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European Climate Neutrality Observatory

2025 Flagship Report:

State of EU progress to climate neutrality

An indicator-based assessment across 13 building blocks for a climate neutral future

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Summary

ECNO's analysis is structured around 13 building blocks of the transition, tracking changes in the six-year trend for nearly 150 indicators and also the expected impact of policies – a new addition to this year's report. In the 2025 edition, we also analysed the changes through the lens of broader EU objectives, namely competitiveness, resilience, and citizens' well-being.

Key results of the 2025 Flagship Report:

The EU has initiated an economy-wide transition to climate neutrality by 2050. While many important on-the-ground developments have accelerated compared to last year's assessment, the current pace of the transition is still not fast enough. Investments are lagging, underscoring the need for targeted policy adjustments to provide certainty for businesses and citizens alike. Speeding up the shift to a clean economy is also fundamental to Europe's long-term competitiveness and security. Deepening geopolitical tensions present a challenging backdrop for this endeavour but also strengthen the case for more decisive action.

The European Commission has tabled the Clean Industrial Deal in response to these challenges, integrating policy priorities around competitiveness and decarbonisation. Together with the shaping of the EU's next long-term budget (2028-2034), it provides a specific window of opportunity to align EU policy with long-term priorities.

This report highlights where the EU is on track and where additional efforts are needed to create the enabling conditions for a prosperous, climate neutral future. Our policy recommendations are based on detailed, data-driven insights into real-world developments across the economy.

Visible momentum: Cleantech progress supports industrial competitiveness and employment

The 2025 results show positive momentum in several policy areas. Notably, there are signs that the EU's cleantech industrial base and innovation ecosystem are improving – now rated **on track**. Value added in the cleantech industry is on the rise and manufacturing capacities are increasing for key technologies, such as wind, solar photovoltaics, heat pumps, electrolysers, and batteries. Battery manufacturing is on track to exceed the EU target of 550 GWh annually by 2030.

Solar power expansion continued to exceed expectations, with a record 65 GW of new capacity installed in 2024. For the first time in mid-2025, solar became the single largest source of electricity in the EU.

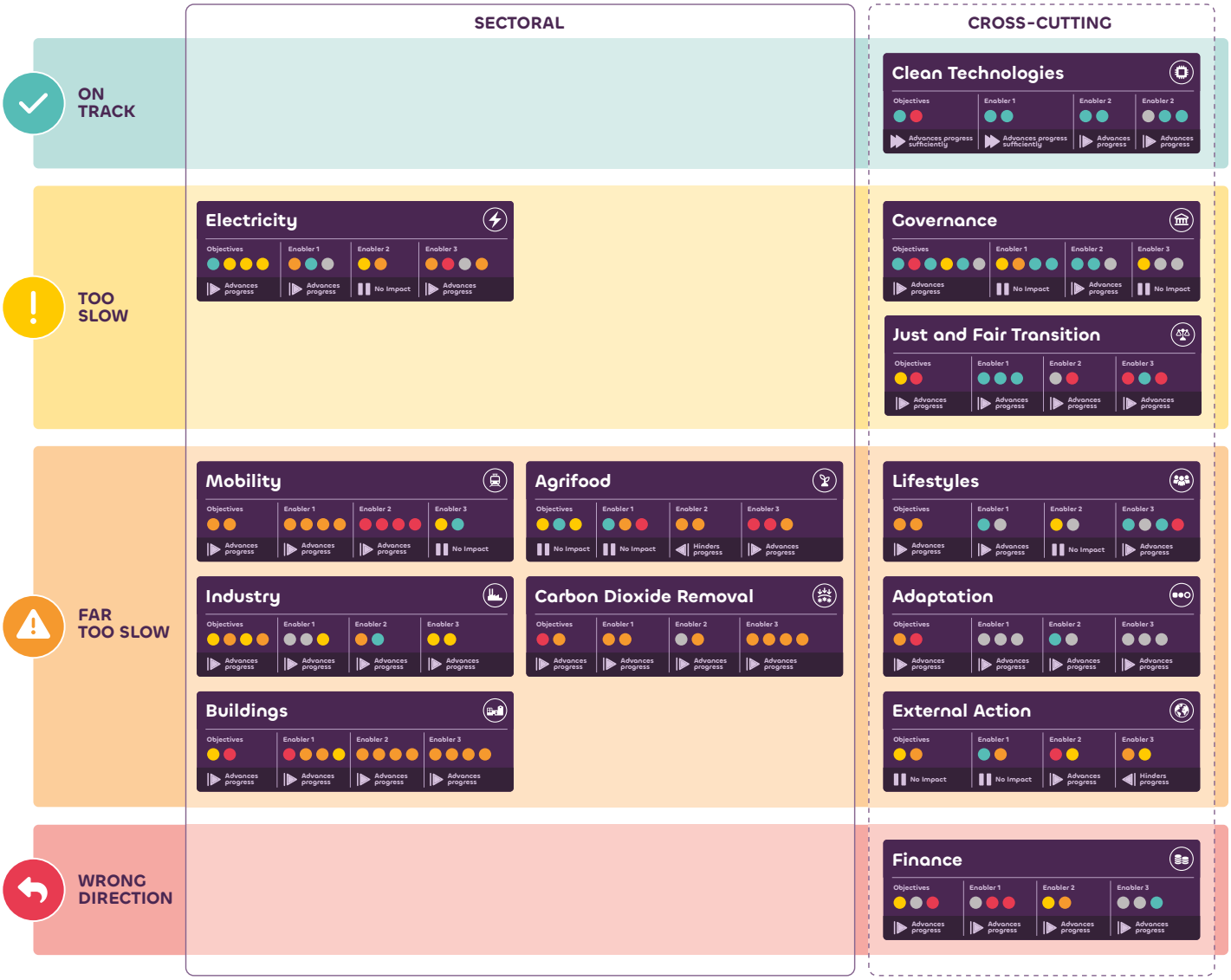
The industrial sector saw improvements across all indicators compared to last year, especially on energy efficiency, resource productivity and circularity, and the use of renewables.

These positive developments have boosted jobs in renewable and environment-related sectors, while employment has also been rising in the EU's coal and heavy industry regions.

A rebound in carbon storage in forests as well as a growing market for the future delivery of technical removals contributed to an improvement in the assessment of Carbon Dioxide Removal – moving from **wrong direction** to **far too slow** in this year's report.

Across most of the building blocks that ECNO assesses, existing EU policies are expected to accelerate progress on the ground.

Figure 1: State of EU progress across 13 building blocks of a climate neutral future



Note: ECNO tracks real-world developments across 13 building blocks of a climate neutral future, analysing indicators and expected policy impact. Circles show the progress classification of each indicator using the same color-coding as for the building blocks; playback icons represent how policies drive change. Source: ©ECNO

Challenges identified: Finance for the transition remains a major stumbling block and contributes to reduced progress in other areas

While the transition is picking up pace, our analysis highlights sectors and policy areas facing hurdles and recommends actions that policy-makers can take to overcome them.

Financing gaps and misaligned incentives continue to hinder investment in industrial decarbonisation and slow down broader demand for clean technologies.

In 2023, there was a **climate investment gap of EUR 344 billion**, manifesting particularly in a slow pace of building renovations, a decline in heat pump uptake, a slump in EV sales, and an insufficient expansion of wind power. As a consequence, electrification has developed too slowly across all energy demand sectors. This poses a risk to the continued build-up of cleantech manufacturing, which has been improving, but at a pace that is already plateauing. These developments put the EU's industrial competitiveness under pressure. Underlying causes are reflected in six-year trends showing that fossil fuel subsidies and investments in fossil fuel supply have increased, while financial support for renewables has declined. Businesses face challenges like slow permitting times, missing or inadequate infrastructure, and access to skilled workers.

What is needed to close the climate investment gap and improve industrial competitiveness?

- **Create a supportive investment framework for clean goods, technologies, and decarbonisation efforts**
  → align public budgets, taxation, and pricing mechanisms to support the climate transition
- **Remove bottlenecks to the transition**
  → speed-up permitting, align planning and investment into grid development with climate targets, and advance skill-building efforts
- **Increase demand for clean goods and technologies and support the creation of lead markets**
  → make public procurement more sustainable and focused on EU products, maintain existing standards, and focus public support
- **Advance implementation of EU legislation in Member States**
  → adjust national incentives including phasing out fossil fuel subsidies to support electrification, renewable expansion, infrastructure and cleantech uptake

- **Despite efforts to build resilience, the EU economy remains vulnerable to internal and external shocks, ranging from climate change to geopolitical tensions and supply chain dependencies.**

Across Europe, climate impacts increasingly threaten livelihoods and the economic systems that support them causing over EUR 160 billion in economic losses between 2021 and 2023. Energy dependency is another source of vulnerability, as demonstrated by the energy crisis following Russia's invasion of Ukraine. In 2024 alone, **the EU imported close to EUR 400 billion worth of fossil fuels,** equal to 2% of the bloc's GDP. This reinforces the EU's dependence on fossil fuel exporters and leaves it vulnerable to global oil and gas market volatilities. In addition, China's dominance in manufacturing, raw materials, and technology raises issues for EU supply chain resilience.

What is needed to improve the EU's resilience (beyond closing the climate investment gap, reducing fossil fuel dependency and improving competitiveness)?

- **Strengthen climate considerations in EU foreign policy**
  → promote global cooperation and resilient clean trade partnerships

- **Strengthen climate resilience through data-informed adaptation action**
  → invest in and mandate adaptation measures and improved data on actions and financing

Citizens have much to gain from a climate neutral transition, but national and regional disparities persist.

While overall employment has increased, the competitiveness of the EU's coal and heavy industry regions saw declines over the past six years and an increasing number of people see themselves as **energy-poor, reaching 11% of the EU population in 2023.** Despite rising concerns over the cost of living, more than 80% of EU citizens support the overarching aims of the transition and have begun to reap the benefits it brings – from job creation to improved environmental quality, and more secure and affordable energy. Citizens also express a desire to play a more active role in the transition, yet national citizens' climate assemblies have been implemented one-off in only eight countries since 2019, reflecting weak overall frameworks for public participation. Moreover, access to sustainable lifestyles and consumption choices is often limited by inadequate infrastructure and incentives.

EU agricultural policy has not yet caught up with consumer trends, missing an opportunity to support more resilient and sustainable livelihoods for farmers.

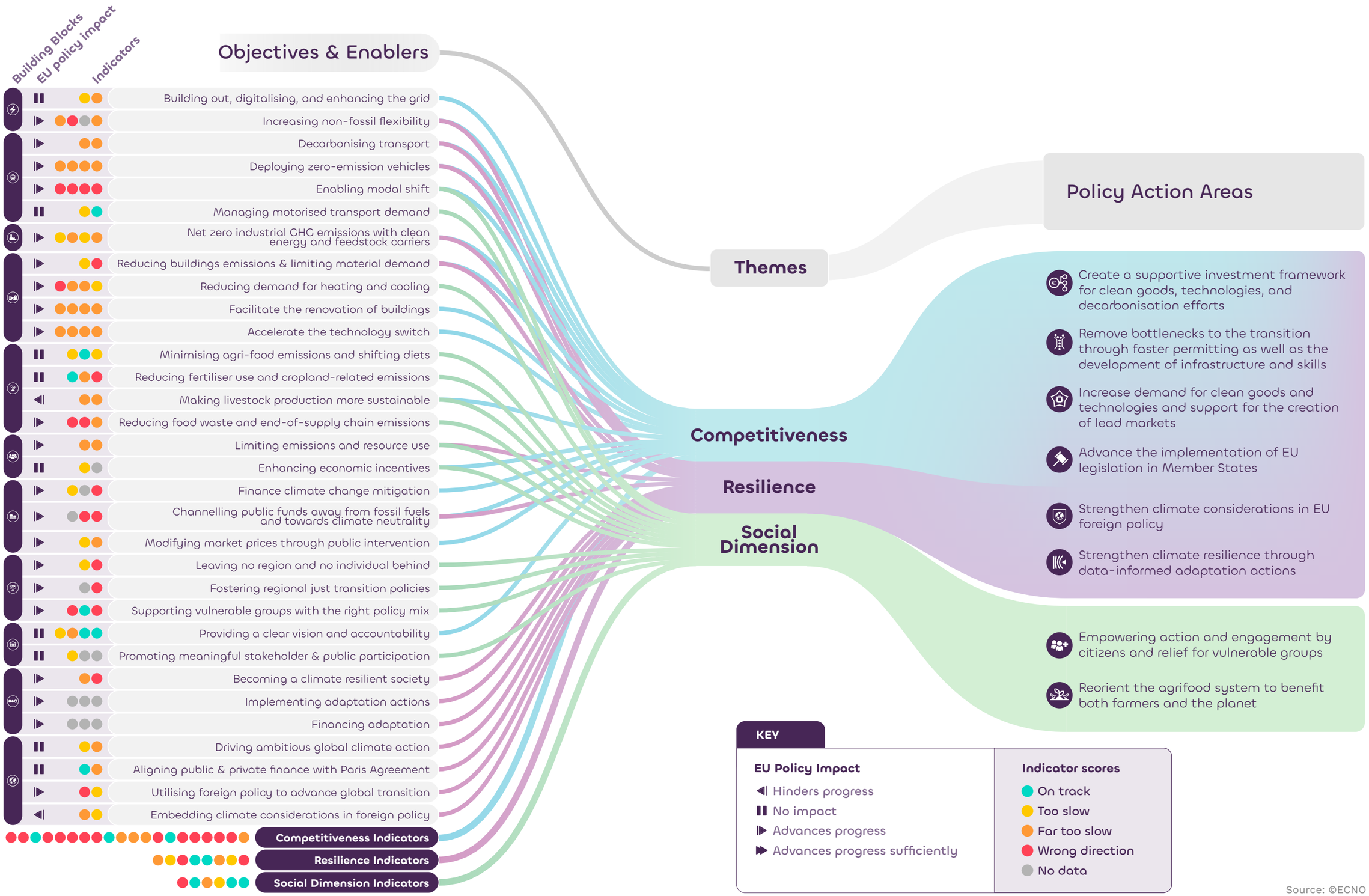
Europeans are diversifying what they eat in favour of healthier, more sustainable diets. In 2023, beef consumption fell below 10 kilograms per person, after years of steady decline. At the same time, the EU's Common Agricultural Policy continues to support emissions-intensive farming models, with 80% of current subsidies flowing to animal-based production. The EU also wastes as much food as it imports, with an equivalent of around **EUR 130 billion worth of food thrown away** each year.

What is needed for a fair transition and resilient agricultural system?

- **Empowering action and engagement by citizens, and relief for vulnerable groups**
  → ensure the continuation of EU-level just and inclusive transition funding and facilitating sustainable consumer choices

- **Reorient the agrifood system to benefit both farmers and the planet**
  → redirect CAP subsidies to support plant-based production and agroecological practices, strengthen food waste reduction targets, and implement clearer date labelling

Figure 2: How qualitative data translates to actionable policy areas



Source: ©ECNO

Outlook: transition monitoring for competitiveness and decarbonisation

This analysis underscores the value of tracking enabling conditions for a clean, fair, and competitive transition. While the EU monitors progress in several policy areas, it lacks **a unified system for tracking progress on the common enabling conditions of its two interlinked priorities of competitiveness and decarbonisation**. Parallel systems risk siloed, uncoordinated policy-making. With limited time and resources, the EU needs the best available information to ensure it meets its objectives. As part of implementing the Clean Industrial Deal, a common EU framework integrating competitiveness and climate priorities should be established. This could deliver a transparent, comparable evidence base to identify obstacles and guide policy at EU and Member State levels.

1 Introduction

Who we are: The European Climate Neutrality Observatory (ECNO) was launched in 2023 as an independent progress monitoring initiative that uses an indicator-based framework and scientifically rigorous analysis to help the EU achieve climate neutrality. ECNO is a partnership of five leading European research organisations with expertise spanning the fields of climate policy, governance, economics, and finance.

1.1 The role of monitoring: Revealing climate action co-benefits for competitiveness, resilience, and social prosperity

An urgent need for action: where climate, social and industrial policy converge

A boost in competitiveness and innovation is essential to securing Europe's role in the global clean economy and ensuring a prosperous future for EU citizens (Draghi, 2024). In recent years, not only global conflicts but also escalating climate impacts have increasingly threatened the EU's security (Niinistö, 2024). Both the EU leaders' Strategic Agenda 2024-2029 (EUCO, 2024) and the Competitiveness Compass (EC, 2025ai) stress that EU climate ambition must be underpinned by a strong industrial sector, innovation, and investment to maintain European competitiveness and promote societal well-being. Without a clear policy push to support this agenda, the EU risks locking in dependencies on imported resources and technologies, losing ground on cleantech and traditional industries, and eroding citizen support and trust.

Effective climate policy strengthens competitiveness and resilience, while delivering broad benefits, such as job creation, improved environmental quality, and more affordable clean energy. This is strongly reflected in the European Commission's 2040 climate target proposal, which frames climate policy as an opportunity to strengthen Europe's role as a hub for clean tech manufacturing and circular business models, while reducing dependence on fossil fuel imports (EC, 2025ac). Scaling up renewable energy, electrification, energy and resource efficiency, and circularity is essential to decarbonise all sectors of the economy and unlock the full benefits of the green transition.

Creating a strategic compass for action

The European Green Deal laid a solid legislative foundation for the climate transition. Maintaining momentum now depends on smart, targeted policy-making and the careful implementation of provisions already in place. This requires a practical, fact-based approach, informed by a nuanced understanding of how enabling conditions – such as technology and innovation, social and behavioural change, infrastructure, finance, and governance – are evolving and will unlock further progress.

Evidence-based monitoring helps ensure that EU policy remains grounded in actual developments and directs resources to areas that deliver real value for a competitive and credible EU transition to climate neutrality. As acknowledged by the EC in its Clean Industrial Deal, 'a strategy is only as good as its effective implementation. This requires robust measuring, monitoring and dialogue and coordinated action at EU scale' (EC, 2025am, p. 23). The EU Parliament echoes this particularly for industry in its related resolution, calling for 'annual monitoring and reporting on the competitiveness and resilience of our industrial ecosystems and on the progress made on the transition pathways, so that instruments can be adapted swiftly with tailor-made support when needed' (EP, 2025b, para. 12). Monitoring is thus a fundamental tool for identifying relevant areas for targeted policy interventions and empowering EU policy-makers to act as a new political cycle gets underway.

1.2 Objective and approach of this report

ECNO's mission

ECNO's scientific analysis is designed to produce actionable insights for smart, efficient, and targeted policy design based on data. What makes this approach particularly valuable is that these insights build on a comprehensive, whole-economy assessment carried out by the scientific partners of the observatory. Importantly, it provides a set of top-level priority action areas while also facilitating more in-depth exploration of specific topics – offering both strategic direction and detailed insights.

This analysis responds directly to the need for a transparent, independent check on progress toward EU climate neutrality, while underscoring strategic opportunities for the EU to strengthen competitiveness, resilience, and social fairness in the process.

The analytical contribution: a transparent and independent progress check

ECNO tracks real-world developments across **13 sectoral and cross-cutting building blocks** of a climate neutral future. The focus extends beyond headline objectives to include enabling conditions that shape progress, providing early insights and informing strategic policy responses across **39 enabling conditions**. This means that ECNO looks beyond greenhouse gas (GHG) emission reductions, tracking trends in systems like infrastructure, market conditions, technologies, and institutional arrangements.

This year's report places focus on an **integrated perspective**:

a) It provides insights into how far the climate neutrality transition speaks to other EU objectives and whether these are mutually reinforcing or in contradiction. This approach helps ensure that all EU policy priorities – **decarbonisation, competitiveness, resilience, and social fairness** – advance in tandem.

b) It assesses progress towards **cross-cutting drivers of the transition**, including electrification, investment, and infrastructure, that bridge building blocks and provide an integrated view on progress across the economy.

The assessment is data-driven. This year, ECNO employed almost **150 quantitative indicators**, analysing past developments in the context of required future changes largely based on the rates of change over the period 2018 to 2023 or 2019 to 2024. Where possible, indicators are measured against benchmarks drawn from official EU sources. The cutoff date for data extraction was 20 June 2025.

In addition, the assessment of past trends is complemented by a systematic evaluation of the **expected policy impact**, providing insights into potential changes in the speed and direction of progress. This helps address the time lag between policy adoption and observable effects in the data. The analysis considers new policies adopted between 2022 and 2025 that were accessible as of 30 June 2025 (see section 7).

Outline of this report

The following Section 2 provides a **synthesis** of the results of this year's analysis, covering:

- an assessment of key EU policy objectives: competitiveness, resilience, and the social dimension of the transition
- developments of the 13 building blocks, and
- a dedicated look at additional cross-cutting drivers: electrification, investment, and infrastructure.

Section 3 reflects on the **main insights and policy implications**, identifying action areas and providing key recommendations for this policy cycle in each case.

Further specifics can be found in the **underlying analysis**, which is provided in full detail.

- Section 4 includes the assessment of the state of competitiveness, resilience, and the social dimension of the transition.
- Section 5 examines the key cross-cutting drivers electrification, investment, and infrastructure.
- Section 6 provides a detailed assessment for all 13 building blocks in separate subchapters.

Lastly, Section 7 recaps **ECNO's approach and methodology** and provides an overview of changes compared to last year's report.

2 Progress towards a clean, fair, and competitive EU

The results from the 2025 assessment of progress toward climate neutrality and other related EU priorities – competitiveness, resilience, and citizens' well-being – show movement in the right direction, but also underline that the EU needs to take an integrated approach to tackling its interrelated policy aims (see 2.1). A close look at indicators across building blocks suggests a positive shift overall for both the objectives and enabling structures of the transition. These are encouraging signs that the EU's economic system is beginning to reorient itself towards climate neutrality, albeit still too slowly (see 2.2). Progress is especially lacking on key cross-cutting drivers – electrification, investment, and infrastructure (see 2.3).

2.1 How the clean transition can support the achievement of EU priorities

The EU faces pressures on industrial competitiveness and security, both externally and internally, and while public support for the overarching aims of the transition remains high and steady, it is tested by concerns over the cost of living. This year's assessment shows that progress on these fronts can go hand-in-hand with the clean transition. The main enablers for industrial **competitiveness, resilience**, and a **fair and prosperous society** are also essential for achieving the EU's climate goals. For the purpose of assessing these three EU priorities, ECNO experts have drawn on indicators from the building blocks, as well as complementary data. Full details of the respective analysis can be found in section 4.

2.1.1 EU industrial competitiveness is slipping – but investments in the clean transition could improve it

Europe's traditional industrial base is under pressure. While the Draghi report (Draghi, 2024) underscored the urgency of addressing the EU's competitiveness challenge and the second von der Leyen Commission has shown clear ambition in its response, the risk remains that Europe will continue to fall behind until initiatives are designed and implemented.

Our assessment shows that the EU economy risks locking in critical dependencies on foreign economies and losing out on the opportunities of the transition. In particular, trade balances in steel and chemicals have slipped into deficit since 2020, highlighting growing vulnerability in carbon-intensive sectors. Energy costs are a key driver. From 2019 to 2024, industrial electricity prices rose by over 7.5% per year, far outpacing the US and China and driven primarily by Europe's lack of fossil fuel resources. At the same time, cleantech manufacturing, which is a strategic priority to stimulate sustainable growth and help secure access (Draghi, 2024), saw mixed progress. While the buildout of manufacturing capacity for batteries and wind was on track, it has advanced too slowly for electrolysers, solar, and heat pumps to achieve the EU's 2030 targets outlined in the Net Zero Industry Act. At the same time, improvements in resource productivity and the circular material use rate facilitated the domestic reuse of materials, which supports reducing dependence on raw material imports and exposure to volatile global supply chains.

Europe has begun to assemble a broader industrial policy toolkit, composed of the Industrial Carbon Management Strategy, the Net Zero Industry Act, and the Energy Efficiency Directive. The Net Zero Industry Act, in particular, is likely to accelerate growth in cleantech and the decarbonisation of industrial production by setting manufacturing targets, simplifying permitting procedures, and introducing resilience criteria and supply-side targets in procurement. Still, the full impacts of the package will not be felt until 2026 and beyond.

While such recent policy efforts have laid a stronger foundation, high energy costs, slow industrial transformation, and persistent material dependencies continue to constrain progress towards a sustainable and competitive EU industrial base. The launch of the Clean Industrial Deal in 2025 signals a shift toward a more strategic, integrated approach to industrial decarbonisation and competitiveness. At its core is the proposed Industrial Decarbonisation Bank, expected to mobilise up to EUR 100 billion through the Innovation Fund, ETS revenues, and InvestEU and aimed at accelerating investment in clean industrial technologies. Policy momentum around green and local public procurement for industry – whether through the Industrial Decarbonisation Accelerator Act or forthcoming revisions to the Public Procurement Directive – underscores the urgent need for more strategic demand-side instruments.

A European strategy that combines climate action with industrial policy offers an opportunity to reverse negative trends. Climate action is not only compatible with competitiveness – it is essential to securing it in the long term. In a global economy that is moving toward zero-carbon technologies, Europe's economic fitness depends on its capacity to lead in clean innovation, strengthen industrial performance, and create new markets for clean technologies while reducing dependence on volatile fossil fuel markets. For more information, see section 4.1.

Box 1: EU policy agenda 2025: the Clean Industrial Deal and the Affordable Energy Action Plan

The **Clean Industrial Deal** (CID) plays a central role in transforming Europe's industrial and energy systems by combining financial, regulatory, and energy cost-reduction tools. The European Commission (EC) has placed particular emphasis on competitiveness and industrial decarbonisation, reinforcing their mutual role in strengthening the EU's resilience (section 4). As a result, the CID is prominently featured in our analysis of building blocks (section 6) as well as in the cross-cutting drivers electrification, investment, and infrastructure (section 5).

At least in principle, the EC has framed its CID also as a means of advancing positive social transformation, claiming that 'every person, community, and business should benefit from the clean transition'. The CID calls for ensuring **fair access to green jobs and benefits**. It also announces the establishment of a **European Fair Transition Observatory**. The **Citizens Energy Package** should serve as a tool to support a fair transition, empowering energy communities and engagement in energy transitions. However, concerns remain that the competitiveness agenda may overshadow the social agenda.

Specifically, the CID plans for financial support, regulation, and guidance. It aims to strengthen the EU's public investment architecture for cleantech through the announced **Industrial Decarbonisation Bank**, the **Competitiveness Fund**, and State Aid flexibilities under the **Clean Industrial Deal State Aid Framework**. It leverages a public procurement reform to support lead markets in cleantech and domestic manufacturing. New permitting rules under the announced **Industrial Decarbonisation Acceleration Act** are expected to speed-up cleantech projects. This offers the opportunity to unlock private capital for investments into renewables, non-fossil power flexibilities, and electrification, while at the same time building a manufacturing base in Europe. The **Circular Economy Act**, planned for 2026, is expected to boost demand for secondary materials, harmonise circular standards, and align procurement rules – thereby addressing supply chain vulnerabilities. It also highlights priority areas, such as improving fertiliser efficiency, reducing food waste, as well as promoting sustainable packaging solutions and recycling rates.

The **Affordable Energy Action Plan** aims to lower energy costs for households and businesses to reduce energy poverty, advance electrification, and improve industrial competitiveness. The plan includes support for long-term electricity contracts for industry, ensuring that electricity is taxed less than other energy sources by issuing recommendations for Member States (MS) on how to use **flexibilities in the tax system** and eliminate or shift levies to the state budget. An **Electrification Action Plan** is expected to come in early 2026 in combination with a **Grid Package**. The latter aims to modernise electricity grids and is expected to include a new design for **network charges** to incentivise investments in electrification and a legislative proposal to **accelerate permitting processes** for grid, storage, and renewables. However, in conflict with the clean transition, the plan also points out that the EU and MS could support investment in fossil fuel infrastructure abroad.

2.1.2 Clean technologies and import diversification have boosted EU economic resilience – as climate risks escalate

The past few years have been marked by successive global crises. From acute disruptions, such as Russia's war in Ukraine, to intensifying climate impacts, these events have exposed deep vulnerabilities across all sectors of the European economy. At the same time, they have highlighted the EU's capacity to respond to shocks.

In response to the gas crisis resulting from the war in Ukraine, the EU has successfully managed to diversify its fossil fuel supply away from Russia. However, the EU has not managed to reduce its overall import dependency. Costs related to fossil fuel imports, after spiking in 2022, have yet to return to pre-crisis levels. The focus on renewable energy and energy efficiency under REPowerEU has been an important step to long-term economic resilience – which requires a phase-out of fossil fuels, but progress on both ends is hampered by national implementation and other barriers. As clean technologies advance, new dependencies on raw materials and manufactured goods have arisen, and with China dominating key markets, new efforts to diversify imports have become a key priority (see 2.1.1).

Europe is the fastest warming continent to date, and climate impacts are a major threat to the EU economy and overall security (EC, 2025). Losses from extreme climate events keep rising, affecting economic, human, and natural assets. Adaptation efforts have shown some improvements, but limited data make it difficult to understand past progress and required changes. To bolster societal acceptance and engagement, the EU needs to communicate and deliver clear societal benefits and pursue meaningful avenues for public participation. While EU citizens continue to show high support for the decarbonisation agenda, evidence points to some slowdown in implementing a fair and inclusive transition (see 2.1.3).

See also:

To ensure EU resilience, it is key to stay on course towards climate neutrality through the implementation of the Fit for 55 and RePowerEU policies, as these will make the EU more independent of external energy supply and help keep global warming in check. The Clean Industrial Deal with its aim to re-industrialise Europe by moving clean manufacturing onshore is essential for competitiveness as well as for securing EU economic resilience in a climate-neutral future. This must be accompanied by a continued effort to build strategic partnerships that ensure the diversified supply of goods and resources. Adaptation to climate change has not yet been sufficiently integrated into the EU's main policy priorities, but the new adaptation plan to be released in 2026 is expected to respond to this gap. The emphasis on economic resilience should not come at the expense of the social dimension of the transition, which risks being sidelined to some extent. For more information, see section 4.2.

2.1.3 Citizens stand to benefit from the transition but national and regional disparities persist

In a global context, the EU ranks consistently high on socio-economic indexes. The EU has made progress maintaining and improving these, such as through the establishment of a just transition framework, but national and regional disparities persist due to implementation lags and missing targeted, place-based support for vulnerable populations. Overall, there is growing employment in transition regions and specifically in environmental sectors and renewable energy supply chains. These trends support future EU prosperity and improved living standards. However, progress is lacking when it comes to regional competitiveness and material deprivation. Public support for the transition remains strong but is increasingly tested by backlash and political polarisation. At the same time, sustainable lifestyles remain far from mainstream, hindered by slow infrastructure rollouts, inconsistent policy signals, and the lack of an overarching EU framework for demand-side measures.

See also:

To pursue a fair transition, the EU has established several dedicated funding schemes, including the Just Transition Fund (JTF, 2021) and the Social Climate Fund (SCF, 2023). In addition, the EC published its Affordable Energy Action Plan to combat rising household energy prices and energy poverty, followed by the Union of Skills communication, which set the stage for the planned Quality Jobs Roadmap. The EU also has several tools aimed at enhancing transparency and trust in institutions with the Aarhus Regulation at the centre. Still, the EU is missing an overarching framework for participatory climate policy – though the EC has promised a 'new era of dialogue' to (re)engage stakeholders and citizens. Similarly, the EU lacks an overarching framework that promotes sustainable consumption, sufficiency, and demand-side mitigation through behavioural change. While some EU initiatives promote sustainable lifestyles, including the Ecodesign for Sustainable Products Regulation (ESPR, 2024) and the Sustainable and Smart Mobility Strategy (EC, 2020j), other policies, such as subsidies for animal products under the Common Agricultural Policy (CAP), are inconsistent with sustainable societal shifts. For more information, see section 4.3.

2.2 2025 update: the transition is gaining momentum

The EU continues to move ahead on its path to climate neutrality. While the pace remains too slow, all 13 areas monitored by ECNO, with the exception of Finance, are helping the EU move closer to a climate neutral economy by 2050 (see 2.2.1). Many on-the-ground developments have sped up compared to last year's assessment (see Box 2), and several key policies are helping drive the transition – even as some continue to work against it (see Box 3). Therefore, several specific enabling conditions need further attention from policy-makers (see 2.2.2).

2.2.1 Progress across the ECNO building blocks – 12 of 13 building blocks are helping the EU move closer to climate neutrality

Although the pace remains too slow overall, 12 of 13 ECNO building blocks support the EU's clean transition. Compared to last year, the outlook for both Clean Technologies and Carbon Dioxide Removals (CDR) improved, with the former now on track at the right speed and the latter at least moving in the right direction – albeit far too slowly. In contrast, the Governance building block was downgraded and is now progressing too slowly.

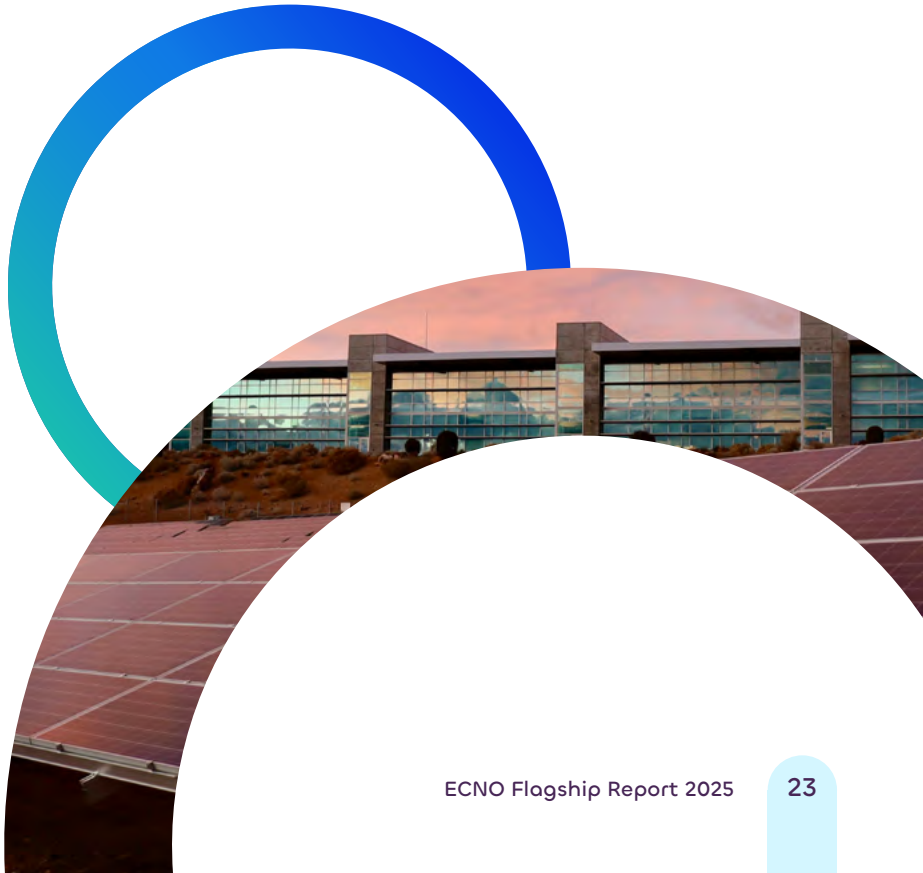
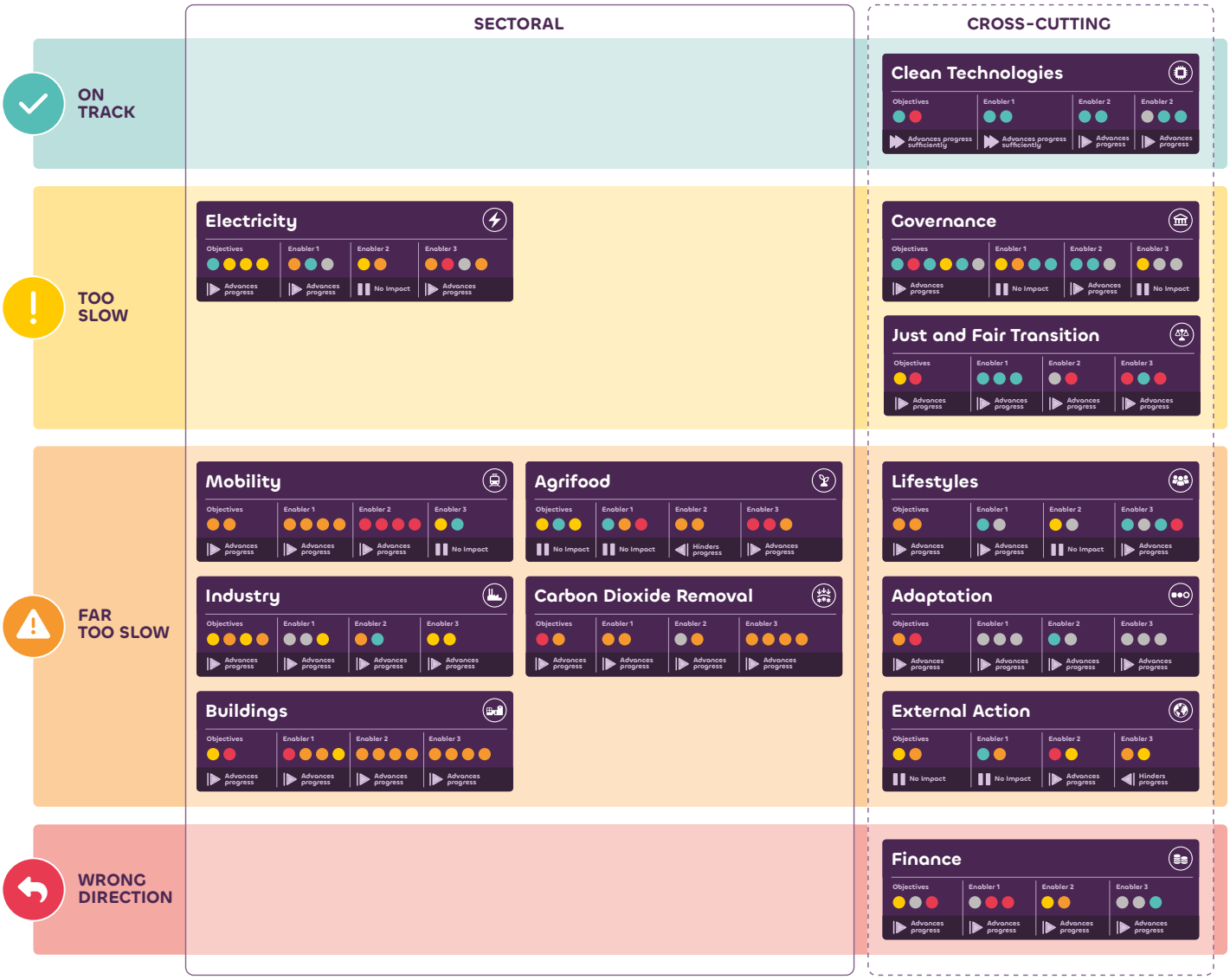


Figure 3: State of EU progress across 13 building blocks of a climate neutral future



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Progress in Industry and Clean Technologies signals positive momentum for the EU's industrial competitiveness

Changes in indicator trends under Industry and Clean Technologies have sped up in several instances, indicating that the EU is moving in the right direction when it comes to strengthening industrial competitiveness – an area that is currently under pressure (see 2.1.1).

While Industry overall was found to be developing far too slowly, the assessment showed improvements across all investigated trends. As a result, it is nearing an upgrade to a better classification. At the indicator level, industrial final energy consumption, in particular, saw a reduction and advanced to the 'too slow' classification (see Box 2).

In addition, the policy mix is expected to further support industrial decarbonisation and related enablers, such as the availability of zero-carbon energy and feedstock carriers, circular economy, and advancements in energy efficiency.

Meanwhile, Clean Technologies is now progressing at the right speed, supported by a vibrant EU research and innovation ecosystem.

Although recent years show signs of a plateau, putting future progress at risk, this year's assessment still found increases in value added from clean technology industries and in private energy R&I spending, while public funding, private spending, and investment in start-ups and large industrial processes continued at the right pace. It must be noted that while current trends will likely achieve the EU benchmarks, the EU's innovation ecosystem is behind that of the US, and with China almost closing the innovation gap, global pressures mean that staying the course risks the EU's future industrial competitiveness (section 4).

Positive movement – notably Carbon Dioxide Removal is no longer headed in the wrong direction

Compared to last year's assessment, progress toward climate neutrality has accelerated in several building blocks in terms of data and policies. Most prominently, Carbon Dioxide Removal is for the first time moving in the right direction, though far too slowly. The change in classification is due to increased net removals in 2023, leading to the near stabilisation of natural sinks over the six-year period. This follows a rebound in forest area growth and carbon stocks in forest land – with both now increasing (see Box 2). Moreover, data availability improved for technical removals, indicating higher levels of investment, slight growth in already implemented removals, and significant growth in agreements for removals to be implemented in the future.

While Electricity, Agrifood, and the EU's efforts on External Action saw some improvements on individual indicators, overall progress was limited and, in some cases, counterproductive. Past trends show that on-the-ground developments have not been fast enough, and for some enablers, the policy mix is either insufficient or even detrimental (see Box 3).

In Electricity, the EU has failed to put itself on track regarding all the enabling conditions. The shift to renewables is not happening fast enough. Building out, digitalising, and enhancing the grid saw little improvement, and the policy mix is expected to have little to no positive impact. In addition, limited data on flexible power generation and declining clean capacity participation in capacity markets indicate that non-fossil flexibilities need more attention. In Agrifood, positive developments on the ground seem to result from evolving public awareness and individual behaviour, but the EU's policy mix was assessed to have little to no impact, and in some places is even hindering further progress, particularly on the enablers (see 2.2.2). The EU's External Action saw some positive changes – in particular, reduced financing from the European Investment Bank for international fossil fuel projects and increased Official Development Assistance allocated to climate action – with both indicators changing into a better classification (see Box 2).

However, new and developing policies covering the objectives and two of the enablers under External Action are expected to have no impact or even hinder further progress. This is especially the case when it comes to embedding climate considerations in foreign policy.

