

5.2 Storing more carbon in trees

Striving for near-natural forests

Past progress: Forests are the key land solution for removing CO₂ from the atmosphere. But progress is still moving in the **wrong direction**. The carbon stock in forest land as well as forest area are increasing, but at a decreasing growth rate. France is the primary Member State driving the increase of forest area and carbon stock (reporting a steady growth rate despite recent signs of decreasing net LULUCF removals (EEA, 2023b), followed by Italy and Poland.

Policy context: Current EU policies seem insufficient to deliver the required increases in forest carbon stores. The EU has few competencies for forestry policy, which is set mostly at the national level. The EU's LULUCF Regulation mandates net GHG removal targets for natural sinks, with forests as the key component. The proposed Nature Restoration Law sets goals by 2030 to enhance forest ecosystems. The Forestry Strategy (EC, 2021g) lays out a plan to protect existing forests and increase cover. The CAP provides financial incentives. The proposed Forestry Monitoring Law (EC, 2023x) aims to improve the knowledge base. Most Member States have targets to increase forest area, trees planted and improve sustainable forest management. However, targets are often unclear regarding details and implementation plans. The EU (through the CFCR) and some of its Member States (e.g., France) have implemented or are considering voluntary certification schemes for forest carbon removals.

Areas of action: To achieve the LULUCF target and enhance other forest ecosystem services, the EU should follow-up on its own guidance to Member States on sustainable forest practices and further promote restoration, reforestation and sustainable management (including a shift towards more near-natural forests, to additionally support other ecosystem services such as biodiversity conservation). It is also crucial that certified removals are of high integrity. The CAP's impact on sustainable forest practices could be improved through capacity building to help landowners implement CAP measures, while applying robust monitoring techniques to ensure that the measures have been implemented.

Table 32: Progress towards storing more carbon in trees

Growth in forest area [ha per year]	
Growth of carbon stock in forest land [MtC per year]	

A closer look at past progress

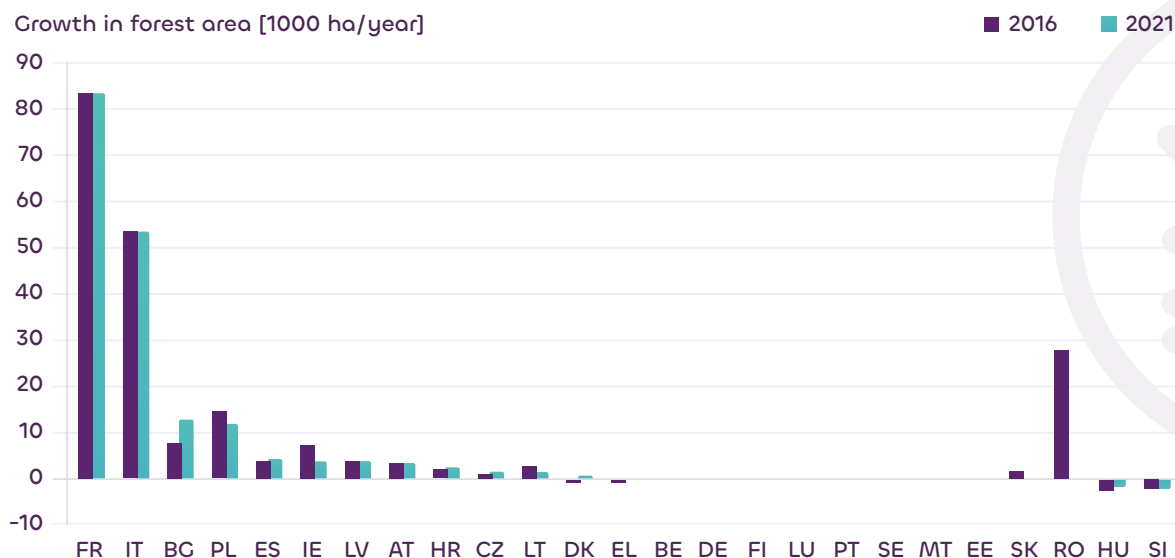
The EU's forests represent major terrestrial carbon sinks and are the key land solution for removing CO₂ from the atmosphere, currently removing around 10% of GHG emissions from other sectors (EEA, 2023b). In addition, they provide other valuable ecosystem services including air purification, flood protection, biodiversity, and recreation. However, progress in forest CDR is still moving in the **wrong direction** and the five-year trendline of net natural removals is still decreasing, following a declining rate of carbon stored in trees due to increased harvesting, tree mortality (worsened by climate change) and mismanagement (ESABCC, 2024a; Hyyrynen et al., 2023). To reverse the trend, forest area and/or forest density must increase at a larger scale while also protecting ecosystems and ensuring their resilience. The volume of carbon removal benefits from restoration and improved forest management is shown in the rate of biomass growth (Bernal et al., 2018). Monitoring the growth of carbon stock in forest land is moreover a useful indicator of forest size, and density of tree planting.

