected to agricultural sector interventions (Cesaro et al., 2019).

Table 2: Planned and disbursed RDP expenditure (€) for risk prevention measures and forest restoration activities regarding wildfire and natural calamities in Italy during 2007-2013 and planned in 2014-2020 programming periods.

Program 2007 - 2013		Program 2014 - 2020	
Measure 226 - Restoring forest potential and introducing preventive measures		Measure 8.3 - Prevention measures for forests damaged by wildfires, natural disasters, and catastrophic events	Measure 8.4 - Restoration of forests damaged by fires, natural disasters, and catastrophic events
Planned public spending (€)	Public expenditure disbursed (€)	Planned public spending (€)	Planned public spending (€)
546,162	531,612	363,410	251,596

In addition to these measures, there are public payments for environmental commitments, such as agro-environmental and climate-related measures, or those related to Natura 2000, which fall under the “Payment for Ecosystem Services-like” (PES-like) mechanism. Examples of restoration in this context include support for post-wildfire restoration, calamity prevention measures (e.g., creating firebreaks or maintaining forest roads network), and the restoration of degraded forests to enhance stability, biodiversity, and protective functions. However, the implementation of these PES-like has been quite limited to date (Cesaro et al., 2019).

Italy has also established regulatory instruments that provide economic incentives for forest management through the 34/2018 Legislative Decree Testo Unico sulle Foreste e Filiere Forestali - TUFF (Consolidated Law on Forests and Forestry Supply Chains). This law, among other things, regulates the conversion of forests to other land uses and mandates that those responsible for forest conversion into another land use must undertake restoration activities or pay for equivalent measures, such as reforestation or projects enhancing the hydro-geological stability of the forest [TUFF 2018]. In case of non-compliance with these obligations, the regional government has the authority to intervene in lieu of the person responsible. Each Regional administration is responsible for defining the criteria for compensation intervention and services, as well as mandatory restoration measures that must be implemented when there is a violation of the compensation obligation. The Regional administration also determines the cases in which exemptions from this obligation may apply, following the guidelines set out in the Ministerial Decree 9219119 of 07/10/2020. This decree acts as the implementing regulation of the TUFF, establishing minimum national criteria for exemptions from compensatory measures following the transformation of forest areas. Additionally, the Strategia Nazionale Forestale - SFN (National Forestry Strategy) emphasizes the importance of linking economic instruments to forestry planning and thematic plans (such as for wildfire prevention, risk management, and Natura 2000 areas definition). In practice, this means that to access public funding for restoration, landowners and land managers must have approved management plans that detail specific prevention and restoration measures. This requirement implies integrating sustainable management practices and specific obligations into these plans, including the need for post-disturbance restoration actions and active management to mitigate the risks deriving from climate change (Strategia Forestale Nazionale, 2022).



In the last years, several market-based economic instruments have been introduced, in the Italian forest sector, even if with modest resonance. These include Payments for Ecosystem Services (PES), voluntary carbon markets, and certification systems. The SFN facilitates the activation of PES to compensate for ecosystem services that are maintained or enhanced through additional commitments not remunerated by market forces. According to SNF PES, which are based on voluntary agreements between providers and beneficiaries, must align with forest planning instruments approved by the Regional Governments and Autonomous Provinces (Strategia Forestale Nazionale, 2022). However, despite PES being recognized in Italian law and formally introduced into the legal system, no implementing decree outlines the operational instruments. This has hindered the development of a stable PES market, limiting experiences primarily to pilot projects or partial public initiatives (Cesaro et al., 2019).