In Just and Fair Transition, all three indicators related to job creation are now on track and the policy mix across the building block's policy areas is expected to support further progress, though not sufficiently to bring all on-the-ground developments on track. However, increases in the regional poverty rate and worsening material deprivation (now headed in the wrong direction) put the EU's objective of leaving no region and no individual behind at risk (see Box 2). Notably, the negative trend on material deprivation was less pronounced for low-income households compared to the average.

In Adaptation, indicator developments suggest that the EU has slightly improved its resilience, but high and rising economic losses from climate-related extremes, along with significant non-economic losses, remain. It is still unclear whether current EU efforts are sufficient to prevent future damage. This is largely due to critical data gaps on adaptation action, governance, and financing. Still, national strategies have been adopted, and some progress is visible at national level. Climate risk integration into fiscal planning is a promising development, although there is no quantitative information to investigate the changes in more depth. Nevertheless, the upcoming 2026 EU Climate Adaptation Plan could provide political momentum to clarify responsibilities, improve governance, and scale investments.

Stagnation in Mobility, Buildings, and Lifestyles risks progress on creating lead markets and maintaining citizen involvement

Progress toward decarbonising Mobility and Buildings has stalled, and the EU has also failed to advance an actionable framework for sustainable Lifestyles. In Buildings, GHG emissions have declined far too slowly, which is nonetheless an improvement over last year's rising emissions. However, progress at the enabler level has stagnated, putting future emission reductions at risk. A particularly concerning sign is the decline in heat pump sales, which undermines momentum in heating and cooling. In Mobility, the pattern is similar. Electric vehicle (EV) sales slowed in 2024 following adjustments to subsidy schemes. Although the share of EVs in new registrations has rebounded in the first months of 2025 and even surpassed 2023 levels, it remains far too low. Meanwhile, the modal shift away from road transport is failing to materialise. These trends are also reflected by limited progress in the diffusion of climate-neutral habits in society and the need to promote the right infrastructure and incentives for sustainable Lifestyles.

Slowdown in Governance and persistent gaps and inconsistencies in Finance risk the success of the transition

In previous years' assessments, Governance was promisingly on track, indicating that, despite room for improvement, EU and national institutions were developing in line to tackle the transition. However, this year's assessment found that progress in the building block has stalled and is now too slow. This change in classification is primarily due to late

and inadequate national planning, no new developments in the build-out of robust national progress monitoring systems, and a slowdown in the implementation of citizen climate assemblies at national level. These trends undermine policy effectiveness and expose gaps in the overall framework, especially when it comes to accountability and meaningful avenues for public participation. A strong governance framework is essential because it helps to engender societal buy-in, coordinate action, correct course, and sustain ambition across Member States. The stalled build-out of institutions and weak implementation of key processes pose a risk to the EU's ability to achieve climate neutrality on time and in an inclusive and cost-effective way.

Finance is still moving in the wrong direction as financial flows remain misaligned with the climate transition. This is visible in increasing investments in fossil fuel supply, persistent fossil fuel subsidies, and a decline in subsidies for renewables. At the same time, climate investments have stagnated, leaving an investment gap of EUR 344 billion in 2023 (see 6.9). While some financial regulations and reporting obligations have been introduced, enforcement and transparency remain weak. While the banking sector plays a crucial role in financing the transition, the European Commission's omnibus package proposal on Corporate Sustainability Reporting lowers the level of ambition regarding banking transition plans. In particular, the proposal suggests removing the sector-specific standards for transition plans – yet these are an essential tool to help banks effectively channel finance towards transition activities.

Table 1: Headline results across 13 building blocks

	SECTORAL BUILDING BLOCKS
Electricity	Emissions fell thanks to on track developments in solar capacity, but wind deployment remained at half the needed rate. Progress on key enablers including grids and batteries remained slow. Implementation of the EMD and RED III support faster progress.
Mobility	Growth in ZEVs and recharging points is insufficient to significantly shift away from fossil fuel reliance. Maintaining CO_2 standards provides certainty for automakers and consumers, while new fleet policies offer momentum. The revised TEN-T strengthens EU-wide modal shift potential.
Industry	Industrial emissions fell partly also due to economic slowdown, leaving progress still too slow. Circularity showed improvement. Announced policies in the CID may help, in particular by providing funding for decarbonisation and regulations to increase energy affordability.
Buildings	Progress in the buildings sector remains far too slow, with renovations and electrification lagging. Heat pump sales are down, and average floor space per person is rising. Impacts of policy revisions, including the EPBD and ETS 2, have yet to materialise.
Agrifood	Diet shifts, food waste reduction, and sustainable farming practices lack momentum. Despite some improvement, policies remain weak and fragmented. CAP subsidies, in particular, continue to favour emissions-intensive, industrial farming models limiting systemic change.
Carbon Dioxide Removal	No longer headed in the wrong direction due to stabilising natural sinks, accelerated tree planting, and increased technical removals. Gaps remain and data are outdated for soils. New policies such as the NRL, CRCF, and proposed forest and soil monitoring laws aim to address gaps and enhance CDR uptake.

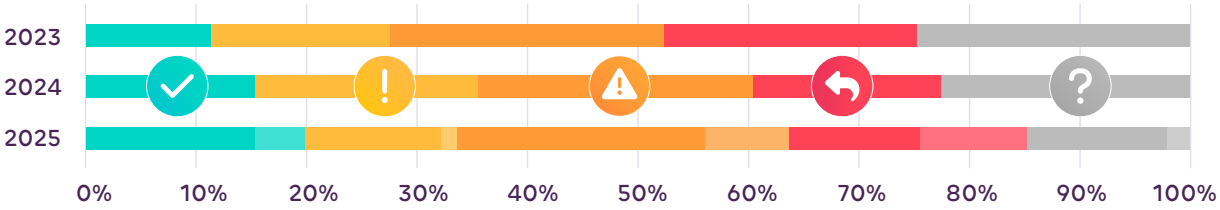
CROSS-CUTTING BUILDING BLOCKS	
Lifestyles	Shifts in diets and material use are outpaced by high carbon footprints and rising car ownership. While awareness grows, the EU lacks a cohesive strategy, that includes targeted funding for public infrastructures and the removal of contradicting economic incentives.
Clean Technologies	Moving at the right speed, the EU research and innovation ecosystem remained vibrant with cleantech accounting for larger shares of industrial production. Though partly falling behind other countries, initiatives under the NZIA and CID are likely to further strengthen the EU cleantech sector.
Finance	Financial flows remain misaligned with climate goals, as investment gaps persist and fossil fuel investment and subsidies continue to rise. While the ETS, financial regulation (CSRD, CRD), and the ETD aim to redirect capital, a coherent climate finance strategy is lacking.
Just and Fair Transition	Progress is delayed, with rising energy poverty and inadequate support measures. While job creation trends are encouraging, funding uncertainties concerning, among others, the MFF, including the JTF and fragmented policy frameworks continue to limit just outcomes.
Governance	Progress slowed due to delays, weak implementation, and low ambition in key planning and reporting tools, especially at the national level, which undermines policy effectiveness. While institutional build-out and public support offer hope, fragmented frameworks risk siloed and weak governance.
Adaptation	Major data gaps persist. Despite strengthened national strategies and new EU initiatives, countries' resilience has only slightly improved, while economic losses from climate events continue to rise. Effective implementation and financing remain key challenges and without data.
External Action	Despite some improvements, such as the EIB's increased clean energy investments and fossil fuel divestment, public funds still support fossil fuel infrastructure abroad, and efforts to integrate climate goals across external finance and foreign policy remain limited.

Notes: EMD: Electricity Market Design; RED: Renewable Energy Directive; ZEV: Zero-Emission Vehicles; TEN-T: Trans-European Transport Network; CID: Clean Industrial Deal; EPBD: Energy Performance of Buildings Directive; ETS 2: Emissions Trading System for Buildings and Road Transport; CAP: Common Agricultural Policy; NRL: Nature Restoration Law; CRCF: Carbon Removal Certification Framework; CDR: Carbon Dioxide Removal; NZIA: Net Zero Industry Act; ETS: Emissions Trading System; CSRD: Corporate Sustainability Reporting Directive; CRD: Cooperative Reporting Directive; ETD: Energy Tax Directive; MFF: Multiannual Financial Framework; JTF: Just Transition Fund; EIB: European Investment Bank. Source: ©ECNO

Box 2: Changes on the ground are picking up speed

Analysing the indicator data, there is a positive shift overall in the objectives and enabling structures of the transition, which reflects a system that is beginning to reorient itself towards climate neutrality. Out of 196 indicators, 125 showed a positive trend. This includes the 146 indicators that were part of a building block assessment as well as 50 complementary indicators added to analyse the conjunction with other key EU objectives and the cross-cutting drivers. In total, 56 were classified as far too slow, 28 as too slow, with 41 moving at the right speed. 42 indicators were found to be moving in the wrong direction – including 11 trade-related indicators used to assess competitiveness and resilience. 29 indicators were lacking data and classification (see Box 4).

Figure 4: Percentage distribution of indicator classifications in the three ECNO assessments



Indicator counts vary by year. For 2025, lighter colours indicate additional indicators covering EU objectives and cross-cutting drivers. Source: ©ECNO

Compared to last year, twice as many indicators improved as worsened in their classification – also accounting for newly added indicators (see Figure 3). Of the indicators without a classification change, 30 indicators still sped up, while 23 slowed down in the rate of progress compared to last year's assessment, taking the average absolute change over the past six years. For more information, see chapter 2 or details in chapter 4 through 6.

Table 2: Progress under the emissions curve: more than twice as many indicators improved as worsened

	INDICATOR	PROGRESS
Electricity	Greenhouse gas (GHG) emissions of electricity generation [Mt CO_2e/year]	
	Share of gas fired power generation [%]	
	Share of variable renewable electricity [%]	
Mobility	Share of ZEVs in new passenger car registrations [%]	
	Total freight transport volume [billion tonne-km]	
Industry	Resource productivity [PPS/kg]	
	Final energy consumed in industry [Mtoe]	
Buildings	GHG emissions from buildings [Mt CO_2e]	
	Heat pump sales [Million units]	
Agrifood	Cattle meat consumption [kg/capita]	
	Nitrogen fertiliser use [kt N]	
	Livestock numbers [million head]	
CDR	Growth in forest area [ha/yr]	
	Growth in forest area [ha/yr]	
Life-styles	Per-person material footprint [tonnes per capita]	
Clean Technologies	Clean technology industry added value [bnEUR 2024]	
	Private energy R&I spending [mEUR2024]	
Just Transition	Regional poverty rate [%]	
	Average of four relevant sub-indicators on the material deprivation rate [%]	
	Employment in environmental goods and services [full-time equivalent jobs]	
	Employment in renewable energy supply-chains [full-time equivalent jobs]	

	INDICATOR	PROGRESS
Governance	Science-based climate neutrality targets in large EU companies [number of companies]	
	National progress monitoring that can trigger additional action [% of EU GHG emissions covered]	
	Citizens' climate assemblies at national level [% of EU GHG emissions covered]	
Adap-tation	ND-GAIN country index [score out of 100]	
External Action	Public finance for international fossil fuel projects (by the EIB) [mEUR]	
	Official development assistance (ODA) allocated to climate action [%]	

Note: Large circles show the progress classification of this year and small circles the one from last year's progress assessment. Arrows indicate positive or negative changes in classification. See Table 45 for further information. Source: ©ECNO

2.2.2 Lagging enablers risk future emission reductions

An assessment of enablers delivers useful insights beyond the objective level. It helps to identify where there is little or no movement on the enabling conditions for the transition on the ground and where policies fail to advance or even hinder progress. Here we zoom in on those enablers with both an **ineffective policy mix and whose underlying indicators were assessed as (far) too slow**. In short, these enabling conditions are in **urgent need of policy improvements** to remove barriers and sufficiently incentivise the required changes. Among these are:

- Making livestock production more sustainable in Agrifood,
- Reducing fertiliser use and cropland related emissions in Agrifood,
- Building out, digitalising, and enhancing the grid in Electricity, and
- Embedding climate considerations in foreign policies in External Action.

In Agrifood, subsidies under the EU's Common Agricultural Policy remain misaligned with the long-term decarbonisation of the sector, while regulatory tools like the Nitrates and Industrial Emissions Directives lack the scope or enforcement strength to drive meaningful change. Under Electricity, the rate of investment into the electricity grid and smart meters is far too slow and accompanied by a fragmented policy framework consisting mainly of scattered plans at the EU level, with the responsibility for grid buildout left to Member States. On top of this, the EU's central ten-year development plan (TYNDP) is not consistent with goals of the clean transition. On External Action, evidence suggests that the EU has rolled back climate considerations in foreign policy. Recent developments such as the reduced emphasis on the EU's global leadership in climate affairs in the 2024-2029 Political Guidelines and cuts to the Directorates-General Internal Partnerships (DG INTPA) and to EU delegation staff worldwide undermine efforts to embed climate concerns into EU foreign policy.

On other enablers, the trend is moving either in the wrong direction or far too slowly, but the current policy mix is expected to deliver a U-turn and support further positive development. These **enablers require close monitoring** of whether the policies are delivering as expected. Enablers with **poor indicator performance but for which policies are expected to drive progress** include:

- Providing non-fossil power flexibilities in Electricity,
- Enabling the modal shift in Mobility,
- Accelerating the technology switch in Buildings,
- Reducing food waste and end-of-supply-chain emissions in Agrifood,
- Channelling public funds away from fossil fuels in Finance, and
- Fostering regional just transitions in Just and Fair Transition.

On a positive note, there are a range of enablers with **promising developments** in terms of past trends and expected policy impact. For example, indicators that measure research excellence under Clean Technologies are on-track, and there is a promising policy mix in place to keep fostering research and innovation, particularly through Horizon Europe, with further funding announced in the Clean Industrial Deal. In the area of Just and Fair Transition, the creation of job opportunities is developing at the right speed, and a supportive policy mix is in place. Under Governance, ensuring a consistent, all-of-government approach to the transition is underpinned by strong indicator performance and promising policy action, and setting up robust Adaptation governance – despite limited data availability – also shows positive developments in one indicator and the policy context.

An additional positive message is that across all building blocks, no enabler shows both a negative past trend in the wrong direction and a policy mix that is accelerating that negative trend or failing to support at least some progress.

Box 3: Recent policy-making at EU level set the stage for the transition

During the last legislative period (2019-2024), the EC launched a range of policy initiatives under the European Green Deal, with the majority of these adopted in 2022 and 2023 (Bassot, 2024). While some of the newly adopted EU policies have yet to be fully implemented and thus their impact is not yet visible in the indicator data, many are expected to advance progress on the ground in a comprehensive manner. A supportive policy mix is likely in place for 85% of the objectives and for 77% of the enablers – although the policies are still not effective enough to accelerate the change sufficiently. One notable exception is for Clean Technologies, where the developing policy mix is likely to maintain a sufficient rate of progress for the building block. In contrast, for two objectives and seven enablers, the policy mix was assessed as having no positive impact, and in two enablers, the policy mix acts as a barrier (see Table 3).

Table 3: Policies support the transition – with some exemptions

Objective	Enabler
The policy package is likely to slow down or reinforce counterproductive trends	
	• Making livestock production more sustainable (Agrifood) • Embedding climate considerations in foreign policy (External Action)
The policy package is likely to have no impact on progress	
• Minimising agri-food emissions and shifting diets (Agrifood) • Driving ambitious global climate action (External Action)	• Building out, digitalising, and enhancing the grid (Electricity) • Managing motorised transport (Mobility) • Reducing fertiliser use and cropland-related emissions (Agrifood) • Enhancing economic incentives (Lifestyles) • Providing a clear vision and accountability (Governance) • Promoting meaningful stakeholder and public participation (Governance) • Aligning all international public and private finance with the Paris Agreement (External Action)
The policy package is likely to advance progress but not at the required scale	
• All 10 remaining objectives	• All 29 remaining enablers
The policy package is likely to support a sufficient progress	
• Developing manufacturing capacity & innovation leadership (Cleantech)	• Fostering research excellence (Cleantech)

Note: ongoing discussions at EU level on changing legislation are not yet reflected in the rating unless already put down in writing. This means that upcoming actions may shift policy progress into a higher (e.g., the initiatives announced under the Clean Industrial Deal) or lower classification (e.g., if the new car fleet targets for CO_2 emissions are lowered or postponed). Source: ©ECNO

2.3 Electrification, investment, and infrastructure lag behind as drivers for the transition

The transition to a clean, fair, and competitive EU economy requires deep, cross-cutting changes. Among the key drivers of structural change are electrification, investment, and infrastructure, each of which spans all sectors.

2.3.1 A concerted effort to advance electrified systems is missing as electrification rates stagnate

Despite representing the most efficient and sustainable alternative to fossil fuels in the demand sectors, electrification has not received the necessary attention and, as a result, has stagnated across all sectors. Unfavourable conditions have compounded this development – in particular, a high electricity-to-gas price ratio caused by fossil fuel subsidies and high electricity prices – alongside general economic uncertainty, inconsistent policy schemes, and declining social acceptance. As a result, sales of key technologies, such as electric vehicles (EV) and heat pumps, have not seen the level of growth needed. In 2024, electric vehicle sales decreased, and the EU heat pump market has been on a decline since 2023. The stable electrification rate in industry, a sector with stagnating energy use, highlights that the gap here is even larger.

Policies supporting electrification are mainly found at the sectoral level, but these are not sufficient to drive the amount of electrification needed. A coordinated effort to foster electrification is currently lacking, despite its central role for decarbonisation in the EU. The EU's effort to publish an 'Action Plan for Electrification' is much needed in this context, but it is important that such a plan provides a comprehensive package that advances existing and new sectoral policies as well as coordination across sectors. For more information, see section 5.1.

2.3.2 EU policies do not foster adequate investment – key sectors are even experiencing a slowdown

EU-level policies have so far failed to deliver investments at the scale needed, which is especially worrying as the cost of delaying action only rises over time. Around EUR 344 billion in additional investments were missing in 2023; in contrast, the EU spent almost twice this amount on fossil fuel imports and subsidies combined. The markets for heat pumps, building energy renovations, and wind power have each experienced a slowdown in recent years, with heat pump sales declining notably. Meanwhile, sales of battery-electric passenger vehicles weakened in 2024, though they appear to have recovered in 2025.

A well-informed and coordinated long-term investment framework with a focus on securing appropriate financing is needed to complement the EU policy framework. Such a strategy would offer stability in turbulent times, providing predictability to private economic actors and helping ensure that the deficit is closed in a timely and cost-effective manner. This strategy must clarify the roles of public and private finance, for example, by using policy tools like fiscal levers or de-risking mechanisms (Calipel et al., 2025). For more information, see section 5.2.

2.3.3 EU infrastructures are far from transition-ready

The transition requires significant investments in infrastructure across the board – electricity grids need to be upgraded to integrate more renewables and enable electrification, railways need modernisation and electrification, electric vehicle charging infrastructure needs to be scaled up, and industrial sites need to be connected to hydrogen or CO_2 networks. However, progress on developing energy, industry, and mobility infrastructure has been uneven and, in many cases, far too slow. On top of this, critical data gaps hinder effective monitoring.

While existing policies offer potential improvements, their effectiveness hinges on coordinated implementation, alignment with climate targets, and the integration of resilience considerations into planning and delivery, to ensure that newly built or refurbished infrastructure is climate-proofed against escalating impacts. For more information, see section 5.3.

Box 4: Gaps in data limit our understanding of whether the EU is on track on the clean transition

A lack of complete and consistent data continues to hinder our efforts to evaluate past progress and identify what changes are required to achieve climate neutrality. Of the 196 indicators assessed in this year's report, 36 do not have sufficient data (at least three data points) to allow for an evaluation of the trend over time (although some of those come with a classification based on other insights).

This data deficiency is particularly evident in several building blocks as well as the cross-cutting driver of Infrastructure. In Adaptation, there are no data for enabling conditions, such as the concrete implementation or financing of adaptation actions. Similarly, no EU-level data are available when it comes to measuring progress on planning and facilitating the renovation of Buildings. For Governance, a lack of data prevents a thorough assessment of stakeholder and public participation over multiple years. In Finance, the data used to measure the shift of the banking system towards climate-friendly financing are incomplete. Data on infrastructure development in the EU are also missing, particularly regarding hydrogen integration and CO_2 transport and storage (see 5.3). To close some of the data gaps, ECNO relies on information compiled and maintained by the contributing research institutes, namely Ecologic Institute and I4CE – this is the case particularly for Governance and Finance.

Targets and benchmarks are necessary to understand what the EU wants to achieve in each sector or policy area. If unavailable, the required direction and speed of changes are difficult to assess. Still, the ECNO framework includes monitoring of indicators without benchmarks as otherwise the indicator set would be insufficient. In total, 103 or 64% of the indicators with sufficient data to calculate a trendline come without benchmarks. Progress on these indicators is classified based on the relative annual change of past development using pre-defined ranges, but the assessment is therefore not attached to an official EU quantitative pathway (see section 7).

New EU laws play an important role in improving data availability. For example, in the field of Infrastructure, the Net Zero Industry Act includes several provisions designed to generate and report new data, particularly regarding CO_2 transport and storage. The proposed Forestry Monitoring Law aims to close information gaps on European forests by creating a timely and comprehensive forest knowledge base from earth observation and ground measures to be implemented by the EEA and the Copernicus programme (see 6.6). The EC has also announced plans to make the Critical Raw Materials monitoring dashboard publicly available online but has yet to do so. In addition, data that exist but remain inaccessible, either due to paywalls or data protection issues, could be collected and publicly published by EU institutions – as is the case for, e.g., building Energy Performance Certificates. Establishing national databases for building energy performance and heating appliances is crucial to address the lack of centralised, comparable, and up-to-date data (see 6.4).

3 Key takeaways and policy implications

3.1 Progress towards a clean, fair, and competitive EU

The transition is gaining momentum amid external pressures

This data-driven analysis shows that the EU is moving too slowly towards a clean, fair, and competitive economy, and facing important challenges on its way. However, compared to last year's assessment, many on-the-ground developments have sped up and several key policies are helping to drive the transition – even as others continue to work against it. All 13 areas monitored by ECNO, apart from Finance, are supporting the EU in achieving a climate-neutral economy by 2050.

The results show positive momentum in several policy areas. Notably, there are signs that the EU's cleantech industrial base and innovation ecosystem are improving – the Clean Technologies building block is now on track. Value added in the cleantech industry is on the rise and manufacturing capacities are increasing for key technologies, such as wind, solar photovoltaic, heat pumps, electrolysers, and batteries. Battery manufacturing is on track to exceed the EU target of 550 GWh annually by 2030. The industry sector saw improvements across all indicators compared to last year, especially on energy efficiency, resource productivity and circularity, and the use of renewables. These positive developments have boosted jobs in renewable and environment-related sectors, while overall employment has also risen in the EU's coal and heavy industry regions.

In addition, a rebound in the carbon storage capacity of EU forests as well as the growing market for the future delivery of technical removals contributed to a more positive outlook on Carbon Dioxide Removal, which was previously headed in the wrong direction but this year was rated far too slow.

EU industry and citizens stand to gain from the transition

Internally and externally, the EU grapples with industrial competitiveness and security pressures. Despite a reduction in fossil fuel imports, especially from Russia, significant import dependencies remain, with new dependencies emerging, notably on individual countries, such as China, for resources and key technologies. China currently dominates the manufacturing market for several key technologies, including solar modules (~82%), wind nacelles (~65%), and battery cells (~83%). Electrification as a cross-cutting driver of the shift to domestic renewable energy production and consumption increased far too slowly and relevant infrastructure development has not advanced fast enough (e.g., electric vehicle charging stations). In addition, persisting national and regional disparities highlight the need for additional attention to a fair and just transition as climate impacts increasingly destroy human, natural, and economic assets.

The EU's strategy to improve competitiveness through climate action as outlined in the Competitiveness Compass (EC, 2025ai) presents an opportunity to confront these challenges and realise benefits for EU industry, citizens, and the EU economy as a whole. New cleantech manufacturing will bring added value and job creation, while decarbonisation of traditional industries will ensure their resilience, cost-effectiveness, and alignment with evolving markets. Reduced import dependency – particularly through domestic cleantech manufacturing, electrification, efficiency and circularity – as well as the diversification of suppliers, will help keep capital and markets within the EU. This strengthens EU security by reducing risks related to supply shortages, price shocks, and overreliance on individual trading partners. A strong EU cleantech economy will also benefit citizens by providing access to affordable energy, sustainable goods, and secure jobs. In addition, ensuring citizens' active participation in the policy-making process and shielding particularly vulnerable groups strengthens support for policy actions and creates domestic demand for cleantech products and services. Decarbonisation also brings direct benefits related to health and quality of life, through cleaner air and water, increased mobility and access to active transport, and improved public spaces.

Finance flows must be aligned with the clean transition to stay on course with renewed momentum

This year's assessment shows that Finance is the only building block moving in the 'wrong direction'. This has a reverberating impact across all other building blocks where the right finance conditions could help to accelerate further progress.

Taking into account ECNO's findings this year across building blocks and from the separate assessments on EU objectives and horizontal drivers, we have identified three key areas where the EU is advancing too slowly. In these areas, dedicated actions are needed to move things forward, while improving the EU's competitiveness and resilience as well as societal prosperity (see 3.2). These three areas are:

a) A gap in investment adds pressure on industrial competitiveness

Financing gaps and misaligned incentives continue to hinder investment in industrial decarbonisation and slow down broader demand for clean technologies. In 2023, there was a climate investment gap of EUR 344 billion. This manifested in the slow pace of building renovations, a decline in heat pump uptake, a slump in EV sales, and the insufficient expansion of wind power. Reflecting the investment gap, electrification has developed too slowly across all energy demand sectors. Moreover, the six-year trend shows that fossil fuel subsidies and investments in fossil fuel supply have increased, while financial support for renewables has declined. These developments pose a risk to the continued build-up of cleantech manufacturing, which has been improving, but at a pace that is beginning to plateau and put the EU's industrial competitiveness under pressure. On top of this, businesses face day-to-day challenges, such as slow permitting times, missing or inadequate infrastructure, and access to skilled workers.

b) EU dependency on imports from single countries

Despite efforts to build resilience, the EU economy remains vulnerable to internal and external shocks, ranging from climate change to geopolitical tensions and supply chain dependencies. Across Europe, climate impacts increasingly threaten livelihoods and the economic systems that support them, causing over EUR 160 billion in economic losses between 2021 and 2023. Energy dependency is another source of vulnerability, as demonstrated by the energy crisis following Russia's invasion of Ukraine. In 2024 alone, the EU imported close to EUR 400 billion worth of fossil fuels, equal to 2% of the bloc's GDP. This reinforces the EU's dependence on fossil fuel exporters and leaves it vulnerable to global oil and gas market volatility. In addition, China's dominance in manufacturing, raw materials, and emerging technologies raises issues for EU supply chain resilience.

c) Challenges for a fair transition and a resilient agricultural system

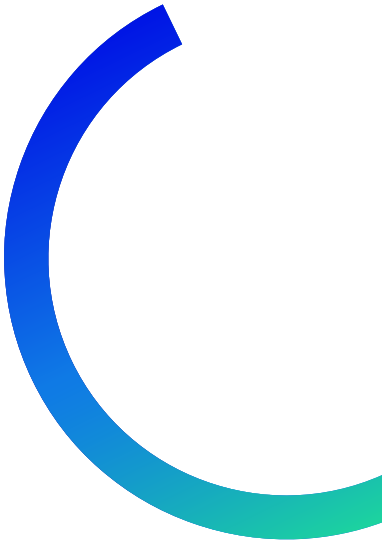
Citizens have much to gain from a climate neutral transition, but national and regional disparities persist. While overall employment has increased, the competitiveness of the EU's coal and heavy industry regions saw declines over the past six years and an increasing number of people see themselves as energy-poor, reaching 11% of the EU population in 2023. Still, despite rising concerns over the cost of living, more than 80% of EU citizens support the overarching aims of the transition and have begun to reap the benefits it brings – from job creation to improved environmental quality, and more secure and affordable energy. Citizens also express a desire to play a more active role in the transition, yet national citizens' climate assemblies have been implemented one-off in only eight countries between 2019 and 2024. This and other evidence point to weak overall frameworks for public participation. Moreover, access to sustainable lifestyles and consumption choices is often limited by inadequate infrastructure and misaligned incentives.

EU agricultural policy has not yet caught up with consumer trends, missing an opportunity to support more resilient and sustainable livelihoods for farmers. Europeans are diversifying what they eat in favour of healthier, more sustainable diets. In 2023, beef consumption fell below 10 kilograms per person, after years of steady decline. At the same time, the EU's Common Agricultural Policy continues to support emissions-intensive farming models, with 80% of current subsidies flowing to animal-based production. The EU also wastes as much food as it imports, with an equivalent of around EUR 130 billion worth of food thrown away each year.

3.2 Action areas for policy-makers to advance the transition

The outcome of this year's analysis points to three burning issues or **priority areas** that need addressing by the EU (see 3.1). These can be further broken down into eight **action areas**, which highlight where targeted policy efforts are most urgent. Each action area is supported by a set of **concrete policy options**, providing practical guidance for decision-makers to help deliver positive developments on the ground:

Priority area 1: Closing the investment gap and improving industrial competitiveness



1) Create a supportive investment framework for clean goods, technologies, and decarbonisation efforts

i. A long-term investment strategy
ii. Climate neutrality aligned pricing
iii. Alignment of public budgets
iv. Reducing the cost of loans
v. Enabling private/corporate investment
vi. Scaling early-stage cleantech finance

2) Remove bottlenecks to the transition

i. Faster permitting
ii. Developing a supportive infrastructure
iii. Developing skills

3) Increase demand for clean goods and technologies and support for the creation of lead markets

i. Make public procurement more sustainable and focused on EU products
ii. Ensure basic sustainability standards
iii. Focus public support on bridging higher upfront costs where needed

4) Advance the implementation of EU legislation in Member States

i. Advance electrification and renewables
ii. Invest in infrastructure
iii. Put in place favourable financial conditions
iv. Support cleantech uptake

Priority area 2: Improve EU resilience

5) Strengthen climate considerations in EU foreign policy

i. Develop an ambitious and effective trade and partnership approach
ii. Strengthen the institutional architecture and financial backbone of EU foreign climate policy
iii. Bring all public finance in line with the Paris Agreement, including through the Multiannual Financial Framework

6) Strengthen climate resilience through data-informed adaptation actions

i. Investing in and mandating adaptation action
ii. Improved data provision

Priority area 3: Moving towards a fair transition and a resilient agricultural system

7) Empowering action and engagement by citizens and relief for vulnerable groups

i. Ensure the continuation of EU-level just transition funding from key sources
ii. Facilitate an approach to the fair transition that accounts for regional differences but ensures coherence
iii. Create meaningful avenues for citizen participation at EU and national level
iv. Build out an EU-level framework to support demand-side measures and empower individual action

8) Reorient the agrifood system to benefit both farmers and the planet

i. Reform CAP subsidies to support climate and environmental objectives
ii. Leverage existing and upcoming policies to further decrease food waste
iii. Make the healthy, sustainable choice the easiest one, e.g., through public procurement
iv. Establish an Agricultural Just Transition Fund to support farmers

While this represents a collection of action areas for the transition as a whole, additional detail and specific further actions can be found in chapters 4 to 6.

3.2.1 Priority area 1: Closing the climate investment gap and improving industrial competitiveness

This priority area is supported by four action areas that are closely interlinked – three pertain to the EU directly, while the fourth outlines actions to be taken by Member States.

1) Create a supportive investment framework for clean goods, technologies, and decarbonisation efforts

For the current legislative period, the European Commission has framed itself as an 'investment Commission' (von der Leyen, 2024a). This is especially relevant as climate investments have slowed down in 2023, and a significant investment gap remains towards achieving the EU's carbon neutrality goal. There are many reasons for this slowdown in critical funding for climate action, but an increase in interest rates, accompanied by high inflation and reduced public support, has played a significant role, not to mention the fact that climate investments are significantly more vulnerable due to their cost structure (i.e., high investment cost, low running costs). The downward trend in interest rates since 2023 can help the investment agenda. Progress on a more supportive investment framework for the clean economy could be made through:

A long-term investment strategy: An effective, well-informed, and coordinated long-term investment framework is needed to clarify the roles of public and private finance. This strategy should use policy tools like fiscal levers, de-risking mechanisms, and regulation to boost private investment.

Climate neutrality aligned pricing: It is essential that the planned revisions of the Energy Taxation Directive address both fossil fuel subsidies as well as exemptions and reduced tax rates favouring fossil fuels. It is even more important that Member States act to implement tax reforms, check on electricity network charges, and phase out fossil fuel subsidies (see section 5). While the EU Emissions Trading System (ETS) has been able to provide a high stable price signal over the past two to three years, it is important to ensure that it also remains effective when the cap reaches zero. Furthermore, for both the ETS and upcoming ETS 2, measures must be in place to support the most vulnerable economic actors and avoid potential public backlash, such as through ensuring the fair, transparent, and efficient use of ETS 2 revenues to compensate those most negatively affected by price increases (see 4.3).

See also:

Alignment of public budgets: The continued alignment of the EU's public budget with the climate neutrality agenda ensures public investments occur in the most pressing areas, such as early technology development, infrastructure development, and a climate-neutral agrifood system, amongst others. To safeguard the availability of sufficient public funding, a successor to NextGenerationEU (NGEU) should be considered. Moreover, the EU should ensure that the newly reformed EU fiscal rules do not become a major obstacle for Member States in financing the transition and should consider easing these rules for climate-related investments if necessary. The European Commission's proposal for the next Multiannual Financial Framework (2028-2034) could be an opportunity for the EU to secure long-term

See also:

public climate finance. And finally, the recent revision of state aid rules, published mid-June, represents an important step to enable Member States to allocate public budget to crucial areas, such as non-fossil flexibility, while placing responsibility on them to act.

See also:

Reducing the cost of loans: Member States should take advantage of the flexibility offered by the revised state aid rules to develop instruments that help de-risk investments in clean technologies, such as through dedicated low-cost loans, subsidies, or guarantee funds (EC, 2025y). At the EU level, planned de-risking instruments need to be implemented and strengthened, such as the forthcoming EU hydrogen bank, the announced Industrial Decarbonisation Bank, and the Competitive Fund, as well as potentially complemented with new instruments, such as under the European Investment Bank. Special attention should be paid to providing low-cost loans to households as major, but often overlooked, actors in the investment agenda (see 4.1 and 5.3).

Enabling private/corporate investment: Several action areas at the EU level can enable private sector investments, e.g., from corporations and businesses. Corporate investments aligned with the EU's Sustainable Finance Taxonomy could be increased by further clarifying the framework, providing accompanying guidance, and by linking incentives to the taxonomy (EC, 2024p; Merler, 2025). Furthermore, the Corporate Sustainability Reporting Directive needs to ensure that transition plans for credit institutions are not only developed but also implemented (see 5.2). Finally, the mentioned long-term investment strategy could also help to ensure predictability for all economic actors.

Scaling early-stage cleantech finance: The EU should strengthen funding for financial instruments that catalyse public R&D investment and support early-stage technology demonstration. This could, for instance, include expanding the role of the European Investment Bank through InvestEU to enable the broader use of loans, guarantees, quasi-equity, and equity instruments that can better crowd in private investment. In addition, other financial instruments, such as 'auctions-as-a-service', should be pushed forward – for instance, under the European Competitiveness Fund. Action should be taken both at the EU level (e.g., through the European Investment Bank) as well as at the Member State level, with strong coordination to avoid a fragmented approach (see 4.1).

See also:

2) Remove bottlenecks to the industrial transition through faster permitting as well as the development of infrastructure and skills

An accelerated industrial transition requires faster permitting of clean projects – from wind power to grid modernisation, bike lanes, and rail networks. In particular, new and modernised infrastructure enables the circulation of energy, goods, and people across the continent. Inadequate, and thus failing, infrastructure risks causing supply disruptions and structural inefficiencies, driving up costs and negatively impacting competitiveness, citizen well-being, and decarbonisation efforts. In addition, the industrial transition needs people to drive innovations and install and maintain clean technologies.

Faster permitting: There is an urgent need to simplify and streamline permitting of new clean projects, including wind, infrastructure, and industrial projects. The full implementation of legislative initiatives like the Net Zero Industry Act and the Renewable Energy Directive should be a priority, as these will help rationalise permitting processes

and accelerate market entry. In addition, progress can be made by effectively implementing the announced proposals for more rapid permitting of grids, storage, renewable energy, and clean industrial projects through the Industrial Decarbonisation Acceleration Act. These measures aim to streamline and digitalise permitting processes via one-stop shops and tacit approvals, while upholding environmental safeguards.

Developing a supportive infrastructure: Insufficient investment in infrastructure should be tackled in a timely manner. In this context, the EU could make progress by addressing disparities in recharging infrastructure development, given that recharging network coverage is much less dense in eastern and central Member States than in western and northern Europe. Increased investments in rail infrastructure are also needed and are likely to be advanced by the forthcoming Sustainable Transport Investment Plan and High-Speed Rail Plan. To maximise benefits and minimise costs, it is important for the EU to play a role assisting Member States in identifying electricity grid extension needs aligned with decarbonisation goals, integrating transmission and distribution system operator planning needs, and promoting coordinated grid investments.

Developing skills: The success of the EU economy depends on developing the workforce to close capacity gaps in permitting, skills development, and monitoring. In surveys, manufacturing enterprises mention the lack of skilled workers as one of the main barriers to investment (EIB, 2023). As such, one of the EU's priorities should be to strengthen the skills, employment, and social dimensions of EU industrial policy, along with increased funding for targeted actions. In addition, ensuring that Member States have the capacity and means to support clean and green job opportunities is essential to European competitiveness in cleantech manufacturing.

3) Increase demand for clean goods and technologies and support the creation of lead markets

Accelerating demand and establishing lead markets for clean technologies and materials are a prerequisite for strengthening EU industry and securing the success of the clean transition. Removing persistent barriers to electrification and scaling up renewables will be key to enabling this shift, alongside fostering demand-side innovation and expanding the use of circular technologies. Together with the other actions in this priority area, these efforts can accelerate decarbonisation, enhance industrial competitiveness, and increase the EU's economic resilience, putting European firms in a position to lead in EU and global markets through innovation and early scale-up, thereby reaping first-mover benefits.

For this, industry and investors require a stable and forward-looking policy framework that advances innovation and investment in cleantech manufacturing and boosts demand for clean products. Such a framework must:

Make public procurement more sustainable and focused on EU products: The European Commission has started the process of revising the Public Procurement Directive, with a proposal expected in late 2026. As it will take time to adopt and implement the Directive, the revision should be bold – significantly mainstreaming public procurement in the EU to stimulate strong local demand for clean technologies, products, and services and to prioritise sustainability criteria and local content over price alone. In the meantime, the

planned Industrial Decarbonisation Acceleration Act should deliver sustainability and 'Made in Europe' criteria for public (and potentially private) procurement of low-carbon products from strategic sectors including, e.g., steel. The legislative proposal is expected in the last quarter of 2025.

Ensure basic sustainability standards: The EU should maintain all introduced standards across the different sectors that promote decarbonisation and give companies and households legal security for their investment decisions. This includes upholding the current CO_2 emission standards for light- and heavy-duty vehicles, providing a clear vision for automakers, and strategically aligning the sector with the EU's priorities for developing clean technologies. For building renovations, including fuel switching to heat pumps, an enforcement system should accompany minimum energy performance standards to ensure their effective deployment. Efforts should focus on the implementation of fossil-free standards for new buildings in countries where such regulations are not yet in place.

The quick implementation and extension of the working plan of the Ecodesign for Sustainable Products Regulation as well as the effective implementation and transposition of the Right-to-Repair Directive in Member States will make more products more durable, efficient, and repairable. Standards could be supported through carbon-intensity labels aiding in the recognition of low-carbon options and enabling green premiums.

The announced Circular Economy Act, expected in 2026, is key to strengthening markets for secondary materials. Much remains to be decided, but it should focus on introducing clear and fitting definitions and the harmonisation of existing rules across Member States to avoid fragmented approaches.

Focus public support on bridging higher upfront costs where needed: Bridging the high upfront costs of clean technologies remains a critical challenge. Public subsidies provide a strategic solution, especially when linked with the right investment framework (see action area 1). In industry, providing sufficient EU-level financing for decarbonisation projects, coupled with the revised State Aid Framework, should simplify and expand the availability of flexible public funding for clean investment. EU-level funding should be maximised for cleantech, with the increased use of 'auctions-as-a-service'. This should be pursued at the EU level alongside national coordination to avoid state aid competition between Member States and foster an efficient approach EU-wide. The build-out of renewables also requires price guarantees and risk reduction often ensured by auctions or feed-in tariffs. The shift to Contract for Difference schemes required by mid-2027 should be implemented quickly by Member States (see action area 4).

Next to industry, public subsidies should reach vulnerable households with the right balance between short-term support and long-term structural investment in energy efficiency and fuel switching. In mobility, there is a need for guidance and coordinated implementation of zero-emission vehicle purchase incentives in Member States, which currently vary substantially in their structure and efficacy. In buildings, grants can speed up the deployment of heat pumps and building renovations.

4) Advance the implementation of EU legislation in Member States

Member States share responsibilities with the EU on the path to climate neutrality. While the EU is mainly responsible for setting targets and the overarching legal framework, national governments need to implement the provisions set by the EU and complement these with their own policies and actions. Importantly, the EU has enacted several legal frameworks since 2023. Their implementation at the Member State level is key in the coming years. Moreover, the recently revised state aid guidelines give national authorities significant leeway to support projects advancing the transition, which can help to boost investment and implementation.

Advance electrification and renewables: Member States need to swiftly implement provisions in the revised Renewable Energy Directive (EMDR, 2024; RED III, 2023). Especially important in this context are streamlined permitting rules and the designation of Renewable Acceleration Areas – both part of RED III and should have been implemented by now. These tools need to be advanced to enable the faster buildout of renewables, especially wind. As the costs of electricity represent a major barrier to electrification, the requirements to implement Contracts for Difference schemes, as well as to enable long-term Power Purchase Agreements, should also be advanced as quickly as possible at national level. In parallel, Member States should reconsider and reform frameworks already in place to promote key electrification technologies, especially electric vehicles and heat pumps. The coordinated implementation of zero-emission and electric vehicle purchase incentives, which currently vary substantially by country in their structure and effectiveness, should be a priority, as well as new measures to accelerate heat pump deployment. The reform of the State Aid Framework published in June 2025 (EC, 2025y) should be used as an impetus to develop appropriate support schemes not only for these technologies, but also for non-fossil flexibility options and other technologies mentioned under the Net Zero Industry Act.