It must be noted that steady CO₂ removal by forests requires steady growth in forest biomass. This means that the growth rate of forest area and/or of the carbon stock must increase compared to the former year to lead to an increased CO₂ removal. In other words, it is not enough if forest area and/or the carbon stock is growing but it must grow faster for CO₂ removals to increase.

Growth in forest area [ha per year]

The geographical coverage of forest land in the EU increased by 5% between 2000 and 2021, reaching 159 million hectares (Mha). Meeting the 3 billion tree pledge by 2030 is expected to require around 1 Mha additional forest land (Lee et al., 2023) – based on current trends, the EU is **on track** towards meeting this target.

However, even though forest area has increased in recent years, it has done so with a declining rate – from a growth of 212,000 hectares (ha) in 2016 to only 182,000 ha in 2021. This decrease in area growth means that less additional land was available to store CO₂ in that year, leading to a reduction in natural removals. Figure 10 compares the growth of forest area in various MS between the years 2016 and 2021. France reported the highest growth of 83,000 ha of forest land per year in both 2016 and 2021. Italy reported the second highest growth of 54,000 ha in both years. Negative growth rates were reported in Hungary and Slovenia for both years, meaning that forest area even decreased in these countries during this period. Data was available for 25 out of 27 MS, with six MS having had no changes in forest area in neither 2016 or 2021, and ten MS having had equal changes in forest area in the years 2016 and 2021. This points to a lack of unique datapoints within the dataset, which in turn evidences insufficient monitoring across the EU.

Figure 8: Past progress of Member States towards growing the area of forest cover


Source: FAO (2024). Note: Annual growth in forest area for years 2016 and 2021, for all EU Member States apart from Netherlands and Cyprus where no data was reported.

The feasibility of increased tree planting largely depends on land availability. Competition for land strongly influences land availability and the financial viability of forests in relation to other competing uses like agricultural production. This is affected by demand (and consequently prices) for wood, food, housing, infrastructure, industry, as well as broader economic conditions. The financial viability of forests can also depend on government support and the incentives provided for afforestation, reforestation and improved forest management (e.g., subsidies, carbon credit revenues). Increased monitoring requirements can reduce incentives (Cacho et al., 2004), but improved accuracy and knowledge of carbon fluxes enables more targeted interventions (e.g., incentives for the protection of old-growth forests). In recent decades, EU forest area has increased while the area of agricultural land has decreased (FAO, 2024).

Several EU policies are putting upwards pressure on the demand for agricultural land relative to forest land, including the CAP with its incentives for livestock and feedstock production (ESABCC, 2024a). The EC's commitment, under the Farm to Fork Strategy (EC, 2020c), to increase organic farming and reduce fertiliser use by 20% each risks putting further pressure on the demand for land to sustain food production, despite its positive environmental impacts. Reducing food waste, but also reducing livestock emissions coupled with an increasingly plant-based diet would partially alleviate this dilemma, lowering the costs of further forest expansion (ESABCC, 2024a) ([see also 4.5](#)).