The voluntary forest carbon market in Italy is still underdeveloped, and it is facing challenges in gaining traction. From 2011 to 2016, the number of projects decreased from 19 in 2011 to only 7 in 2016. Concurrently, transaction volumes decreased, from 244,181 tCO₂eq in 2011 to 46,720 tCO₂eq in 2014, though there was a slight increase to 104,036 tCO₂eq in 2016 (Cesaro et al., 2019). In 2018, the Carbon Monitoring Unit reported an increase to 17 projects, but these corresponded only to 10,147 tCO₂eq being traded (Maluccio et al., 2019). The average price of carbon credits also fluctuated significantly, ranging between a low of €6.3/tCO₂eq in 2015 and a high of €36.0/tCO₂eq in 2017. Most of these projects focus on afforestation and reforestation, as well as habitat improvement related to restoration efforts. Furthermore, Italy in 2023 decided to establish a national registry for voluntary carbon credits generated through sustainable agroforestry practices. This initiative aimed to provide clear criteria and guidelines for the generation, certification, and sale of national carbon credits, as outlined in Article 45, paragraphs 2-4 to 2-octies of Legislative Decree No. 13, dated February 24, 2023. The registry will be managed by the Council for Agricultural Research and Analysis of Agricultural Economics (Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria - CREA) and it is set to be operational by 2026. Its primary objective will be to ensure operational effectiveness and transparency for all participants in the carbon credit market (Romano, 2025).

Forest certification serves as another economic tool. Both the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) operate in Italy, covering together approximately 9% of the national forest area (Cesaro et al., 2019). According to FSC data from 2024, 73% of certified areas have implemented the verification of ecosystem services, with several managers already reporting verified positive impacts (FSC, 2024). The new FSC-STD-ITA 02-2024 standard allows for the integration of restoration actions into the verification of ecosystem services. PEFC certification covers around 880,000 ha of forest as of 2021, ensuring the traceability of the timber supply chain, even for “post-event timber,” which is timber obtained from utilization and salvage logging operations following natural disturbances such as windthrows, wildfires, or winter storms (PEFC, 2022).

Finally, following Storm Vaia, which in 2018 caused extensive damage to the forests in the eastern Italian Alps and circa 12 million m³ of timber loss (Piragnolo et al., 2021; Udali et al., 2021), several volunteer initiatives were launched to support forest restoration. One of the most notable initiatives is WOWnature, which successfully planted over 100,000 new trees across more than 65 ha. This initiative engaged thousands of citizens and numerous businesses in implementing and co-financing tree planting. Another significant example is the Trentino Tree Agreement (TTA), initiated by the Autonomous Province of Trento. This agreement serves as a “pact between foresters, forest lovers, and forest visitors,” relying on voluntary donations from individuals and businesses, which are collected through a dedicated digital platform. The funds go directly into the provincial budget and are used for projects aimed at restoring state-owned forests impacted by the windthrow. By 2019, over 650 individuals and several private businesses had participated, with donations tied to tree planting and environmental education activities. The restoration efforts focused on approximately 68 ha of forest, including the Paneveggio Forest (28 ha), the Eremo Forest in San Martino di Castrozza (20 ha), and the Cadino Forest (20 ha) (Provincia Autonoma di Trento, 2020). These volunteer-



driven initiatives complement public policies and contribute with additional resources and social innovation to the forest restoration sector.

In conclusion, the Italian framework for forest restoration encompasses various economic instruments of different types. Market instruments show potential for growth, though this remains limited. Fiscal instruments, which rely on public funds, serve as the backbone of restoration efforts but face challenges related to spending and a lack of true national coordination. Regulatory instruments, which include restoration obligations outlined by the TUFF, ensure accountability for environmental impacts and changes, although their implementation varies by region. Additionally, voluntary instruments have proven effective in engaging citizens and businesses in innovative ways, albeit within localized contexts. Overall, while the combination of these instruments lays a foundation for financing and planning forest restoration activities, significant improvements are needed, especially in regulatory areas. One major concern is the lack of the Piano Nazionale per la Gestione degli Eventi Estremi (National Plan for the Management of Extreme Events), a tool mandated by the SFN but not implemented.