See also: ›

See also: ›

Invest in infrastructure: Infrastructure is a key horizontal driver of the transition (see 5.3). Member States bear major responsibility for the appropriate development of their domestic infrastructures, especially due to the need for significant public investments. To advance grid infrastructure, Member States should focus on investing in enhancing and expanding the grid, prioritising projects of common interest to ensure an integrated European grid, and the long overdue buildout of smart meters. The advancement of the Trans-European Rail Network requires Member States to expand and upgrade their railway infrastructure to ensure the reliability of critical train routes. To facilitate the roll-out of electric mobility, Member States must focus on the development of charging infrastructure, as required under the Alternative Fuels Infrastructure Regulation (AFIR, 2023). In the building sector, Member States need to find ways to decarbonise district heating networks, especially due to the lack of any EU-level policy in this area. Similarly, CO_2 infrastructure and hydrogen networks require Member State coordination and investment. Finally, given the importance of infrastructure across all economic sectors and its foundational role for other key drivers, such as electrification, both the EU and Member States should work to improve data availability on past and planned investments.

See also: ›

Put in place favourable financial conditions: Member States need to speed up the phase-out of fossil fuel subsidies. The planned timetables in most Member States are behind schedule, particularly with regard to tax design (ECNO, 2025a). Recommendations by the EU expected by the end of 2025 will inform Member States on flexibilities in the tax system. These flexibilities should be used by Member States as fast as possible to reduce taxes on electricity, applying the minimum excise duty rates or a reduced VAT rate (see 5.1). Member States need to use the opportunities presented by the new state aid framework and put in place frameworks, such as subsidies or tax credits, to support technologies under the Net Zero Industry Act. To ensure the ETS 2 is effective and to prevent public backlash as companies pass costs along to consumers, Member States need to monitor and re-invest revenues from the scheme in a manner that minimises negative impacts, especially on the most vulnerable populations (see 4.3). Finally, both the EU and Member States should develop long-term investment frameworks to help guide investment in the national context.

Support cleantech uptake: Member States should take decisive steps to implement the Net Zero Industry Act effectively. This includes establishing regulatory sandboxes to support the rapid development and testing of clean technologies, helping to turn research into market-ready innovations. They must also adopt green public procurement rules that prioritise sustainable and innovative solutions in public tenders, creating stronger demand for cleantech made in the EU. To avoid delays, Member States need to ensure fast-track permitting by increasing administrative capacity and streamlining approval processes, especially for projects designated as strategic under the regulation. Additionally, they should actively identify and support these strategic projects and participate in the EU's coordination platform to align efforts, share best practices, and monitor progress across the Union.

See also: ›

3.2.2 Priority area 2: Improving the EU's resilience beyond closing the climate investment gap and improving competitiveness

This priority area on improving the EU's resilience is also strongly supported by the action areas outlined under priority area 1 – though they are not repeated here. Instead, the focus is on two additional action areas that complement the picture and relate to foreign partnerships and climate resilience.

5) Strengthen climate considerations in EU foreign policy to promote global cooperation and resilient clean trade partnerships

While the EU can do much within its own borders, it cannot achieve a climate neutral future alone. As the United States retreats (yet again) from international climate leadership, it is all the more critical for the EU to strengthen global cooperation with trusted partners.

The EU's external action reflects both the responsibility and strategic interest to work with partner countries to navigate major global transitions, especially in an era increasingly shaped by global competition over green technologies, standards, and markets. At the same time, the EU remains heavily dependent on third countries for cleantech components

and the supply of critical raw materials essential for decarbonisation efforts. In many instances, these imports are highly concentrated from a few countries, heightening the EU's vulnerability to trade disruptions. Against this backdrop, the EU's ability to position itself as an attractive and reliable partner has become a key element of its geopolitical relevance. To advance climate and the clean transition in foreign policy, the EU should:

Develop an ambitious and effective trade and partnership approach: A joined-up European trade approach can address the significant, geopolitically risky dependencies on critical materials and cleantech components. The new Clean Trade and Investment Partnerships are an integral part of this strategy. Well-designed partnerships can serve a dual purpose: diversifying access to critical raw materials and clean technologies while supporting partner countries' sustainable industrial development and transitions. However, they are still a largely undefined instrument. Their success will depend on several factors, including:

- Alignment with existing EU initiatives, such as Global Gateway or Partnerships on Critical Raw Materials, to ensure coherence and avoid duplication.
- Co-developing the scope with partner countries to ensure local ownership, long-term buy-in, and a focus on priority sectors where the EU and partner countries have aligned interests and opportunities.
- Structuring the partnerships as comprehensive support packages, combining trade facilitation, investment frameworks, technology cooperation, and capacity building measures. Risk reduction tools, blended finance, regulatory alignment, and viable project pipelines will be important methods to leverage private capital.

If designed and implemented effectively, Clean Trade and Investment Partnerships can become a cornerstone of the EU's clean economy diplomacy – enhancing supply chain resilience through mutually beneficial agreements.

Strengthen the institutional architecture and financial backbone of EU foreign climate policy: To enhance the effectiveness of its foreign climate policy, it is important for the EU to improve coordination across Commissioners, institutions, and EU delegations abroad (NewClimate Institute, 2024; Sperber et al., 2025). Decisions around the next Multiannual Financial Framework (2028-2034) are an opportunity to increase climate spending targets and provide adequate resources for climate mainstreaming in foreign and development policy. This could be supported by tapping into the EU's own resources, such as revenues from the Carbon Border Adjustment Mechanism. At the operational level, placing dedicated climate experts in EU Delegations and strengthening collaboration with Member State embassies would promote consistency and increase the EU's strategic presence in partner countries. Such institutional reforms are fundamental for turning the EU's stated priorities, linking green transition, competitiveness, and security into a coherent and impactful foreign policy strategy (EC, 2025ai).

Bring all public finance in line with the Paris Agreement, including through the Multiannual Financial Framework: To demonstrate policy coherence and uphold the commitment to phase out public support for fossil fuels, the EU must ensure that all new external

financing policies, including those under the Affordable Energy Action Plan, are aligned with long-term decarbonisation goals. This includes avoiding short-term contingency measures that undermine the credibility of the EU's fossil fuel phase-out pledge. Again, a key opportunity lies in the negotiations for the next Multiannual Financial Framework, where the EU can introduce a climate-compatible budget classification system and leverage the process to strengthen Paris alignment across its public finance architecture. This would help track compatibility and incentivise the more strategic use of limited public resources, particularly for sectors most vulnerable to climate impacts. Such reforms would also support the EU's position in global finance negotiations and enhance accountability in climate diplomacy.

6) Strengthen climate resilience through data-informed adaptation actions

Europe is the fastest-warming continent, and climate impacts pose a major threat to the EU's economy and overall security (EC, 2025ai), with rising losses across economic, human, and natural assets. Even if global efforts were to limit warming to 1.5°C, Europe would still need to prepare for scenarios where temperatures rise by 3°C or more. At the same time, significant data gaps hinder our understanding of past progress and required change in terms of adapting to climate change, while the evidence-base is stronger for climate impacts (C3S, 2025).

See also: ›

Investing in and mandating adaptation action: There is a need to embed adaptation and climate-proofing principles into public investment decisions, while also tracking investment needs and expenditures across public and private sectors and establishing dedicated adaptation budgets. Promoting stronger cooperation between public and private finance is essential to mobilise sufficient resources for effective adaptation. Implementation of National Adaptation Strategies and Plans must speed up to keep pace with the urgency of climate risks.

The EU should clarify, and potentially strengthen, its policy mandate for financing and enforcing adaptation measures. This includes integrating adaptation across departments and sectors and establishing dedicated coordination mechanisms to overcome institutional silos. Member States should consider legal requirements ensuring policy integration across different governance levels and policy areas.

Improved data provision: The EU should facilitate the collection and access to timely, harmonised, and comprehensive data for adaptation actions and financing. Data on land cover and use, updated every six years and available through the EEA's Urban Atlas, could be improved with more comprehensive and regular updates through the Copernicus earth observation programme. Data on EU objectives, such as the river restoration target, should be more readily accessible. The mid-term evaluation of the Nature Restoration Law provides an opportunity to incorporate such monitoring. Further adoption of guidelines on harmonising national adaptation strategies will help improve the assessment and monitoring of adaptation efforts across the EU. The European Climate Adaptation Platform (Climate-ADAPT) should continue to be maintained and improved. Additional data could also be published by the EEA on its 'measuring progress towards climate resilience' dashboard, which could support monitoring adaptation actions and implementation.

3.2.3 Priority area 3: Moving towards a fair transition and resilient agricultural system

This priority area represents a combined focus on citizen engagement and the agrifood system. Here, the common thread is a strong emphasis on aspects related to a fair and resilient transition.

7) Empowering action and engagement by citizens and relief for vulnerable groups

The scope of transition required to decarbonise the EU economy means all of society will share the costs and benefits, but these are not equally distributed. Understanding the social dimension of the transition is thus important to ensure that no person or region is left behind, and indeed that all citizens can access the benefits and opportunities of a clean economic future. Broad public support is a prerequisite but cannot be assumed. Households are increasingly feeling the impacts of climate mitigation policies, and growing political polarisation and past implementation challenges point to the need to re-engage with citizens to build social capital and trust in governmental action at all levels. On top of this, the social dimension is a key component of the EU's twin political priorities – a fair transition and competitiveness – as reskilling and the creation of new quality, well-paying jobs in green sectors bolster European competitiveness in the face of global pressures.

For a fair and inclusive transition, EU policy must address distributional concerns, such as regional poverty and competitiveness, by highlighting the tangible benefits of climate action, and making it easy for citizens and communities to participate, both politically and materially, in the clean economy. To reach these ends, the European Commission should view European competitiveness and the clean transition as mutually synergistic and underpin these with robust social policies linked to meaningful citizen engagement and empowerment (see 4.3).

Ensure the continuation of EU-level just transition funding from key sources: The EU should advance social considerations through the build-out of its just transition framework. This can be done by reinforcing and integrating the current patchwork of binding and non-binding instruments at EU level, not allowing crucial funding streams like the Just Transition Fund to run dry, and facilitating the fair and transparent monitoring and distribution of funding under the Social Climate Fund for aims set forth in the European Pillar of Social Rights.

See also: ›

Facilitate an approach to the fair transition that accounts for regional differences but ensures coherence: The EU should work closely with local and regional authorities to implement territorial just transition plans using a true 'place-based' approach that accounts for the unique challenges and struggles of certain areas. Finally, the EU should ensure consistency and integration of just transition policy with broader EU climate and energy policy, especially when it comes to Member States' national energy and climate plans (i.e., NECPs).

See also: ›

Create meaningful avenues for citizen participation at EU and national level: To bolster transparency in policy-making, engender trust, and pre-empt backlash, the EU should lean

into the deliberative shift in policy-making that began under the European Green Deal and fully implement the 'age of dialogue' promised by Ursula von der Leyen with a concerted effort to emphasise intergenerational fairness and include marginalised voices. Boosting trust in the transition means maintaining avenues for participation that are meaningful and balanced, ensuring that business and special interests do not drown out the voice and concerns of the public. The planned 'implementation dialogues' as well as the European Citizens' Panels and other EU-level mechanisms should be based on robust standards for best practice that are embedded in existing legal frameworks, such as the EU Climate Law.

See also:

Build out an EU-level framework to support demand-side measures and empower individual action: To reinforce sustainable lifestyles and infrastructures, the EU should re-engage the European Climate Pact in earnest, complementing this with additional on-the-ground support for local and municipal authorities as well as an EU-level strategy for sustainable consumption shifts, especially in the areas of mobility and agrifood. Significant progress could be made through expanded public procurement of sustainable goods and services and through promoting infrastructures that enable sustainable choices and practices. Importantly, the burden of responsibility cannot fall solely to EU citizens as consumers – a supporting policy environment is often an important prerequisite for change. The EU should further support national and local level authorities in pursuing infrastructure investments that enable behavioural shifts, making these easy and commonplace over time (see 4.3).

See also:

8) Reorient the agrifood system to benefit both farmers and the planet

The EU's Common Agricultural Policy (CAP) represents around a fourth of the EU's current annual budget – yet it often does not align with the EU's own priorities, particularly when it comes to the long-term resilience of the sector and the transition to climate neutrality.

With the ongoing negotiations around the next CAP and the 2028-2034 Multiannual Financial Framework, the EU has an opportunity to leverage its funds in a way that aligns with a transition to climate neutrality in the agriculture sector, while supporting a fair transition for farmers and boosting the competitiveness of the EU agricultural and food industry.

Reform CAP subsidies to support climate and environmental objectives: CAP instruments – such as eco-schemes, conditionalities, and rural development programmes – should be explicitly directed toward incentivising sustainable practices, including low-emission, agroecological farming and a shift toward plant-based protein production. Currently, around 80% of CAP subsidies support animal-based food production, with more than half allocated to feed production (Kortleve et al., 2024). A reorientation of these subsidies could significantly contribute to climate and biodiversity goals.

Leverage existing and upcoming policies to further decrease food waste: While the EU has agreed on new food waste targets, these fall short of the UN Sustainable Development Goals, which call for a 50% reduction in food waste at the retail and consumer levels by 2030. These targets will be revisited in 2027, but there are opportunities to address food waste before that, including through the Circular Economy Act. Member States can also

tailor CAP Strategic Plans to local needs and maximise their potential; these plans could more explicitly support food system transformation – particularly in areas such as food waste reduction at the primary production level (EU CAP Network, 2024).

Make the healthy, sustainable choice the easiest one, e.g., through public procurement: Public procurement policy can be leveraged to make healthy and sustainable food the easiest and most accessible choice. This includes prioritising plant-based and locally sourced options in public institutions and schools, which can drive demand while supporting farmers.

Box 5: The Vision for Agriculture and Food

The Vision for Agriculture and Food outlines a five-year roadmap focused on reducing bureaucratic burdens, enhancing competitiveness, and balancing food security and sovereignty objectives. However, it excludes mention of dietary shifts and does not include specific actions to promote plant-based diets or to reshape food systems in a way that fosters sustainable consumption patterns. The Vision also foresees more public procurement – however, it is unclear to what extent this will shape consumers' choice environments. In addition, building on its Vision, the EU plans to release a long-term strategy for the livestock sector that leverages the diversity of the sector for competitiveness and sustainability and has kickstarted its livestock workstream. However, the approach currently lacks explicit references to reduced herd size or decreased meat and dairy production. This is a missed opportunity so far, as such measures could significantly reduce emissions, land-use change, and fertiliser use, while supporting biodiversity.

Establish an Agricultural Just Transition Fund to support farmers: The creation of an Agricultural Just Transition Fund, as proposed during the Strategic Dialogue on Agriculture but not followed up on in the Commission's Vision for Food and Agriculture, could provide a powerful financial mechanism to support farmers in making the shift from, for instance, livestock farming to plant-based protein production (IEEP, 2025).

With cattle meat consumption on track and likely to overachieve the EU's own benchmark in 2050, there is an opportunity to develop plant-based alternatives to ensure European farmers can benefit from this shift. However, a clear strategy to boost protein diversification and plant-based foods is needed to tap into the opportunities throughout food value chains.

3.3 Tracking progress through an official EU transition monitoring framework that integrates competitiveness and climate action

The EU already publishes information and data related to the transition to a clean, fair, and competitive economy across several different portals and web platforms. However, there is no single system that brings these data together and analyses them in a comprehensive manner that considers the enabling conditions of the transition.

The monitoring landscape is complex and includes monitoring systems like the European Monitor of Industrial Ecosystems, the 8th Environmental Action Programme, the European Pillar of Social Rights framework for monitoring societal progress and the European Commission's Climate Action Progress Reports. In 2025, this has been complemented by the existing Annual Single Market Competitiveness Report, which will from now on include progress monitoring on the Clean Industrial Deal and 'towards decarbonisation and competitiveness objectives'. All of these rely on partially overlapping but often distinct indicator data. Moreover, not all include a progress check against future benchmarks – and, crucially, there seems to be no intention to merge overarching insights into one framework. This reinforces a siloed approach across policy areas and limits cross-sector coordination.

ECNO's 2025 assessment, now in its third iteration since the launch of the Observatory in 2023, shows that with new circumstances and challenges, a common framework – potentially extended to cover additional relevant aspects – can provide a comprehensive understanding across policy areas. This allows for a better grasp of where the EU transition faces on-the-ground developments that are heading in the wrong direction, and where there is a need to speed up change. It also reveals blind spots and missing information. These insights can inform policy-making by helping to identify policy gaps and setting priorities for the formulation of new policies, revising existing policies, as well as removing policies that set the wrong incentives.

While ECNO's assessment provides detailed input for policy-makers, it cannot replace regular and sufficiently comprehensive EU-wide transition monitoring carried out by EU institutions directly. Such an official framework would lead to greater comparability, facilitate evaluations, and increase transparency by integrating existing planning, monitoring, and reporting activities. This would in turn produce a unified set of facts for evidence-based policy-making and reduce overall effort and administrative burden for Member States and EU institutions alike. It would also allow the European Commission to be more systematic when triggering action under Article 6(3) of the EU Climate Law, which requires a response to findings from progress monitoring towards climate neutrality.

4 Progress towards other objectives

4.1 Competitiveness

Europe is facing a steady erosion of its industrial competitiveness. Higher industrial energy prices, a fading leadership in Research and Innovation (R&I), and a continued emphasis on 20th-century industrial goods rather than on the new technologies shaping the 21st century weaken future prospects. Electricity prices in the United States are 2 to 3 times lower than in the EU, while China has almost closed the gap in innovation performance over the past decade. China's manufacturing dominance and recent industrial overcapacity, coupled with the protectionist trade positioning of the US, further undercut EU manufacturers of both legacy industrial goods, such as steel, as well as cleantech.

A European strategy that combines climate action with industrial policy offers an opportunity to reverse this trend. Climate action is not only compatible with competitiveness – it is essential to securing it in the long term. In a global economy that is moving toward zero-carbon technologies, Europe's ability to stay competitive depends on its capacity to lead in clean innovation, strengthen industrial performance, and create new markets for clean technologies while reducing its dependence on volatile fossil fuel markets.

As a result, competitiveness has become a core priority for EU policymakers – now positioned alongside climate action in the European Commission's post-Draghi agenda (Born et al., 2022; EC, 2025ai; Lory and Hess, 2024). While competitiveness, as outlined in the Competitiveness Compass (EC, 2025b), goes beyond industrial competitiveness, the core of the EU's approach to align climate and competitiveness objectives is focused on this area. The analysis of this theme is therefore structured around three pillars: the decarbonisation of existing industry, the development of competitive cleantech manufacturing, and the establishment of more resilient supply chains (EC, 2025e).

Learn more about the definition of Competitiveness.

4.1.1 State of the EU's competitiveness

Table 4: Progress on Competitiveness

Clean Industrial Competitiveness		
Industrial electricity prices EU [EUR/MWh]	🔴	
Industrial electricity prices - USA [EUR/MWh]	🔴	
Industrial electricity prices - China [EUR/MWh]	🟠	
Share of electricity in industrial energy carrier and feedstock use [%]	🟠	🏭
Share of renewables and biofuels in industrial energy and feedstock use [%]	🟡	🏭
Trade balance in iron and steel [bnEUR]	🔴	
Trade balance in chemicals [bnEUR]	🔴	
Trade balance in cement [bnEUR]	🔴	

EU Cleantech Leadership		
Battery manufacturing capacity [GWh/year]	●	⚙
Solar PV/modules manufacturing capacity [GWac/year]	●	
Heat pumps manufacturing capacity [GW/year]	●	
Electrolyser manufacturing capacity [GW/year]	●	
Wind turbine blades manufacturing capacity [GW/year]	●	
Public funds for environmental and energy research and development (R&D) [mEUR2023]	●	⚙
Private energy research and innovation (R&I) spending [mEUR 2024]	●	⚙
Trade balance in batteries [bnEUR2024]	●	
Trade balance in electric vehicles (EVs) [bnEUR2024]	●	
Trade balance in heat pumps [bnEUR2024]	●	
Trade balance in solar/photovoltaic (PV) components [bnEUR2024]	●	
Trade balance in wind turbines [bnEUR2024]	●	

Resilient Supply Chain		
Resource productivity [PPS/kg]	●	🏭
Circular material use rate [%]	●	🏭
Trade balance in rare earths [bnEUR]	●	
Trade balance in cobalt (oxides and hydroxides) [bnEUR]	●	
Trade balance in lithium (carbonates) [bnEUR]	●	
Trade balance in platinum (unwrought or powder form) [bnEUR]	●	
Trade balance in silicon [bnEUR]	●	

Note: Circles show the current year's progress classification; see also Table 45. An icon in the right-hand column indicates that the indicator is included in the corresponding building block. Source: ©ECNO.

Clean industrial competitiveness

Europe's traditional industrial base is under pressure. Trade balances in steel and chemicals have slipped into deficit since 2020, highlighting growing vulnerability in carbon-intensive sectors. Energy costs are a key driver: from 2013 to 2024, industrial electricity prices rose by over 7.5% per year, far outpacing the US and China – an issue that was mainly driven by Europe's lack of natural (fossil-fuel) resources (Draghi, 2024). Trade dynamics, particularly in steel, have further compounded the issue, with Chinese overcapacity and US tariffs intensifying the challenges faced by European producers (EC, 2025an; Wood Mackenzie, 2025). Structural transformation of the EU's energy system remains sluggish, with the share of electricity in industrial energy and feedstock use having grown only marginally in recent years. The share of renewables and bio-based fuels is increasing steadily, but the overall pace is too slow to align with 2030 decarbonisation goals. Overall, this cost gap, slow electrification, and trade challenges continue to erode competitiveness (Heussaff, 2024).

The EU Emissions Trading System (EU ETS) remains the central instrument for industrial decarbonisation, but its price volatility has so far prevented the creation of a stable green premium that could guide long-term investment in low-carbon materials and technologies. While key reforms – such as the phase-out of free allowances and the introduction of the Carbon Border Adjustment Mechanism – are still being gradually implemented, Europe has begun to assemble a broader industrial policy toolkit, including the Industrial Carbon Management Strategy, the Net Zero Industry Act, and the Energy Efficiency Directive. However, recent policy momentum around green and local public procurement for industry – whether through the Industrial Decarbonisation Accelerator Act (IDAA) or forthcoming revisions to the Public Procurement Directive –underscores the urgent need for more strategic demand-side instruments.

EU cleantech leadership

Cleantech manufacturing is a strategic priority to stimulate sustainable growth (Draghi, 2024), backed by regulatory initiatives like the Net Zero Industry Act (NZIA) and the Green Deal Industrial Plan (GDIP), both launched in 2023. However, progress on the ground is fragmented. While battery capacity grew from 16 GW/year in 2018 to 255 GW/year in 2024, growth has slowed in the face of recent market volatility (with Northvolt's bankruptcy being the most high-profile case), and existing capacity is underutilised in the face of weaker demand (Calipel et al., 2025; Nicola et al., 2024). The build-out of manufacturing capacity for electrolysers, solar, and wind remain below 2030 targets, while heat pump production has plateaued (Calipel et al., 2025). Nevertheless, the NZIA represents a clear policy effort to accelerate this growth by setting manufacturing targets, simplifying permitting procedures, and introducing resilience criteria in procurement. However, the full impacts of the package will not be felt until 2026, and its effectiveness may be undermined by provisions that allow for procurement rules to be circumvented if the costs of technologies from supported suppliers exceed that of competitors by more than 20%.

Public research and development (R&D) investment has grown, and private R&D investment is now on track. Despite support from the Innovation Fund, InvestEU, Horizon Europe, and national fiscal incentives, financing gaps persist – especially for scale-up and commercialisation (Mack, 2024). Trade data underscores this fragility: the EU runs deficits in most key cleantech sectors, with wind being the only area maintaining a consistent surplus.

Resilient supply chains

While resource productivity has improved steadily (+3.7%/year), the circular material use rate remains low, rising only from 8.2% to 11.8% since 2004. Europe remains highly dependent on imported critical raw materials, with the trade balance in key elements such as lithium (for battery manufacturing), platinum (used in hydrogen electrolysers), and silicon (the key material in Solar PV) all heading in the wrong direction. This trend highlights the challenges in building a resilient European manufacturing ecosystem (IEA, 2024c).

The EU has responded with regulatory tools such as the Critical Raw Materials Act (CRMA, 2024) and supply-side targets under the NZIA. The Circular Economy Action Plan (EC, 2020d) is now being operationalised through legislation including the Ecodesign for Sustainable Products Regulation, Empowering Consumers for the Green Transition

Directive, updates to chemicals regulation, and the proposed End-of-Life Vehicles Regulation, which aims to improve vehicle design, boost recycling, and recover critical raw materials in one of the EU's most resource-intensive sectors (EC, 2023n).

Despite growing policy ambition, Europe's industrial transformation remains incomplete – leaving its competitiveness exposed to rising global risks.

4.1.2 Policy initiatives to boost competitiveness

The launch of the Clean Industrial Deal (CID) in 2025 signals a shift toward a more strategic, integrated approach to industrial decarbonisation and competitiveness. At its core is the proposed Industrial Decarbonisation Bank, expected to mobilise up to EUR 100 billion through the Innovation Fund, ETS revenues, and InvestEU – aimed at accelerating investment in clean industrial technologies (EC, 2025am).

The forthcoming Industrial Decarbonisation Accelerator Act (IDAA) promises faster permitting processes and stronger market-shaping tools, including non-price criteria and EU-preference in procurement, as well as a voluntary label on the carbon intensity of products. The Affordable Energy Action Plan adds measures to reduce industrial energy costs and support long-term contracts, including a EUR 500 million pilot Power Purchase Agreement (PPA) programme with the EIB. A forthcoming revision of the EU's Public Procurement Directive is expected to strengthen sustainability and resilience criteria, helping to create lead markets for European cleantech. A new Gas Market Task Force will also assess further reforms to improve price transparency and regulatory oversight in response to recent market volatility (EC, 2025am).

To address supply chain vulnerabilities, a Circular Economy Act is planned for 2026, aimed at boosting the use of secondary materials, harmonising circular standards, and aligning procurement rules. In parallel, the Commission will establish a dedicated EU Critical Raw Material Centre to coordinate joint purchasing, strategic stockpiling, and investment in upstream supply chains both within the EU and abroad.

The CID also proposes boosting cleantech innovation through a EUR 600 million Horizon Europe pilot, a Startup and Scaleup Strategy, and expanded use of InvestEU. If fully implemented, these initiatives could begin to close critical gaps identified in the EU's clean industrial strategy – though their impact will depend on legislative follow-through and sustained financial support.

4.1.3 What is needed to ensure the EU's long-term competitiveness?

Fast and ambitious implementation of announced initiatives: A wide range of relevant legislation has already been brought forward to bolster Europe's competitiveness, with further measures announced under the Clean Industrial Deal. However, the impacts of these initiatives are still yet to be felt on the ground, as the indicators in this chapter show. While the Draghi report (Draghi, 2024) underscored the urgency of addressing the EU's competitiveness challenge and the second von der Leyen Commission has shown a clear ambition to respond, there remains the risk that Europe continues to fall behind as initiatives are designed and implemented. Full implementation of existing legislation, along with the accelerated and ambitious design of upcoming instruments (for example, ensuring non-price criteria in the IDAA and revision of Public Procurement Directive are more rigorous than those introduced under NZIA), is now critical.

Coordinated regulation and investment to build lead markets: The Net Zero Industry Act (NZIA, 2024), the forthcoming Industrial Decarbonisation Accelerator Act, and the revision of the Public Procurement Directive (EC, 2025am) must accelerate permitting processes and unlock lead markets through stronger procurement criteria that incentivise green, European production (EC, 2025am). Strengthening the EU's public investment architecture through the announced Industrial Decarbonisation Bank and Competitiveness Fund offers an opportunity to unlock the necessary private capital. Ensuring a large EU budget, combined with the State Aid flexibilities announced under the Clean Industrial Deal State Aid Framework, and national coordination through the Competitiveness Coordination Tool, is important to avoid fragmentation and preserve the EU's position against more coordinated economic blocs.

Building a resilient European industrial supply chain: Actions under the Circular Economy Act, expected in 2026, to strengthen markets for secondary materials will be an important area of action. A coherent European trade approach, building on the announced Clean Trade and Investment Partnerships, can address the significant, geopolitically risky dependencies on critical materials and cleantech components. At the same time, the cleantech innovation pipeline must be scaled up. This requires expanded support through Horizon Europe and its successor, and improved mechanisms to support technology transfer from foreign cleantech industrial investments.

Addressing capacity gaps: Finally, success will require addressing capacity gaps in permitting, skills development, and monitoring. A competitive, climate-neutral industrial base depends not just on good strategy, but on coordinated, well-funded, and timely delivery (Humphreys et al., 2025).

Table 5: Details on additional indicators for Competitiveness

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
CLEAN INDUSTRIAL COMPETITIVENESS						
Industrial electricity prices EU [EUR/MWh]	↩	2019-2024 (Eurostat, 2025d)	20.3%	21.9 EUR/MWh	n/a	n/a
Industrial electricity prices - USA [EUR/MWh]	↩	2018-2023 (Eurostat, 2025d)	6.2%	3.9 EUR/MWh	n/a	n/a
Industrial electricity prices - China [EUR/MWh]	⚠	2018-2023 (Eurostat, 2025d)	-1.3%	-1.0 EUR/MWh	n/a	n/a
Trade balance in iron and steel [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-17.1%	-1.3 bnEUR	n/a	n/a
Trade balance in cement [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-24.0 %	-0.1 bnEUR	n/a	n/a
Trade balance in chemicals [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-47.4 %	-5.6 bnEUR	n/a	n/a
EU CLEAN TECHNOLOGY LEADERSHIP						
Solar PV/modules manufacturing capacity [GWac/year]	⚠	2019-2024 (Calipel et al., 2025)	14.9%	1.0 GWac	24 GW by 2030 (NZIA, 2024)	2.5 GW (2024–2030) → **2.5 times faster**
Heat pumps manufacturing capacity [GW/year]	⚠	2019-2024 (Calipel et al., 2025)	2.5%	0.5 GW	31 GW by 2030 (NZIA, 2024)	1.5 GW (2024–2030) → **3 times faster**
Electrolyser manufacturing capacity [GW/year]	⚠	2019-2024 (Calipel et al., 2025)	55.2%	1.2 GW	25 GW by 2030 (NZIA, 2024)	3 GW (2024–2030) → **2.5 times faster**
Wind turbine blades manufacturing capacity [GW/year]	✓	2019-2024 (Calipel et al., 2025)	24.6%	4.0 GW	36 GW by 2030 (NZIA, 2024)	1 GW (2024–2030) → **on track**
Trade balance in batteries [bnEUR2024]	↩	2019-2024 (Bruegel, 2025a)	-36%	-0.3 bnEUR	n/a	n/a
Trade balance in EVs [bnEUR2024]	✓	2019-2024 (Bruegel, 2025a)	52.2 %	2.3 bnEUR	n/a	n/a
Trade balance in heat pumps [bnEUR2024]	↩	2019-2024 (Bruegel, 2025a)	-10.4%	-0.01 bnEUR	n/a	n/a
Trade balance in solar/PV components [bnEUR2024]	↩	2019-2024 (Bruegel, 2025a)	-17.1 %	-0.2 bnEUR	n/a	n/a
Trade balance in wind turbines [bnEUR2024]	↩	2019-2024 (Bruegel, 2025a)	-4.5 %	-0.01 bnEUR	n/a	n/a
RESILIENT SUPPLY CHAIN						
Trade balance in rare earths [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-1.8%	-0.0001 bnEUR	n/a	n/a
Trade balance in cobalt (oxides and hydroxides) [bnEUR]	✓	2019-2024 (Eurostat, 2025g)	11.5%	0.005 bnEUR	n/a	n/a
Trade balance in lithium (carbonates) [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-13.4%	-0.01 bnEUR	n/a	n/a
Trade balance in platinum (unwrought or powder form) [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-49.8%	-0.08 bnEUR	n/a	n/a
Trade balance in silicon [bnEUR]	↩	2019-2024 (Eurostat, 2025g)	-8.1%	-0.06 bnEUR	n/a	n/a

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section

Source: ©ECNO.

4.2 Resilience

The past few years have been marked by successive global crises. From acute disruptions – such as the COVID-19 pandemic and Russia's invasion of Ukraine – to intensifying climate impacts and trade tensions, these events have exposed deep vulnerabilities across all sectors of the European economy. In response, resilience has emerged as a defining theme of the European Commission's policy priorities for the 2024–2029 period.

Strengthening the EU's resilience is essential to achieving a successful transition to climate neutrality. This assessment examines resilience progress across the following dimensions: economic resilience (focusing on securing energy supply, resilient supply chains, and access to raw materials), social resilience, and finally resilience to the physical impacts of climate change.

Learn more about the definition of Resilience.

4.2.1 State of the EU's economic, social, and climate resilience

Table 6: Progress on Resilience

Energy independence and resilience		
Net fossil energy imports [ktoe]		
Fossil energy import dependency [%]		
Fossil fuel import value [bnEUR]		
Fossil gas import diversification – HHI [-]		
Fossil oil import diversification – HHI [-]		
Share of renewable energy in final energy consumption [%]		
Final energy consumption [Mtoe]		

Securing critical raw materials and resilient supply chains		
Energy technology import diversification – HHI [-]		
Trade balance in wind turbines		
Trade balance for solar/PV components		
Trade balance in batteries		
Circular material use rate [%]		
Trade balance in rare earths [bnEUR]		
Trade balance in cobalt (oxides and hydroxides) [bnEUR]		
Trade balance in lithium (carbonates) [bnEUR]		
Trade balance in platinum (unwrought or powder form) [bnEUR]		
Trade balance in silicon [bnEUR]		

Social resilience for a fair and acceptable transition		
Public support for the transition to climate neutrality [% of EU population]	●	⌂
Citizens' climate assemblies at national level [% of EU GHG emissions covered]	●	⌂
Protests against climate measures [Number of instances]	●	
Protests for climate measures [Number of instances]	●	

Resilience to physical climate risks through adaptation		
Economic losses from climate-related extremes [bnEUR]	●	⋯
National adaptation policies [%]	●	⋯
Total investment needs (in adaptation) [bnEUR]	●	⋯
Total planned expenditure (in adaptation) [bnEUR]	●	⋯
Actual spending (in adaptation) [bnEUR]	●	⋯

Note: Circles show the current year's progress classification; see also Table 45. An icon in the right-hand column indicates that the indicator is included in the corresponding building block. Source: ©ECNO.

Securing sustainable energy supply – reducing the dependence on fossil fuel imports

Despite significant achievements in renewable energy buildout and energy efficiency., the EU economy continues to be heavily dependent on energy imports, which accounted for nearly 60% of its total energy in 2023 (Eurostat, 2024d).

The EU's energy dependence is due to its continued reliance on fossil fuels: in 2023, the EU imported 96% of its oil and 90% of its fossil gas (Eurostat, 2025u, 2025ab). In 2024, the EU spent EUR 376 billion on imported fossil fuels. During the 2022 energy crisis, spending on fossil fuels nearly doubled, reaching close to EUR 700 billion, highlighting the EU's vulnerability to fossil fuel price shocks. While net imports of fossil fuels reduced by 18% between 2018 and 2023, fossil fuel import dependence, measured as the share of net imported fossil fuels in gross available energy, has largely remained stable due to a reduction of 36% in the primary production of nascent fossil fuels.

The high share of imports – particularly the increased reliance on costly Liquefied Natural Gas (LNG) – contributes to the fact that the EU's energy prices are above those of other major economies, including the US and China. This puts a strain on industrial competitiveness in particular (EC, 2024e). Securing stable access to renewable energy is therefore not only a climate imperative but also essential to support economic resilience more broadly.

To counter this vulnerability, the EC launched REPowerEU (EC, 2022d), which accelerated renewable energy production, brought energy prices down from the 2022 peak, and reduced the EU's reliance on energy imports, particularly from Russia. While the figures above show that the plan's overall impact on the EU's energy import dependency has been limited, short-term diversification efforts have made progress since the 2022 crisis. The concentration of the largest fuel supplier decreased for both gas and oil products in 2022

and 2023. The most significant shift occurred for oil products, where Russian imports were almost entirely replaced by other suppliers (Eurostat, 2025u; Lekavičius et al., 2024). While not quite as dramatic, fossil gas imports from Russia decreased sharply as well (around 91% between 2019 and 2024) and are expected to approach 0 between 2026 and 2027 (ACER, 2024a).

While these developments are important for strengthening the EU's short to mid-term energy security, long-term resilience will depend on clean energy buildout and energy efficiency. The share of renewables reached 24% in the total energy mix in 2023, but the rate of change is still far too slow to reach the EU target of 42.5% by 2030 (RED III, 2023). A key to reaching energy independence is the decarbonisation of the electricity sector, where the increase in the share of renewables was most significant. However, this needs to be accompanied by the electrification of demand sectors, which is still progressing far too slowly. Similarly, final energy consumption has continued to decrease, but the trend is still too slow to reach the EU's target set as part of the Energy Efficiency Directive (EED, 2023). ECNO analysis has shown that especially for the EED targets (i.e., reduction of primary and final energy consumption), there is a significant gap in MS commitment, while there is a much broader alignment between the EU targets and MS contributions for the RED target (ECNO, 2025a).

See also:

The EU can further enhance its energy security, as well as energy service reliability, by modernising the electricity grid, scaling cross-border grid interconnections, expanding energy storage solutions, and supporting decentralised energy generation. Taking these steps also reduces the risk of brown- and blackouts and minimises energy price volatility.

Ensuring resilience in manufacturing supply chains and critical raw materials

As the energy transition progresses and the reliance on imported fuels diminishes, the resilience of capital-intensive supply chains for technologies – especially those for electrification, renewables, and energy storage – becomes more relevant (Agora Energiewende and Agora Industry, 2023). Ensuring resilience in technology supply chains requires the strengthening of European participation as well as a strategic diversification in suppliers in order to minimise the risk of supply disruptions and dependences (Lekavičius et al., 2024).

The import balance, an indicator for the strength of EU supply chains, shows a mixed picture for key technologies. Import balances for wind turbines and electric vehicles (EVs) are positive, while they are negative for photovoltaics (PV) and heat pumps. However, the net imports for all technologies, except EVs, keep declining, highlighting that the (re) location of supply chains in Europe is not working.

Similarly, the diversification of non-European suppliers for energy technologies, as measured by the Herfindahl-Hirschman Index (HHI), has headed in the wrong direction. The HHI index has increased by over 150% between 2008 and 2013 (Lekavičius et al., 2024). Many global supply chains have become increasingly concentrated. In 2023, the vast majority of manufacturing for solar modules (~82%), wind nacelles (~65%), and battery cells (~83%) was located in China (IEA, 2024a). In response, the EU is actively working on relocating manufacturing of some of these strategic value chains within the EU under the Clean Industrial Deal.

Certain raw, non-energy materials are also key for enabling a more resilient and competitive EU economy. The EU considers 34 raw materials to be 'critical' for its economy (CRMA, 2024). These include minerals, metals, and elements that are vital for technologies and industries that underpin a climate neutral economy. However, the EU remains highly dependent on imports for these critical raw materials (CRM), with the supply often concentrated in a small set of non-EU countries (EPRS, 2023). As net imports continued to rise during the evaluation period, ECNO assesses that the trade balances for nearly all critical elements are heading in the wrong direction.

The EU is taking steps to minimise critical raw mineral import dependencies and address supply chain vulnerabilities. Since 2021, the EU has established bilateral raw materials partnerships with 14 countries (EC, 2024d). In early 2025, the EC introduced its Clean Trade and Investment Partnerships (CTIPs) as a novel, alternative instrument to further diversify supply chains for critical raw materials (EPRS, 2025).

Beyond strategic trade partnerships, the EU is expanding its regulatory approach for critical raw materials. The European Critical Raw Materials Act (CRMA, 2024) is the EU's flagship policy for safeguarding reliable access to critical raw materials. The act promotes increased domestic raw material production, diversified supply chains, and improved circularity in industry. It sets non-binding targets for CRM extraction, processing, consumption, and sourcing. Specifically, the EU seeks to extract at least 10%, process at least 40%, and recycle at least 25% of its annual CRM consumption by 2030. In addition, no more than 65% of EU's annual consumption of a given CRM should be sourced from a single trading partner by 2030. A circular and efficient industry can further reduce import dependencies by lowering the demand for critical raw materials – valuable given that raw materials are scarce within the EU and resource extraction can face local opposition. However, progress towards enhancing circular material use is still far too slow. The Circular Economy Action Plan (EC, 2020d) has put several measures in place to further increase circularity.

See also: ›

Social resilience for a fair and acceptable transition

Fundamental economic transformations, such as those required for the transition to climate neutrality, need to receive broad societal support in order to be successful. To achieve this, they need to deliver clear societal benefits. EU citizens continue to show high support to the decarbonisation agenda but many lack trust in the national measures to implement it. Progress to make the transition fairer is also too slow and a number of indicators related to the just transition are trending the wrong way.

See also: ›

Energy prices for households, including gas and electricity, have also substantially increased in response to the gas prices and have not managed to return to pre-crisis levels. As a result, households have suffered from significantly increased expenditures and less than half of the EU's citizens believe that sustainable energy and services will be affordable for all in the next decades (Eurobarometer, 2022).

For a full analysis on the social dimension of the transition to climate neutrality, see our dedicated chapter on the topic in section 4.3.

Resilience to physical climate risks through adaptation

The EC's Competitiveness Compass (2025k) identifies extreme weather events linked to climate change as a major threat to the EU's economic security, yet progress on climate adaptation has been far too slow. The global economy is projected to face a 19% income reduction due to climate damages by 2050 (under current emission trends), highlighting the urgency of climate adaptation measures (Kotz et al., 2024). In the EU alone, the economic losses resulting from climate impacts have been rising by an average of EUR 6 billion per year, amounting to an average of EUR 44 billion in the years 2020 and2023 (EEA, 2024b). Europe is the fastest-warming continent to date, and its agriculture sector is particularly vulnerable to the impacts of climate change, with annual losses due to adverse weather impacts estimated at EUR 28 billion (EIB, 2025b).