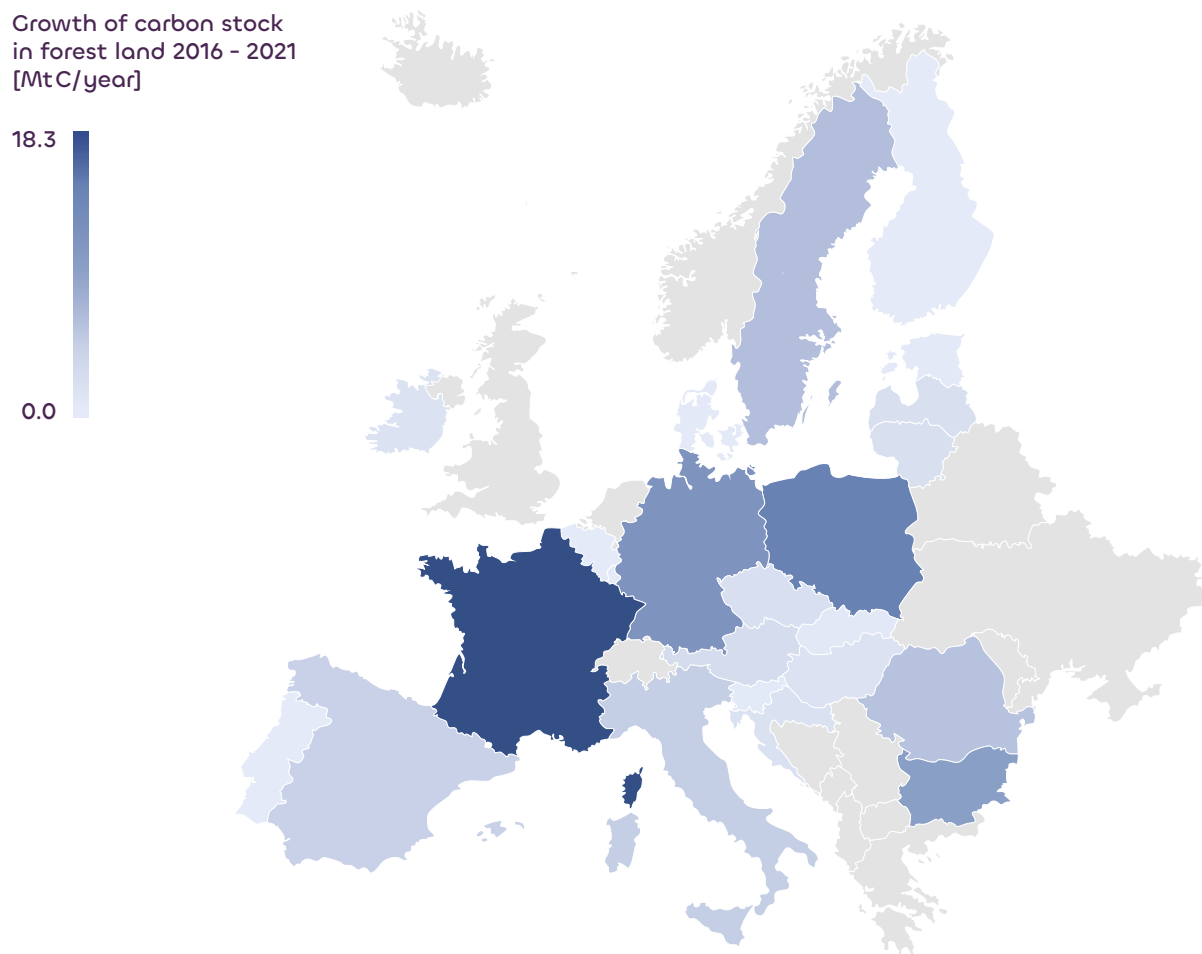
Growth of carbon stock in forest land [Mt C per year]