3.8. Croatia

Croatia today combines fiscal, regulatory, and market instruments for forest restoration and sustainable management. The key framework consists of the Rural Development Programme (EAFRD) and the Croatian Regulation on the Implementation of Intervention Reconstruction/Conversion of Degraded Forests (Official Gazette 150/2024), which enables co-financing of forest conversion and resilience enhancement through a combination of national and EU funds. This intervention serves as the main mechanism for the operational implementation of restoration and climate adaptation goals. Fiscal support is further provided through the Fee for Forest Ecosystem Services (OKFŠ), a stable parafiscal source of financing for public functions such as fire prevention infrastructure, research, and afforestation, as well as through State Aid SA.57417, approved in accordance with EU state aid rules. Market-based mechanisms include FSC and PEFC certification, which ensure sustainable forest management and access to higher value-added markets. Pilot projects for voluntary carbon credits and Payments for Ecosystem Services (PES) schemes are still in their early stages but are being developed through LIFE projects and initiatives by Croatian Forests Ltd. and the water and tourism sectors. The regulatory framework is defined by the Forest Act, which mandates restoration and sustainable management, while the Natura 2000 system introduces compensatory obligations and management restrictions, with the possibility of financial compensation. The “polluter pays” principle is integrated into environmental protection legislation, ensuring accountability for ecological damage. At the voluntary level, corporate ESG initiatives and public-private partnerships in afforestation are growing, alongside the issuance of the first green bond in 2023. Although fiscal and regulatory instruments are well developed, Croatia still needs to strengthen market-based and hybrid mechanisms, particularly a national registry for forest carbon credits and PES models, to increase private sector participation and ensure the long-term sustainability of investments.

4. Conclusion: Policy Convergence, Divergence, and Pathways for Scaling Economic Instruments

Central European countries share a common policy trajectory shaped by the European Green Deal, the EU Biodiversity Strategy for 2030, the EU Forest Strategy for 2030, and the Nature Restoration Regulation. These frameworks collectively establish ambitious targets for ecological restoration, carbon sequestration, and biodiversity enhancement, making forest restoration a key pillar of the region’s climate and land-use agenda.



Across the analyzed countries, Austria, Germany, Czechia, Slovenia, Hungary, Poland, Italy, and Croatia, the predominant reliance on public fiscal instruments remains evident. Common Agricultural Policy (CAP) Strategic Plans, Rural Development Programmes (RDPs), and EU Structural and Cohesion Funds serve as the primary financial mechanisms. Yet, there is growing awareness that public funds alone cannot close the restoration financing gap, estimated by the European Investment Bank (2023) at over €49 billion annually.

To address this, countries increasingly deploy market-based and hybrid mechanisms, including Payments for Ecosystem Services (PES), carbon and biodiversity credits, green bonds, and public-private partnerships (PPPs). These tools aim to mobilize private finance, reward ecosystem services, and diversify funding beyond subsidies. The convergence of policy intent linking ecological outcomes to financial incentives is evident throughout the region.

4.1. Divergent Implementation Pathways

Despite shared objectives, the design and maturity of economic instruments vary substantially:

- Austria and Germany have established comprehensive and integrated frameworks combining fiscal incentives, certification, and voluntary markets. Advanced monitoring, reporting, and verification (MRV) systems underpin their credibility, while active forest-owner cooperatives and corporate ESG participation enhance scalability.
- Czechia and Poland represent transitional systems moving from subsidy-based to performance-based approaches. Czechia's amendment to the Forest Act (Act No. 250/2025) introducing statutory PES is a pioneering step toward results-based compensation for ecosystem services.
- Slovenia and Hungary remain primarily subsidy-driven, with limited engagement from private finance. While Slovenia benefits from coherent regulatory coordination, Hungary's fragmented institutional landscape and lack of a national PES registry constrain innovation.
- Italy combines strong legal and policy frameworks (TUFF 2018; Strategia Forestale Nazionale 2022) with uneven regional implementation. Participatory mechanisms such as WOWNature and the Trentino Tree Agreement demonstrate the potential of civic engagement and corporate partnerships.
- Croatia maintains an effective blend of fiscal and regulatory mechanisms, including the Fee for Forest Ecosystem Services (OKFČ), but needs to develop national systems for carbon and biodiversity credits to stimulate private investment.