Much of the EU's energy infrastructure also remains too vulnerable to the increasingly severe impacts of climate change. To enhance infrastructure resilience, climate risks must be factored into infrastructure planning and development scenarios (ESABCC, 2023). The EC's Technical Guidance on Climate Proofing sets requirements to assess climate risks for major EU-funded infrastructure (EC, 2021h). The Trans-European Networks for Energy (TEN-E) regulation also recognises the need to factor in climate risks, but this is still happening insufficiently.

While it is clear that progress on adaptation needs to speed up, a comprehensive assessment, especially regarding adaptation finance, is hindered by a lack of data. For more details, see our chapter on adaptation.

4.2.2 Policy initiatives to boost resilience

The European Commission is prioritising resilience as a cornerstone of its 2024-2029 policy agenda to safeguard the EU's prosperity and security while advancing climate neutrality. Guided by the Draghi report, the European Commission has placed particular emphasis on economic resilience, competitiveness, and industrial decarbonisation via the Clean Industrial Deal (CID) (EC, 2025e).

To accelerate the deployment of renewable energy and clean energy technologies, the CID introduced new state aid rules in June 2025 and plans to reform public procurement criteria to encourage more domestic production of key technologies in the EU, while simplifying permitting procedures. The forthcoming Circular Economy Act, another key component of the CID, aims to support efforts to improve recycling rates and the circular use of critical raw materials, while the Clean Trade and Investment Partnerships aim to establish sustainable partnerships around critical raw materials.

Although the details around these measures are still being agreed on, it is likely that they will strengthen the EU's resilience in terms of energy supply, cleantech manufacturing, and access to critical raw materials. In parallel to the measures outlined in the CID, it will also be important for the EU to agree on a new 2040 policy package to support renewable and energy efficiency deployment in the long term – although the EU will first need to agree on its overarching 2040 emissions reduction target.

See also: ›

The European Commission has also prioritised social resilience in its policy discourse but there are uncertainties about the concrete level of support for initiatives promoting a fair transition in the next 2028–2034 budget cycle, as key funding mechanisms (such as the Just Transition Mechanism and the Recovery and Resilience Facility) are due to end in the next years. The Affordable Energy Action Plan has outlined measures to reduce household energy prices, but it is still too early to evaluate its impacts. To counter energy poverty and avoid polarisation on climate-related policies, it is vital to place social considerations at the centre of decarbonisation – and ensure continued funding for the just transition in the 2028–2034 EU budget.

See also:

A new European Climate Adaptation Plan will be released in 2026. While the EU released its adaptation strategy in 2021, the new plan is expected to mainstream climate adaptation into economic policy priorities and key sectoral plans, such as agriculture and energy – thereby also making adaptation a pillar of the EU's overall economic resilience.

See also:

4.2.3 What is needed to strengthen the EU economy and society's resilience

Resilience is both a prerequisite for and an outcome of a successful transition to climate neutrality. Advancing this transition requires an ambitious, decarbonised economic vision – one that secures livelihoods, maintains global competitiveness, and ensures a just transition through concrete policy action. At the same time, accelerating climate neutrality is the only path to achieving long-term resilience, with the costs of inaction due to climate impacts far outweighing the costs of climate mitigation. Below, we outline a few key steps needed to strengthen the EU's resilience.

Prioritise a faster buildout of renewable energy and increased electrification to phase-out of fossil fuels: The EU economy is still highly vulnerable to external price shocks due to its continued reliance on imported fossil fuels. Key measures to accelerate the uptake of renewable electricity include an effective implementation of existing EU policies at Member State level, supporting the latter in the market integration of renewables, and the development of national objectives for non-fossil flexibility. Integrated grid planning and investments into grid development are also fundamental. The updated state aid guidelines can also help to support these objectives and boost the investments needed from Member States.

Switch gears on the circular economy: The Circular Economy Act, which is expected to be published in 2026, promises to improve resource efficiency and reduce waste. Ambitious objectives in these areas are key, as global competition for the resources needed for renewable energy and clean technologies will increase.

Promote Clean Trade and Investment partnerships to diversify critical raw materials imports through mutually beneficial deals: CTIPs are a new tool in the EU's trade policy toolkit. To meaningfully strengthen the resilience of the EU's CRM supply chains, CTIPs need to build on and go beyond the EU's existing bilateral and multilateral raw materials partnerships, such as the Global Gateway, to ensure coherence and avoid duplication. To ensure effective long-lasting partnerships, the EU needs to co-develop these with partner

countries, identifying priority sectors where cooperation presents opportunities for both sides. To achieve this, CTIPs should include comprehensive support packages, focusing on investments, technology cooperation, capacity building, and private sector participation.

Mainstream considerations around climate impacts into EU spending and sectoral policies – in particular for infrastructure and agriculture: Climate-related extreme weather events are becoming increasingly frequent and severe, which has significant implications for physical infrastructure across sectors. The agriculture sector is also strongly impacted, with annual climate-related losses already amounting to half of the annual EU's Common Agricultural Policy spending.

Stay the course on funding a fair transition for continued citizen support: Concerns remain that the competitiveness agenda – or the increasingly prominent defence agenda – may overshadow climate priorities, particularly when it comes to the social dimension. Ensuring sufficient funds to support a just and resilient transition in the next cycle of the EU budget will be critical.

Elevate the climate neutral transition as a top priority in the EU's external policy: While the EU can do much within its own borders, it cannot achieve a climate neutral future alone. With the United States retreating from international climate leadership, it is all the more critical for the EU to strengthen global cooperation with other partners and uphold the multilateral climate agenda. The EU's long-term resilience and prosperity ultimately depend on this.

Table 7: Details on additional indicators for Resilience

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENERGY INDEPENDENCE AND RESILIENCE						
Net fossil energy imports [ktoe]	!	2018–2023 (Eurostat, 2025c)	- 2.2%	- 18,279 ktoe	n/a	n/a
Fossil energy import dependency [%]	↩	2018–2023 (Eurostat, 2024d)	0.4%	0.002%-points	n/a	n/a
Fossil fuel import value [bnEUR]	⚠	2021–2024 (Eurostat, 2025n)	- 1.2%	- 5.5 bnEUR	n/a	n/a
Fossil gas import diversification – HHI [-]	✓	2018–2023 (Lekavičius et al., 2024)	- 8.2%	- 0.015	n/a	n/a
Fossil oil import diversification – HHI [-]	✓	2018–2023 (Lekavičius et al., 2024)	- 8.4%	- 0.012	n/a	n/a
Share of renewable energy in final energy consumption [%]	⚠	2018–2023 (Eurostat, 2025c)	5.0%	1.0 %-points	42.5% (RED III, 2023)	2.6%-points **→ 5.0 times faster**
Final energy consumption [Mtoe]	!	2018–2023 (Eurostat, 2025h)	- 1.5%	- 13.9 Mtoe	763 Mtoe by 2030 (EED, 2023)	- 18.7 Mtoe **→ 1.5 times faster**
SECURING CRITICAL RAW MATERIALS AND RESILIENT SUPPLY CHAINS						
Energy technology import diversification – HHI [-]	↩	2018–2023 (Lekavičius et al., 2024)	21.8%	0.06	n/a	n/a

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section.

Source: ©ECNO.

4.3 Social Dimension

Over the last decade, the EU has taken an increasingly proactive approach to advancing the social rights and welfare of its citizens. Key objectives include promoting equal opportunities, ensuring fair and safe working conditions, and fostering social inclusion, especially in the areas of gender equality, disabilities, and vulnerable groups (EC, 2021i).

This focus on social equity is especially critical in the context of the green transition. The scope of the transformation – not to mention the impacts of climate change – means that all of EU society will bear the costs. However, these costs are not equally distributed. Understanding the social dimension of the transition is thus important to ensure that no person or region is left behind, and indeed that everyone is empowered to take part in the transformation of the EU economy. The European Green Deal (EGD) recognised this and sought to link climate policy to positive social transformation by 'putting people first' and paying 'attention to the regions, industries, and workers who will face the greatest challenges' (EC, 2019).

Achieving a just climate neutral future in the EU requires the fair distribution of policy impacts, inclusive engagement across society, and attention to both the costs and opportunities that come with decarbonisation. Broad public support is essential but cannot be assumed – especially amid growing political polarisation and past implementation challenges. To be successful, a fair green transition depends on building trust and social capital, which in turn rely on robust social policies linked to meaningful citizen engagement and empowerment (Bonvin et al., 2023).

Learn more about the definition of Social Dimension.

4.3.1 The state of progress on the social dimension of the transition

Table 8: Progress on the Social Dimension

Ensuring fairness, opportunity, and quality of life		
Employment in environmental goods and services [FTE]	●	⚖
Employment rate in regions [% of population]	●	⚖
Employment in renewable energy supply-chains [FTE]	●	⚖
Competitiveness performance of regions in transition [score]	●	⚖
Share of support for energy efficiency purposes [% of energy subsidies]	●	⚖
Share of support for households [% of energy subsidies]	●	⚖
Electricity purchasable with household income [kWh]	●	⚖
Premature deaths due to exposure to fine particulate matter [Number of deaths]	●	
Newly installed residential and rooftop solar capacity [GW]	●	

Enhancing citizen acceptance, trust, and participation		
Public support for the transition to climate neutrality [% of population]	●	
Citizens' climate assemblies at national level [% of EU GHG emissions covered]	●	
Protests against climate measures [Number of instances]	●	
Protests for climate measures [Number of instances]	●	
Trust in national institutions [% of EU population]	●	
Trust in EU institutions [% of EU population]	●	

Enabling sustainable lifestyles and infrastructures		
Self-reported climate-conscious behaviour [% of surveyed population]	●	
Price on carbon [EUR/tCO_2e]	●	
Share of passenger transport volume on road [%]	●	
Car ownership density [# per 1,000 inhabitants]	●	
Share of ZEVs in new passenger car registrations [%]	●	
Total number of recharging points [#]	●	
EU funding for cycling and foot paths [mEUR]	●	
Average space per capita [m²/capita]	●	
Electricity-to-gas price ratio for residential users [-]	●	
Cattle meat consumption [kg/capita]	●	
Dairy consumption [kg/capita]	●	
Plant-based food sales [million units/week]	●	

Note: Icons indicate progress classification of this year; see also Table 45 for further information. Source: ©ECNO.

Ensuring fairness, opportunity, and quality of life

In a global context, the EU consistently ranks high on socio-economic indexes for life satisfaction, GDP per capita, social support, healthy life expectancy, freedom, generosity, and perceptions of corruption (Helliwell et al., 2025). Gender equality has improved steadily, with women increasingly at the forefront of research and employment in the green transition, albeit still underrepresented in leadership and decision-making roles (EIGE, 2023, 2024). Moreover, the EU is **on track** to meet its target for reducing premature deaths due to exposure to fine particulate matter, a core co-benefit of reductions in fossil fuel use (EEA and JRC, 2025).

Despite some progress in establishing an EU-level framework to ensure a fair transition, the impact in the real economy has been slow (see Table 8). Over the past six years, indicators on regional competitiveness, support for energy efficiency, and electricity purchasable with household income were all headed in the wrong direction. The disconnect between policy ambitions and actual outcomes is also illustrated by the persistence of transport poverty, especially in rural areas, driven by limited access to public transport and affordability (Cludius et al., 2024). While poverty rates in transition regions improved overall between 2019 and 2024, the rate of change remains too slow, and indicators on the material deprivation rate, including energy poverty, were headed in the wrong direction over the same period. These trends are reflected in public sentiment; only 46% of EU citizens believe that 'by 2050 sustainable energy, products and services will be affordable for everyone, including poorer people' (Eurobarometer, 2022). Moreover, many of the overarching metrics described in this assessment obscure regional disparities. Overall, bridging regional and local gaps remains a key challenge when it comes to a just and inclusive transition.

See also:

The EU has established several dedicated funding schemes to pursue a fair transition. These include most prominently the Just Transition Fund (JTF, 2021) and the Social Climate Fund (SCF, 2023), both of which are tied to underlying planning requirements that Member States (MS) or regions must meet to access funding. To receive financial support under the SCF, MS must submit national social climate plans. These are due in mid-2025 and will be a key vehicle for mitigating the impact of EU climate measures on vulnerable populations – specifically the expanded EU Emissions Trading System covering transport and buildings (ETS2). In addition, existing financial instruments, such as InvestEU under the Just Transition Mechanism, have been redirected to advance the just transition. On top of this, the Social Convergence Framework under the European Semester aims to bridge regional economic disparities more broadly.

There are encouraging signs when it comes to creating opportunities through the transition. The data indicate growing employment overall in transition regions and specifically in environmental sectors and renewable energy supply chains. Data compiled by the European Monitor of Industrial Ecosystems shows a large jump between 2023 and 2024 in the share of professionals EU-wide with skills relevant to the green transition – from 3.9% to 6.6%, with demand for those skills remaining constant at around 2% of job advertisements (EMI, 2025).

Outside of the job market, private citizens have benefited materially in other ways. Residential renovation and modernisation has increased not only energy efficiency and household savings but also home market values (DG ENER et al., 2019). Newly installed residential and rooftop solar capacity has grown steadily, despite the rollback of some support schemes at national level (SolarPowerEU, 2024). A recent study found over 4,000 energy communities across Europe representing over 900,000 EU citizen 'prosumers' (Koltunov et al., 2023). Still, financing conditions vary by MS, as does the degree to which national governments have transposed legal provisions related to the definition and support schemes for renewable energy communities (REC) and citizen energy communities (CEC) (REScoop, 2025a, 2025b). Additionally, despite subsidies, lower income groups are often locked out of these and other opportunities due to high upfront costs.

Enhancing societal acceptance, trust, and participation

Stable public support has helped the EU's climate agenda weather multiple crises – from the COVID-19 pandemic to the Russian invasion of Ukraine, the energy crisis, and historic inflation. Still, recent controversies, such as the 2023-2024 farmers' protests and backlash against Germany's clean heating law, highlight the urgent need for more meaningful participatory processes. Adopting new technologies and practices takes time and often involves higher costs, supply bottlenecks, delays, and concerns over reliability – challenges made worse by poorly designed policies. Legitimate public concerns, combined with politicisation, widespread mis- and disinformation, and the rise of climate policy backlash by politicians across Europe, make clear that public support for decarbonisation measures cannot be taken for granted.

While EU democracies are among the most healthy and robust in the world, there is significant national variation (EIU, 2024). This can be at least in part explained by varying levels of trust in institutions. Overall, the share of the population that 'tends to trust' EU institutions rose from 43% to 51% between 2019 and 2024, with a sharp increase in 2020. In the same period, trust in national institutions remained comparatively low, fluctuating around 35%. Trust in national government ranged from 17% in Slovenia to 76% in Luxembourg (Eurobarometer, 2024b). In comparison, local and community authorities have the highest levels of public trust across all levels of EU government (European Committee of the Regions, 2024).

Public acceptance of the EU's decarbonisation efforts has remained consistently high but there are signs of increased polarisation around climate-related issues and growing lack of trust in governmental action, especially at national level (see Table 8). A striking majority of the EU population is in favour of the EU climate neutrality target, but citizens lack confidence in national measures to combat the climate crisis (Eurobarometer, 2025). At the same time, survey results also suggest that the salience of climate issues has fallen slightly relative to other political topics, such as economic competitiveness and migration (EP, 2025a). Data on direct action in EU cities show an increase in protests both for and against climate measures over the last three years, signalling simultaneously that citizens are engaged and either demand additional action or are worried about the impact that climate policies may have on their livelihoods.

The EU has several policies aimed at enhancing transparency and trust in institutions. Chief among these is the Aarhus Regulation, which establishes standards for public participation and access to environmental information. Still, the EU is missing an overarching framework for participatory climate policy (Kulovesi et al., 2024). Numerous studies – including from the EC itself – show that MS have been slow to implement the participatory provisions of the EU Governance Regulation (GovReg, 2018), particularly those related to multi-level climate and energy dialogues and standards for public consultation in national climate planning (CAN-E, 2025b; EC, 2024l; Oberthür, Von Homeyer, et al., 2025). The increased use of citizens' climate assemblies over the last six years is a positive signal, but governmental attention to these innovative deliberative models seems to have slowed more recently.

See also: ›

Enabling individual action by citizens

A societal shift towards more sustainable choices and lifestyles is a necessary lever for deep emission cuts, especially in sectors, such as mobility and agrifood, where supply-side abatement may lag or become costly over time (L. Costa et al., 2021). Many external factors influence the consumption decisions of EU citizens – not least physical infrastructure and social norms.

EU progress in promoting behavioural contexts and infrastructures that enable sustainable lifestyles was found to be mixed during the evaluation period (see Table 8). While funding for non-motorised transport paths (cycling and foot traffic) increased significantly between 2018 and 2023, the proliferation of electric vehicle (EV) recharging stations was far too slow. EU citizens are also confronted with inconsistent price signals regarding the overall price on carbon and the household electricity-to-gas price ratio. On behavioural outcomes, the picture is likewise varied. Overall, EU citizens are quick to self-report climate conscious behaviour in surveys (Eurobarometer, 2023), but this is not always reflected in demand-side data. Even though beef consumption has steadily decreased alongside rising plant-based food purchases, reductions in dairy consumption are not occurring fast enough. Trends in average living space, car ownership, and passenger road transport volume are all headed in the wrong direction, and the uptake of zero-emission passenger vehicles has progressed far too slowly. These dynamics underpin overarching trends in the per capita carbon and material footprint of EU citizens, each of which has decreased but at a rate far too slow to be aligned with climate neutrality by 2050. Notably, EU-wide data on citizens' consumption habits and contexts in many areas are not always available, making a more comprehensive assessment challenging.

See also: ›

A handful of EU initiatives seek to promote sustainable lifestyles. Chief among these is the voluntary European Climate Pact, which mobilises citizens, organisations, and communities to act on climate through highlighting best practices and platforming opportunities for exchange (EC, 2020h). Other relevant initiatives aim to make sustainable products, services, and infrastructures more available, including the Ecodesign for Sustainable Products Regulation (ESPR, 2024) and the Sustainable and Smart Mobility Strategy (EC, 2020j). Nevertheless, some EU policies, such as subsidies for animal products under the Common Agricultural Policy (CAP), are inconsistent with sustainable societal shifts. More broadly, the EU lacks an overarching framework that promotes sustainable consumption and demand-side mitigation through behavioural change.

4.3.2 Policy initiatives to boost the social dimension

Several new and developing initiatives at EU level have the potential to improve the social aspects of Europe's green transition. One example is the EC's Clean Industrial Deal, a plan that the EC has framed – at least in principle – as a means of advancing the positive social transformation at the heart of the EGD. It places particular emphasis on affordable energy, stating that 'every person, community, and business should benefit from the clean transition' (EC, 2025am, p. 20). However, observers have been quick to point out that the just transition risks being overshadowed by an acute policy focus on relief for businesses, competitiveness, and defence spending (Sabato et al., 2025). Nonetheless, just transition

concerns are incorporated into the EU's Clean Industrial Deal and Competitiveness Compass in various ways, primarily within the context of employment. This includes a key performance indicator (KPI) on reducing skill shortages for the green transition; the creation of a European Fair Transition Observatory; and the proposed use of social, training, and skill conditionalities for access to EU funding for the industrial transition.

At the start of 2025, the EC published its Affordable Energy Action Plan to combat rising household energy prices and energy poverty, followed by the Union of Skills communication (EC, 2025c, 2025ag). The latter set the stage for the planned Quality Jobs Roadmap expected by the end of 2025, aimed at advancing fair wages, good working conditions, skills, training, and fair job transitions. Ursula von der Leyen's political guidelines for the 2024-2029 legislative period emphasise the importance of reskilling and skills funding and promise dedicated support for just transition in the EU Multiannual Financial Framework (MFF) proposal for the post-2027 period (EC, 2024y). This is especially important given that both the Just Transition Fund and the Recovery and Resilience Facility will end in the coming years. The Commissioner for Social Rights and Skills, Quality Jobs and Preparedness, Roxana Minzatu, will lead a review of the European Pillar of Social Rights (EPSR) Action Plan at the end of 2025. This review may include further advancement of the 'Social Scoreboard', the EPSR's framework for monitoring societal progress (Eurostat, 2025aa). Although monitoring of the implementation of national social climate plans will not commence until 2029, this integration of dedicated social indicators into the existing climate and energy framework may improve data availability and clarity on the impact of policies on citizens' well-being. Finally, the upcoming Citizens Energy Package aims to help energy consumers and communities reap the benefits of the transition through technical and financial assistance as well as capacity and knowledge building.

On participation, the Commission has promised a 'new era of dialogue' to (re)engage stakeholders and citizens and signed a new Pact for European Social Dialogue in March 2025 to reinforce the role of social partners in EU policy. New planned Implementation Dialogues, the Competitiveness Coordination Tool, and the pending revision of the GovReg offer additional opportunities to improve participatory processes, especially related to the industrial transition and national climate planning (EC, 2024o, 2025b). At the time of writing, the EC is in the midst of public consultations and scoping for the development of an Intergenerational Fairness Strategy and has already implemented a new round of Youth Policy Dialogues on a range of topics, including climate (EC, 2025af, 2025ap). Finally, in June 2025, the EC issued a call for evidence around a proposed Civil Society Strategy to address the 'shrinking civic space' and provide an overarching framework for meaningful engagement (EC, 2025j).

Finally, the EU has introduced several initiatives to address material consumption and promote more sustainable choices. These include the Packaging and Waste Regulation, the Right to Repair Directive (R2R, 2024), as well as plans to promote the accessibility and affordability of sustainable transport modes through the proposed Single Digital Booking and Ticketing Regulation (SDBTR) and an 'affordable EV platform' with guidelines on social leasing as announced in the Clean Industrial Deal. Still, the EU has yet to adopt an integrated approach to harness the full climate mitigation potential of lifestyle changes, and existing EU agricultural subsidies create perverse incentives undercutting the relative affordability of plant-based alternatives.

4.3.3 What is needed to advance the social dimension

A just transition must address distributional concerns, such as regional poverty and competitiveness, highlight the tangible benefits of climate action, and make it easy for citizens and communities to participate both politically and materially in the EU's climate neutral future. To reach these ends, the EC should view European competitiveness and a just and fair transition as mutually synergistic.

Reinforce the EU just transition framework: The EU should continue to advance social considerations through the build-out of its just transition framework. This can be done by reinforcing and integrating the current patchwork of binding and non-binding instruments at EU level, not allowing crucial funding streams to run dry, and ensuring the fair and transparent monitoring and distribution of ETS2 revenues for EPSR aims (Crespy and Moreira Ramalho, 2025; Görlach et al., 2022). This also includes accelerating efforts to mitigate not only the cost of living but also providing targeted support for training and (re) skilling (European Alliance for a Just Transition, 2025); helping citizens and communities reap the benefits of small-scale renewable energy investments and building renovations (Schmid et al., 2025); and tackling energy, transport, and renovation poverty head on through innovative models, such as 'social leasing schemes' for vulnerable drivers (Dorantes and Murauskaite-Bull, 2023; T&E, 2025a). Special attention should be given to the high upfront costs of, e.g., energy modernisation and retrofitting, that act as a barrier for low-income citizens. The EC should work closely with local and regional authorities to implement territorial just transition plans using a true 'place-based' approach that accounts for the unique challenges and struggles of certain areas (Weller et al., 2024). Finally, the EU should ensure consistency and integration of just transition policy with broader EU climate and energy policy, especially when it comes to national energy and climate planning (NECPs) (CAN-E, 2025a; Kögel, 2024a).

Create meaningful avenues for citizen participation: To bolster transparency in policy-making, engender trust, and pre-empt backlash, the EC should lean into the deliberative shift in policy-making that began under the EGD (Buzogány et al., 2025) and fully implement the 'age of dialogue' promised by Ursula von der Leyen with a concerted effort to emphasise intergenerational fairness and include marginalised voices (EC, 2024x). Boosting trust in the transition means maintaining avenues for participation that are meaningful and balanced, ensuring that business and special interests do not drown out the concerns of the public (Dupont et al., 2025). Participation processes should leverage citizens' trust in local officials and civil society organisations (CSOs) and be implemented 'upstream' from policy formulation to allow diverse voices to be heard at the agenda-setting stage. EU and national officials should ensure information on timing, scope, and follow-up is communicated transparently and sufficiently in advance. The EC's planned 'implementation dialogues' as well as the European Citizens' Panels and other EU-level mechanisms should be based on robust standards for best practice that are embedded in existing legal frameworks, such as the EU Climate Law (ECL, 2021; Oberthür, Schewe, et al., 2025). Finally, to ensure a productive discourse around the transition, EU and national governments should continue to combat the rising wave of mis- and disinformation around climate issues (Global Covenant of Mayors for Climate and Energy, 2024).

Empower and enable sustainable consumption and behaviour: To reinforce sustainable lifestyles and infrastructures, the EU should re-engage the European Climate Pact, complementing this with additional on-the-ground support for local and municipal authorities as well as an EU-level strategy for sustainable consumption shifts, especially in the areas of mobility and agrifood. Significant progress could be made through expanded public procurement of sustainable goods and services and through promoting infrastructures that enable sustainable choices and practices. Importantly, the burden of responsibility cannot fall solely to EU citizens as consumers – a supporting policy environment is often an important prerequisite for change (Çelik, 2025). The EU should further support national and local level authorities in pursuing infrastructure investments that enable behavioural shifts, making these easy and commonplace over time.

Table 9: Details on additional indicators for Social Dimension

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENSURING FAIRNESS, OPPORTUNITY, AND QUALITY OF LIFE						
Premature deaths due to exposure to fine particulate matter [Number of deaths]	✓	2017–2022 (Eurostat, 2025x)	- 4.7%	- 12,357 deaths	- 55% by 2030 (EC, 2021b)	- 5,630 deaths → on track
Newly installed residential and rooftop solar capacity [GW]	✓	2019–2024 (SolarPowerEU, 2024)	28.2%	2.3 GW	n/a	n/a
ENHANCING SOCIETAL ACCEPTANCE, TRUST, AND PARTICIPATION						
Protests against climate measures [Number of instances]	↩	2019–2024 (CEIP, 2025)	336%	6.0	n/a	n/a
Protests for climate measures [Number of instances]	✓	2019–2024 (CEIP, 2025)	115%	6.0	n/a	n/a
Trust in national institutions [% of EU population]	⚠	2019–2024 (Eurobarometer, 2024b)	0.6%	0.2	n/a	n/a
Trust in EU institutions [% of EU population]	!	2019–2024 (Eurobarometer, 2024b)	2.1%	1.0	n/a	n/a

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section.

Source: ©ECNO.

5 Progress towards cross-cutting drivers

5.1 Electrification

Electrification is key to the EU's Competitiveness and Resilience. Advancing electrification requires the development of innovative electrification technologies, such as electric vehicles (EVs) and long-duration energy storage, as well as their large-scale deployment. This presents a significant opportunity for reshoring manufacturing capacity. Moreover, successful electrification contributes directly to a more resilient Europe through reduced import dependence. It is also an integral part of achieving a clean energy system, offering the most efficient and sustainable pathway to replacing fossil fuels with wind and solar electricity. It is important to note that successful electrification depends on the participation of citizens, as a significant share of technology adoption relies on private household investment.

See also:

Learn more about the definition of Electrification.

5.1.1 State of electrification

Table 10: Progress in Electrification

Electrification across sectors		
Share of electricity in final energy demand [%]		
Share of electricity in transport final energy consumption [%]		
Share of electricity in industrial energy carrier and feedstock use [%]		
Share of electricity in buildings final energy consumption [%]		
Share of electricity in agriculture final energy consumption [%]		

Key electrification technologies		
Share of zero-emission vehicles (ZEVs) in passenger car stock [%]		
Share of ZEVs in heavy-duty vehicle stock [%]		
Share of ZEVs in new passenger car registrations [%]		
Heat pump sales [Million units]		
Stock of heat pumps [Million units]		

Electrification drivers		
Investment into power grid [mEUR/ year]		
Share of electric smart meters [%]		
Total number of recharging points [#]		

Barriers to electrification	
Electricity-to-gas price ratio for industrial consumers [-]	
Electricity-to-gas price ratio for residential users [-]	
Electricity-to-gas price ratio for service users [-]	
Electricity purchasable with household income [kWh]	
Fossil-fuel subsidies [mEUR2023]	

Note: Circles show the current year's progress classification. See also Table 45. Source: ©ECNO.

Progress in electrification, directly measurable through the share of electricity in final energy consumption, has stagnated in the last 5 years, leading to far too slow progress relative to the EU's own key performance indicator (KPI) set as part of the Clean Industrial Deal (EC, 2025am). This KPI sets a target to increase economy-wide electrification from 21.3% in 2022 to 32% in 2030. This lack of progress is consistent across all demand sectors during the assessment period. Main electrification technologies did not diffuse at the speed and scale needed. EV and heat pump sales were far too slow, with heat pump sales even declining over the last two years. Enabling infrastructure and systems, such as smart meters (crucial for digitalisation and thus electrification), EV charging stations, battery storage, demand-side flexibility, and the build-out of electricity grid infrastructure, has developed either far too slowly, too slowly, or there is a lack data to appropriately assess them.

A major barrier to electrification has been the unfavourable ratio of gas to the electricity price. Improvements have been far too slow in the residential and service sector and electricity has even become less affordable to households. Improvements were also too slow in industry. This may also be a result of increasing fossil fuel subsidies, which continue to favour gas over electricity.

In addition, an overarching policy framework for electrification is currently lacking at the EU level. At the sector level, policy frameworks support individual electrification technologies.

In Mobility, EV sales have mainly been driven by the car standards at the EU level, which have been further strengthened in 2023 for light-duty vehicles (LDVs) and in 2024 for heavy-duty vehicles (HDVs). The LDV standard effectively leads to a phase-out of fossil fuels by 2035, sending a clear signal to car manufacturers to accelerate EV development. However, recent efforts by the EC to introduce additional flexibility and leeway in the compliance mechanism for 2025 may undermine this momentum, potentially causing manufacturers to slow down their transition to EVs by signalling a reduced sense of urgency. Heat pumps are supported by several EU policy measures, including the indicative renewables target for heating and cooling under the Renewable Energy Directive (RED), provisions in the Energy Performance of Buildings Directive (EPBD) requiring MS to work towards a fossil fuel phase-out by 2040, and the forthcoming ETS2, where the CO_2 price is expected to improve the economics of heat pumps compared to fossil fuel alternatives.

While the RED and EBPD mainly set targets at EU level and require policies at the national level, the upcoming ETS2 represents the first mechanism at the EU level to provide an incentive for the phase-in of heat pumps. In both cases (EV and heat pumps), the

See also:

technologies are only indirectly supported by EU-level policies that address the emissions of fossil fuel alternatives. The ETS is also the main policy supporting electrification in industry, but its impact is highly uncertain. Other instruments include the proposed Decarbonisation bank (EC, 2025am), although it does not have a direct focus on electrification, and regulation around Power Purchase Agreements (PPAs) and Contracts for Difference (CFDs), enabling long-term security for investors in electrification options (EMDD, 2024). In the power sector, smart meters lack a centralised EU-driven support, and the buildout of the power grid continues to be mainly driven by Member States. Existing EU-level coordination efforts, demand-side flexibility, and any other non-fossil flexibility rely on MS implementing provisions under the EMD directive (EMDD, 2024). In mobility, railroad electrification has also only progressed far too slowly. Finally, the EU has done little to improve the relative competitiveness of electricity over gas as an energy carrier, especially as fossil fuel subsidies continued to grow in 2023, further disadvantaging electrification of end-use sectors.

See also:

5.1.2 Policy initiatives to boost electrification

Under the Affordable Energy Action Plan (EC, 2025c), the EC has committed to major measures aimed at advancing electrification across sectors. At the centre of this effort is the publication of the Electrification Action Plan in early 2026 (Q1 2026). This plan could become a key EU-level tool to drive electrification if it manages to help decrease the costs of electrification technologies, foster the development of new electrification technologies, increas the awareness of the cost savings, and establish a governance framework with sector-specific electrification targets that helps improve the coordination of sectoral policies (Eurelectric, 2024; Waliszewska, 2024).

The Affordable Energy Action Plan also seeks to reduce the electricity price, making electricity more affordable than fossil fuels for end-users. One approach is to ensure that electricity is taxed less than other energy sources. The EC is currently supporting the Council in adopting the revision of the Energy Taxation Directive (EP, 2025c), which would eliminate exemptions and reduced tax rates that favour fossil fuels. The EC aims to publish recommendations in Q4 2025 informing Member States about the flexibilities in the tax system and how to reduce the tax component on electricity by applying the minimum excise duty rates, introducing reduced VAT rates, and eliminating or shifting levies to the state budget.

In this context, the EC also intends to put forward a network charge design that incentivises investments in electrification. This proposal, expected in Q2 2025, will include the option to make certain provisions legally binding and will provide guidance to Member States on how to use public budgets to lower network charges covering additional costs from market integration and challenges around the transition to renewables.

See also:

Another key initiative is the facilitation of electricity supplier switching, to be included in the upcoming Citizen Energy Package (Q3 2025). More competition and easy switching among suppliers can allow customers to find electricity price models and tariffs that favour their electrification needs, e.g., through off-peak pricing. This can, in turn, support system stability/flexibility, drive down electricity prices, improve efficiency, foster innovation and customer solutions, and enhance service quality.

At the sectoral level, the EU also committed to several policies that could promote electrification. In the building sector, although the planned European Action Plan on Heat Pumps (originally scheduled for early 2024) was cancelled (Kurmayer, 2023), the EU has launched a Heat Pump Accelerator Platform. Further provisions to support heat pump deployment are expected to be included in the upcoming revision of the Heating and Cooling Strategy, planned for Q1 2026 (EHPA, 2025c). In the area of mobility, the EC recently published the Automotive Industrial Action Plan, which includes several measures to strengthen the EV supply chain and further incentivise EVs. Measures in the power sector that could further advance electrification include the announced revision of state aid rules for non-fossil flexibilities and demand response, the proposal for accelerating permitting of storage, as well as the European Grid Package (EC, 2025c). Overall, demand-sector-level policies should further refine their focus towards more targeted support for electrification.

See also:

5.1.3 What is needed to advance on electrification

See also:

Electrification is still progressing far too slowly and remains an economy-wide effort that requires a coordinated approach across sectors. Several key barriers must be addressed, including the high price of electricity compared to gas, which is heavily influenced by ongoing subsidies for fossil fuels, lacking infrastructure development, and limited access to financing.

Reducing electricity prices: To make electrification more attractive, the EC has outlined a set of actions in its Affordable Energy Action Plan. While the details of the Electrification Action Plan remain unclear to date, the planned actions for reducing electricity prices will likely advance electrification efforts in the EU if properly implemented. In particular, the EU should intensify its efforts to phase-out fossil fuel subsidies under a revised Energy Taxation Directive and any other policies – EU and national – that still support natural gas or oil-based heating or mobility options. In addition, Member States should consider further measures to reduce electricity prices by, for instance, reducing VAT rates, thus further incentivising electrification options such as heat pumps.

Strengthening sectoral policy for electrification technologies: The EU could further improve the cost competitiveness of electrification technologies through enhancing sectoral policy frameworks. For EVs, maintaining the CO_2 emission standards, coordinating zero-emission vehicle (ZEV) incentive schemes across MS, and addressing recharging infrastructure disparities are important measures to further their uptake. For heat pumps, in addition to the measures that reduce the electricity price, the finalisation and implementation of the Heat Pump Action Plan, as well as further support for other promising technologies, especially in industry, are needed. To support early-stage technologies, the EU could further advance the Innovation Fund and Horizon Europe (and its successor, FP10) in fields such as high-temperature heat pumps, electrified aviation, and shipping.

See also:

Building an electricity infrastructure that enables electrification: To enable electrification, the EU must accelerate digitalisation efforts – for example through faster smart meter roll-out – and scale up power grid investments, aligning the Ten-Year Network Development Plan (TYNDP) with the climate neutrality target. Strengthening demand-side flexibility through, for instance, planning and establishing dedicated support mechanisms (EC, 2025am), further enables the integration of electrification options (ACER, 2024b; ESABCC, 2024a).

See also:

Table 11: Details on additional indicators for Electrification

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ELECTRIFICATION ACROSS SECTORS						
Electricity-to-gas price ratio for service users [-]		2017–2022; (EC, 2023b)	1.0%	- 0.03	n/a	n/a

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section.

Source: ©ECNO.

5.2 Investment

Investment decisions shape our climate future. The equipment and infrastructure in use significantly determine the volume of greenhouse gas emissions released into the atmosphere, yet only a small share is replaced every year. The timing of climate investments is thus crucial to avoid the risk of carbon lock-in. Each year that investment is postponed adds to the scale of investment needed in subsequent years. Investments are therefore key indicators to understand if the EU is on track to meet the policy objectives set out by the European Green Deal.

Climate investment needs are not solely about fighting climate change. They are essential to ensure the EU's modernisation, resilience, energy independence, and competitiveness. Europe's infrastructure is ageing and needs to be reinforced. Power grids – particularly distribution networks – are over 40 years old in many Member States (MS) and require both modernisation and expansion to support growing electrification. The same is true for railway systems and renewable energy assets, including wind and hydro power plants, that will face growing renewal needs in the coming years. By developing clean and diversified energy sources, electrifying usage, and improving energy efficiency, the EU can reduce its dependence on fossil fuels and contribute to price stability. Renewable installation, building renovation, and broader deployment of heat pumps and electric vehicles can strengthen Europe's energy system while delivering reliable and affordable energy to households and businesses. Finally, investing in clean technologies supports industrial competitiveness. By helping innovative companies scale up and manufacture in Europe, the EU can reduce its reliance on foreign suppliers and increase certainty in critical supply chains.

Learn more about the definition of Investments.

5.2.1 State of investment

Table 12: Progress in Investment

The state of climate investments and fossil fuel investments at EU level		
Climate investments [bnEUR2023]		
Investment in renewables [bnEUR2023]		
Investment in battery storage [bnEUR2023]		
Investments in trans-European railways infrastructures [bnEUR2023]		
Investments in battery electric vehicles [bnEUR2023]		
Investments in heat pumps [bnEUR2023]		
Investment in fossil fuel supply [mEUR2023]		

Public and private funding of the transition		
Subsidies to renewable energies [mEUR2023]	●	
Fossil-fuel subsidies [mEUR2023]	●	
Share of green bonds issued by governments and corporations [%]	●	
Public funds for environmental and energy research and development (R&D) [% of GDP]	●	
Private energy research and innovation (R&I) spending [% of GDP]	●	
Early-stage private cleantech investment [mEUR 2024]	●	
Cleantech scale-up finance [mEUR 2024]	●	
Public financing for international fossil fuel projects by the European Investment Bank (EIB) [mEUR]	●	
Public finance for international clean energy projects (by the EIB) [mEUR]	●	

Note: Circles show the current year's progress classification. See also Table 45. Source: ©ECNO.

Climate and fossil fuel investments at the EU level

Investments in **climate mitigation** are progressing far too slowly. In 2023, I4CE (Calipel et al., 2025) estimated that climate investments in the EU reached almost EUR 500 billion in the energy, buildings, transport, and cleantech manufacturing sectors. After years of significant growth (+24.6% in 2021 and +11.8% in 2022), this represents an increase of only 1.5% compared to the previous year. Yet, the EU is still far from reaching the EU's 2030 climate and industrial policy objectives, which are estimated to require an average annual investment of EUR 842 billion between 2025 and 2030 (Calipel et al., 2025).

The largest share of climate investments went to renewable energy, whose progress was far too slow. In 2023, investments in **renewable energy** grew by 11% to reach EUR 82 billion (Calipel et al., 2025). This growth was driven by a 42% increase in solar power investments but was partly offset by a 16% decline in wind power investments. According to (WindEurope, 2025), this slowdown in wind power investments is mainly due to reduced installation rates caused by grid bottlenecks, permitting durations in several MS, and challenging financial conditions. Yet, achieving the EU's 2030 road transport decarbonisation targets would require at least EUR 143 billion in investment per year between 2025 and 2030 (Calipel et al., 2025). Investment in battery storage was also far too slow during the assessment period, despite its crucial role in counterbalancing the intermittency of renewable energy.

See also: ›

Progress in **battery electric vehicle** investments was also found to be far too slow. In 2023, investments in battery electric vehicles grew by 37.4% to reach EUR 58 billion (Calipel et al., 2025). Electric vehicles accounted for 22.7% of new car registrations and 7.7% of new van registrations (EEA, 2023d). However, preliminary estimates project a 2.9% decline in investment in battery electric vehicles for passenger cars in 2024 (Calipel et al., 2025).

See also: ›

This decline is part of a broader downturn in vehicle sales in some EU countries, particularly in France (-3.2% registrations) and Germany (-1.0%). It also follows the end of government subsidies for electric vehicles in Germany, which contributed to a 13.5% drop in electric vehicle registrations. Yet, achieving the EU's 2030 transport decarbonisation targets would require at least EUR 140 billion in investment per year between 2025 and 2030 (Calipel et al., 2025).

Progress in **heat pump** investments was far too slow as well. After years of significant growth, heat pump investments decreased by 3.7% in 2023 and sharply dropped by 26.9% in 2024 to EUR 19 billion (Calipel et al., 2025). According to the European Heat Pump Association (EHPA), this decline is largely due to less competitive electricity prices compared to gas prices, a sluggish economy amid a cost-of-living crisis, and less public support (EHPA, 2025a). Yet, to meet the REPowerEU target of installing 30 million heat pumps between 2020 and 2030 (EC, 2022d), annual investments of EUR 55 billion euros will be required between 2025 and 2030 (Calipel et al., 2025).

See also: ›

Finally, progress in **trans-European railway infrastructure investments** was far too slow, too. These investments relate to the infrastructure priorities defined in the EU's Trans-European Transport Network (TEN-T) Regulation, which outlines a development plan at the continental scale (TEN-T, 2024). It identifies high-priority infrastructure objectives, called Core TEN-T, that must be achieved by 2030. For railways, this mainly includes the development of fast and long-distance rail transport built to European standards. The TEN-T was revised in 2024 (EC, 2021a). In 2023, investment in the Core TEN-T reached EUR 22 billion. These investments have remained relatively stable, at constant prices, since 2020. However, meeting TEN-T objectives would require annual investments of EUR 51 billion in long-distance rail infrastructure between 2025 and 2030.