The carbon stock in forest land is increasing, but at a decreasing rate, from a 119 Mt C increase in 2016 to a 73 Mt C increase in 2021. The increase in the growing stock of carbon in forests was greater than the expansion of forest area over the same period, which means that on average the carbon stock density of forests has increased in the EU. Still, the decreasing trend in carbon stock growth means that less additional CO₂ is stored in

each year leading to an overall reduction in natural forest removals. [Figure 2](#) compares the growth of carbon stock in forest land in various EU Member States averaged between 2016 and 2021. France reported the fastest growth rate of 18 Mt C per year. The next most significant driving countries of the carbon stock in EU forests are Poland (13 Mt C/year), Germany (11 Mt C/year), and Bulgaria (10 Mt C/year).

The declining growth rate of carbon storage suggests a deteriorating ability of the EU's forests to sequester carbon. Related drivers include forest age, temperature effects and natural disturbances worsened by climate change (including pests, storms, and wildfires), harvesting practices as well as mismanagement (ESABCC, 2024a; Hyyrynen et al., 2023), leading to higher tree mortality and lower forest growth. External factors can also be influential, such as the increase in harvesting in Latvia following the energy crisis in 2022 which led to increased biomass extraction for energy generation. At the same time, data quality remains poor with irregular and fragmented measurements, so current data may not fully capture the changes in forest carbon sequestration, nor the impacts of exceptional droughts in the EU since 2015 on forest stands (Forest Europe, 2020).

Figure 9: Past progress of Member States towards growing the carbon stock in forest land between 2016 and 2021



Source: FAO (2024). Note: Average growth of carbon stock in forest lands for all EU Member States apart from the Netherlands and Cyprus where no data was reported.

EU and Member States policies

Forest policy in the EU is fragmented across different levels of governance from the EU to the local level and is weakly institutionalised at the EU-level, related to the fact that the EU has few competencies in this area (Elomina & Pütz, 2021). Forest policy remains a competence of Member States under the subsidiarity principle with the EU being able to influence forestry practices in particular through its targets, guidance and financial support.

EU policies

Current EU policies seem insufficient to deliver the required increases in forest carbon storage in the context of the **LULUCF Regulation**. The Regulation guides the development of natural removals by ensuring they are accurately accounted for through a binding EU target of 310 Mt CO₂ to be stored in 2030 and national net removal targets. In this context, the EC published its **Forestry Strategy** for 2030 (2021g), which sets out the vision and actions required to improve the quantity and quality of the EU's forests, anchored within the European Green Deal. It commits to planting at least 3 billion trees by 2030 and includes measures to improve forest restoration, resilience, and sustainable management. The strategy also emphasises the importance of improving monitoring, making decentralised planning more effective, and proposes reviewing the EU taxonomy criteria for forestry and bioenergy to enhance biodiversity.

The proposed Nature Restoration Law sets a goal to restore 20% of the EU's land and sea areas by 2030. It promotes a rising trend in the presence of standing and laying deadwood, unevenly aged forests, biodiversity and the stock of organic carbon. If adopted, Member States will have to submit Nature Restoration Plans which outline how they comply with the targets. The CAP also supports forests and sustainable management through subsidies. From 2014–2020, the CAP committed subsidies of EUR 6.7 billion for sustainable forest measures, mostly to afforestation (27%), prevention of forest fires and other natural disasters (24%), and investments in ecological, social and resilience functions (19%). The current CAP (2023–2027) provides more flexibility on forestry subsidy design, according to specific national circumstances. The EC (2021g) provided recommendations to Member States on the CAP Strategic Plans to improve sustainable forest management, and to restore forest ecosystem services. The CFCR aims at incentivising afforestation, reforestation and sustainable forest management by certifying carbon removals, but questions remain with regard to ensuring additionality, long-term storage and liability (Meyer-Ohlendorf et al., 2023). Ensuring high-integrity certification is also important for monitoring progress towards the LULUCF Regulation and Nature Restoration Law objectives.