These contrasts highlight a regional divide: Western and Alpine states exhibit mature, diversified financing ecosystems, while Central and Eastern countries rely more on EU subsidies and face persistent governance and capacity barriers.

4.2. Policy Barriers

Despite progress, several systemic barriers continue to hinder the scaling of economic instruments for forest restoration.

- **Fragmented Governance Responsibilities** are dispersed among multiple ministries and agencies, resulting in overlap and inefficiency. Integrated inter-ministerial coordination remains limited in most countries.
- **Administrative Complexity** Access to funding, especially through CAP and RDP mechanisms, is cumbersome for smallholders due to complex procedures, limited advisory support, and high co-financing requirements.



- Weak MRV Systems and the absence of standardized monitoring, reporting, and verification frameworks undermine transparency and deter private investors.
- Beyond Austria and Germany, corporate participation in restoration finance is minimal due to regulatory uncertainty and the lack of tradable credit frameworks, highlighting the insufficient Private-Sector Engagement.
- Short-Term Fiscal Planning Restoration funding is tied to EU budgetary cycles, leading to discontinuity between programming periods and limited long-term vision.
- Integrity Risks in Emerging Markets are evident since some carbon and biodiversity credits support legally required reforestation, creating “low additionality” concerns and risking greenwashing.

4.3. Policy Recommendations

1. Develop National Restoration Finance Strategies

Each country should adopt a unified national strategy that integrates fiscal, market-based, and hybrid instruments within a coherent policy framework aligned with EU Forest Strategy 2030 objectives.

2. Institutionalize Payments for Ecosystem Services (PES)

Building on Czechia’s legislative innovation, other countries should establish statutory PES systems that link payments directly to verified ecosystem outcomes such as carbon storage, water regulation, or biodiversity gains.

3. Implement the EU Carbon Removals and Carbon Farming Certification Regulation (CRCF 2024/3012)

Regional cooperation in applying CRCF standards can harmonize MRV systems, prevent double counting, and enable cross-border trading of certified credits.

4. Mobilize Blended and Green Finance

Public funds should be used strategically to de-risk private investment through blended finance, guarantees, and green bonds. The European Investment Bank’s Natural Capital Financing Facility offers a model for replication.

5. Simplify Access and Support Smallholders

Streamline administrative processes, introduce digital one-stop portals for applications, and strengthen local advisory services. Cooperative models should be promoted to aggregate small forest parcels into bankable restoration projects.

6. Establish Integrity Standards for Credits and Offsets

Align national frameworks with the EU Taxonomy and CRCF integrity principles, ensuring additionality, permanence, and transparency in carbon and biodiversity markets.

7. Institutionalize Public-Private Partnerships (PPPs)

Introduce national PPP guidelines for forest restoration, enabling formal collaboration between governments, companies, and NGOs. The Austrian and Italian PPP models demonstrate scalable, trust-based cooperation.

8. Integrate Restoration into Fiscal and Spatial Planning

Forest restoration objectives should be embedded in national climate budgets, land-use strategies, and disaster risk management frameworks to secure sustained financing.

9. Create a Central European Restoration Finance Network



Under the auspices of FOREST EUROPE or CINEA, establish a regional platform for sharing methodologies, MRV protocols, and investment models to accelerate harmonization and learning.

4.4. Strategic Outlook

The next decades will determine whether Central Europe can transition from a subsidy-dependent model to a resilient, investment-driven restoration economy. Fiscal instruments will remain indispensable but should evolve to leverage private finance and civic engagement. The integration of PES, carbon markets, and nature credits within EU and national policy architectures can unlock large-scale, results-based restoration.

Achieving this transformation requires political will, institutional coordination, and the establishment of robust verification systems that ensure environmental integrity. By aligning national instruments with EU standards, streamlining governance, and fostering innovation, Central Europe can position itself as a leader in sustainable forest restoration finance, contributing decisively to Europe's climate neutrality and biodiversity recovery goals by 2050.

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