This investment analysis focuses solely on mitigation investments. Assessment of **climate adaptation investment**, both in terms of current investment and future investment needs, is hindered by a lack of data at the EU level. As a result, it is impossible to determine if the EU is on track at this level. Yet, financing adaptation is a key enabler to becoming a climate-resilient society because sufficient and targeted funding is essential to plan, implement, and sustain effective adaptation measures.

See also: ›

On the other hand, investments in **fossil-fuel supply** continue to move in the wrong direction. They have increased steadily by around 8% per year since 2021, with no sign of reversal. In 2023, investments reached EUR 27 billion. This increase is largely driven by the EU's addition of over 50 bcm/year of extra LNG import capacity to switch away from Russian gas (IEA, 2024d).

See also: ›

Public and private funding of the transition

Financing the transition to a low-carbon economy and adapting to climate change requires both public funding (e.g., subsidies or loans) and private funding (e.g., banking loans, equity investment, other financial instruments, or household self-consumption).

Progress towards channelling public funds away from fossil fuels and towards climate is heading in the wrong direction. In 2023, **renewable energy subsidies** amounted to EUR 61 billion, a 9% drop compared to 2022 (EC, 2025ad). This is mainly due to high wholesale electricity prices, which have approached or even exceeded the reference tariffs set through Feed-in Premiums and Contracts for Difference, leading to minimal subsidy payments by Member States. Whilst the reason for the reduction in subsidies may appear to be a positive development, the investment deficit in this sector remains significant. These types of support could be complemented by other policy instruments such as public guarantees or streamlined permitting procedures. Conversely, **EU fossil fuel subsidies** continued to increase in 2023, reaching EUR 242 billion (+19% vs 2022) (OECD and IISD, 2025). The surge in FFS began in 2020, following the energy price crisis triggered by the war in Ukraine. **Finally, public funding allocated to environmental R&D** remains on track, although levels peaked in 2022 before falling in 2023, highlighting some concerns around the prospects for cleantech research funding.

See also:

Regarding **private funding**, the EU Platform on Sustainable Finance estimated that **Taxonomy-aligned CapEx from large listed European companies** reached EUR 250 billion in 2023, a 34% increase from the previous year (EUPSF, 2025). A third of these investments concern electric utilities and grid operators (EUPSF, 2025). Taxonomy-aligned CapEx represents 16% of total CapEx spent by these same large listed European companies (EUPSF, 2025). **Green bonds** remain the primary financing instrument, with annual EU issuance exceeding EUR 200 billion since 2021 (EUPSF, 2025). However, they still represent only 6.8% of total bonds issued in the EU in 2023 (EEA, 2024e).

See also:

As for private **cleantech financing**, private financing on energy research and innovation has progressed to being on track. Companies are increasingly drawn to the potential of leading the next wave of green technologies. The early-stage financing landscape for prototypes transitioning to market, especially among start-ups and small-scale innovators, remains healthy. However, investment levels decreased from 2023 to 2024, raising concerns about future stability in the cleantech ecosystem.

See also:

Finally, at international level, it is important that the EU aligns **all international public and private finance with the Paris Agreement**. This would ensure an effective use of limited public resources to support global efforts to combat climate change. Overall progress on aligning the EU's international finance with the Paris Agreement showed mixed results over the period assessed. Due to data gaps in EU climate-related international public finance, an assessment of the alignment of financing activities by the EIB was used as a proxy indicator. While the EIB tripled its clean energy investments outside the EU between 2021 and 2022, these had previously fallen by half between 2017 and 2020, meaning that overall progress was still far too slow. At the same time, the bank phased out fossil fuel financing outside the EU by 2022, putting it on track to align its operations with the Paris Agreement. However, this progress does not extend to the broader EU budget, which continues to support fossil fuel infrastructure in third countries

See also:

5.2.2 Policy initiatives to boost investment

Investments are at the heart of the European Green Deal and Europe's climate neutrality objectives. Ursula von der Leyen, in her speech as candidate to become the next president of the European Commission in July 2024, indicated that the focus of the next Commission mandate will be 'on implementation and investment to make [the European Green Deal] happen on the ground' (von der Leyen, 2024b).

Several instruments and policies at EU level enable a redirection of investment towards a climate neutral economy. The main ones are the EU and national public budgets. 30% of the EU's multiannual budget (MFF) (2021-2027) is allocated to green investments. Similarly, 37% of the NextGenerationEU's (NGEU) funds are earmarked for green initiatives. National public budgets also contribute through several instruments such as subsidies, public guarantees, etc. However, public climate investment will face several challenges after 2026. For now, no successor to the NGEU has been proposed, and repayment of the common debt contracted will start in 2028 with the next MFF (2028-2034). Furthermore, the newly reformed EU fiscal rules will reinforce pressure on the public budgets of several Member States, potentially preventing several of them from investing more in climate (Agora Energiewende, 2024). The next MFF (2028-2034) presents a key opportunity for the EU to define a long-term climate investment strategy, as many energy and climate-related funding programs depend on the MFF. However, its first presentation by the European Commission in July 2025 did not yet demonstrate a clear commitment to directing public money towards closing the climate investment deficit (Calipel and Humphreys., 2025).

The EU has implemented several other measures to redirect financial flows towards a low-carbon economy, including carbon taxation through the EU ETS and specific financial regulation. Initiatives such as the Corporate Sustainability Reporting Directive (CSRD), together with the 2023 revision of the Capital Requirements Directive (CRD), and the Corporate Sustainability Due Diligence Directive (CSDDD) aim to progressively make climate transition planning mandatory (CRD, 2024; CSDDD, 2024; CSRD, 2022). In February 2025, the European Commission published the 'Omnibus package', in an attempt to streamline and simplify the financial regulatory environment (EC, 2025z). The simplification of the CSRD foresees a review of European Sustainability Reporting Standards (ESRS), but as of now it is unclear how far this will modify reporting obligations of large banks (EC, 2025z). The CSDDD proposed revision kept the obligation to adopt transition plans by credit institutions but removed the obligation of implement them (EC, 2025ab). CSRD and CSDDD serve as essential instruments for driving climate-related investments. Consequently, any dilution of ambition in these directives would significantly undermine the European Commission's ability to meet its climate objectives and the expected investments for the transition.

5.2.3 What is needed to ensure climate investment

As the EU recalibrates its focus on competitiveness and resilience, this analysis offers a stark reminder: Climate policy without sufficient investment will not deliver, and the cost of delaying action will only rise over time. To address this, the EU must take decisive steps in three key areas:

Developing an investment framework at EU level: There is an urgent need to implement a well-informed, coordinated, and long-term investment framework that includes a strategy for financing the EU's ambition in terms of climate, strategic autonomy, and competitiveness. Such a strategy would offer stability in turbulent times, provide predictability to private economic actors, and help ensure the deficit is closed in a timely and cost-effective manner. This strategy must clarify the roles of public and private finance, using policy tools like fiscal levers, de-risking mechanisms, and regulation (Calipel et al., 2025).

Transforming National Energy and Climate plans (NECPs) into national climate investment plans: NECPs are the strategic delivery vehicles by which the EU and its Member States can collectively reach the 2030 energy and climate policy goals. The recent assessment of the final updated NECPs by the European Commission (EC, 2025q) shows that their full implementation would bring the EU close to reaching its 2030 climate objectives. However, several Member States' plans lack comprehensive strategies for mobilising public and private finance. By improving the estimates of the investment needs required to meet the objectives set out in these plans and by detailing their financing strategies, the NECPs could become a valuable tool, evolving into genuine investment plans at Member State level, while also providing a common analytical framework for monitoring their progress at the EU level.

Phasing out fossil fuel subsidies as soon as possible: To enable the redirection of financial flows from fossil assets to climate neutral ones, it is essential that fossil fuel subsidies are replaced by climate-friendly subsidies as soon as possible. More pressure should be put on MS to publish action plans with clear timelines for phasing out fossil fuel subsidies, along with mechanisms to ensure implementation. Furthermore, the ETD should be revised to remove tax exemptions for fossil fuels in the aviation and maritime sectors.

See also: ›

Table 13: Details on additional indicators for Investment

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
THE STATE OF CLIMATE INVESTMENTS AND FOSSIL FUEL INVESTMENTS AT EU LEVEL						
Climate investments [bnEUR2023]	⚠	2020–2023 (Calipel et al., 2025	14.1%	50.3 bnEUR	842 bnEUR by 2025 (Calipel et al., 2025)	+ 171.9 bnEUR
Investments in renewables [bnEUR2023]	⚠	2020–2024 (Calipel et al., 2025	16.1%	8.8 bnEUR	139 bnEUR by 2025 (Calipel et al., 2025)	+ 63.0 bnEUR
Investment in battery storage [bnEUR2023)	⚠	2020–2024 (Calipel et al., 2025)	90.6%	2.0 bnEUR	13.9 bnEUR by 2025 (Calipel et al., 2025)	+ 5.6 bnEUR
Investments in trans-European railways infrastructures [bnEUR2023]	⚠	2020–2023 (Calipel et al., 2025)	5.8%	1.1 bnEUR	51 bnEUR by 2025 (Calipel et al., 2025)	+ 14.7 bnEUR
Investments in battery electric vehicles [bnEUR2023]	⚠	2020–2023 (Calipel et al., 2025)	59.0%	12.0 bnEUR	140 bnEUR by 2025 (Calipel et al., 2025)	+ 41.0 bnEUR
Investments in heat pumps [bnEUR2023]	⚠	2020–2024 (Calipel et al., 2025)	10.9%	2.0 bnEUR	55 bnEUR by 2025 (Calipel et al., 2025)	+ 36.4 bnEUR

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section.

Source: ©ECNO.

5.3 Infrastructure

Infrastructure is the backbone of EU society, enabling the circulation of energy, goods, and people across the continent. Infrastructure that is fit-for-purpose underpins EU Competitiveness, ensures the smooth functioning of the Single Market, and provides inclusive access to clean mobility and energy for all. It also facilitates demand-side flexibility in end-use sectors and enables the safe transport and long-term storage of CO_2. Without anticipatory planning and coordinated Investment, however, inadequate, thus failing, infrastructure risks causing supply disruptions and structural inefficiencies, driving up costs and negatively impacting competitiveness, citizen well-being, and decarbonisation efforts.

See also:

Learn more about the definition of Infrastructure.

5.3.1 State of infrastructure development

Table 14: Progress in Infrastructure

Energy & industry		
Investment into power grid [mEUR/year]		
Battery storage capacity [GW]		
Investment in battery storage [bnEUR]		
Share of electric smart meters [%]		
Length of district heating and cooling networks [km]		
District heat transported [EJ]		
H_2 infrastructure (pipelines, storage, connected industrial sites) [n/a]		
Length of natural gas transmission network [km]		
CO_2 infrastructure (pipelines, storage, connected industrial sites) [n/a]		
Public funding for CO_2 infrastructure in the EU [mEUR]		

Mobility		
Length of bike lanes [km]		
EU funding for cycling and foot paths [mEUR]		
Length of railway lines [km]		
Length of high-speed railway lines [km]		
Electrification rate of railway lines [%]		
Investment in trans-European railway infrastructure [bnEUR]		
Total number of recharging points [#]		

Note: Circles show the current year's progress classification. See also Table 45. Source: ©ECNO.

Electricity infrastructure

Progress in developing electricity infrastructure was generally lagging during the assessment period. Investment into power grids received a too slow rating, while the roll-out of electric smart meters was rated far too slow. Similarly, battery storage capacities and related Investment also advanced far too slowly.

See also:

Several EU policies seek to improve these shortcomings. The Trans-European Networks for Energy Regulation (TEN-E, 2022) aims to strengthen EU energy infrastructure by supporting cross-border connectivity, grid modernisation, and the transition from fossil to clean gases. Member States are required to prioritise Projects of Common Interest (PCIs), digitalise electricity grids for renewable integration, and align infrastructure planning with climate targets. The Ten-Year Network Development Plan (TYNDP) (ENTSO-E, 2024; ENTSO-G, 2025) aims to support cross-border integration and guide planning across Member States, but its limited alignment with EU climate targets weakens its effectiveness. The European Scientific Advisory Board on Climate Change expresses concern that the TYNDP process does not sufficiently reflect the transformative changes required for the energy sector. The EC's Grid Action Plan (EC, 2023f) seeks to modernise and expand electricity grids to make the networks fit for volatile renewable energy generation and increased electrification, but its success will depend on rapid implementation and coordination with infrastructure strategies in the Member States. Lastly, the Connecting Europe Facility for Energy (CEF-E) (EC, 2024d), equipped with a budget of EUR 5.8 billion for the period of 2021-2027, provides targeted funding for the implementation of TEN-E PCIs, particularly for cross-border electricity and hydrogen infrastructure.

Hydrogen and natural gas infrastructure

There are currently no data to assess the development of hydrogen and natural gas infrastructure in the EU. However, hydrogen infrastructure deployment is a priority under the EU Hydrogen Strategy (EC, 2020c) and the REPowerEU Plan (EC, 2022d). The European Hydrogen Backbone (EHB) initiative envisions an approximately 53,000 km long hydrogen pipeline network by 2040, with estimated investment costs ranging from EUR 80 billion to EUR 143 billion (van Rossum et al., 2022). Under the TEN-E, new fossil gas infrastructure is generally no longer supported but transitional investments in repurposed pipelines that blend fossil gas with hydrogen or biomethane are still permitted until the end of 2029. Despite these initiatives, gas infrastructure planning across Member States remains fragmented, with limited regulatory guidance for decommissioning and inconsistent strategies for repurposing networks for hydrogen. While most countries have outlined general visions for hydrogen-ready or hydrogen-only grids, concrete planning for upgrading or converting existing pipelines remains uneven (Stobbe et al., 2024).

See also:

According to the EC's Impact Assessment for the 2040 climate target, gaseous fuel consumption is projected to fall by 54% to 68% by 2040, with the sharpest decline occurring in the residential sector. This expected drop in demand implies that large parts of the existing gas distribution network – particularly those serving buildings – may become underutilised or obsolete, unless infrastructure planning shifts decisively toward network

repurposing or decommissioning (EC, 2024h). Despite the gradual introduction of hydrogen, gas infrastructure is still expected to contract, while electricity grids and distribution networks will need to be significantly expanded between 2030 and 2040 to meet future system demands (R. Rodrigues et al., 2023).

District heating and cooling infrastructure

Data on district heating and cooling infrastructure are limited to two data points showing an increase of 6%, while distributed heat supply declined slightly by 4% between 2020 and 2022. District heating and cooling can facilitate the large-scale, centralised use of heat pumps, renewables, and waste heat sources – particularly in densely populated urban settings where clean single-building solutions are limited (Billerbeck et al., 2023). Recognising this potential, the EU foresees a larger role for heating and cooling networks. For example, the Renewable Energy Directive (RED III, 2023) outlines that infrastructure for district heating and cooling should be further developed. This is supported by the Affordable Energy Action Plan, which states that 'new [...] local heat networks are necessary' (EC, 2025c).

EU policy around district heating is limited to the RED III, which requires Member States to increase the share of renewable and waste heat in such networks and allow access by third parties providing renewable or waste heat. However, the EU did not go for a comprehensive market standardisation and liberalisation, as it has for gas or electricity (Billerbeck et al., 2023).

CO_2 infrastructure

During the assessment period, EU and Member States public funding for CO_2 infrastructure was on track with around EUR 260 million per year on average. However, data on the physical build-out of pipelines, storage capacities, and/or connected industrial sites remained unavailable. The Net Zero Industry Act (NZIA) aims to achieve an annual injection capacity of 50 $MtCO_2$ by 2030 (NZIA, 2024). The Joint Research Centre (JRC) estimates that building a CO_2 network for 2050 of up to 19,000 km could require between EUR 9 billion and EUR 23 billion of investment (Tumara et al., 2024). This shows that there is a large gap between public funding and what is required in terms of investment.

On a policy level, progress is being made through EU initiatives such as the Net-Zero Industry Act (NZIA, 2024), the Industrial Carbon Management Strategy (ICMS) (EC, 2024c), and the CCS Directive (CCS Directive, 2009), which aim to establish a single EU market for CO_2 and ensure safe and permanent geological storage.

See also: ›

Mobility infrastructure

Infrastructure to allow for clean transportation progressed in some areas. Positively, EU funding for cycling and foot paths continued to increase during the evaluation period, reflecting policy efforts such as the European Declaration on Cycling (EP et al., 2024). However, it remains unclear how much investment is actually required across the EU and whether the coverage and standard of cycling infrastructure are sufficiently increasing.

See also: ›

Railway infrastructure build-out was found to be lagging during the assessment period. Both the development of overall railway infrastructure and investment in trans-European railway infrastructure were heading in the wrong direction, while high-speed railway infrastructure and railway electrification were improving far too slowly. The Trans-European Networks for Transport Regulation (TEN-T, 2024) aims to complete critical rail network enhancements by 2030 and long-distance routes by 2050, requiring Member States to expand and upgrade their railway system. Implementation is supported by the Connecting Europe Facility for Transport (CEF-T) (EC, 2024d) with a budget of EUR 25.8 billion for the 2021-2027 period, with 44% allocated to cohesion countries. However, the TEN-T Regulation and related funding are unlikely to close existing gaps in time (EP, 2022).

For the widespread use of electric vehicles (EVs), mobility infrastructure needs to allow for charging. However, the rollout of EV recharging points was far too slow. To support minimum infrastructure availability and interoperability, the EU adopted the Alternative Fuels Infrastructure Regulation (AFIR, 2023), which complements the TEN-T Regulation by requiring Member States to equip roads with EV charging stations and hydrogen refuelling infrastructure.

See also: ›

Climate proofing

EU infrastructure is threatened by climate impacts. Extreme climate events – such as floods, droughts, storms, hail, and extreme cold – can damage infrastructure and disrupt supply, impacting well-being and economic activity. For example, transport networks are at risk from heat-induced damage, while flooding is considered the costliest hazard for road and railway systems (EEA, 2024c). Drought can hinder fuel transport by barges or ships through reduced water levels in rivers or canals. In 2021, severe flooding in Belgium and Germany caused extensive damage to bridges, roads, and railways (Koks et al., 2021). More recently, in 2024, extreme rainfall in Czechia caused saturated soils and falling trees that left 250,000 households without electricity (Tagesschau, 2024).

Despite these growing risks, information on the climate proofing of infrastructure is limited, as it is for adaptation to climate impacts overall. However, strengthening the resilience of infrastructure against climate risks is increasingly important for all forms of infrastructure. Infrastructure must be managed holistically to avoid cascading failures, as disruptions in one system can trigger widespread impacts across other areas (EEA, 2024c).

See also: ›

The Technical Guidance on Climate Proofing (2021–2027) (EC, 2021h) sets binding requirements for all major EU-funded projects to assess climate risks, integrate adaptation measures, and ensure alignment with EU climate targets. Complementing this, the Integrated Energy, Climate and Spatial planning (IN-PLAN), developed under the LIFE programme, supports regional and local authorities in coordinating spatial, energy, and climate planning (EC, 2022c). It addresses fragmented governance, one of the most persistent structural barriers to climate-resilient infrastructure (Carluccio et al., 2023).

5.3.2 Policy initiatives to support infrastructure development

The EU outlines a couple of initiatives to advance its **energy and industrial infrastructure** under its Action Plan for Affordable Energy (EC, 2025c) and the Clean Industrial Deal (CID) (EC, 2025am). This includes a forthcoming electricity Grid Package, expected in early 2026 that builds on the 2023 Grid Action Plan (EC, 2023f) and aims to modernise electricity grids to support renewable energy and electrification. Alongside, the EC plans to publish legislative proposals for the acceleration of permitting processes for grid, storage, and renewable energy projects. Key actions in the Grid Package include:

- Simplification of the TEN-E Regulation for cross-border integrated planning and implementation of projects, especially of interconnectors;
- Streamlining of permitting procedures;
- Improvement of distribution network planning;
- Promotion of digitalisation and innovation;
- Creating visibility of manufacturing supply needs.

Its effectiveness will depend on successful implementation, alignment with national frameworks, and the reform of the TYNDP scheduled for 2026 (EC, 2025g).

In addition, the new initiatives announced in the CID include an Industrial Decarbonisation Accelerator Act, intended to 'speed-up permitting for industrial access to energy and industrial decarbonisation', and the planned Competitiveness Fund, which should offer support to sustainable investments. Both initiatives may also include relevant infrastructure required for clean manufacturing, such as H_2 and CO_2 transport and storage. CO_2 transport infrastructure has also been recognised in the ongoing revision of the TEN-T Regulation: The EP has approved a version that explicitly includes multiple modes of transporting CO_2 to permanent storage sites (CATF, 2024). The upcoming Multiannual Financial Framework (MFF) for the post-2027 period could play a pivotal role by prioritising infrastructure-related funding streams and addressing persistent investment gaps, contingent on its strategic focus and implementation.

Non-motorised **transport**, including bikes and walking, and the development of related infrastructure are not specifically addressed in the strategic documents of the EC. In the rail sector, the EC announced in its Competitiveness Compass that it will further strengthen EU cross-border rail connectivity through a 'High Speed Rail Plan' still to come in 2025. Following this announcement, DG MOVE started a consultation in April 2025 to get initial feedback. The consultation document outlines that the Plan should 'accelerate the implementation of an EU-wide high-speed rail network, structured around the following pillars: 1) enabling a citizen-oriented service model by facilitating EU-wide high-speed rail connectivity; 2) coordinated planning, financing, and implementation of infrastructure; 3) facilitating a profitable business model for operators and ensuring their competitiveness on the high-speed rail network.' (EC, 2025g).

The forthcoming Sustainable Transport Investment Plan (STIP) (EP, 2025d), announced as part of the CID and expected in 2025, aims to accelerate the rollout of recharging and refuelling infrastructure, particularly in hard-to-decarbonise transport modes such as aviation and maritime. The Industrial Action Plan for the European Automotive Sector (EC, 2025u), adopted in March 2025, sets out a roadmap across five pillars – including clean mobility, competitiveness, and supply chain resilience – intended to guide the automotive industry's transition in line with climate targets. In this context, the STIP is expected to address investment bottlenecks, reduce administrative barriers such as permitting delays, and improve the bankability of infrastructure projects, with particular emphasis on improving access to finance in cohesion regions. The EC has allocated EUR 422 million through the Alternative Fuels Infrastructure Facility (AFIF) to support 39 projects across the EU, focusing on the deployment of electric recharging stations, hydrogen refuelling stations, and the electrification of ports and airports (EC, 2025d). The upcoming MFF for the post-2027 period presents a key opportunity to strengthen investment in climate-aligned mobility infrastructure, particularly where national delivery remains weak.

Additionally, the **Global Gateway** (EC, 2021j) is the EU's flagship strategy to mobilise up to EUR 300 billion in investments between 2021 and 2027 for sustainable infrastructure projects in partner countries of the EU – covering transport, climate, and energy infrastructure. It is coordinated by the EC and the European External Action Service (EEAS) under the 'Team Europe' approach, which also involves the European Investment Bank (EIB) and Member States (EC, 2025s). The flagship projects endorsed under the Global Gateway predominantly target regions outside Europe, with a limited number of projects in the EU's neighbourhood and enlargement regions. As such, its relevance for intra-EU infrastructure remains marginal (EUCO, 2025a).

Regarding **climate resilience**, the EC's Competitiveness Compass (2025ai) identifies the increasing occurrence of extreme weather events due to climate change as a major threat to the EU's economic security, emphasising the necessity of updated climate risk assessments and integrated climate-proofing strategies in spatial planning. To address this issue, the EC will present a European Climate Adaptation Plan.

5.3.3 What needs to happen to advance on infrastructure development

Infrastructure must be adapted to both withstand the challenges posed by the transition and to enable that transition to take place. However, progress in energy and mobility infrastructure development was found to be uneven during the evaluation period, and in most cases, far too slow. Data gaps persist, particularly for new industrial systems. EU policies lay the groundwork and are likely to speed up infrastructure development, but more work is required. In particular, planning and investment need to be aligned with climate mitigation and resilience goals, avoiding fragmented approaches that risk locking in long-term vulnerabilities (Leal Filho et al., 2024).

Align infrastructure development to support climate action: The ESABCC (2023) stresses that all steps of the development process of the TYNDP for electricity and gas must be guided by EU climate targets to ensure investment decisions genuinely support the transition. In addition, a clear EU-wide framework is needed to guide the repurposing and decommissioning of fossil gas infrastructure, ensuring that long-term infrastructure planning supports the phase-out of fossil fuels and aligns with climate neutrality objectives (ESABCC, 2024b). The forthcoming Grid Package and the infrastructure components of the CID, including permitting reform and conditional funding, could address systemic weaknesses if they are supported by coordinated national implementation.

Scale up and better target EU public funding: Persistent disparities in EV recharging rollout and rail network development reflect capacity and investment bottlenecks that require both funding and administrative support, particularly in cohesion regions (ECA, 2021b). Germany, for example, is using Recovery and Resilience Facility (RRF) funds to co-finance 24 hydrogen projects, contributing approximately EUR 4.6 billion. These hydrogen projects are part of the Important Projects of Common European Interest (IPCEI) initiative ‘Hy2Infra’, which was initiated by seven Member States and aims to establish EU-wide infrastructure for renewable hydrogen (BMWE, 2024; EC, 2024b).

Step up climate proofing: Greater attention must be paid to cross-sectoral and cascading climate impacts on infrastructure, including critical systems. This requires stronger coordination across sectors and governance levels – both within Member States and at the EU level – with public procurement playing a crucial role in integrating climate risks into infrastructure design and planning (EEA, 2024c).

Close data gaps for better monitoring of targets: Finally, data gaps hinder accurate monitoring, strategic planning, and targeted investment. Closing these gaps is essential for tracking progress towards targets, such as CO_2 injection capacity, and for identifying and addressing bottlenecks in time.

Table 15: Details on additional indicators for Infrastructure

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENERGY & INDUSTRY						
Length of district heating & cooling networks [km]	?	n/a	n/a	n/a	n/a	n/a
District heat transported [EJ]	↩	2018–2023 (Eurostat, 2025c)	- 2 .5%	- 0.1 EJ	n/a	n/a
H_2 infrastructure (pipelines, storage, connected industrial sites) [n/a]	?	n/a	n/a	n/a	n/a	n/a
Length of natural gas transmission network [km]	?	n/a	n/a	n/a	n/a	n/a
Length of natural gas transmission network [km]	?	n/a	n/a	n/a	n/a	n/a
CO_2 infrastructure (pipelines, storage, connected industrial sites) [n/a]	?	n/a	n/a	n/a	n/a	n/a
Public funding for CO_2 infrastructure in the EU [mEUR]	✓	2019 – 2024 (Carbon Gap, 2025b)	16.4%	35.3 mEUR	n/a	n/a
MOBILITY						
Length of bike lanes [km]	?	n/a	n/a	n/a	n/a	n/a
Length of railway lines [km]	↩	2018–2023 (Eurostat, 2025r)	- 0.08%	- 175.3 km	n/a	n/a
Length of high-speed railway lines [km]	⚠	2017–2022 (Eurostat, 2025r)	1.1%	289 km	Doubling by 2030 (EC, 2020j)	3,303 km **→ 11 times faster**
Electrification rate of railway lines [%]	⚠	2018–2023 (Eurostat, 2023a)	0.7%	0.4 %-points	n/a	n/a

Note: Icons indicate progress classification of this year; see also Table 45 for further information. n/a indicates that data are not available. Detail on indicators covered by the building blocks can be found in the respective section.

Source: ©ECNO.

6 Progress of 13 building blocks towards a climate neutral future

SECTORAL BUILDING BLOCKS

CROSS-SECTORAL BUILDING BLOCKS

Table 16: Building Blocks

BUILDING BLOCK	DESCRIPTION
Electricity	Electricity powers modern societies, and its importance will only increase over time through the electrification of demand sectors. Renewable energies and a power system enabling their integration are crucial.
Mobility	Mobility connects people and sustains economies. Reducing motorised transport, promoting clean modes, and decarbonising remaining transport are essential for achieving a transformative shift.
Industry	The EU needs a competitive and sustainable industry to ensure long-term economic prosperity and security. Cutting emissions will depend on the availability of zero-carbon energy and feedstock carriers, infrastructure, circularity, and efficiency.
Buildings	Buildings facilitate activities essential for human life and society. Optimising building services, renovation, modernisation, and transitioning to renewable technologies are crucial on the path to climate neutrality.
Agrifood	Agrifood refers to all stages of the agricultural supply chain, from production to processing, retail, food services and household consumption to disposal, while also considering aspects of land use and the production of agricultural inputs.
Carbon Dioxide Removal	Carbon dioxide removal (CDR) is crucial to compensate for unabated residual emissions. It requires storing carbon in trees and soils and using sustainable technical removals in the future.
Lifestyles	Sustainable behavioural patterns and social practices, enabled by policies that make sustainable options accessible, affordable, and the default, are key for decarbonisation.
Clean Technologies	Clean technologies are the backbone of a decarbonised economy. It is vital to develop a strong European manufacturing base which can deliver innovative solutions for the transition to climate neutrality on the continent and globally.
Finance	Redirecting financial flows towards the transition is essential to put the EU on track to achieve climate neutrality by 2050. This includes both public and private investment flows.
Just and Fair Transition	Just transition refers to designing and executing the shift to climate neutrality in a fair and inclusive way, ensuring no one is 'left behind'. Job opportunities, regional policies, and managing distributional effects are essential to the process.
Governance	Governance refers to the institutions, procedures, and frameworks used by EU and national governments to manage and guide policy-making and foster societal buy-in to the transition to climate neutrality.
Adaptation	Climate adaptation is necessary to respond to unavoidable climate impacts. It requires implementing effective adaptation measures on the ground as well as supportive governance and financial frameworks.
External Action	The EU plays a crucial role as a leader in international climate action, due to its ability and responsibility to support partner countries and to maintain its competitiveness in an era increasingly shaped by global green competition.

6.1 Electricity

Electricity powers modern societies, and its importance will only increase over time through the electrification of demand sectors. Renewable energies and a power system enabling their integration are crucial.

Table 17: Progress in Electricity

OBJECTIVE	INDICATORS	POLICY
Decarbonising electricity supply and phasing out fossil fuels		

ENABLERS	INDICATORS	POLICY
Reforming electricity markets		
Building out, digitalising, and enhancing the grid		
Increasing non-fossil flexibility		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Electricity

Past progress: In the timeframe assessed, the power sector decarbonisation continued to be too slow to be in line with the EU's long-term climate target, despite an emission trend that progressed on track (EC, 2024h). Three main factors contributed to ECNO rating the progress in the building block as too slow: First, in 2024, when electricity demand increased for the first time in years, fossil fuel generation continued to decrease too slowly – at an even slower pace than in the previous year. Second, core enablers for the next stages of the power sector transition such as battery storage, electrification, and smart meter roll-out continued to progress far too slowly as well. Third, it was assessed that wind continued to be built out at half the capacity needed. Despite these shortcomings, there were also positive signs. For example, the overall yearly added wind and solar capacity was on track, mainly due to solar. Moreover, although the generation from variable renewable sources was far too slow due to an updated benchmark, a rebound in hydro and nuclear generation, in combination with the extensive solar growth, has led to emissions decreasing by 9% compared to the previous year (Ember, 2025b).

Policy context: Policies in the power sector are likely to accelerate the (positive) trend but remain insufficient. 2024 has seen several important policy developments that will shape the power sector in the coming years. Most importantly, the Electricity Market Design (EMDR, 2024) reform is set to shape renewables support and non-fossil flexibility uptake, while the Renewable Energy Directive (RED III, 2023) sets new targets for 2030 and aims to remove major barriers to wind development. Most policies enacted still need to be implemented at Member State (MS) level. While there has been a push to further build out the grid, the framework at the EU level remains scattered and financing and planning decisions in the hands of Member States. The alignment of the ETS (Emissions Trading System) with the EU climate targets has not yet led to a marked increase in CO_2 prices in the assessment period, but prices are projected to rise in the coming years, potentially accelerating the phase-out of fossil power generation. The Clean Industrial Deal (CID) has added important elements, such as public procurement roles or the innovation sandboxes that can ensure a manufacturing base in Europe, but these measures have yet to deliver results.

Areas of action: Implementation of the recently enacted EU frameworks at Member States level is key in the coming years (EC, 2025am; EMDR, 2024; NZIA, 2024; RED III, 2023). The EU should support Member States in this process with a special focus on the cost-efficient market integration of renewables, the development of national objectives for non-fossil flexibility and related support schemes, and integrated grid planning and development. Fast and effective implementation of the Affordable Energy Action Plan (AEA), which outlines further measures to support the power sector transition, is vital as it further helps address key challenges.

Objective: Decarbonising electricity supply and phasing out fossil fuels

Indicators:

- Greenhouse gas (GHG) emissions of electricity
- Share of fossil fuel-fired power generation
- Share of gas-fired power generation
- Share of coal-fired power generation

Past progress: Power sector emissions continued to decrease in 2024, shifting from a too slow rating to on track, even though the pace of reduction slowed. Renewables growth, driven especially by solar – which overtook coal in terms of annual generation for the first time in 2024 (see also Table 18) – continued to be the main driver of this trend. A rebound in hydro and nuclear electricity generation contributed to this growth as well (Ember, 2025b). However, fossil fuels still declined too slowly in the reference period, with both coal and gas declining at about the same speed. This is somewhat slower than last year's trend. Based on current trajectories, coal will likely only be phased out around 2037, seven years later than the 2030 phase-out date suggested by the IEA (2023b) and two years later than projected in last year's report. In contrast, gas is now projected to be phased out by 2041, which is still too late but an improvement to last year's trend that did not suggest a phase-out at all, improving the classification to too slow.

Policy context: The policy package the EU has in place to decarbonise the power sector is likely to advance progress but not at the required scale. While various policies drove and enabled the increase of renewables, the EU ETS remained the main instrument directly driving the phase-out of fossil fuels in the assessment period. After peaking in early 2025 at above EUR 80/tCO_2, the prices fell back to last year's level of around EUR 65 to EUR 70/tCO_2 by March 2025. Price forecasts uniformly expect the price to continue to rise until 2030 (Dimitrova, 2024), likely driven by last year's alignment of the cap trajectory with the EU Climate Law. Member State goals to phase out coal will likely play a less important role, especially since the coal phase-out timelines for the two Member States accounting for two-thirds of coal generation (Germany and Poland) are among the least ambitious (Ember, 2025b). Frameworks that continue to support gas persist at the EU level: Fossil gas continues to be regarded as a sustainable investment under the taxonomy, and direct or indirect subsidies (such as investments under the Temporary Crisis and Transition Framework) are still in place (ESABCC, 2024b).

Areas of action: The EU has yet to outline a clear plan for reforming the EU ETS as the cap reaches zero, an outcome projected to happen by 2040 (ESABCC, 2024b). This step is essential to ensuring the ETS is fit for climate neutrality (Pahle et al., 2023). Staged fossil fuel phase-out targets by technology in line with the EU's climate targets could be considered at the EU level (Trinder, 2025), possibly in combination with supporting Member States in setting their own contributions. At the same time, gas is seemingly making a temporary comeback in some MS (in particular Germany) (Staude, 2025), a trend that should be carefully monitored as it is potentially undermining the EU's own efforts to switch towards non-fossil-based flexibility options.

Enabler 1: Reforming electricity markets

Indicators:

- Share of variable renewable electricity
- Additional installed wind and solar capacity
- Electricity interconnector capacity availability for cross-zonal trading

The uptake of wind and solar, technologies that differ from existing technologies due to their high up-front cost and variable output, requires reforming the electricity markets across the EU, including the establishment of an integrated EU market regime.

Past progress: The annual growth in installed solar and wind capacity combined was assessed to be sufficient to put the sector **on track**. The buildout of wind power by itself remained insufficient: In 2024, only 15 GW were added – 2 GW less than in 2023 – stagnating at half the pace suggested by the IEA (2022). Solar continued to exceed expectations at 65.5 GW, though the year-on-year growth has also slowed down. Mainly due to the slow buildout of wind, the share of variable renewable generation was rising only **far too slowly** during the evaluation period. The related growth rate was similar to previous year's assessments, but with a higher benchmark for 2030 at 58% instead of 48% (EC, 2024h). With regard to an integrated EU-wide electricity market, there continues to be a lack of data for measuring ACER's own target of at least 70% of transmission capacity available for cross-border trade by 2025. ACER recently highlighted that some TSOs only made available between 30% and 50% of their capacity, and thus are far from reaching the target (ACER, 2024d).

Policy context: The existing policies are **likely to advance progress but not at the required scale**. The EU itself has acknowledged this in the Affordable Energy Action Plan, which emphasises the need for additional cost-reduction measures (EC, 2025c). Almost all relevant policies (RED III, EMD, NZIA) entered into force in 2024 and 2025, and yet need to be implemented at the Member State level to deliver their impact. They cover important elements, including an RE target, electricity market design rules favouring renewables and storage technologies, and recently also the development of innovative technologies. While the RED and the EMD Directive can build on relevant institutional setups in Member States, the NZIA provides several instruments to incentivise local manufacturing, such as regulatory sandboxes that aim to support innovative RE technologies (NZIA, 2024).

Areas of action: The EU has enacted several important legal frameworks in 2024 and 2025, and their implementation at Member State level will be key in the coming years. A first deadline in July 2024 to implement procedures streamlining permitting processes has already been missed by many MS (EC, 2025am), while the overall Directive has to be implemented by May 2025, and the Contract for Difference (CfD) schemes to support renewables under the EMD Directive by mid-2027 (EMDR, 2024; RED III, 2023). The instruments under the NZIA need to be carefully evaluated with regard to their success, especially when it comes to supporting innovative renewable technology uptake. To further foster the integration of a European electricity market and minimise system costs, the upcoming 'White paper on electricity market integration', to be published in 2026, will be critical. Equally, all other measures outlined under the Affordable Energy Action Plan should be implemented and enforced in a timely manner to ensure the transition happens in a cost-efficient manner and delivers tangible benefits for European citizens (EC, 2025c).

See also:

Enabler 2: Building out, digitalising, and enhancing the grid

The grid is essential for integrating more wind and solar, ensuring efficient transmission, real-time supply-demand balancing, and optimised storage. This enhances reliability, prevents bottlenecks, and supports the electrification of transport, heating, and industry.

Indicators:

- Investment into power grid
- Share of electric smart meters

Past progress: There is still insufficient data available on both historical investments in transmission grids and the projected investment levels needed to meet future requirements. Two significant gaps exist at the EU level: First, existing planned projects in the 10-year network development plan (TYNDP) only address about 50% of already identified cross-border capacity needs. Second, these projects address only 10% to 15% of the investment needed towards a decarbonised power system, highlighting a significant monitoring and potential investment gap (ACER, 2024b). While these insights are based on the TYNDP 2022, an assessment of the draft TYNDP 2024 (ENTSO-E, 2024) indicates that this situation has not changed significantly (ESABCC, 2024a). Therefore, the progress of grid buildout is still considered too slow. The rollout of smart meters continues at a far too slow pace, despite being a relatively low-effort measure that is key to advancing grid digitalisation.

Policy context: Existing EU-level policies are likely to have no impact on progress. The policy framework for the enabler is rather scattered and mainly consists of plans at the EU level, with the responsibility for actual grid buildout left to MS through their National Development Plans (ACER, 2024b). The central EU instrument for guiding Member State planning, the TYNDP, does not align with the EU's decarbonisation goals of the sector (ACER, 2024b; ESABCC, 2024a). Central EU-level policy levers include support in planning and identifying 'Projects of Common Interest' (PCIs), streamlining the permitting process through TEN-E, and coordinated planning through the TYNDP. To support MS, there are many other existing and upcoming EU actions including a finance one-stop shop, an implementation task force, and a technical toolbox supporting the digitalisation (Ember, 2024). Under the EMD, consumers with and without smart meters can now participate in flexibility services using dedicated devices (EMDR, 2024).

Areas of action: The EU should move forward on its planned 'European Grid package', which aims to address important gaps such as the implementation of cross-border projects, long permitting lead times, grid planning and the digitalisation of the grid, as well as its efforts to reform network charges (EC, 2025c). The EU should support MS in identifying decarbonisation-aligned grid extension and integrated TSO and DSO system planning needs, as well as promote coordinated grid investments that maximise benefits and minimise costs (ACER, 2024b; Ember, 2024). To support the supply of EU-based grid components, the European Investment Bank should move forward with the grids manufacturing package to support EU-based manufacturing (EC, 2025am). Finally, better and updated data on transmission and distribution grids, especially on cross-border projects, need to be collected at the EU level (ACER, 2024b).

Enabler 3: Increasing non-fossil flexibility

Increasing non-fossil demand and supply flexibility is crucial for ensuring renewables can be integrated into the energy system. By reducing costs through minimising losses of renewable electricity generation, avoiding reliance on more expensive gas imports, and strengthening the business case for demand-side options, it can create new economic opportunities and enhance industrial competitiveness while ensuring that electricity is always available.

Indicators:

- Battery storage capacity
- Non-fossil participation in capacity markets
- Flexible power demand
- Share of electricity in final energy demand

Past progress: In the assessment period, battery storage continued to grow far too slowly and data and a benchmark on seasonal storage capacity were lacking entirely. Likewise, aggregated data on demand-side potential continued to be unavailable. Sales of electric vehicles (EVs) and heat pumps continued to rise. Electrification continued to be far too slow, and sector-level indicators provided mixed signals for more recent years. Other important demand-side options, especially in industry, lacked data. The use of non-fossil sources for flexibility services continued to be limited – their share in capacity mechanisms has seen a far too slow increase.

See also:

›
›

Policy context: Policies under the enabler, especially the latest EMD revision (EMDR, 2024), are likely to advance progress but not at the required scale, as, for instance, state aid rules for flexibility frameworks still require clarification (EC, 2025c). Under the EMD, Member States need to regularly assess flexibility needs and define indicative national objectives for non-fossil flexibility, split nito demand-side response and management (DSR/DSM) and energy storage. Furthermore, MS are encouraged to develop new support mechanisms for DSM and storage, and to adapt existing mechanisms, such as capacity markets, to better accommodate these solutions. Other provisions include electricity sharing, allowing flexibility from small consumers, and the (market) participation of small-scale flexibility providers (EMDR, 2024). The provisions made under the RED addressing faster permitting of storage facilities have not been fully implemented in Member States, despite a past implementation deadline (EC, 2025am; RED III, 2023). Electrification continues to be supported mainly through sectoral policies.