The Renewable Energy Directive (RED III) strengthened sustainability criteria for forest biomass with new limits on its use for burning; however, there are concerns that issues with monitoring, compliance and fraud may undermine the effectiveness of these (ESABCC, 2024a). The EU Timber Regulation (EUTR) aims to prevent illegal logging and trade in wood products in the EU Member States, by establishing obligations on operators and traders of wood products to implement a due diligence system, ensuring that the wood products are legal. The EU Deforestation Regulation (EUDR) ensures that seven commodity products identified as major drivers of deforestation are not sold in the EU if they are sourced from areas affected by deforestation.

Despite these policies, there are a lack of EU-wide rules that apply to Member States for forest protection, afforestation, sustainable forest management practices and payments. The EC (2023c, 2023s, 2023u) provides voluntary guidelines to support national implementation. In addition, the proposal for a Forest Monitoring Law (EC, 2023x) aims to improve knowledge on forest ecosystem services, by providing standardised satellite data and harmonising with data collected by MS.

Member States policies

The forestry policy framework across Member States is rather difficult to assess as the approach to forest regulation often varies by region. There are many national and regional processes to improve forestry practices, whereby many of these processes are ongoing and/or have not been enshrined to law (Pecurul-Botines et al., 2023). There is a lack of policy coordination particularly within Member States characterised by multiple level and regional governance structures. Forest laws are in place for almost all countries in Europe and generally cover rules on clearing, protection against forest fires or forest pests and on forest practices (Forest Europe, 2020). There are some policies that influence carbon sequestration, but impacts are usually indirect and non-binding. Most Member States seem to promote the growth of forests through targets to increase forest area, plant trees and/or improve sustainable forest management (Lee et al., 2023). Roughly half of these targets are specific and quantitative, however some are unclear regarding timescales, details and implementation plans. The EU (through the Certification Framework for Carbon Removals) and some of its Member States have implemented or are considering voluntary certification schemes for forest carbon removals (Margaras & Jensen, 2022). In the following, we outline some key policies from five MS, which have a direct or indirect impact on carbon sequestration.

France introduced a scheme mobilising up to EUR 720 million in investment aid until 2029 to repair and prevent damage to forests, and to plant up to 1 billion trees (DGAL, 2024). The investment aid aims to avoid clearcutting of plantations, which was already an issue under the previous tree-plantation-policy where 87% of the projects financed were clear-cuts, mostly on stands suffering of dieback (Canopée, 2023). Another major policy impacting forest expansion is the low-carbon label (label bas-carbone), a government-backed voluntary scheme for certifying carbon projects either for emission reductions or carbon sequestration (République française, 2018). The programme aims to incentivise the development of emission reduction and carbon removal projects in the agriculture and forestry sectors, among other economic sectors. The programme includes provisions to ensure that the certified carbon units generate a positive climate impact. Projects can be financed through public and private sources. By February 2024, approximately 2.6 Mt CO₂ had been certified (République française, 2024). Around 75 % of this mitigation potential stems from afforestation or reforestation projects (Carbon Gap, 2023b). However, the label has been criticised for several shortcomings common across most carbon certification schemes including inadequately integrating biodiversity preservation into its criteria and not contractually guaranteeing the preservation of carbon stock in case of reversal (Carbon Gap, 2023b; Réseau Action Climat, 2023; Vennin & Angerand, 2023).

In **Germany**, forest management is regulated at the federal and state level. Strategies include the National Forest Strategy 2050 (BMEL, 2021b), the Charter for Wood 2.0