Areas of action: The policy framework for non-fossil flexibilities contains few binding elements. It is therefore essential that the EU supports Member States in implementing the various provisions under the EMD Directive, especially in planning and establishing support mechanisms for non-fossil flexibility (EC, 2025am). This also needs a fast and effective revision of state aid rules for non-fossil flexibilities and demand response as announced by the AEAP (EC, 2025c). While the EMD Directive also requires Member States to identify seasonal flexibility needs, there is no specific focus on these under the sections highlighting support mechanisms. Furthermore, the Commission needs to publish its guidance on flexibility in retail contracts. Finally, the Clean Industrial Deal calls for reforms of the energy taxation directive to make the framework more conducive to electrification (EC, 2025am), and further acceleration for electrification might come from the announced revision of state aid rules for non-fossil flexibilities and demand response and the proposal for accelerating permitting of storage (EC, 2025c).

Table 18: Details on Electricity indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Decarbonising electricity supply and phasing out fossil fuels						
The policy package is likely to advance progress but not at the required scale						
Greenhouse gas (GHG) emissions of electricity generation [Mt CO_2e/year]	↗ ✓	2019-2024 (EEA, 2023b; Ember, 2025a)	- 5.7%	- 38.4 Mt	319.4 Mt in 2030 (EC, 2024h)	- 38.5 Mt (2024-2030) → on track
Share of fossil fuel-fired power generation [%]	!	2019-2024 (EMBER, 2025A)	- 5%	- 1.8%-points	11.9% in 2030 (EC, 2024h)	- 2.8%-points (2024-2030) → 1.6 times faster
Share of gas-fired power generation [%]	↗ !	2019-2024 (Ember, 2025a)	- 4.6%	- 0.9%-points	n/a	n/a
Share of coal-fired power generation [%]	!	2019-2024 (Ember, 2025a)	- 6.4%	- 0.9%-points	n/a	n/a
ENABLER 1: Reforming electricity markets						
The policy package is likely to advance progress but not at the required scale						
Share of variable renewable electricity [%]	↘ ⚠	2019-2024 (Ember, 2025a)	11.3%	2.3%-points	58% in 2030 (EC, 2024h)	3.2%-points (2024-2030) → 1.4 times faster
Additional installed wind and solar capacity [GW]	✓	2018-2023 (Ember, 2025a)	36.6%	10 GW	106 GW in 2030 (EC, 2024h)	2 GW (2023-2031) → on track
Electricity interconnector capacity availability for cross-zonal trading [%]	?	n/a	n/a	n/a	70% by 2025 (ACER, 2022)	n/a
ENABLER 2: Building out, digitalising, and enhancing the grid						
The policy package is likely to have no impact on progress						
Investment into power grid [mEUR/y]	!	2021-2022 (EIB, 2024)	n/a	n/a	EUR 85.8 bn between 2031-2040 (EC, 2024n)	n/a
Share of electric smart meters [%]	⚠	2018, 2021, 2023 (Berg Insight, 2022, 2023, 2024; EC, 2020g)	11.9%	5.3 %-points	n/a	n/a
ENABLER 3: Increasing non-fossil flexibility						
The policy package is likely to advance progress but not at the required scale						
Battery storage capacity [GW]	⚠	2018-2023 (IEA, 2024e)	65.2 %	3.2 GW	101.4 GW in 2030 (EC, 2024h)	12.1 GW (2024-2030) → 3.8 times faster
Non-fossil participation in capacity markets [%]	↩	2019-2024 (ACER, 2023, 2024c)	- 5.9%	- 3,7%-points	n/a	n/a
Flexible power demand [TWh]	?	n/a	n/a	n/a	n/a	n/a
Share of electricity in final energy demand [%]	⚠	2018-2023 (Eurostat, 2025c)	0.6%	0.02% points	32% in 2030 (EC, 2024h)	1.5%-points (2023-2050) → 12 times faster

Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.2 Mobility

Mobility connects people and sustains economies. Reducing motorised transport, promoting clean modes, and decarbonising remaining transport are essential for achieving a transformative shift.

Table 19: Progress in Mobility

OBJECTIVE	INDICATORS	POLICY
Decarbonising transport		

ENABLERS	INDICATORS	POLICY
Deploying zero-emission vehicles		
Enabling modal shift		
Managing motorised transport demand		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Mobility

Past progress: Progress towards climate neutrality in the mobility sector was still far too slow. The sector, which is responsible for the largest share of the EU's final energy consumption, is still largely dependent on fossil fuels, and both motorised passenger and freight tratnsport volumes are poised to increase until 2050. However, the EU is taking steps to expedite emissions reductions, reduce import dependencies, and safeguard EU industry. Although still insufficient, the rate at which zero-emission vehicles (ZEVs) were being deployed and recharging infrastructure was being built appeared promising.

Policy context: Transport policy at the EU level is likely to accelerate progress but insufficient to put the EU on track to achieving climate neutrality in the sector. The EU has largely focused on increasing the share of ZEVs through strengthened CO_2 emissions performance standards. The EC's Decarbonising Corporate Fleets communication bolsters the EU's demand-side policy package for ZEV uptake (EC, 2025m). However, the proposed amendment of the light-duty vehicle standard's compliance mechanism in the EC's Action Plan for the Automotive Industry (EC, 2025u) undermines the standard's credibility, prolongs fossil fuel dependency, slows technological innovation, and weakens the EU automotive industry's long-term competitiveness (ICCT, 2025; T&E, 2025b). The revised Trans-European Transport Network (TEN-T) is the EU's flagship policy for enabling a union-wide modal shift (TEN-T, 2024). Motorised transport demand management is not included in the EU's approach for decarbonising the mobility sector (ESABCC, 2024b).

Areas of action: The EU should maintain and enhance its existing policy framework for deploying ZEVs. Upholding emissions standards ensures reliable, long-term investment conditions for automakers. The EU could further accelerate progress towards decarbonising transport by going beyond ZEVs, facilitating greater modal shift for passenger and freight transport from road to rail and reducing overall motorised transport volumes. These policy gaps could be addressed in the EC's forthcoming Sustainable Transport Investment Plan and High-Speed Rail Plan. Specifically, the EC could mobilise additional funding to expand enabling infrastructure for rail and non-motorised modes and harmonise incentives for less-emitting transport modes across Member States (MS).

Objective: Decarbonising transport

Indicators:

- GHG emissions from transport
- Share of electricity in final energy consumption in transport

Past progress: Overall, progress towards decarbonising EU transport – a central objective for achieving climate neutrality and strengthening energy security – was far too slow in the assessed period. Reductions in GHG emissions have occurred far too slowly, excluding the extraordinary impacts of the COVID-19 pandemic on mobility and considering the clear rebounding of GHG emissions after 2020. Over the next three decades, emissions reductions need to occur 1.4 times faster to meet the EU's 2050 target of a 92% reduction in GHG emissions relative to 2005 levels (EC, 2018). Electrification is key to decarbonising transport. However, the share of electricity in the sector's final energy consumption has not meaningfully increased since 1990. To align with the EU's climate neutrality objective, electricity's share needs to grow 12.5 times faster.

Policy context: The EU's policy package is likely to advance progress but not at the required scale to put the EU on track towards a fully decarbonised transport system. In the Affordable Energy Action Plan, the EC recognises electrification's critical role in reducing emissions and energy dependencies across all sectors, including transport (EC, 2025c). For transport, the EU's dependency on imported oil results in higher, more volatile costs for suppliers and consumers, while driving the sector's GHG emissions. To expedite decarbonisation and advance electrification, the EU extended the Emissions Trading System (ETS 2) to consider emissions from road transport (ETS Directive, 2023). Starting in 2027, the ETS 2 will disincentivise high-emission fuels through its carbon pricing mechanism. Electrification of road transport is further supported by light- and heavy-duty vehicle CO_2 emissions performance standards. The proposed Energy Taxation Directive (ETD) would complement the ETS 2 and emissions standards by increasing the minimum tax level on diesel and petrol (EP, 2025c). The revised Energy Efficiency Directive (EED) seeks to reduce transport's energy consumption, which accounted for over 30% of the EU's total energy consumption in 2022 (EC, 2025n; EED, 2023). For hard-to-abate transport modes, such as aviation and shipping, the EU's ReFuelEU Aviation and FuelEU Maritime regulations are scaling certain low-carbon bio- and synthetic fuels (FuelEU Maritime, 2023; ReFuelEU Aviation, 2023).

Areas of action: Further progress towards decarbonising transport can be made by expanding and addressing gaps in direct electrification across all transport modes. The technological and commercial maturity of electrification varies substantially across transport modes. For well-established electrified road transport, the EU could incentivise efficiency improvements within the ZEV segment (ESABCC, 2024b). The EU could also raise the ambition of the Clean Vehicles Directive (CVD, 2019), as well as other relevant public procurement measures, to incentivise the production and consumption of electric vehicles and their components. For aviation and shipping, electrification remains in the early stages of deployment. Still, the EU could provide additional, targeted support to bolster EU leadership and competitiveness in low- and zero-emission aircraft and vessel development (EC, 2024s). Alongside supporting innovation in electrification for aviation and shipping, the EU should continue expanding its efforts to develop bio- and synthetic fuels.

Enabler 1: Deploying zero-emission vehicles

Indicators:

- Share of ZEVs in passenger car stock
- Share of ZEVs in heavy-duty vehicle stock
- Share of ZEVs in new passenger car registrations
- Total number of recharging points

Accelerating ZEV deployment is key for reducing emissions from mobility as road transport accounts for most of the sector's emissions.

Past progress: Progress towards deploying ZEVs at the EU level is improving but remains **far too slow**. By 2050, ZEVs must make up nearly 95% of the passenger car stock and nearly 80% of the heavy-duty vehicle stock to align with the EU's climate neutrality target (EC, 2024h). To reach this level of uptake, the annual increase in the share of ZEVs must be 8 times faster for passenger vehicles and 82 times faster for heavy-duty vehicles. The share of ZEVs in new passenger car registrations reached a record high in 2023, but decreased slightly in 2024 following reductions in ZEV purchase incentives in key MS with large vehicle markets (IEA, 2025). Preliminary data for 2025 indicate that ZEV registrations are rebounding to 2023 levels (EAFO, 2025b). Nevertheless, growth in the share of ZEV registrations needs to further increase from 3 to 8% per year . The number of recharging stations increased by approximately 58% per year between 2019 and 2024, but must accelerate threefold to align with the EU's goal to operationalise over 16 million public recharging points by 2050 as set forth in the Alternative Fuels Infrastructure Regulation (AFIR, 2023).

Policy context: The current policy mix is **likely to advance progress but not at the required scale** to put the EU on track to reach its ZEV targets. The EU strengthened its fleet-wide CO_2 emission performance standards for light- and heavy-duty vehicles in 2023 and 2024, respectively (CO_2 Standards for Cars and Vans, 2023; CO_2 Standards for Heavy-Duty Vehicles, 2024). For cars and vans, the standards set emissions reduction targets of 15% in 2025, 55% in 2030, and 100% in 2035, relative to 2021 levels (Dornoff, 2023). In doing so, the standards effectively initiate the phase-out of new internal combustion engine (ICE) vehicles by 2035. For heavy-duty vehicles, the reduction targets were increased to 65% by 2035 and 90% by 2040. The EC's proposal – as outlined in its Action Plan for the Automotive Industry (EC, 2025u) – to amend the compliance mechanism for the 2025 light-duty emissions reduction target would undermine the standards' credibility and create undesirable market uncertainty (T&E, 2025b). The revised AFIR complements the CO_2 emission standards by establishing distance-based targets for light- and heavy-duty recharging stations along the TEN-T road network (AFIR, 2023). The EC's Decarbonising Corporate Fleets communication identifies opportunities for national and subnational entities to accelerate stock turnover in high-mileage corporate fleets, which account for approximately 60% of all vehicle registrations (EC, 2025m).

Areas of action: To provide a clear vision for automakers and strategically align with the EU's priorities for developing clean technologies, the EU should uphold the current emissions standards for light- and heavy-duty vehicles. The EC's Decarbonising Corporate Fleets communication is a positive step but should be followed up with an effective legislative initiative. To further activate demand for ZEVs, the EU, as identified in the Action Plan for the Automotive Industry, could provide guidance and coordinate implementation of ZEV purchase incentives in MS, which currently vary substantially in their structure and efficacy (EC, 2025u). The EU could also address disparities in recharging infrastructure development, given that recharging network coverage is much less dense in eastern and central MS than in western and northern Europe (T&E, 2025b).

Enabler 2: Enabling modal shift

Indicators:

- Share of passenger transport volume on road
- Share of passenger transport volume on rail
- Share of freight transport volume on road
- Share of freight transport volume on rail

The EU can make progress towards decarbonising transport by shifting more road transport onto rail (Rudolph et al., 2023). Beyond mitigating sectoral emissions, a modal shift away from road transport would reduce fossil fuel dependencies and strengthen EU energy resilience.

Past progress: The modal split in passenger and freight transport was headed in the wrong direction in the assessed period. Passenger transport volumes on road and rail have largely returned to pre-pandemic levels: road transport accounted for nearly 80% of total passenger transport, while rail only made up 7%. Therefore, accelerating the rate at which passengers are switching from cars to trains remains essential. The modal split in freight transport, which was largely unaffected by the pandemic, showed a steady increase in the share of freight transported by road, while the share on rail continued to decrease.

Policy context: The EU's policy portfolio for facilitating a modal shift in the transport sector is likely to advance progress but not at the required scale to substantially shift transport away from road, given that policy implementation is dependent on MS. This has resulted in fragmented and inconsistent progress in the past (ESABCC, 2024b). In 2024, the EU revised the TEN-T Regulation (TEN-T, 2024), which functions as the EU's principal multimodal transport infrastructure planning and development policy. It stipulates the completion of an extensive long-distance, cross-border passenger and freight rail network by 2050. The network's most critical rail lines, connecting key metropolitan areas and transit nodes, are to be operational by 2030. By 2050, the TEN-T aims to connect over 400 cities and all major EU airports with passenger trains travelling at least 160km/h. The TEN-T revision additionally calls for an increase in the number of freight trains in the EU and ensures international integration for dedicated rail freight corridors. The EC's proposal to amend the Combined Transport Directive, still in negotiation, would offer financial support for adopting intermodal transport models (EC, 2023e).

Areas of action: Although the EU's TEN-T expands the development of cross-border, inter-city rail connections, there exist significant gaps in the buildout of rail infrastructure in rural areas, which account for 80% of the EU's total territory (EPRS, 2022). For passenger transport, insufficient investment in rail and other public transport options in rural areas has resulted in limited mobility options, effectively locking residents into car dependency (EUUMO, 2023). Since freight and passengers are transported on the same rail lines in Europe (Clausen and Voll, 2013), the absence of rural rail infrastructure means that freight can often only be transported on roads. Significant increases in investments in rural rail infrastructure – which the EC could address in its forthcoming Sustainable Transport Investment Plan and High-Speed Rail Plan – could help facilitate the necessary modal shift for passenger and freight transport. The EU could also support MS in optimising and coordinating incentive schemes for rail and other non-road transport modes; for passenger transport, single 'climate ticket' systems, which offer reduced fares across multiple public transport modes, have successfully increased public transport passenger volumes at the MS level (EC, 2024q).

Enabler 3: Managing motorised transport demand

Indicators:

- Total passenger transport volume
- Total freight transport volume

Moderating the demand for emissions-intensive, motorised transport is a cost-effective approach for reducing emissions from the mobility sector (Litman and Pan, 2025). However, this method is largely absent from the EU's current policy portfolio.

Past progress: Progress towards managing motorised transport demand for passengers and freight is mixed. The COVID-19 pandemic caused a sharp decline in total passenger transport volumes, which heavily skews the trend data. Considering the pre-pandemic 6% annual growth rate of the passenger transport volume between 2015 and 2019 and the post-pandemic rebounding of passenger transport volume, EU-wide passenger transport demand is likely to continue increasing, especially since the number of passenger cars per EU inhabitant increased to a record-high in 2023 (Eurostat, 2024i) and Europe's population is expected to continue to grow (Eurostat, 2019). Freight transport volume, which was less impacted by COVID-19, has increased at a rate that is compatible with the EU's climate neutral scenarios.

Policy context: The EU's approach for moderating motorised transport demand is likely to have no impact on progress. Growing transport volumes have been the primary driver in increasing GHG emissions from road transport since 2000 (EEA, 2022a). However, the EU does not consider motorised transport demand management as a policy option and, therefore, has not introduced any targets (ESABCC, 2024b). This policy gap can partially be attributed to the fact that the demand for and volume of motorised transport is most immediately addressed through spatial planning at the municipal level, rather than at the EU level. In its TEN-T revision, the EU recognises cities' role in enabling active mobility: the revision mandates 400 cities to develop sustainable urban mobility plans (SUMPs), which should aim to increase the modal share of non-motorised transport (TEN-T, 2024). The EU Cohesion Policy supplements the TEN-T's SUMPs: the policy mobilises specific funds, including the European Regional Development Fund (ERDF) and the Cohesion Fund, to implement low-emission, intermodal mobility solutions at local, regional, and national levels (Widuto, 2021). The EU commits to mobilising funding and providing technical support for cycling infrastructure development in its European Declaration on Cycling (EP et al., 2024).

Areas of action: Progress towards moderating motorised transport demand can be achieved by enabling and integrating non-motorised, active modes of mobility. The pandemic spurred an unprecedented demand for cycling in Europe, which has remained resilient (Marsilio, 2024). To leverage this positive trend, the EU should follow through on the financial commitments made in the Cohesion Policy and the European Declaration on Cycling to support MS, regions, and municipalities in increasing cycling's modal share. However, as acknowledged in the declaration, the EU does not consistently collect data on active mobility, which limits its ability to effectively address investment needs. Encouraging circular industry with localised supply chains and lower material use – as envisioned in the EC's Clean Industrial Deal – could reduce motorised freight transport volume (EC, 2025am; ESABCC, 2024b).

Table 20: Details on Mobililty indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Decarbonising transport						
The policy package is likely to advance progress but not at the required scale						
GHG emissions from transport [Mt CO_2e]		2018-2023 (EEA, 2024g)	-1.0%	-8.7 $MtCO_2$ e	92% reduction by 2050 relative to 2005 (EC, 2018)	-31.2 $MtCO_2$e (2023-2050) → **3.6 times faster**
Share of electricity in final energy consumption in transport [%]		2018-2023 (Eurostat, 2025c)	6.1%	0.1%-points	27.7% share by 2050 (EC, 2024h)	1.0%-points (2023-2050) → **12.5 times faster**
ENABLER 1: Deploying zero-emission vehicles						
The policy package is likely to advance progress but not at the required scale						
Share of ZEVs in passenger car stock [%]		2018-2024 (EAFO, 2025b)	82.1%	0.4%-points	93.5% share by 2050 (EC, 2024h)	3.5%-points (2023-2050) → **8.8 times faster**
Share of ZEVs in heavy-duty vehicle stock [%]		2018-2023 (Eurostat, 2024j)	55.2%	0.04%-points	79.6% share by 2050 (EC, 2024h)	2.9%-points (2023-2050) → **82.1 times faster**
Share of ZEVs in new passenger car registrations [%]		2018-2024 (Eurostat, 2025b)	39.1%	2.6%-points	100% share by 2035 (CO_2 Standards for Cars and Vans, 2023)	7.9%-points (2023-2035) → **3 times faster**
Total number of recharging points [#]		2019-2024 (EAFO, 2025a)	57.6%	175,389 points	16.3m points by 2050 (EC, 2021e)	591,796 points (2024-2050) → **3.4 times faster**
ENABLER 2: Enabling modal shift						
The policy package is likely to advance progress but not at the required scale						
Share of passenger transport volume on road [%]		2017-2022 (Eurostat, 2024h)	1.4%	1.1%-points	77.5% share by 2050 (EC, 2024h)	-0.1%-points (2022-2050) → **needs u-turn**
Share of passenger transport volume on rail [%]		2017-2022 (Eurostat, 2024h)	-1.4%	-0.1%-points	12.6% share by 2050 (EC, 2024h)	0.2%-points (2022-2050) → **needs u-turn**
Share of freight transport volume on road [%]		2017-2022 (Eurostat, 2024g)	0.7%	0.5%-points	64.6% share by 2050 (EC, 2024h)	-0.5%-points (2022-2050) → **needs u-turn**
Share of freight transport volume on rail [%]		2017-2022 (Eurostat, 2024g)	-1.7%	-0.3%-points	22.9% share by 2050 (EC, 2024h)	0.2%-points (2022-2050) → **needs u-turn**

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENABLER 3: Managing motorised transport demand						
The policy package is likely to have no impact on progress						
Total passenger transport volume [billion passenger-km]		2017-2022 (Eurostat, 2024)	-3.1%	-170 bn pkm	7180 bn pkm in 2050 (EC, 2024h)	55.8 pkm 2022-2050) → **can still increase**
Total freight transport volume [billion tonne-km]		2018-2023 (Eurostat, 2024f, 2024k, 2025y)	0.8%	19 bn tkm	3520 bn tkm in 2050 (EC, 2024h)	43.3 Mt-km (2023-2050) → **on track**

Note: (1) Zero-emission vehicles (ZEVs) are defined as battery electric vehicles (BEVs) and hydrogen fuel cell electric vehicles (FCEVs), differing from last year's report, which included plug-in hybrid electric vehicles (PHEVs). Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.3 Industry

The EU needs a competitive and sustainable industry to ensure long-term economic prosperity and security. Cutting emissions will depend on the availability of zero-carbon energy and feedstock carriers, infrastructure, circularity, and efficiency.

Table 21: Progress in Industry

OBJECTIVE	INDICATORS	POLICY
Progressing towards net zero industrial GHG emissions with clean energy and feedstock carriers		

ENABLERS	INDICATORS	POLICY
Availability of zero-carbon energy and feedstock carriers and infrastructure		
Circular economy		
Energy efficient industrial processes		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Industry

Past progress: During the assessment period, progress towards the net zero targets in the industrial sector remained far too slow. Although greenhouse gas (GHG) emissions from the sector dropped in 2023, the pace of change - while faster than in last year's assessment - is still too slow to meet the targets set out by the 2040 Climate Target Plan (currently still under development). Importantly, this decline in emissions was partly due to a downturn in industrial activity in 2023, a key contextual factor when interpreting recent changes in the sector. The slowdown contributed to a reduction in final energy consumed in industry, which was upgraded to the too slow category. On a positive note, both indicators in the area of circular economy showed progress, with resource productivity accelerating sufficiently to be on track this year.

Policy context: The existing policies are likely to accelerate the progress but remain insufficient. The core of the policy framework is the EU Emissions Trading System (ETS), a carbon pricing mechanism, updated in 2023 with the EU ETS2, the Carbon Border Adjustment Mechanism (CBAM), and the gradual phase-out of free allocation of allowances. Strategies like the Industrial Carbon Management Strategy and the Net Zero Industry Act support access to zero-carbon energy and feedstock carriers, while the Renewable Energy Directive and Energy Efficiency Directive target improved efficiency. The circularity is enhanced by the Circular Economy Action Plan and the policies derived from it. In 2025, the European Commission (EC) announced the Clean Industrial Deal (CID) – a comprehensive package of legislative and non-legislative initiatives that aim to improve the EU industry's competitiveness and accelerate its decarbonisation. The CID is expected to close many of the existing policy gaps, in particular by providing funding for investment in industrial decarbonisation and regulations to increase energy affordability.

Areas of action: The CID has the potential to become a transformative strategy for the sector, but whether that will be the case will depend on the final design of the policies, their implementation, and funding. Therefore, the main area of action is a robust policy development process. The focus should be on the initiatives that support lead markets for green products and improve energy affordability, as these also strengthen industrial competitiveness and economic resilience. Providing sufficient EU-level financing for industrial decarbonisation projects could help unlock crucial investments and attract private funding for the transition.

Objective: Progressing towards net zero industrial GHG emissions with clean energy and feedstock carriers

Indicators:

- GHG emissions from industry
- Share of electricity in energy carrier and feedstock use
- Share of renewables and biofuels in energy and feedstock use
- Gross value added in manufacturing

Past progress: The progress towards industrial transition objectives during the evaluation period was mixed, with some areas progressing too slowly, and some far too slowly. Overall, the results are similar to last year's assessment (see Table 22). While there were no major shifts in progress categories, it is worth noting a higher pace of GHG emissions reduction in 2023, which – although too slow to reach the target implied by the not yet adapted 2040 Climate Target Plan (EC, 2024h) – picked up by 1 percentage point. However, this positive development came against the backdrop of a downturn in EU manufacturing, as its gross value added dropped by 1.4% in 2023. The downturn was largely driven by elevated energy costs, following the sharp reduction in EU import of fossil fuels from Russia after Russia's invasion of Ukraine in 2022. A negative signal for industry is a slight drop in the share of electricity in final energy consumption in 2023.

Policy context: The existing policies are likely to advance progress but not at the required scale. However, the new measures announced in the CID (EC, 2025am), and the upcoming implementation of adopted policy acts have the potential to close some key existing policy gaps by fostering lead markets, improving energy affordability, and unlocking private and public financing for transition. However, this will depend on the final structure of the adapted policies. Although the EU ETS, a cornerstone of GHG emissions reduction since 2005, was revised in 2023, these changes are yet to take effect. The revision will extend the carbon pricing scheme to buildings and transport sectors in 2027 and introduce the CBAM, which will impose tariffs on third countries to prevent carbon leakage in 2026. Other relevant policies – Industrial Carbon Management Strategy, the Net Zero Industry Act, and the Renewable Energy Directive III – were adopted in 2023 and 2024 and require further action to be effective.

Areas of action: The most critical area of action will be the careful design and implementation of the policies outlined in the CID. Among many promising initiatives in the CID, the Industrial Decarbonisation Bank stands out. It aims to provide EUR 100 billion in funding for relevant projects (from the Innovation Fund, additional revenues from the ETS, and a revision of InvestEU). The bank could prompt crucial investments and crowd in private financing, but its effectiveness will depend on the size of the financial envelope and the conditions under which the funding will be made available. A second priority should be ensuring that the Industrial Decarbonisation Accelerator Act (IDAA) – which should accelerate the permitting process for industrial access to energy and decarbonisation projects – contains strong provisions for creating lead markets by fostering non-price criteria in public and private procurement, thus supporting not only decarbonisation, but also the economic resilience and competitiveness of the EU. Moreover, the scope of green public procurement could be expanded to apply not only to pure public markets, but also to all markets driven by public support, thereby increasing demand leverage for green goods. Furthermore, the planned reforms to the State Aid Framework will simplify state aid rules for flexible public funding for investment in decarbonisation.

Enabler 1: Ensuring availability of zero-carbon energy and feedstock carriers and infrastructure

To reduce industrial GHG emissions, businesses need reliable access to zero-carbon energy sources like electricity, bioenergy, hydrogen, and ambient heat (EC, 2024h). Additionally, infrastructure for CO_2 transport and long-term geological storage is necessary, particularly for managing process emissions in sectors like cement or steel (EC, 2024r).

Indicators:

- Amount of CO_2 captured
- Renewable and low carbon hydrogen production capacity
- Electricity-to-gas price ratio for industrial consumers

Past progress: As in the previous assessment, there is still no comprehensive data to fully evaluate progress in these areas. However, there is some improvement in data availability, as the European Hydrogen Observatory now provides data on various parameters of hydrogen production in Europe (starting from 2022). Between 2022 and 2023, renewable and low-carbon hydrogen production capacity for industrial use grew by 130% to 83.5 kt/year. To measure the relative cost availability of electricity, a new indicator based on pre-existing data was added – electricity-to-gas price ratio for industrial consumers – which progresses at too slow a pace.

Policy context: The existing policies are likely to advance the uptake of energy and feedstock carriers and infrastructure but not at the required scale. However, most of the relevant policy instruments that govern this area are relatively new and their full effects are yet to be seen. Key recent initiatives include the 2024 Net Zero Industry Act (NZIA), the 2024 Strategic Technologies for Europe Platform (STEP), the 2024 Industrial Carbon Management Strategy, the European Hydrogen Bank (2022), and the Grid Action Plan (2023) – with the exception of the long-standing Trans-European Networks for Energy (2013). Financing for projects aiming at deploying innovative low-carbon technologies is made available through such instruments as the Horizon Europe funding programme, Innovation Fund, Connecting Europe Facility (CEF), and Modernisation Fund. Within the CID, several initiatives target this area. These initiatives include the IDAA, the Affordable Energy Action Plan (see 6.3.2), and the European Grid Package. The CID will also support hydrogen production through a delegated act clarifying the rules for producing low-carbon hydrogen, a call under the Hydrogen Bank with a budget of up to EUR 1 billion, and the Hydrogen Mechanism, designed to mobilise and connect offtakers. Moreover, the Sustainable Transport Investment Plan will support the uptake of renewable and low-carbon fuels for air and marine transport, which is key for many energy-intensive industries.

Areas of action: Progress hinges on the effective implementation and careful calibration of the policy measures announced in the CID – particularly the IDAA and the Affordable Energy Action Plan, which could improve access to zero-carbon energy sources for a wide range of industrial enterprises. Given that in surveys, manufacturing enterprises mention the lack of skilled workers as one of the main barriers to investment (EIB, 2023), one of the EU's priorities should be to strengthen the skills and social dimension of the EU's industrial policy, along with increasing funding for such action. Another key area of action is the development of a comprehensive monitoring framework with strong indicators, which would allow for progress tracking and, consequently, enhance the quality of planning, policy design, and evaluation.

Enabler 2: Boosting circular economy

Indicators:
- Circular material use rate
- Resource productivity

The circular economy focuses on reducing waste, maximising resource efficiency, and promoting the reuse and recycling of materials. It supports industrial decarbonisation by integrating sustainability into the industrial processes, thus driving down emissions by increasing efficiency, reducing waste, extending the lifecycle of products, and lowering their carbon intensity.

Past progress: Compared to last year's assessment, there was a marked improvement in the progress in the area of circularity. Resource productivity is now **on track**, after being classified as **too slow** in the 2024 assessment. The accelerated progress in this indicator shows that the link between natural resource use and economic growth is weakening more quickly. It is important to note that as resource productivity is measured relative to Gross Domestic Product (GDP), this positive environmental result is not due to the drop in industrial production that happened in 2023. The circular material use rate also increased in 2023, but the change was small. To meet the 23.4% target set for 2030, progress would need to speed up by a factor of 32.

Policy context: The existing and upcoming policies are **likely to advance progress but not at the required scale**. Some of the key policies stemming from the Circular Economy Action Plan (EC, 2020d) entered into force in 2024, including Ecodesign for Sustainable Products (ESPR, 2024), Empowering Consumers for the Green Transition Directive (2024), as well as the Classification, Labelling, and Packaging of Chemicals Regulation (CLP Regulation, 2024). The EC announced in 2025 that it will launch a Circular Economy Act in 2026, as a part of the CID. The role of the Act will be to facilitate the free movement of circular products, secondary raw materials, and waste, to strengthen the supply of high-quality recyclates, and to outline the demand-side measures to help develop markets for circular products and materials, simultaneously cutting feedstock costs of manufacturing. The Act is also expected to harmonise circularity-linked criteria for public procurement, ahead of the revision of Public Procurement Directives planned for 2026. To support circularity-related innovation and investment, the Circular Economy Financing Support Platform was launched in 2017.

Areas of action: Although the EU policy landscape regarding circularity is quite comprehensive, more action is needed, especially in lowering primary resource demand, increasing material efficiency, and reducing environmental pressures (EEA, 2024a). One of the potential tools could be the introduction of binding, quantifiable circular economy targets, especially on resource use. Progress could also be accelerated by putting in place measures supporting markets for secondary raw materials, which is expected to be addressed by the Circular Economy Act. One of the key measures in this area would be strengthening provisions regarding circularity criteria in green corporate and public procurement, something the CID aims to explore. In the plastics sector, critical reforms include the introduction of chemical recycling and incentivising investments in waste management and recycling (Plastics Europe, 2024). At the national level, more tailored policies are needed to address country-specific circularity blind spots. These policies could include binding targets, strategies, and roadmaps, such as listed in the good practice document (Geerken et al., 2022).

Enabler 3: Energy-efficient industrial processes

Energy efficiency is a key factor in industrial decarbonisation because it directly reduces the amount of energy needed to produce goods, which lowers GHG emissions. It also helps to decrease the operational costs of industrial enterprises, which improves their profitability, and thus encourages further investment in the adoption of sustainable technologies and practices.

Indicators:

- Final energy consumed in industry
- Energy intensity of output

Past progress: The progress in terms of energy efficiency of industrial processes was too slow. Compared to last year, the reduction of the final energy consumption in industry continued to accelerate, as the volume of consumption dropped in 2023, again reaching the lowest value on record. As a result, this indicator was upgraded to the too slow category, from far too slow last year. However, in the context of lower economic activity in the EU's manufacturing sector in 2023 (see 6.3.2), this development cannot be assessed as a positive, as it was partly a result of deindustrialisation. Still, given that the energy intensity of output continued to fall in 2023, it is evident that the energy efficiency gains were not only an effect of lower economic activity in the sector but also indicate progress towards decarbonisation.

Policy context: The existing policies are likely to advance progress but not at the required scale, as key gaps in energy reduction remain, particularly regarding demand-side flexibility, access to the markets, and clean energy carriers. Major policy initiatives – such as RED III, the Action Plan for Affordable Energy, the revised EU ETS, and the Energy Efficiency Directive – took effect between 2023 and 2025 but still require full implementation. The EU ETS remains the main driver of reduction in industrial energy demand through the introduction of carbon pricing. RED III also plays a crucial role, targeting a 1.6% annual increase in renewables for end-use and aiming for at least 42% renewable hydrogen in industry by 2030, rising to 60% by 2035. The CID sets other policy initiatives that aim to further advance energy efficiency in industry. The Action Plan on Affordable Energy includes measures to lower energy bills in the short term and speed up structural reforms, such as reducing taxes and levies on electricity, investment in clean energy and infrastructure, and increasing transparency of gas markets. The Industrial Decarbonisation Bank is expected to provide financing for relevant projects. The CID also aims to lower barriers for energy-intensive industries to secure long-term energy contracts by introducing a pilot programme for corporate Power Purchase Agreements (PPAs), launched jointly by the EC and the European Investment Bank (EIB) with an indicative amount of EUR 500 million.

Areas of action: The top priority is the fast and effective implementation of the measures announced in the CID, especially those fostering a single market for energy efficiency within the Action Plan on Affordable Energy. Ensuring adequate and accessible funding – through the Action Plan and the Industrial Decarbonisation Bank – will be crucial for driving the large-scale adoption of energy efficiency measures across the industry sector. Another key area is strengthening the implementation at the MS level. An analysis of National Energy and Climate Plans (NECPs) from 22 MS revealed significant policy gaps in the area of energy efficiency, as only four of the inspected countries had policy mixes deemed effective enough to meet the required contributions to EED targets (ECNO, 2025a).

Table 22: Details on Industry indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Progressing towards net zero industrial GHG emissions with clean energy and feedstock carriers						
The policy package is likely to advance progress but not at the required scale						
GHG emissions from industry [$MtCO_2e$]		2018-2023 (EEA, 2024i, 2025a)	-3.5%	-25.4 $MtCO_2e$	440 $MtCO_2e$ in 2030 (EC, 2024h)	-26.9 $MtCO_2e$ (2023-2040) → **1.1 times faster**
Share of electricity in energy carrier and feedstock use [%]		2018-2023 (Eurostat, 2025c)	0.2%	0.04%-points	41% in 2030 (EC, 2024h)	-2.3 %-points (2023-2040) → **52.4 times faster**
Share of renewables and biofuels in energy and feedstock use [%]		2018-2023 (Eurostat, 2025c)	4.1%	0.3%-points	n/a	n/a
Gross value added in manufacturing [bnEUR]		2018-2023 (Eurostat, 2025m)	1.7%	34.9 bnEUR	n/a	n/a
ENABLER 1: Availability of zero-carbon energy and feedstock carriers and infrastructure						
The policy package is likely to advance progress but not at the required scale						
Amount of CO_2 captured [tCO_2/year]		-	n/a	n/a	n/a	n/a
Renewable and low carbon hydrogen production capacity [Mt]		2022-2023 (EHO, 2025)	n/a	n/a	n/a	n/a
Electricity-to-gas price ratio for industrial consumers [-]		2019-2024 (Eurostat, 2025e, 2025k)	-7.1%	-0.2	n/a	n/a
ENABLER 2: Circular economy						
The policy package is likely to advance progress but not at the required scale						
Circular material use rate [%]		2018-2023 (Eurostat, 2025b)	0.5%	0.05%-points	23.4% by 2030 (EC, 2020d)	1.7 %-points → **32.2 times faster**
Resource productivity [PPS/kg]		2018-2023 (Eurostat, 2025z)	5.3%	0.1 PPS/kg	n/a	n/a
ENABLER 3: Energy-efficient industrial processes						
The policy package is likely to advance progress but not at the required scale						
Final energy consumed in industry [Mtoe]		2018-2023 (Eurostat, 2025c)	-2.7%	-8.6% Mtoe	205 Mtoe in 2030 (EC, 2024h)	-11.2 Mtoe → **1.3 times faster**
Energy intensity of output [Mtoe/mEUR]		2018-2023 (Eurostat, 2025c, 2025m)	-4%	0.005 Mtoe/ mEUR	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.4 Buildings

Buildings facilitate activities essential for human life and society. Optimising building services, renovation, modernisation, and transitioning to renewable technologies are crucial on the path to climate neutrality.

Table 23: Progress in Buildings

OBJECTIVE	INDICATORS	POLICY
Reducing building emissions and limiting material demand		

ENABLERS	INDICATORS	POLICY
Reducing demand for heating and cooling		
Facilitate the renovation of buildings		
Accelerate the technology switch		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Buildings

Past progress: Progress towards climate neutrality in the buildings sector has been far too slow, as in last year's assessment. Operational emissions from buildings have not declined fast enough to reach the EU's 2030 targets. This is due in part to insufficient renovation rates, especially for deep renovation. While residential heating energy demand decreased slightly, the rate of decrease remains insufficient. Moreover, the current transition to renewable energy in buildings, including electrification, is progressing too slowly to significantly cut emissions. Although heat pump sales increased between 2016 and 2022, sales have gone down in 2023 and 2024. The trend in the average living space per person, a cost-efficient way to lower emissions, has gone in the wrong direction thanks to recent increases in floor space.

Policy context: European building policies are shaped by four key directives: the Energy Performance of Buildings Directive (EPBD, 2024), the Energy Efficiency Directive (EED, 2023), the new EU Emissions Trading System (ETS Directive, 2023), and the Renewable Energy Directive (RED III, 2023) – all of which were revised in 2023 and 2024. These policies are likely to accelerate the (positive) trend, but insufficiently so. The updated EPBD provides a clear framework for non-residential buildings through Minimum Energy Performance Standards (MEPS), sets an energy efficiency trajectory for residential buildings, and mandates new buildings to be zero-emission from 2030 onwards. It also includes provisions to simplify the energy renovation process by setting a definition for deep renovation and improving access to information and financing options. The new ETS2, entering into force in 2027, creates a market incentive for the transition to renewable and low-emission technologies in the buildings sector. To mitigate negative distributional effects, part of ETS2 revenues must be used to protect vulnerable households through the Social Climate Fund (SCF, 2023).

Areas of action: A further acceleration in the shift to clean electrification is needed, particularly through new and strengthened policies and financing measures to accelerate the deployment of heat pumps. For renovations, an enforcement system should accompany MEPS to ensure their effective deployment. Public finance should provide grants to address the financial barriers posed by the upfront costs of heat pumps and renovations, and electricity prices should be reduced to close the spark gap (e.g., by lowering electricity taxes and levies). Establishing national databases for building energy performance and heating appliances is crucial to address the lack of centralised, comparable, and up-to-date data. In addition, efforts should focus on ensuring the implementation of fossil-free standards for new buildings in countries where such regulations are not yet in place, alongside the national implementation of local heating and cooling plans that municipalities are required to develop. Finally, implementation of the Clean Industrial Deal should present new measures to elevate heat pumps as a key clean energy technology that can boost European competitiveness as global demand rises, while also improving energy security by reducing gas demand.

Objective: Reducing emissions and limiting material demand

Indicators:

- GHG emissions from buildings
- Demand of cement or concrete blocks and bricks

Past progress: The buildings sector is far from achieving its climate objectives for 2030 and 2050 (ESABCC, 2024b). Particularly, the EU falls short of its target from the EU Renovation Wave (EC, 2020e) to cut buildings' greenhouse gas emissions by 60% by 2030 compared to 2015 levels, and achieve climate neutrality by 2050 (EU Climate Law). To meet these targets, emissions reductions would need to double from 2024 to 2030, rising from cuts of 16.5 Mt CO_2e per year between 2018-2023 to 33 Mt CO_2e per year. Although the decarbonisation of the EU's building sector accelerated compared to last year's assessment, due to the expansion of renewable energy, it is still moving **too slowly**. Building construction in the EU27 accounted for approximately 9% of all domestic material use in 2019 (EC, 2021k). While there is no EU target, improved material efficiency could potentially reduce 80% of sector emissions (EC, 2021k). However, the demand for cement, concrete blocks, and bricks, essential for constructing new buildings, increased annually by an average of 18% between 2018 and 2023 (Eurostat, 2023d), indicating a trend in the **wrong direction**.

Policy context: The existing policies are **likely to advance progress but not at the required scale**. However, the impacts are not yet observable. Almost all relevant policies (EPBD, EED, RED, and the new ETS2) entered into force in 2023 and 2024 and have yet to be fully implemented by Member States (MS). Aside from renovation obligations and decarbonised heating solutions, outlined in the following sections, the EPBD covers several other important elements, including 'whole life carbon' emissions and a requirement to calculate and disclose these in new buildings larger than 1000 m² by 2028 and for all new buildings by 2030. MS are obligated to publish and notify the EC of a roadmap by January 2027, outlining the implementation of limit values on the total cumulative lifecycle emissions of all new buildings. Additionally, REPowerEU aims to install 60 million heat pumps by 2030, compared to 2020 levels (EC, 2024w).

Areas of action: Deploying low-carbon measures in renovation and new buildings can limit the increase in embodied emissions by 2050 (operational emissions are covered in the following sections), while reducing operational emissions can be achieved through the uptake of clean heating technologies and the energy renovation of buildings (Le Den et al., 2023). A comprehensive EU policy strategy for buildings, encompassing all lifecycle stages, would enhance synergies and minimize trade-offs while addressing energy efficiency and emissions (EEA, 2024k). While the EPBD review assesses the overall carbon impact of new buildings, there is still no equivalent process for the renovation of existing buildings. In its possible next revision in 2027, the EPBD could be reinforced with additional actions, including broadening the definition of zero-emission buildings (ZEB) to encompass lifecycle carbon in renovations of existing buildings (BPIE, 2022). Simultaneously, manufacturers should invest in research and development to innovate construction products that are more sustainable, resource-efficient, circular, and resilient (EEA, 2024k). This would complement renovation goals, as explained under Enabler 1 below.

Enabler 1: Reducing demand for heating and cooling

The reduction of demand for space heating and cooling makes it easier to reduce both direct emissions and embodied emissions from the buildings sector.

Indicators:

- Average space per capita
- Demand for heating and cooling
- Demand for heating in residential buildings
- Demand for heating in non-residential buildings

Past progress: As last year, the reduction of energy demand for heat and cooling was still far too slow. Between 2016 and 2021, there was an annual decrease of 1.0 kWh/m² in energy consumption for heating and cooling. This indicates insufficient progress towards the goal of reducing final energy consumption by a third between 2015 and 2030 as implied in the impact assessment of Europe's 2040 climate target (EC, 2024h). The same trend was also observed for households, where the decrease in energy consumption was far too slow. For non-residential buildings, the trend is a little better but still too slow. Moreover, the drop between 2020 and 2021 caused by the COVID-19 pandemic distorted the historical trend, and a rebound has already been observed (BPIE, 2023a). The overall surface area of European buildings was found to be heading in the wrong direction between 2018 and 2023, with an annual increase of 0.5 m²/capita in average space per person. Thermal renovation and the switch to heat pumps, the two other main ways of reducing energy demand, are explained under Enablers 2 and 3 below.

Policy context: The recast of the EPBD in 2024 is likely to advance progress but not at the required scale to achieve the necessary reductions in energy consumption. The EPBD focuses largely on renovation and new buildings' efficiency. It aims for all new buildings to be ZEBs by 2030, and all buildings by 2050, prioritising the worst-performing buildings. A ZEB has no on-site carbon emissions from fossil fuels and very high energy performance. For residential buildings, MS are tasked to establish national plans to decrease the average primary energy consumption of residential buildings by at least 16% by 2030, compared to 2020, and 20 to 22% by 2035. Countries have flexibility to employ methods beyond MEPS to achieve this, while ensuring that at least 55% of the reduction comes from renovating the least efficient buildings. For non-residential buildings, MS must enforce MEPS, aiming to renovate the 16% worst-performing buildings by 2030, and 26% by 2033. Notably, energy security is one of the pillars of the Clean Industrial Deal (EC, 2025ak), but it focuses mainly on energy supply. This underestimates the important potential of energy efficiency in buildings, especially when it comes to reducing dependency on fossil fuels in heating.

Areas of action: An effective compliance and enforcement system should accompany MEPS to monitor and track their deployment and impacts at the national level (BPIE, 2023a). For the MEPS scheme to be effective, accessible, and affordable, it must be integrated into a comprehensive ecosystem of supporting policy instruments tailored to the diverse needs of various target groups (BPIE, 2023b). Secondly, the EU should provide clearer guidance on how to reduce floor area through urban and spatial planning (ESABCC, 2024b). Finally, the link between energy security and building energy demand needs to be emphasized more in future policies of the Clean Industrial Deal.

Enabler 2: Plan and facilitate the renovation of buildings

Indicators:

- Investments for energy renovation
- Average renovation rate
- Deep renovation rate of residential buildings
- Deep renovation rate of non-residential buildings

Renovating the EU building stock is crucial for reducing emissions because it enhances energy efficiency while also improving living conditions.

Past progress: EU renovation data are sparse, hindering implementation tracking. Only outdated data from 2016 on renovation rates and depth exist, and information on average annual energy-related renovation investments is equally outdated (see Table 24). This is despite the EU initiative on the Building Stock Observatory. The renovation rate between 2012 and 2016 was around 1% per year, but must at least double by 2030 (EC, 2020a). In 2016, shallow retrofits dominated, and deep renovations made up only roughly a fifth of all EU renovations. Renovation rates of 0.2% for residential and 0.3% for non-residential buildings indicate a lack of common deep renovation practices. Annual investments in renovation increased by 5% per year between 2012 and 2016, or by 13 billion EUR per year. Despite the lack of recent data, renovation rates and depth are **far too slow** to achieve the goals of the Renovation Wave (BPIE, 2021), and the EPBD targets require additional investments of EUR 149 million per year between now and 2030 (Bruegel, 2025b).

Policy context: The 2024 recasts of the EED and EPBD are **likely to advance progress but not at the required scale** to reach the renovation rates needed. The revised EED mandates that public buildings achieve an annual renovation rate of 3% as well as the ZEB standard in new buildings. To achieve this, it requires MS to set up national schemes for renovation passports. The EPBD encourages the establishment of one-stop shops to help building owners plan renovations. Other measures support MS to encourage the switch to non-fossil fuel heating technologies or deploy solar energy in buildings. Regarding investment in renovation, MS are tasked with providing financing, setting up support measures, and pursuing other tools to overcome market barriers towards achieving ZEB by 2050. As part of the Clean Industrial Deal (EC, 2025am), the European Energy Efficiency Financing Coalition has been created to identify actions to concretely improve private financing for energy efficiency (EC, 2025p). In March 2025, the European Investment Bank (EIB, 2025a) announced a EUR 10 billion investment over two years to drive energy efficiency and housing renovation across Europe.

Areas of action: National databases for building energy performance should be established and centralised to address the lack of up-to-date data at EU level (ESABCC, 2024b). Skills training should be supported at EU level to retrain contractors and meet the demand for skilled workers (ESABCC, 2024b). The new ETS2 for energy use in buildings will aid energy retrofits, but additional measures are needed to address barriers related to distribution, organisation, administrative capacity, investment, and data that extend beyond inadequate price signals (ESABCC, 2024b). Public finance should provide grants for low-income and vulnerable households, as well as the middle class, to address the financial barriers and upfront costs of heat pumps and renovations. Finally, the work of the European Energy Efficiency Financing Coalition should align with the objectives of the EED and the EPBD.

Enabler 3: Accelerate the technology switch.

Simultaneously with improving energy efficiency, decarbonising energy demand necessitates a technological shift from fossil fuels to clean energy sources.

Indicators:

- Share of renewable energy in heating and cooling
- Heat pump stock
- Heat pump sales
- Electricity-to-gas price ratio for residential users

Past progress: Progress on decarbonising European heat supply has been far too slow. Data indicate an annual increase of renewable energy in heating and cooling of only 0.9% between 2018 and 2023, mostly due to the contribution of biomass and heat pumps (EC, 2024b). This trend falls far short of the required pace to phase out fossil fuels completely by 2040. To meet the indicative renewable target of 49% in 2030, the share of renewable energy needs to increase by 3.8 percentage points per year on average between 2021 and 2030, four times the current rate. For heat pumps, the growth in stock has been far too slow and needs to grow three times faster to reach the target of 60 million units by 2030 as set forth by REPowerEU. Furthermore, although sales of heat pumps grew strongly in Europe between 2018 and 2022, this trend reversed in 2023 and 2024 and is therefore far too slow.

Policy context: Existing policies are likely to advance progress but not at the required scale. The current policy frameworks at the EU level are not sufficient to accelerate the needed roll-out of heat pumps. With the revised RED, MS should promote renewable heating and cooling to reach the indicative target of 49% renewable energy in buildings by 2030. The Directive defines a binding target to increase renewables in heating and cooling by 0.8% per year until 2025, and then 1.1% from 2026 to 2030. Under the EPBD, MS must plan a fossil fuel phase-out in heating and cooling, with a view to phasing out all fossil fuel boilers by 2040. The new ETS2 will put a price on emissions from fossil fuel heating, providing a market incentive for the transition to renewable and low-emission solutions. To mitigate negative distributional effects, revenues from the ETS2 will go to the SCF to protect vulnerable households. MS must submit a Social Climate Plan to the EC to benefit from SCF financing. Finally, the publication of a European action plan on heat pumps was initially planned for the end of 2023 but has not yet been published.

Areas of action: The modest shift towards non-fossil fuels can be partially explained by the fact that EU state aid rules still permit subsidies for fossil gas, which reduces the incentive to fully transition to cleaner energy sources (ESABCC, 2024b). A gradual phase-out of fossil fuel subsidies should encourage the transition to non-fossil fuels. Secondly, a plan and strategy to massively accelerate the roll-out of heat pumps would be necessary to get back on track to meet the EU's target. The decline in heat pump sales in 2023 and 2024 was caused by lower gas prices compared to electricity, and changes in national support policies (EHPA, 2025b). The deployment of heat pumps would require a strategy and an action plan at the EU and national levels, as well as favourable financing conditions, particularly under lower electricity prices (Clean Heat Europe, 2024). Strategic guidance could come from updating the 2016 EU Heating and Cooling Strategy and bringing it into line with the 2030 objectives, followed by concrete measures to implement it. In addition, a clean heat market mechanism, as in the United Kingdom (DESNZ, 2023), could drive down prices for clean heat technologies and accelerate their uptake.

Table 24: Details on Buildings indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Reducing building emissions and limiting material demand						
The policy package is likely to advance progress but not at the required scale						
GHG emissions from buildings [Mt CO_2e]		2018-2023; (EEA, 2024g)	-3.3%	-17.2 Mt CO_2e	60% reduction between 2015 and 2030 (EC, 2020e)	-32.4 Mt (2023-2030) → **1.9 times faster**
Demand of cement or concrete blocks and bricks [M tons]		2018-2023; (Eurostat, 2023d)	18.4%	11.2 Mt	n/a	n/a
ENABLER 1: Reducing demand for heating and cooling services						
The policy package is likely to advance progress but not at the required scale						
Average space per capita [m²/capita]		2016-2021; (Rózsai et al., 2024)	0.8%	0.5 m²/capita	n/a	n/a
Demand for heating and cooling [kWh/m²]		2016–2021; (Mantzos et al., 2018; Rózsai et al., 2024)	-1.0%	-1.0 kWh/m²	69 kWh/m² by 2030 (EC, 2024h)	-2.9 kWh/m² (2021-2030) → **3.0 times faster**
Demand for heating in residential buildings [kWh/m²]		2017-2022; (Odyssee, 2023)	-0.9%	-1.0 kWh/m²	76.7 kWh/m² by 2030 (EC, 2024h)	-3.9 kWh/m² (2022-2030) → **3.8 times faster**
Demand for heating in non-residential buildings [kWh/m²]		2016-2021; (Rózsai et al., 2024)	-1.9%	-1.4 kWh/m²	54.1 kWh/m² by 2030 (EC, 2024h)	-2.0 kWh/m² (2021-2030) → **1.4 times faster**
ENABLER 2: Plan and facilitate the renovation of buildings						
The policy package is likely to advance progress but not at the required scale						
Investments for energy renovation [billion EUR]		2011-2016; (EC, 2023b)	5%	13.2 bnEUR	n/a	n/a
Average renovation rate [%]		2016; (DG ENER et al., 2019)	n/a	n/a	At least double between 2020 and 2030 (EC, 2020e)	n/a
Deep renovation rate of residential buildings [%]		2016; (DG ENER et al., 2019)	n/a	n/a	n/a	n/a
Deep renovation rate of non-residential buildings [%]		2016; (DG ENER et al., 2019)	n/a	n/a	n/a	n/a

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENABLER 3: Accelerate the technology switch						
The policy package is likely to advance progress but not at the required scale						
Share of renewable energy in heating and cooling [%]		2018-2023; (Eurostat, 2023c)	3.8%-points	0.9 %-points	49% in 2030 (RED III, 2023)	3.3 %-points (2023-2030) → **3.7 times faster**
Heat pump stock [Million units]		2019-2024; (EHPA, 2025b)	14.5%	2.2 M units	60 M units in 2030 (EC, 2022d)	6.3 M units → **2.8 times faster**
Heat pump sales [Million units]		2019-2024; (EHPA, 2025b)	10.1%	0.2 M units	n/a	n/a
Electricity-to-gas price ratio for residential users [-]		2017-2022; (EC, 2023b)	-1.7%	-0.05 ratio points	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.5 Agrifood

Agrifood refers to all stages of the agricultural supply chain, from production to processing, retail, food services and household consumption to disposal, while also considering aspects of land use and the production of agricultural inputs.

Table 25: Progress in Agrifood

OBJECTIVE	INDICATORS	POLICY
Minimising agrifood emissions and shifting diets		

ENABLERS	INDICATORS	POLICY
Reducing fertiliser use and cropland-related emissions		
Making livestock production more sustainable		
Reducing food waste and end-of-supply chain emissions		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Agrifood

Past progress: During the assessment period, progress towards aligning the EU agrifood sector with climate neutrality remained far too slow. Reductions in greenhouse gas (GHG) emissions from the sector were limited, and the EU will likely miss its 2030 targets for increasing organic farming area as well as consumer and manufacturing food waste reduction. While the trends for beef consumption and nitrogen fertiliser use have improved to be on track to meet EU benchmarks, data uncertainties persist, and the benchmarks themselves leave further room to align the sector with climate neutrality.

Policy context: The current agrifood policy framework is unlikely to impact the trend. The Common Agricultural Policy (CAP), despite being the EU's largest expenditure, has not reduced emissions and continues to support large-scale, intensive farming. The Vision for Agriculture and Food prioritises competitiveness, food security, and policy simplification, but lacks concrete sustainability measures and makes no reference to dietary shifts or reducing livestock numbers (EC, 2025al). In addition, an SME assessment and a competitiveness check are now required on all agricultural policies, which may undermine sustainability measures. Regulatory and implementation gaps continue to hinder progress on fertiliser use, with the Integrated Nutrient Management Action Plan (INMAP) put on hold despite the EU's 2030 targets. A proposal to strengthen pesticide use regulations was withdrawn, and the Sustainable Food Systems Law has not materialised. While some policies like the Organic Farming Action Plan drive investment, inadequate support hampers the transition to sustainable practices (Arboleas, 2024).

Areas of action: To reach its climate targets, the EU must ensure sufficient funding is available to support farmers, particularly those operating small and medium-sized farms, in transitioning to sustainable practices. This primarily requires a reform of the CAP, along with better use of other public finance tools in the sector, many of which underpin private investments. Redirecting these resources is essential to phasing out emissions-intensive, industrialised farming and scaling up agroecological practices. Shaping the food environment is key to enabling dietary shifts. This includes supporting plant-based agricultural production, aligning public procurement with health and sustainability goals, reducing VAT (value-added tax) rates on plant-based foods, and encouraging communal catering. Reducing herd sizes can enhance the resilience of the sector, while lessening reliance on imported feed would contribute to improved food security (EIT Food, 2024). Finally, stronger environmental regulation is vital. Key measures involve expanding food waste targets to include the primary production stage, revisiting regulations on unfair trading practices and date marking and labelling, and strengthening existing EU laws like the Nitrates Directive and the Industrial Emissions Directive (EEB, 2024a). Biomethane targets must also align with agricultural sustainability goals to prevent further livestock expansion and unsustainable feedstock production and use (Feedback EU, 2023).

Objective: Minimising agrifood emissions and shifting diets

Indicators:

- Agricultural emissions
- Cattle meat consumption
- Dairy consumption

Past progress: Progress in agricultural emissions reductions was found to be too slow during the evaluation timeframe to meet the EU's climate neutrality objectives. Agrifood is expected to be the largest emissions source in the EU by 2040, yet reductions have notably slowed since the early 2000s. While reductions in cattle meat consumption improved to be on track to meet the EU benchmarks set in long-term climate target scenarios, progress in decreasing dairy consumption remains too slow. However, these changes only represent a moderate dietary shift, and efforts to reduce animal product consumption and increase plant-based protein consumption should ramp up to be aligned with climate neutrality.

Policy context: Existing policies are likely to have no impact on progress as key measures lack ambition or have been deprioritised, such as the Sustainable Food Systems Law. The CAP, the EU's largest expenditure, has failed to deliver emissions reductions and has instead reinforced emissions-intensive farming. The 2024 simplification package further weakened its environmental rules, undermining its impact (Brzeziński, 2024). Other key regulations, like the Nitrates Directive and the Water Framework Directive, while fit-for-purpose, face implementation and enforcement gaps (EEB, 2024a). The Vision for Agriculture and Food serves as a five-year roadmap focused on reducing bureaucratic burdens, enhancing competitiveness, and balancing food security and sovereignty objectives. However, it excludes mention of dietary shifts and herd size reduction – measures that could significantly reduce emissions, land-use change and fertiliser use, and support biodiversity. Agricultural policies will now undergo a SME and competitiveness check, which could influence the future sustainability measures (EC, 2025al).

Areas of action: Reforming the CAP remains crucial, but simplification efforts must not undermine transparency and effectiveness. There is a financing gap of EUR 62 billion for economically viable farms, with small farms facing particular difficulties in accessing finance (EC, 2023o). Funding should be more closely tied to performance and accountability. The creation of an Agricultural Just Transition Fund represents another promising financing mechanism. The benchmark for cattle meat is outpaced by current trends, indicating greater potential for emissions reductions (ECNO, 2025b). Benchmarks for plant-based protein supply and investment in value chains would support the sector's resilience and sustainability. The food industry should further improve availability of alternative protein products (Brava, 2024; Walton, 2023). Public procurement programmes should promote plant-based diets and reduce food waste, fostering healthy and sustainable foods that influence consumer choices through availability, affordability, appeal, and information (Agora Agriculture and IDDRI, 2025). Portugal and Denmark have developed or committed to plant-based action plans to ensure policy coherence. Emissions pricing, as exemplified by Denmark, must be ambitious yet carefully designed to avoid unintended consequences. Strengthening existing EU laws, such as expanding the Industrial Emissions Directive (IED) to include cattle farms, could improve the regulatory oversight of emissions. Biomass targets for energy use must align with agricultural measures to ensure coherence in sustainability efforts (EEB, 2024b; Feedback EU, 2023).

Enabler 1: Reducing fertiliser use and cropland-related emissions

Reducing fertiliser use improves soil health, reduces nutrient run-off, and protects biodiversity. It also reduces the EU's dependency on imports, improving food security by reducing strategic dependencies and de-risking supply chains. Expanding organic farming enhances soil health and resilience while reducing reliance on external inputs and synthetic fertilisers.

Indicators:

- Nitrogen fertiliser use
- Share of organic farming in total agricultural area
- Share of electricity in agricultural final energy consumption

Past progress: Progress towards increasing organic farming area in the EU is still far too slow to align with the 2030 target outlined in the Farm to Fork Strategy (F2F). Although the reduction in nitrogen fertiliser use now appears to be on track to meet the F2F target, significant data uncertainties in estimates from 2020 onward make it difficult to accurately assess progress. The share of electricity in agricultural final energy consumption has developed in the wrong direction.

Policy context: Policies covering fertiliser use and organic farming are likely to have no impact on progress. The current enforcement and implementation of the Nitrates Directive has been insufficient; for instance, derogations on compliance have been granted to some of the most livestock-intensive regions (EEB, 2024a). The upcoming Circular Economy Act highlights priority areas such as improved fertiliser efficiency and manure valorisation for biogas. However, the Integrated Nutrient Management Action Plan (INMAP), critical for achieving the EU's target of reducing nutrient losses by 50% by 2030, has faced continuous delays (Dahm, 2023). The Organic Farming Action Plan aims to drive investment in the field, yet many farmers continue to struggle to receive sufficient financial support to make the transition from conventional to organic farming. The largest direct source of on-farm energy consumption is diesel use, primarily in tractors. Although farmers can receive support from the EU for implementing on-farm renewable energy sources, there are no explicit sectoral policies covering electrification or energy consumption (Paris et al., 2022).

Areas of action: The EU lacks a strong regulatory framework to improve nutrient management and reduce fertiliser use. Implementation and enforcement gaps in the Nitrates and Water Framework Directives must be resolved without weakening existing provisions. The upcoming Nitrates Directive review presents an opportunity to reinforce stricter nutrient management. However, some MS are advocating to exempt recovered nitrogen from manure (RENURE) from these limits, which could perpetuate incentives for high livestock numbers (EEB, 2024a). Recent import tariffs on Russia, previously supplying up to a quarter of the EU's fertiliser imports, are pushing farmers towards buying (more expensive) domestic fertiliser (Lory, 2025). More incentives are needed to encourage farmers to make the transition to organic farming, and to stimulate demand by reducing taxes or prices for consumers (Arboleas, 2024). Promoting low-tillage practices could have a considerable impact on diesel reduction, in addition to its fertiliser reduction benefits (Paris et al., 2022). Incentivising the combined production of food and solar electricity could support farmers' livelihoods, while increasing the EU's renewables capacity and promoting the sector's electrification (Czyżak and Mindeková, 2024).

Enabler 2: Making livestock production more sustainable

Indicators:

- Livestock numbers
- Livestock emissions

While technical mitigation solutions (e.g. feed additives) and efficiency improvements are important, they are not sufficient to meet emissions targets (Scheffler and Wiegmann, 2024). The EU's reliance on imported feed, particularly from regions linked to deforestation, poses risks to food security and sustainability. A broader diversification of protein production can strengthen resilience, enhance competitiveness, and support farmers' livelihoods.

Past progress: Progress towards making livestock production more sustainable was far too slow in the assessed period. While the EU's livestock population and emissions declined, these trends are largely driven by farm restructuring following the accession of Eastern MS, demographic changes, and efficiency improvements rather than deliberate environmental policies. To align with climate neutrality goals, action in the livestock sector, in tandem with support for plant-based protein production, must be significantly scaled up.

Policy context: The current EU policy framework for livestock management is likely to slow down or reverse progress. The CAP's high-input, resource-intensive livestock subsidies have historically incentivised greater herd sizes and intensification. A study found that 82% of the EU's agricultural subsidies are used for animal-based foods, with 44% attributed to animal feed (Kortleve et al., 2024). Building on its Vision for Agriculture and Food, the EC plans to release a long-term strategy for the livestock sector that leverages the diversity of the sector for competitiveness and sustainability. However, the draft currently lacks explicit references to reduced herd size or decreased meat and dairy production (EC, 2025al). The Industrial Emissions Directive (IED), which regulates air and water pollutants, was recently revised to expand coverage to large pig and poultry farms. Cattle farms were left largely unregulated, despite their significant environmental footprint – a decision influenced by farmers' protests. The revision, additionally, has a limited scope and covers only 30% of intensive, high-input pig and poultry farms (EEB, 2024b). The EU's biomethane target is similarly unaligned with climate objectives in the agricultural sector, and would require volumes of manure from a significantly higher livestock population than what's needed (Feedback EU, 2023).

Areas of action: CAP subsidies should be redirected from large-scale, high-input animal agriculture toward small and medium-sized farms that adopt more sustainable practices. This redesign must avoid creating stranded assets and lock-ins for farmers (Kortleve et al., 2024). Besides reducing total meat and dairy production, policies should promote plant-based value chains for legumes, vegetables or nuts, extensive grazing systems to enhance resilience in protein supply, and support low-emissions feed options such as insect-based ones (EIT Food, 2024). Financial mechanisms must be designed to prevent emissions leakage. Furthermore, greater policy and investment support for dietary shifts and plant-based protein innovation could provide the EU with a competitive advantage in sustainable food systems and economic benefits.

Enabler 3: Reducing food waste and end-of-supply-chain emissions

Indicators:

- Volume of consumer food waste
- Volume of manufacturing food waste
- Emissions from food processing, transport, and packaging

EU food waste, accounting for 16% of food system emissions and costing EUR 132 billion annually, represents a missed opportunity – decisive action can unlock substantial economic and climate benefits (EC, 2023h; EEA, 2022b).

Past progress: Over the assessed period, progress towards reducing both consumer and manufacturing food waste moved in the **wrong direction**. Progress in cutting downstream emissions – linked to food processing, transport, and packaging – was also **far too slow** and must be accelerated. MS are required to reduce food waste by 30% (per capita) at the retail and consumption phases (i.e., restaurants, services, households) and by 10% in processing and manufacturing. In 2022, the EU generated 129 kg of food waste per capita, with the retail and consumption phase accounting for 72% (Eurostat, 2025j).

Policy context: Recent policy developments addressing food waste and downstream emissions are **likely to advance progress but not at the required scale**. The EC's proposed legally binding food waste reduction targets for the manufacturing and consumer stages are relatively low and the latter falls short of the UN's SDG target of a 50% reduction in consumer food waste (EC, 2025r). The upcoming Circular Economy Act is expected to strengthen food waste reduction and valorisation efforts, as well as promote sustainable packaging solutions and higher recycling rates (Circle Economy, 2025). Existing regulatory measures for end-of-supply-chain emissions include the IED, which mandates emissions permits for large food processing facilities, including slaughterhouses. Large food processing combustion units fall under the EU Emissions Trading System (ETS), incentivising energy efficiency and fuel switch (Cameron et al., 2021). While downstream food emissions are addressed through broader policies targeting the power, industry, and transport sectors, the food industry currently lacks an integrated policy framework to drive sectoral change.

Areas of action: Food waste targets could be strengthened to align with international agreements and include primary production. Strengthening MS' reporting requirements would improve data accuracy across the supply chain (Agora Agriculture, 2024). UTPs remain a challenge, shifting cost burdens onto farmers and contributing to food waste (Piras et al., 2018). In processing and retail, better inventory management and forecasting can reduce overproduction and spoilage. Redirecting surplus food for animal feed or redistribution helps minimise waste. At the consumer level, strategies such as meal planning and using leftovers can further cut waste (Bajželj et al., 2020). Date labelling could account for up to 10% of EU food waste, yet regulations remain unchanged (EC, 2025l). The EU could incentivise storage infrastructure and strengthen investments in food processing and distribution to support decarbonisation via retrofitting and clean energy (Bajželj et al., 2020; Cameron et al., 2021). Improving energy efficiency also results in reduced operating and production costs (ibid.).

Table 26: Details on Agrifood indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Minimising agrifood emissions and shifting diets						
The policy package is likely to have no impact on progress						
Agricultural emissions [$MtCO_2e$]	!	2018–2023 (EEA, 2024g)	-1.1%	-4.3 $MtCO_2e$	194 $MtCO_2e$ by 2050 (EC, 2024h)	-6.3 $MtCO_2e$ (2023–2050) → **1.5 times faster**
Cattle meat consumption [kg/capita]	↗ ✓	2018–2023 (DG AGRI, 2024)	-1.7%	-0.18 kg/capita	-34% by 2050 relative to 2013 (EC, 2018)	-0.11 kg/capita (2023–2050) → **on track**
Dairy consumption [kg/capita]	!	2018–2023 (DG AGRI, 2024)	-0.8%	-0.65 kg/capita	-27% by 2050 relative to 2013 (EC, 2018)	-0.67 kg/capita (2023–2050) → **1.04 times faster**
ENABLER 1: Reducing fertiliser use and cropland-related emissions						
The policy package is likely to have no impact on progress						
Nitrogen fertiliser use [kt N]	↗ ✓	2017–2022 (Eurostat, 2024a)	-2.9%	-286kt N	20% in 2030 vs. 2020 (EC, 2020b)	-111 kt N (2022–2030) → **on track**
Share of organic farming in total agricultural area [%]	⚠	2018–2023 (FiBL, 2025)	6.4%	0.6%-points	25% in 2030 (EC, 2020b)	2%-points (2023–2030) → **3.4 times faster**
Share of electricity in agricultural final energy consumption [%]	↩	2018–2023 (Eurostat, 2025i)	-1.6%	-0.3%-points	21.5% in 2030 (EC, 2024h)	0.9%-points (2023–2030) → **needs U-turn**
ENABLER 2: Making livestock production more sustainable						
The policy package is likely to slow down or reverse progress, or to reinforce counterproductive trends						
Livestock numbers [million head]	↗ ⚠	2018–2023 (Eurostat, 2024)	-1.6%	-4.3 million head	n/a	n/a
Livestock emissions [$MtCO_2e$]	⚠	2017–2022 (EEA, 2024g)	-0.6%	-1.5 $MtCO_2e$	134 $MtCO_2e$ by 2050 (EC, 2024h)	-3.9 $MtCO_2e$ (2022–2030) → **2.6 times faster**
ENABLER 3: Reducing food waste and end-of-supply chain emissions						
The policy package is likely to advance progress but not at the required scale						
Volume of consumer food waste [kg/capita]	↩	2017–2022 (Eurostat, 2025j)	-0.2%	-0.2 kg/capita	-30% by 2030 (EC, 2023h)	-3.5 kg/capita (2022–2030) → **needs U-turn**
Volume of manufacturing food waste [kg/capita]	↩	2017–2022 (Eurostat, 2025j)	2.4%	0.5 kg/capita	-10% by 2030 (EC, 2023h)	-0.4 kg/capita (2022–2030) → **needs U-turn**
Emissions from food processing, transport, and packaging [$MtCO_2e$]	⚠	2017–2022 (FAO, 2024a)	-0.8%	-1.9 Mt	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.6 Carbon Dioxide Removal

Carbon dioxide removal (CDR) is crucial to compensate for unabated residual emissions. It requires storing carbon in trees and soils and using sustainable technical removals in the future.

Table 27: Progress on Carbon Dioxide Removal

OBJECTIVE	INDICATORS	POLICY
Enhancing natural sinks and delivering on technical removals		

ENABLERS	INDICATORS	POLICY
Store more carbon in trees		
Store more carbon in soils		
Increase technical removals sustainably		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Carbon Dioxide Removal

Past progress: The development of the Carbon Dioxide Removal (CDR) building block improved since last year's report, but progress remains far too slow. The change in classification is due to a combination of stabilising natural sinks and increased technical removals. While natural sinks continue to decline, the rate has slowed significantly, primarily due to increased net removals in 2023. Moreover, forest area and carbon stocks are both increasing with positive growth rates. For technical removals, improved data suggests higher levels of investment as well as slight growth in removals already achieved, and agreements for removals to be implemented in the future. However, data availability for soils remains unreliable and is a major gap.

Policy context: CDR policies are picking up speed but lack sufficient measures for full effectiveness. The EU Climate Law sets binding commitments to achieve net zero by 2050 and net negative emissions thereafter (ECL, 2021). The Carbon Removals and Carbon Farming Regulation (CRCF, 2024) encourages the uptake of both nature-based and technical CDR through robust certification. The EU's Land Use, Land-Use Change, and Forestry Regulation (LULUCF-R, 2023) sets binding EU and national net removal targets for natural CDR, and the Nature Restoration Law (NRL, 2024) includes binding restoration targets to enhance forest and soil carbon sequestration and improve adaptability to climate change. The EU's Common Agricultural Policy (CAP) provides some incentives for sustainable management of forests and soils. The proposed Soil and Forest Monitoring Laws aim to improve data availability and quality. Finally, the EC's Clean Industrial Deal seeks to incentivise technical CDR investments.

Areas of action: Separate long-term targets should be established for emissions reductions and CDR. To help guarantee investment and future demand, the EU should publish a long-term strategy for CDR, clarifying its role for achieving climate neutrality. For natural CDR, there is an urgent need to limit and reverse forest dieback, maintain tree growth, and promote restoration and sustainable management of forests and soils. For sustainable deployment of technical CDR post-2030, increased R&D funding and incentives to develop the market are necessary, considering the full lifecycle impacts. These incentives for CDR must ensure removal quality through robust certification and liability mechanisms, data accuracy, and addressing non-permanence and additionality risks. Policy coordination is required to develop necessary transport and storage infrastructure and ensure sustainable energy and biomass sourcing. Finally, carbon removal obligations should be explored to implement the polluter pays principle.

Objective: Enhancing natural sinks and delivering on technical removals

Indicators:

- Net removals from land-use, land-use change and forestry (LULUCF)
- Technical CDR delivered in the EU

Past progress: Even though net natural removals from the LULUCF sector increased from 236 $MtCO_2e$ in 2022 to 256 $MtCO_2e$ in 2023, the six-year trend is still headed in the **wrong direction**. This indicates declining sinks, mostly due to climate change impacts and harvesting. Removals must increase by 7.6 $MtCO_2e$ each year to reverse the trend and meet the 310 $MtCO_2e$ net natural removal goal from the EU's LULUCF Regulation by 2030 (see Table 28). Annual deliveries of technical CDR have increased slightly from almost nothing in 2019 to 0.03 $MtCO_2$ in 2024, which is still less than 1% of the EU's target of 5 $MtCO_2$ technical removals by 2030. Most technical removals come from biochar (94%), the most mature option to date, with the remaining 6% from enhanced rock weathering (ERW) (CDR.fyi, 2025). While public funding for technical CDR has increased (Carbon Gap, 2025a), abatement costs are still much cheaper for nature-based CDR solutions (EUR 0-110/tCO_2) compared to technical CDR solutions (EUR 100-1000/tCO_2) (ESABCC, 2025).

Policy context: The current policy mix for CDR is **likely to advance progress but not at the required scale**. The LULUCF Regulation sets EU- and nationally specific natural CDR targets and provides accounting rules. Until 2026, it requires Member States (MS) to compensate emissions from land-use with at least an equivalent quantity of removals; after that it enforces binding EU and national net removal targets. Still, insufficient attention has been paid to declining land sinks and their resilience. The CRCF aims to incentivise financing for removals by establishing standards for voluntary certification. By promoting quantification, the CRCF should help landowners adopt carbon management strategies and encourage companies to invest in CDR. Funding for CDR is mostly voluntary in the short-term, which provides a useful first step but is insufficient to achieve targets. Important determinants of future CDR demand in the EU include the EU's 2040 climate target as well as mandatory and, to a lesser extent, voluntary initiatives. The Net Zero Industry Act (NZIA, 2024) includes a target of 50 $MtCO_2$ injection capacity per year by 2030, which should enable the deployment of technical CDR (and carbon capture and storage, CCS) infrastructure. The Clean Industrial Deal highlights the need to incentivise technical CDR. Integration into the EU Emissions Trading System (ETS) is being considered (EC, 2025am).

Areas of action: Reversing the decline in the EU's land sink is a critical priority for nature-based removals. Landowners should be rewarded for protecting natural sinks and increasing removals. Mandating compliance (e.g., through the NRL, 2024) may be necessary to ensure sufficient CDR demand to achieve objectives. Moreover, incentives should be provided for technical carbon removals to enable market development. Environmental integrity of CDR incentives must be ensured through robust certification and appropriate safeguards to avoid undermining climate objectives, particularly when CDR is used in carbon markets. It is also important that CDR does not lead to the unsustainable use of biomass, energy, water, or land, and that biodiversity is protected. The EU should provide clear guidance on the uses of removal certificates (both technical and nature-based) under the Green Claims Directive (EC, 2023l).

Enabler 1: Store more carbon in trees

Storing more carbon in trees is the most established land-based carbon removal technique in the EU, offering high technological readiness, low costs, and significant mitigation potential.

Indicators:

- Growth in forest area
- Growth of carbon stock in forest land

Past progress: Forests are the key natural solution for CO_2 removal, yet growth in forest carbon sequestration has been far too slow. The rating has improved since last year due to increases in both forest carbon stocks and forest area, with accumulation rates turning marginally positive. This marks a welcome and necessary shift towards reversing the declining natural sink. Still, growth must accelerate significantly to meet the 2030 LULUCF targets. The stagnation of forest carbon sequestration is due to several factors, including harvesting; climate-change-related disturbances (e.g., droughts, wildfires, pests); and maturing forest stands that now sequester at a lower rate (EEA, 2025d; ESABCC, 2024b). Financial incentives for sequestration, restoration, and protecting existing forests remain insufficient, leaving forests vulnerable to competing land uses. Furthermore, despite signs of progress, emissions reporting from forestry remains among the most uncertain of all sectors (EEA, 2025d). Fragmented monitoring and time lags in inventories obscure real-time trends.

Policy context: Policies are likely to partially advance progress in support for forest carbon sequestration but not at the required scale due to lack of effective enforcement. While forestry policy remains a national competence, several EU-level initiatives exist. The LULUCF Regulation sets net removal targets, while the NRL mandates the restoration of 20% of EU land by 2030 and includes a commitment to plant at least 3 billion trees. However, there are no binding obligations for landowners to meet these targets. The CRCF incentivises afforestation by certifying forest-based CDR using a dedicated methodology due late 2025. There is high potential for removals with Improved Forest Management (IFM) activities, which are awaiting their own CRCF methodology. The proposed Forestry Monitoring Law (EC, 2023j) aims to harmonise national forest data from satellites. The Renewable Energy Directive (RED) strengthened sustainability criteria for forest biomass, limiting its use for bioenergy and supporting long-life wood products that store carbon (RED, 2024). Yet, bioenergy expansion risks undermining long-term sequestration goals and could increase degradation and deforestation in the future (Camia et al., 2020).

Areas of action: The EU should develop financial and policy incentives for landowners to protect, restore, and enhance forest carbon sinks. Risks associated with these incentive mechanisms need to be mitigated, for example, through robust certification and liability mechanisms; subsidies under the CAP should be conditional on implementation to ensure additionality; and full implementation of the NRL through National Nature Restoration Plans. Risks of forest mortality should be addressed via climate-sensitive decision-making tools, species diversification, and close-to-nature forestry practices. The EU should align forest restoration, afforestation, and sustainable management efforts (e.g., continuous cover forestry) with biodiversity and climate resilience goals by ensuring policy coherence between agriculture, bioenergy, and forest carbon sequestration measures. The EU should strengthen its forest data collection through the adoption and swift implementation of the proposed Forest Monitoring Law, taking advantage of the latest technologies (e.g., remote sensing).

Enabler 2: Store more carbon in soils

Indicators:

- Soil organic carbon in arable land
- Net CO_2e emissions from croplands, grasslands, and wetlands

Soils hold most of the carbon in the biosphere, making their preservation and enhancement essential for maintaining and increasing carbon sinks. Healthy soils also support ecosystem services including food production; water purification; biodiversity conservation; resilience to natural disturbances; and carbon storage, with potential for additional carbon sequestration (L. Rodrigues et al., 2021).

Past progress: Soils remain a net source of emissions due to pressures, such as land cover change, intensive use, and erosion (EEA, 2023e). Soil carbon data is unreliable, hampered by measurement challenges including spatial variability and varied soil types (Bellassen et al., 2022). The only dataset on organic carbon concentration in arable land (organic and mineral soils) includes just two data points (2009 and 2018) and shows negligible change, making a trend analysis difficult. In key land categories, soils still emit more CO_2 than they store. In 2023, croplands, grasslands, and wetlands emitted a net of 69 $MtCO_2e$ (34, 13, and 22 $MtCO_2e$ respectively) (EEA, 2024) – wetlands, especially drained peatlands, have the highest emissions relative to their area. The decline in emissions from these lands between 2018 and 2023 was **far too slow**.

Policy context: The policy package is **likely to advance progress but not at the required scale** and counterproductive incentives hinder effectiveness. The EU NRL introduced legally binding objectives for restoring agricultural organic soils as well as restoration measures for at least 30% of drained peatlands by 2030. The proposed Soil Monitoring Law (EC, 2023k; Eurostat, 2021) aims to harmonise soil data collection, improving data accuracy and compliance with targets under the LULUCF Regulation. The CAP supports improved soil management through good agricultural and environmental condition (GAEC) standards, as well as subsidies through 'eco-schemes' and voluntary agri-environmental-climate measures (EC, 2024t). However, conflicting incentives within the CAP perversely promote intensive farming practices that contribute to soil degradation, undermining carbon sequestration efforts (ECA, 2021a; ESABCC, 2025).

Areas of action: With soils still a net source of emissions, reductions from key land categories should be an immediate priority, and the EU should acknowledge the inherent risk of reversals with soil organic carbon and take a holistic approach to addressing the multiple ecosystem services provided. Targeted financial support and technical guidance should be provided to farmers to promote soil regeneration and carbon sequestration. The CAP should be improved with stricter conditionality requirements that result in increased removals (ECA, 2021a; ESABCC, 2024b). It should be a priority to promote the adoption and implementation of the Soil Monitoring Law proposal, establishing the knowledge base and ensuring easily accessible and regularly updated data. It is crucial that any certification of soil carbon removals is based on a robust database to ensure verifiable removals. The CRCF creates the conditions for homogeneous and robust certification of soil carbon sequestration practices. For these practices to be put in place, it is now important to facilitate their financing through a combination of private and public funding sources.

Enabler 3: Increase technical removals sustainably

Increasing technical removals sustainably is needed to ensure effective long-term removal and storage of atmospheric carbon, reliably counterbalancing unabated residual emissions without compromising resource availability.

Indicators:

- Public funding for technical CDR in the EU
- Sales of technical CDR for immediate or future delivery
- Sales of BECCS and DACCS for immediate or future delivery
- Sales of Biochar for immediate or future delivery

Past progress: Progress was **far too slow** for technical CDR, but data availability has significantly improved. However, potential resource constraints, such as biomass availability for BECCS and high water and energy demands for DACCS, limit feasibility (Velten et al., 2025). While both BECCS and DACCS could store CO_2 for millennia under good conditions, biochar, the most widely deployed technology thus far, has a lower permanence (ESABCC, 2025). EU and MS public funding for technical removals has increased from EUR 0.7 million in 2019 to EUR 156 million in 2024, which is an annual increase of 41% (Carbon Gap, 2025a). The market is dynamic and over half (51%) of global technical CDR sales now originate from EU projects. EU suppliers' sales for immediate or future delivery of all technical removals have increased from almost nothing in 2021 (0.01 Mt CO_2e) to 5.7 Mt CO_2e in 2024. Most of this growth (98%) was driven by BECCS, mostly via offtake agreements with suppliers in Denmark and Sweden. These cover over 90% of all transactions by volume (CDR.fyi, 2025), but so far there are no data on the future delivery dates of these transactions.