(BMEL, 2021a), and the Federal Action Plan on Nature-based Solutions for Climate and Biodiversity (BMUV, 2023). The Federal Forest Act (BWaldG) provides guidelines for forest subsidy schemes but so far stipulates only very limited mandatory requirements for forest protection. The government's proposed revision of the legislation might include a new focus towards the protection of forests and their ecosystem services and a new forest governance consisting of unified and binding minimum standards, a foundation for payments for ecosystem services and an improved forest information and monitoring framework (BMEL, 2023a; Höllerl, 2023). The Nature-based Solutions programme for forest management distributes approximately EUR 200 million per year to private forest owners complying with 12 sustainability criteria (BMEL, 2023b). The rural infrastructure program 'GAK' provides another approximately EUR 125 million per year towards the forestry sector (BMEL, 2024a). Germany's Forest Climate Fund (BMEL, 2024b) which financed R&D projects for forest protection, climate adaptation, and the development of a forest carbon storage monitoring system since 2013 was recently dismantled. The National Forest Inventory (FRI) provides data on the status and development of Germany's forests including carbon stock, resource management and ownership title. The FRI is updated every 10 years and is supplemented by a national carbon stock inventory every 5 years, and a forest soil inventory every 15 years.

In **Romania**, forest degradation through illegal logging has been declared a threat to national security. Out of more than 6.5 million hectares of forest, less than 3% are protected against any type of logging (WWF, 2020b). In response to the rise in illegal logging in Romania, failure to enforce the EC's EUTR law, and pressure from the EC and the public to end this, Romania introduced new rules to improve the monitoring and transparency of wood harvests. Hence, the decision 470/2014 (amended in 2020) helps to reduce losses in the carbon stock by defining rules on the origin, circulation and marketing of wood products (ClientEarth, 2018). The new rules include a requirement for actors of the wood industry to use an Integrated Information System for Tracking Wood Materials. New sanctions have also been introduced to ensure enforcement (Wikström Avaria, 2023). However, the EC's EUTR and national laws in Romania against forestry crime have up to now not been implemented with full effect due to different gaps and obstacles. These include, for example, problems with control system, judicial inefficiency, corruption, the absence of a forest cadastre, the administrative fragmentation of the national forestry fund, lack of trainings, specialised staff, and low salaries (WWF, 2020a).

Italy has a national law (no. 353 of 21 November 2000) that aims to prevent forest fires and hence decrease the impact of these events on GHG emissions. The law sets rules for municipalities and landowners for the management of land affected by fires, in particular for grazing and building. The law also lays out how these areas are monitored.

Areas of actions

To achieve the LULUCF target and enhance other valuable forest ecosystem services, there is a need to further promote and support forest afforestation, reforestation and sustainable forest management. The EU and its Member States should make best use of the upcoming national Nature Restoration Plans. The EU should follow-up on its own guidance to Member States on sustainable forest practices and their consideration and implementation. The EU

should particularly address the risks of fast growing plantation forests, encouraging a shift away from monoculture forests towards more near-natural forests with a greater mix in tree species, promoting biodiversity and the forests adaptability to climate change (see e.g., ESABCC, 2024a). Adaptation efforts should be improved to address the uncertainties with climate change and its impacts on forest carbon sinks. Forest resilience should therefore be a key element of mitigation plans.

Building on the 3 billion trees initiative, the EU should consider degraded or unused lands for the expansion of forests to new areas (changes to other land uses may also free-up areas for new forests). In this context, it is important that EU policies on agriculture and biofuels reflect the necessity to preserve and expand the area of forests for carbon sequestration (ESABCC, 2024a). It is also important that a restoration-oriented approach is taken towards rich forest ecosystems.

The CAP should be improved with stricter conditionality requirements and eco-scheme and agri-environmental-climate incentives that result in increased removals (ECA, 2021b; ESABCC, 2024a). The impact of the CAP on sustainable forest practices could also be improved by providing capacity building to help landowners implement CAP measures and access funding, while ensuring robust monitoring to ensure that the measures have been implemented.

Any certification of forest carbon removals, such as under the CFCR, must ensure that removals are of high integrity and long-term storage is ensured (Meyer-Ohlendorf et al., 2023). Furthermore, the EU's knowledge and database needs to be improved for forests, based on a strong adoption and implementation of the proposed Forest Monitoring Law. The Forest Information System for Europe (FISE) should be improved to add more comprehensive information on indicators and policies at the Member State level. It is important that data covers ecological, social and health indicators and is easily accessible with regular updates (see e.g., Carbon Gap, 2022).