Policy context: Policies are **likely to advance progress towards the sustainable deployment of technical CDR but not at the required scale** as financial incentives are still lacking. The NZIA includes a legally binding target of 50 Mt CO_2 injection capacity per year by 2030 (EC, 2023a), for both CCS and CDR, enabling the uptake of BECCS and DACCS. The Industrial Carbon Management Strategy (ICMS) aims at boosting technical CDR development amongst other objectives and creating a single EU market for CO_2 (EC, 2024c). This includes the CRCF as well as the potential inclusion of CDR in the EU ETS Directive, which will be assessed in 2026. The Clean Industrial Deal reaffirms the commitment of the ICMS to increase incentives for investing in CDR across the entire value chain but does not add anything to it (EC, 2025am).

Areas of action: Additional funding for technical removals is needed to ensure that full lifecycle emissions are lower than the CO_2 captured, that plants are powered by renewable energy, and that the deployment of technical CDR does not exert pressure on environmental boundaries. To provide investment incentives for the sector, the most mature technical CDR technologies should be gradually integrated into the EU ETS with limited volumes and under strict conditions, reducing the risk of mitigation deterrence (ESABCC, 2025). To use the considerable CO_2 storage capacities in the EU in a risk-free way, harmonising regulatory standards across MS is needed (Cames et al., 2024). Effective MRV techniques guarantee the durability and mitigate the risks related to technical CDR. The MRV challenges are greater for open-loop systems interacting with natural processes, such as biochar and ERW, than for closed-loop systems such as DACCS and BECCS (Mercer and Burke, 2023).

Table 28: Details on Carbon Dioxide Removal indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Enhancing natural sinks and delivering on technical removals						
The policy package is likely to advance progress but not at the required scale						
Net removals from land-use, land-use change and forestry (LULUCF) [$MtCO_2e$]		2018-2023 (EEA, 2024g)	-0.7%	- 1.4 $MtCO_2$	310 Mt in 2030, (LULUCF-R, 2023)	15.9 Mt (2022-2030) → needs U-turn
Technical CDR delivered in the EU [$MtCO_2e$]		2019-2024 (CDR.fyi, 2025)	72.6%	0.01 $MtCO_2$	5 Mt in 2030, EC (2021g)	0.8 Mt → 152 times faster
ENABLER 1: Store more carbon in trees						
The policy package is likely to advance progress but not at the required scale						
Growth in forest area [ha/yr]		2018-2023 (FAO, 2024b)	0.2%	416 ha per year	n/a	n/a
Growth of carbon stock in forest land [MtC/year]		2018-2023 (FAO, 2024b)	1.7%	1.2 Mt C per year	n/a	n/a
ENABLER 2: Store more carbon in soils						
The policy package is likely to advance progress but not at the required scale						
Soil organic carbon in arable land [gC/kg]		2009, 2018 (JRC ESDAC, 2023)	n/a	n/a	n/a	n/a
Net GHG emissions from croplands, grasslands, and wetlands [$MtCO_2e$]		2018-2023 (EEA, 2024g)	-0.8%	-0.6 $MtCO_2$	n/a	n/a
ENABLER 3: Increase technical removals sustainably						
The policy package is likely to advance progress but not at the required scale						
Public funding for technical CDR in the EU [EUR in million]		2019-2024 (Carbon Gap, 2025a)	41.4%	26 mEUR	n/a	n/a
Sales of technical CDR for immediate or future delivery [$MtCO_2e$]		2019-2024 (CDR.fyi, 2025)	65.7%	1.03 $MtCO_2$	n/a	n/a
Sales of BECCS and DACCS for immediate or future delivery [$MtCO_2e$]		2019-2024 CDR.fyi (2025)	65.8%	1.01 $MtCO_2$	n/a	n/a
Sales of Biochar for immediate or future delivery [$MtCO_2e$]		2019-2024 CDR.fyi (2025)	206%	0.01 $MtCO_2$	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.7 Lifestyles

Sustainable behavioural patterns and social practices, enabled by policies that make sustainable options accessible, affordable, and the default, are key for decarbonisation.

Table 29: Progress on Lifestyles

OBJECTIVE	INDICATORS	POLICY
Limiting emissions and resource use		

ENABLERS	INDICATORS	POLICY
Providing enabling infrastructure		
Enhancing economic incentives		
Diffusion of climate neutral habits		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Lifestyles

Past progress: Progress towards lifestyles that support EU climate neutrality has improved since last year's assessment, but the pace remains far too slow. ECNO's approach follows the assumption that to live sustainably, the sustainable option must become the convenient choice, the most affordable, and the default – in short: make it easy, make it cheap, make it normal (ECNO, 2023). While some positive trends, such as the growing adoption of climate-friendly habits like plant-based diets and other individual actions, have been observed, challenges persist. Emissions from consumption are still not being reduced at the necessary pace, with the decline in the average carbon footprint of EU citizens insufficient to meet the EU's 2050 climate neutrality target (Axelsson et al., 2024). On the other hand, material consumption has decreased. Now headed in the right direction, the pace of reduction is still far too slow. The prevalence of individual car ownership increased over the period. Data availability, although still a limitation to the assessment, has improved over the last year, allowing us to draw conclusions about economic incentives.

Policy context: One of the main barriers to sustainable lifestyles is the lack of a comprehensive strategy at EU level on how to tackle demand-side emissions. Questions of efficiency are covered under EU policies for product design and energy. While the Clean Industrial Deal (CID) (EC, 2025am) includes actions to advance the circular economy, other EU policies discourage consumers from choosing more sustainable options. Relevant here are the far-reaching impacts and subsidies for emissions-intensive products under the Common Agricultural Policy (CAP) (EC, 2023i). Moreover, the EC's new Vision for Agriculture and Food does not include specific actions to promote plant-based diets or to reshape food systems in a way that fosters sustainable consumption patterns (EC, 2025i). Finally, the concept of sufficiency is not well-integrated across sectors in EU policies (EEB, 2024c).

Areas of action: To maximise the mitigation potential of sustainable lifestyles, the EU should work towards a comprehensive strategy for how to integrate options for behavioural change into other policy areas and documents. For that, the EU needs to acknowledge that only through providing the right choice environments for citizens will more climate-friendly daily lives become the norm. Appealing narratives for behavioural and societal changes that speak to local EU contexts and highlight the co-benefits of more sustainable lifestyles could help engender the necessary support amongst both EU citizens and policy-makers for policies directed at individual choices (ESABCC, 2024b).

Objective: Limiting emissions and resource use

Indicators:

- Per-person material footprint
- GHG emission footprints

Past progress: Progress towards the objectives of limiting GHG emissions and the overall material use by households was far too slow. Household material consumption saw a drop from 2022 to 2023, and is thus now headed in the right direction, albeit **far too slow**. This decline is partly due to dire economic conditions, inflation, and lower real income in EU countries (Eurostat, 2024; OECD, 2024), leaving open how much of the development is attributable to a better circular economy and behavioural change. The GHG emission footprints decreased on average over the period 2017 to 2020. Still, this progress has been far too slow and must accelerate substantially to align with climate neutrality by 2050.

Policy context: The existing policies are **likely to advance progress but not at the required scale** to limit emissions and resource use. Early this year, the Packaging and Packaging Waste Regulation (PPWR, 2025) entered into force, which helps EU citizens reduce their material consumption for packaging. The Right to Repair Directive entered into force in July 2024, encouraging citizens to repair functionally defective goods (R2R, 2024). The Deforestation-Free Products Regulation (2023) limits deforestation from products consumed in the EU, such as coffee or palm oil. The Clean Industrial Deal from February 2025 foresees the adoption of a Circular Economy Act in 2026 (EC, 2025am). The act aims to speed up the circular transition and maximise the efficient use and reuse of scarce materials, with the goal of achieving 24% material circularity by 2030. If the Circular Economy Act is adopted and implemented as planned, EU material consumption of can be expected to decline further. Still, the EU lacks a comprehensive strategy for leveraging the mitigation potential of lifestyle changes (ESABCC, 2024b) and has yet to integrate the principle of sufficiency across climate policy-making (EEB, 2024c).

Areas of action: To ensure lifestyle changes contribute to climate neutrality, the EU should advance the Circular Economy Act and properly deliver on its objectives as outlined in the CID, while ensuring effective implementation and transposition, respectively, of the PPWR and R2R in Member States (MS). To unlock the mitigation potential of households, EU policy-makers should better integrate demand-side measures into the EU's climate policy mix. Policies that promote societal and behavioural changes should be reinforced by narratives tailored to local contexts and grounded in evidence about the anticipated costs and benefits to gain the support of consumers and national governments (ESABCC, 2024b).

Enabler 1: Providing enabling infrastructure

By providing the right infrastructure, EU citizens are able to choose the sustainable option without giving up comfort or practicality. In this way, living sustainably becomes the easy choice.

Indicators:

- EU funding for cycling and foot paths
- Municipalities that promote sustainable food

Past progress: Progress on enabling infrastructures has been partly made regarding mobility options, while other areas are difficult to observe due to insufficient information and a lack of reliable EU-wide data. EU cohesion policy has continuously increased its support for new and renovated cycle paths and footpaths (EC, 2025t). This has had a positive effect on the mobility choices of citizens, albeit primarily in urban areas. Sustainable public procurement aimed at increasing plant-based foods in canteens is not monitored at the EU level. However, some cities and regions serve as notable examples of good practice (ECNO, 2023, 2024a). In Paris, as part of the 2022-2027 Sustainable Food Plan, the city government aims for three-quarters of publicly procured food to be organic, in addition to other sustainable measures (Ville de Paris, 2025).

Policy context: The policies in place are likely to advance progress on delivering an enabling choice infrastructure but not at the required scale. The few policies are scattered across many policy domains and are often non-binding. There remains no comprehensive EU-wide policy roadmap specifically dedicated to infrastructures that enable sustainable behaviour. Since last year, there have been no major policy developments. There is notable progress in mobility-related policy packages like the EU Alternative Fuel Infrastructure Regulation (AFIR, 2023) or the Trans-European Transport Network's Sustainable Urban Mobility Plans (TEN-T, 2024). These could help to advance multimodal transport, digitalisation, and climate resilience, especially in an urban mobility context. Policies touching other lifestyle-related topics are rare. Importantly, the EC's new Vision for Agriculture and Food (EC, 2025i) does not specifically mention strategies to align consumption patterns with climate neutrality, such as altering food environments, implementing nudges, or other modes of influencing consumer choices toward more sustainable diets.

Areas of action: For sustainable lifestyle choices to become more accessible to citizens, progress can be made by establishing more effective 'choice architecture' through EU policies (Thaler and Sunstein, 2021). Improving urban planning can facilitate the transition away from fossil fuel-based transportation towards more active, public, and/or shared mobility. Public procurement provides levers that can be implemented immediately, for instance, consistently offering vegetarian meals in public canteens. Additionally, the food industry can be incentivised to encourage climate-conscious eating habits through strategic product placement, clear labelling, and pricing strategies. Progress can be achieved if national plans under the Social Climate Fund (SCF, 2023), to be submitted in June 2025, allocate funding to support vulnerable households in insulating their homes or switching to heat pumps and solar panels. Overall, EU policy thus far has been too fragmented and should be consolidated into a comprehensive strategy centred on making it easier for citizens to live sustainably.

Enabler 2: Enhancing economic incentives

Indicators:

- Price on carbon
- Affordability of vegetarian compared to meat options

The affordability of sustainable lifestyles implies a price advantage over more carbon-intensive choices. Living sustainably therefore becomes the cheaper choice.

Past progress: Progress on economic incentives to advance sustainable lifestyles has been too slow. Whereas in last year's report data availability was a limitation, this year, data from the OECD on net-effective carbon rates allowed for an assessment of progress (OECD, 2023). The average carbon price resulting from taxes and emissions trading systems (ETS) increased over the period assessed; however, it was still too slow and unlikely to bring about the necessary behavioural changes. A study by the Good Food Institute (GFI, 2024) showed that lower prices can drive demand for plant-based foods, but the relative affordability of low-carbon versus emission-intensive supermarket choices was not measurable due to a lack of data. The study also found that the recent inflation increased prices for plant-based alternatives disproportionately.

Policy context: Ongoing policy efforts to encourage climate-friendly behaviour using economic incentives are likely to have no impact on progress, and in some instances, policies that give climate-damaging consumption a price advantage counteract progress. The proposal to revise the Energy Taxation Directive (ETD), initially presented by the EC in July 2021, remains under discussion and has not yet been adopted (EP, 2025c). The proposed revision aims to align the taxation of energy products with the EU's climate objectives by promoting clean technologies and eliminating outdated exemptions that currently favour fossil fuels. Despite efforts to promote sustainability, significant EU agricultural subsidies continue to support activities detrimental to mitigation efforts. The CAP still includes schemes which incentivise the overproduction and consumption of meat and dairy products. In April 2022, the EP amended its rules to allow MS to lower VAT on fruits and vegetables to 0%, but most MS have not applied the change (VAT Directive Amendment, 2022).

See also: ›

Areas of action: The significant financial support by the EU for fossil fuel consumption, which increased under the energy crisis in 2022, should be phased out. Likewise, progress on making plant-based diets more affordable could be made if CAP subsidies are shifted away from climate-damaging agricultural products towards more sustainable practices and produce. This ensures that agricultural production remains in Europe without artificially suppressing prices. Pricing schemes should be designed to enhance the effectiveness of the price signal while avoiding regressive impacts, such as has been attempted with the EU ETS2 and SCF. As carbon pricing is extended to other sectors, mechanisms like direct rebates to lower-income households can ensure that the financial burden does not disproportionately affect the most vulnerable populations. Educating consumers about how sustainable products can reduce long-term expenses despite their higher upfront costs – particularly on energy and maintenance – helps to underscore their overall affordability.

See also: ›

Enabler 3: Diffusion of climate neutral habits

Indicators:

- Self-reported climate-conscious behaviour
- Climate-damaging advertisement
- Plant-based food sales
- Car ownership density

Sustainable consumption patterns are still a long way from being the 'norm' across society. The widespread, rapid uptake of climate-friendly lifestyles can be driven by making the sustainable option the default.

Past progress: Progress toward the normalisation of sustainable habits and practices in the EU was mixed. Self-reported personal mitigation actions declined slightly in 2023, but the overall trend was still positive between 2019 and 2023. The survey data from 2025 – not yet part of the analysis in this report – hint towards a further decline, though (Eurobarometer, 2025). There is no data on advertisements for fossil-fuel-intensive products and services. Plant-based food alternatives showed a massive increase in sales. However, the indicator uses proxy data from only five non-representative EU countries (FR, DE, ES, NL, IT) in which diet substitution and reduced meat consumption have been more popular than in Central and Eastern Europe (Kamin et al., 2024). Although the five countries account for around 60% of the EU population, the trend is likely to be less positive for the EU27. Regarding mobility, owning a car is still the norm: Individual motorised transport has been on a steady rise since 2011 in the EU.

Policy context: The policy mix is **likely to advance the diffusion of climate neutral habits but not at the required scale**. The Ecodesign for Sustainable Products Regulation (ESPR, 2024) aims at increasing the 'circularity, energy performance, recyclability and durability' of products. The Sustainable and Smart Mobility Strategy promotes sustainable transport modes as the default choice (EC, 2020j). By April 2024, over 90% of its 82 initiatives were at various stages of implementation and some completed (EC, 2024v). The EC has further pushed the shift from combustion to electric drive systems in private vehicle sales (EC, 2025u). The CID mentions circularity as one of its main goals, and both the CID and the Vision for Agriculture and Food foresee more public procurement – however, it is unclear to what extent this will shape consumers' choice environments. Vegan dairy substitutes still cannot be marketed using the traditional name for the animal product (CJEU, 2017), but there has been a divergent ruling on meat, which allows for more flexibility as long as it is clearly labelled (ECJ, 2024). Traditional names sound familiar, thereby normalising the consumption of alternatives (Clay et al., 2020). Current EU agricultural subsidies – over 80% of CAP subsidies – are still directed towards animal agriculture (Kortleve et al., 2024).

Areas of action: A quick implementation of the ESPR will make products more durable, efficient and repairable. Adjusting CAP subsidies to support plant-based agriculture rather than emissions-intensive livestock farming can help align funding with climate goals (ESABCC, 2024b). The EU's co-funding regulations for food promotion campaigns (Regulation (EU) No 1144/2014, 2014), which allocate around EUR 180 million annually, could be revised to prioritise the promotion of foods that contribute to healthy and sustainable diets, including fruits, vegetables, and sustainably-labelled products (Agora Agriculture, 2024). Expanding public procurement rules to include not only organic foods but also more plant-based options in public institutions can make sustainable diets more visible. Likewise, improving infrastructure for active mobility and enhancing public transport accessibility can make low-carbon transport an easier choice.

See also:

Table 30: Details on Lifestyles indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Limiting emissions and resource use						
The policy package is likely to advance progress but not at the required scale						
Per-person material footprint [tonnes per capita]		2018-2023 (Eurostat, 2025s)	-0.7%	-107 t/capita	n/a	n/a
GHG emission footprints [$kgCO_2e$/capita]		2017 -2022 (Eurostat, 2025l)	-1.3%	-133 $kgCO_2e$/ capita	n/a	n/a
ENABLER 1: Providing enabling infrastructure						
The policy package is likely to advance progress but not at the required scale						
EU funding for cycling and foot paths [mEUR]		2018-2023 (EC, 2025t)	+59.9%	+353 mEUR	n/a	n/a
Municipalities that promote sustainable food [-]		n/a	n/a	n/a	n/a	n/a
ENABLER 2: Enhancing economic incentives						
The policy package is likely to have no impact on progress						
Price on carbon [EUR/tCO_2e]		2018; 2021; 2023 (OECD, 2023)	+2.6%	+1.9 EUR/tCO_2e	n/a	n/a
Affordability of vegetarian compared to meat options		n/a	n/a	n/a	n/a	n/a
ENABLER 3: Diffusion of climate neutral habits						
The policy package is likely to advance progress but not at the required scale						
Self-reported climate-conscious behaviour [% of surveyed population]		2019; 2021; 2023 (Eurobarometer, 2023)	+1.2%	+0.8 %-points	n/a	n/a
Climate-damaging advertisement [EUR]		n/a	n/a	n/a	n/a	n/a
Plant-based food sales [million units per week]		2021–2023 (GFI, 2024)	+10.7%	+3.8 m units/ week	n/a	n/a
Car ownership density [# per 1000 inhabitants]		2018-2023, (Eurostat, 2025v)	+1.1 %	+5.9 #	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.8 Clean Technologies

Clean technologies are the backbone of a decarbonised economy. It is vital to develop a strong European manufacturing base which can deliver innovative solutions for the transition to climate neutrality on the continent and globally.

Table 31: Progress in Clean Technologies

OBJECTIVE	INDICATORS	POLICY
Developing manufacturing capacity and innovation leadership		

ENABLERS	INDICATORS	POLICY
Fostering research excellence		
Bringing innovation to market using private resources		
Increasing clean technology uptake		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Clean Technologies

Past progress: The growth of the clean technology industrial base and innovation ecosystem is now on track, for the first time since the start of ECNO's analysis. The EU research and innovation (R&I) architecture remained vibrant, with significant public funding, and private R&I spending has progressed to on track in the period assessed. Investment in start-ups and larger industrial processes continues to show a positive trend, although recent years show signs of a plateau, putting future progress at risk.

Policy context: The EU has a range of policies which support research and innovation, manufacturing, and deployment of clean technologies. The Fit for 55 package creates the market conditions and future demand for clean energy, electric mobility, and other technologies. The Net Zero Industry Act (NZIA) complements and builds on existing policies to provide the regulatory environment for enhancing European cleantech manufacturing capacity (EC, 2025ae). A range of funds and financial instruments are already in place to support clean technologies, including the Innovation Fund (Humphreys, 2023b). In 2025, the European Commission presented the Clean Industrial Deal (CID), with the announcement of both limited short-term financial support and a European Competitiveness Fund to invest in the European cleantech manufacturing base (EC, 2025am), along with a stronger focus on a 'European preference' approach in public procurement.

Areas of action: The full implementation of legislative initiatives like the Net Zero Industry Act (entering into force in 2026) should be a priority, as it will help streamline permitting processes and accelerate market entry. Supporting the widespread adoption of mechanisms such as 'regulatory sandboxes' will facilitate the transition of research into market-ready solutions. EU-level funding should be maximised for cleantech, with an increased usage of financial instruments beyond grants, as well as 'auctions-as-a-service' both in this budgetary period and under the Competitiveness Fund in the next. This should be pursued at the EU level alongside national coordination to avoid a fragmented state aid competition between Member States (MS) (Humphreys, 2023a). Beyond this, the EU should mainstream across all strategic cleantech sectors policy options currently being explored in the automotive and battery sectors, such as facilitating joint ventures and the licensing of technology or intellectual property, to increase the level of technology transfer (EC, 2025ae).

Objective: Developing manufacturing capacity and innovation leadership

Indicators:

- Clean technology industry added value
- Eco-innovation related patents

Past progress: Compared to last year, the indicator 'Clean technology industry added value' improved and is now **on track**, while the performance of the research ecosystem declined. The steady growth of the clean technology industrial base continues in line with EU goals established in the NZIA, with battery manufacturing on track to exceed the 550 GWh/year 2030 target. Firms still face challenges regarding access to finance and slow permitting times (EC, 2025ae; Humphreys, 2024). Despite strong public and private R&I investment, the EU's ecosystem is falling behind that of the US, with China almost closing the innovation gap (Draghi, 2024).

Policy context: The EU already has a strong policy architecture for cleantech, with strategies such as the Strategic Energy Technology (SET) plan and Hydrogen Strategy, industrial alliances such as the European Battery Alliance, and funding instruments such as the Innovation Fund creating an effective, if complex, industrial policy framework that **maintains sufficient advancement**. Recent policy developments could reinforce this trend. In February 2025, the European Commission launched the Clean Industrial Deal (CID), placing the cleantech sector at the core of Europe's industrial transformation. These efforts build on the Green Deal Industrial Plan (GDIP), which, although also falling short in the matter of fresh EU funds, created a much-improved regulatory framework for European cleantech. Its impact is yet to be seen, with new regulations not fully implemented until 2026.

Areas of action: The full implementation at MS level of the Net Zero Industry Act should be a priority. The 'regulatory sandboxes' launched in NZIA can support the accelerated transformation of research excellence into innovative products, and some Member States have already included such instruments in their regulatory frameworks (EC, 2025ae). With the Clean Industrial Deal, the Commission aims to further invest in cleantech through the EIB, Horizon Europe, and the establishment of a Competitiveness Fund in the next budgetary period (EC, 2025am). The ambitious design and implementation of these funds could further strengthen the business case for the sector.

Enabler 1: Fostering research excellence

Indicators:

- Eco-innovation related publications
- Public funds for environmental and energy R&D

Past progress: Progress on maintaining EU research excellence in the clean technology sphere remained robust over the period assessed. Although eco-innovation patent activity declined (see objectives section), the European clean technology research environment remained active. Europe's progress in the publication of research activity was **on track**, with a spike in activity observable in 2022, and growing steadily until 2024 (increasing almost 5.8% year-on-year). Public funding allocated to environmental R&D remains **on track**, although levels peaked in 2022 before falling in 2023, highlighting some concerns around the prospects for cleantech research funding.

Policy context: The EU-level public architecture for supporting R&D and R&I is developed and well-financed, suggesting that these policies are **likely to maintain sufficient advancement**. Horizon Europe is the most significant of these programmes. Although it has been threatened by cuts, as evidenced during the 2024 mid-term budget negotiations, which saw the fund reduced by EUR 2.1 billion (Zubascu, 2024), the Clean Industrial Deal announced a EUR 600 million pilot call for Horizon Europe to be launched under the 2026 to 2027 work programme, focusing on projects which can be clear candidates for future support under the Innovation Fund. Beyond the addition of the concept of 'regulatory sandboxes' in the NZIA, there has not been a significant regulatory push to support clean technology innovation with new instruments or programmes, although the proposed Start Up & Scale Up Strategy (EC, 2025ap) may have some impact.

Areas of action: With the Clean Industrial Deal, the European Commission committed to increasing funding for Horizon Europe to enhance its impact. This marks a step forward, as the current programme's predecessor, Horizon 2020, required a further EUR 159 billion to fund all proposals judged 'above the quality threshold' (EC, 2024g). However, the EUR 600 million announced so far is not sufficient on its own to maintain the positive upward trend. The size and the scope of Horizon Europe should be expanded in the next iteration of the programme, known as FP10. The long-term future of the EU's R&I funding, however, remains uncertain. Proposals to merge the Framework Programme with the planned Competitiveness Fund have raised concerns among stakeholders who fear this could result in a de facto cut to R&I funding (Francica, 2023).

Enabler 2: Bringing innovation to market with private resources

Indicators:

- Private energy R&I spending
- Early-stage private cleantech investment

Past progress: Translating cutting-edge research ideas in the field of clean technology into market-ready products requires not only public support but the interest and investment of the private sector. In a positive shift, private investment in R&I has progressed to being **on track**, with companies increasingly interested in the opportunities that being at the forefront of the next wave of green technologies can bring. Once a prototype has left the lab and is being brought to market by a start-up or other small-scale innovator, the financing landscape in Europe remains healthy, with private early-stage finance **on track**. However, investment levels decreased in 2023-2024, warning of troubles ahead for the cleantech ecosystem.

Policy context: The current policies are **likely to advance progress but not at the required scale** in light of recent downturns in investment. The EU Innovation Fund is a key tool for supporting private investment in clean tech R&D and early-stage deployment, particularly through grants for small and medium projects (Humphreys, 2023b). The European Investment Bank also plays a vital role, with InvestEU and Venture Debt helping to de-risk early-stage projects. Proposals under the Clean Industrial Deal, including boosting InvestEU's risk-bearing capacity (EC, 2025am), could support this enabler remaining on track, but success depends on the design and scale of public support. Both the CID and 2025 Competitiveness Compass announce a forthcoming Startup and Scaleup Strategy to tackle financial and regulatory barriers (EC, 2025k, 2025am). The proposed Savings and Investment Union could further aid high-risk cleantech investment and harmonise regulation for cross-border scale-ups (BDF, 2025).

Areas of action: To support cleantech scale-ups, the EU should better fund financial instruments that catalyse public R&D investment and early-stage technology demonstration. Strengthening support through the EIB via InvestEU and enabling a broader use of loans, guarantees, quasi-equity, and equity could better crowd in private investment (Humphreys, 2024). The Clean Industrial Deal (CID), while promising, prioritises industrial decarbonisation over support for innovative clean technologies and SMEs in its policy proposals and funding instruments, most notably the Industrial Decarbonisation Bank, leaving a need to provide a similar scale of support for cleantech. Strengthening existing programmes targeted at the scale-up of innovative companies, most notably the EU Innovation Council, would be another important step.

Enabler 3: Increasing clean technology uptake

Indicators:

- Share of green public procurement
- Cleantech scale-up finance
- Battery manufacturing capacity

Past progress: The greatest decarbonisation potential lies in scaling up the most mature clean technologies, and while progress remains on track, 2024 has been a year of significant headwinds. Battery manufacturing – the sector with the highest investment needs – has continued to grow and remains on track to meet the 2030 NZIA targets (as is wind, although solar PVs, electrolysers and heat pumps are far too slow. However, the sector is increasingly volatile, with 11 of 16 planned gigafactories cancelled or delayed, driven by delayed expansions of existing manufacturing plants (Nicola et al., 2024). Scale-up finance remains on track but is also faltering: investment peaked in 2021 and has since dropped by 35% (adjusted for inflation).

Policy context: The EU's current policy package is likely to advance clean technology industrialisation but not at the required scale. The NZIA and Critical Raw Materials Act set production targets, but their impact is uncertain as implementation remains in an early stage. The NZIA's new sustainability and resilience criteria for auctions and procurement may have limited effect, as many calls will be exempted on price grounds. Investment platforms like the Innovation Fund and InvestEU provide important funding (Humphreys, 2023b) but the 2023 STEP fund added little targeted support (Simon, 2024). The Clean Industrial Deal could strengthen the EU's cleantech policy mix by introducing European preference criteria, prioritising cleantech projects with the Clean Industrial Deal State Aid Framework, and coordinating industrial policy through the Competitiveness Coordination Tool – although whether this will be enough to support the sector as it potentially enters a crisis in the coming years remains to be seen.

Areas of action: To continue past momentum and shore up strategic industries, Member States must fully implement the NZIA. The EU should mandate green public procurement by revising the Public Procurement Directive to prioritise sustainability and resilience over price alone. Ensuring Member States have the capacity to process permits and address skills shortages is also essential to expand cleantech manufacturing and create sustained demand for European industry. The European Competitiveness Fund should simplify the EU public finance landscape and act as a vehicle to improve industrial policy coordination (Kammer et al., 2024).

Table 32: Details on Clean Technologies indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Developing manufacturing capacity and innovation leadership						
The policy package is likely to maintain sufficient advancement						
Clean technology industry added value [mEUR 2024]		2016-2021 (Eurostat, 2024e)	5.4%	8259.5 mEUR	n/a	n/a
Eco-innovation related patents [number/million inhabitants]		2014-2024 (EC, 2024f)	- 4.4%	- 4.1 number/ million inhabitants	n/a	n/a
ENABLER 1: Fostering research excellence						
The policy package is likely to maintain sufficient advancement						
Eco-innovation related publications [number/million inhabitants]		2019-2024 (EC, 2024f)	5.8%	12.6 number/ million inhabitants	n/a	n/a
Public funds for environmental and energy R&D [mEUR2023]		2018-2023 (IEA, 2024b)	11.6%	241.3 mEUR	n/a	n/a
ENABLER 2: Bringing innovation to market with private resources						
The policy package is likely to advance progress but not at the required scale						
Private energy R&I spending [mEUR2024]		2014-2019 (EC, 2024m)	7.5%	1104.4 mEUR	n/a	n/a
Early-stage private cleantech investment [mEUR 2024]		2019-2024 (Cleantech for Europe, 2025)	24.4%	531.6 mEUR	n/a	n/a
ENABLER 3: Increasing clean technology uptake						
The policy package is likely to advance progress but not at the required scale						
Share of green public procurement [n/a]		n/a	n/a	n/a	n/a	n/a
Cleantech scale-up finance [mEUR 2024]		2019-2024 (Cleantech for Europe, 2025)	10.2%	638.1 mEUR	n/a	n/a
Battery manufacturing capacity [GWh/year]		2019-2024 (Calipel et al., 2025)	151.7%	49.5 GWh	550 GWh in 2030 (EC, 2023m)	42.9 GWh → on track

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.9 Finance

Redirecting financial flows towards the transition is essential to put the EU on track to achieve climate neutrality by 2050. This includes both public and private investment flows.

Table 33: Progress in Finance

OBJECTIVE	INDICATORS	POLICY
Finance climate change mitigation		

ENABLERS	INDICATORS	POLICY
Channelling public funds away from fossil fuels and towards climate neutrality		
Modifying market prices through public intervention		
Shifting the banking system towards climate-friendly financing		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Finance

Past progress: Efforts to direct financial flows toward the net zero transition in the European Union (EU) were heading in the wrong direction in the assessed period, resulting in no change to last year's progress classification. This is primarily due to the significant climate investment gap hindering the EU from achieving its climate objectives by 2030. This gap amounted to EUR 344 billion in 2023 for the energy, buildings, transport, and cleantech manufacturing sectors – representing 40% of the needed investments between now and 2030 to achieve these targets. At the same time, fossil fuel subsidies rose by 19% in 2023 (compared to 2022 levels), reaching EUR 242 billion. Finally, information regarding the amount of green transition financing by banking institutions remains limited, with the reporting quality and the publication of transition plans largely uncertain.

Policy context: There are currently no regulations that coordinate an efficient redirection of both public and private financing towards EU climate objectives to close the climate investment gap. However, the EU and Member States (MS) have implemented several measures, such as carbon taxation, public subsidies, the Carbon Border Adjustment Mechanism (CBAM), and financial regulations, to redirect financial flows towards a low-carbon economy. The EU's 8th Environmental Action Programme urged Member States to phase-out fossil fuel subsidies as soon as possible, but no sanctions are imposed on MS for non-compliance. With the adoption of the Corporate Sustainability Due Diligence Directive (CSRD) in 2023, and the revision of the Capital Requirement Directive (CRD) in 2023, banking transition should become progressively mandatory. The simplification of the CSRD envisioned by the Omnibus package in 2025 foresees a review of European Sustainability Reporting Standards (ESRS), but as of now it is unclear how this will modify reporting obligations of large banks (EC, 2025z). Furthermore, the Commission deleted the publication of sectorial standards. Due to the specific features of the banking sector, it is unclear whether existing standards sufficiently monitor banks' activities related to transition financing.

Areas of action: Given its significance, the climate investment gap must be urgently addressed, as failure to do so risks undermining the Green Deal and the Clean Industrial Deal. Bridging this gap will require comprehensive public policy that leverages existing regulations, such as carbon pricing systems, alongside enhanced public finance schemes and financial regulations to mobilise both public and private investments. An EU long-term climate investment plan could help bridge the gap in climate investment by effectively coordinating public funding and private financing. This is particularly important as the Recovery and Resilience Facility (RRF) is set to end in late 2026, and there is no successor designated yet. To achieve EU climate targets by 2030, it is also essential that MS cease their fossil fuel subsidies as quickly as possible. Finally, although legislative progress has been made in recent years on the obligation for banks to publish transition plans, further clarification is needed regarding the publication timeline and the effectiveness of these plans in enabling banks to better finance the transition.

Objective: Financing climate change mitigation

Indicators:
- Climate investment gap
- Climate-hostile financial flows
- Investments in fossil fuel supply

Past progress: Progress towards the objective of financing climate change mitigation was too slow. In this assessment period, climate investments in the European energy, buildings, transport, and cleantech manufacturing sectors reached EUR 498 billion. After years of significant growth (+26.2% in 2021 and +11.8% in 2022), this represents a modest increase of just 1.5% compared to the previous year. Despite these investments, the EU is still far from reaching its 2030 climate and industrial policy objectives, which would require an average annual investment of EUR 842 billion between 2025 and 2030, leaving a EUR 344 billion investment gap (Calipel et al., 2025). At a more granular level, almost all sectors of the EU economy suffered from climate investment gaps of varying sizes. Although there is no data on climate-hostile investments, investment in fossil fuel supply infrastructures indicates that the current trajectory remains misaligned with transition goals. In 2023, these investments in fossil fuels – including EUR 27 billion in the oil and gas industry and EUR 6 billion in liquefied natural gas (LNG) facilities – highlighted this trend (IEA, 2024d; WBG, 2025). These investments grew by 7.7% during the 2021–2023 period compared to the 2016–2020 period (in constant euros), and the International Energy Agency (IEA) expects an additional 6.7% increase in 2024 alone.

Policy context: The EU has taken important steps to shift investments away from hostile financing toward climate-friendly projects, and existing policies are likely to advance progress but not at the required scale. The EU still lacks a long-term climate investment strategy to meet its green targets, and recent political developments suggest shifting investment priorities from EU policymakers. For example, the European Commission proposed to reallocate a portion of the resources available under the Cohesion Funds towards defence-related investment (EC, 2025v). There are, however, also some positive developments. The European Commission's Clean Industrial Deal proposes the creation of a Competitiveness Fund, embedded in the next Multiannual Financial Framework (MFF) (2028–2034) (EC, 2025am). However, its scope will likely embed only climate investments that have a direct impact on EU competitiveness. Regarding MS public investment, the European spending rules, established by the Stability and Growth Pact (SGP), constrain MS' budgets to a 3% deficit-to-GDP ratio and 60% debt-to-GDP ratio. These limits may restrict the ability of MS to finance green projects (EP, 2024).

Areas of action: At the beginning of her new mandate in July 2024, Ursula von der Leyen indicated that the focus of the next Commission will be 'on implementation and investment to make the European Green Deal happen on the ground' (von der Leyen, 2024b). The proposed Competitiveness Fund has the potential to accelerate climate investments, but it alone will not be sufficient to close the climate investment gap. Other sections of the MFF could be used as well, such as Connecting Europe Facility or the Cohesion Fund. In parallel, the EU should plan for a successor to the Next Generation EU (NGEU), which is set to expire in late 2026, to maintain a fiscal instrument for climate investments. Closing the climate investment gap requires a comprehensive approach that involves better utilisation of existing tools (such as carbon pricing systems, public finance schemes or financial regulation) to scale up private investment. A focus on a long-term EU climate investment plan could be one of the central measures for the new mandate.

Enabler 1: Channelling public funds away from fossil fuels and towards climate neutrality

Indicators:

- Public climate subsidies
- Subsidies to renewable energies
- Fossil-fuel subsidies

Past progress: During the assessment period, progress towards channelling public funds away from fossil fuels and towards climate was heading in the **wrong direction**. There are currently no official aggregated data at the EU level covering all climate subsidies. Partial data are available for subsidies granted to renewable energies. In 2023, renewable energy subsidies amounted to EUR 61 billion, a 9% drop compared to 2022 (EC, 2025ad). This decrease is mainly due to high wholesale electricity prices, which have approached or even exceeded the reference tariffs set through Feed-in Premiums (FiPs) and Contracts for Difference (CfDs), leading to minimal subsidy payments by Member States. Whilst the reason for the reduction in subsidies may appear to be a positive development, the investment deficit in this sector remains significant (EUR 122 billion in 2022) (Calipel et al., 2024). This prompts the question of whether these public support instruments are the most effective means of assisting the sector.

Conversely, EU fossil fuel subsidies (FFS) continued to increase in 2023, reaching EUR 242 billion (+19% vs 2022). The escalation of FFS began in 2020 as energy prices soared following the war in Ukraine. However, significant disparities exist among MS. Germany saw a sharp increase in FFS, up to 300% in 2023, due to an economic shield implemented by the Federal Government to cap energy prices and subsidies for LNG infrastructure (BRg, 2022). In contrast, Italy, after tripling its FFS in 2022, reduced them by 40% in 2023. This was the result of fiscal reforms aimed at phasing out environmentally harmful subsidies and aligning fossil fuel taxation with climate objectives (MASE, 2024).

Policy context: The policy context is **likely to advance progress but not at the required scale**. The EU's 8th Environmental Action Programme (EAP) urged MS to phase out fossil fuel subsidies as soon as possible but its target and objectives do not create legal obligations for MS. In the Clean Industrial Deal, unveiled in February 2025, the Commission announced the intended scale-down and phase-out of fossil fuel subsidies. Moreover, European institutions are currently negotiating the revision of the Energy Taxation Directive (ETD), with the possibility of ending preferential tax treatment for fossil fuels and taxing energy sources based on their environmental performance (EP, 2025c). The updated Renewable Energy Directive (RED III), in effect since 2023, sets a framework for establishing cost-effective, market-based support schemes for renewable energy deployment (EC, 2025aj).

Areas of action: To enable the redirection of financial flows from fossil assets to climate-neutral ones, it is essential that fossil fuel subsidies are replaced by climate-friendly subsidies as soon as possible. More pressure should be put on MS to publish action plans with clear dates for phasing out fossil fuel subsidies and with information about how they will ensure this happens. Furthermore, the ETD should be revised to exclude the tax exemptions for fossil fuels in the aviation and maritime sectors.

Enabler 2: Modifying market prices through public intervention and raising revenues for climate action

Indicators:

- Share of greenhouse gas (GHG) emissions covered by an explicit carbon market price or tax
- Share of EU Emissions Trading System (ETS) revenues directed towards green investments

Past progress: Progress towards adjusting market prices through public intervention was found to be too slow in the assessment period. In 2024, 58% of EU greenhouse gas (GHG) emissions were covered by a carbon price, yet only 35% were subject to an 'explicit' carbon price (i.e., without reduced rates or free allowances) (I4CE, 2025). While carbon pricing coverage has expanded over the years, the effectiveness of these mechanisms in incentivising decarbonisation remains uneven across the EU (EEB, 2021). Moreover, although since 2023 MS are required to allocate 100% of their revenues from the EU ETS in energy- and climate-related projects, this is still not fully implemented (EEA, 2024j). In 2023, MS disbursed 72% of revenues for energy and climate purposes (EEA, 2024j).

Policy context: Carbon pricing policies in place are likely to advance progress, whereas those for increasing the use of EU ETS auction revenues are not at the required scale. In April 2023, the EU adopted a revision of the EU ETS Directive and established a new ETS (ETS2) that covers road transport and buildings. This revision includes a gradual phase out of free allowances, especially with the implementation of the Carbon Border Adjustment Mechanism (CBAM). This could significantly increase the EU GHG emissions coverage to around 75% (ETS Directive, 2023). Since 2023, all ETS revenues must be allocated to climate- and energy-related purposes (EEA, 2024j). As established by Articles 10(3) and 10a(6) of the EU ETS Directive, maintained by the 2023 revision, MS may also use up to 25% of ETS revenues to compensate for indirect emissions of electro-intensive sectors (ETS Directive, 2023). Despite these measures, transparency and accountability in reporting how EU ETS revenues are spent remain inadequate.

Areas of action: The revision of the EU ETS Directive will impact both households and businesses. Member States may use the ETS2 revenues to support structural measures and investments to help households and businesses decarbonise their activities or their assets (European Commission, 2025). The role of the Social Climate Fund will be fundamental, and the EU should ensure adequate funding to support vulnerable groups in the transition. Member States should also develop better tools for the planning and management of auction revenues and expenditures (Bellisai and Scano, 2025). To improve transparency and traceability, the EU should set up a strong framework to improve reporting on the allocation and spending of these revenues (Bellisai and Scano, 2025).

Enabler 3: Shifting the banking system towards climate-friendly financing

Indicators:

- Share of banks with a sound transition plan
- Share of new banking lending flows aligned with the Paris agreement
- Share of green bonds issued by governments and corporations

The financial sector plays a crucial role in financing the transition. While equity investors, such as investment funds and asset owners, primarily base their investment decisions on public policies that impact project profitability, banks focus mainly on individual and systemic risks associated with the investment. As the effects of public policies on project profitability are examined in other sections of this report (carbon pricing, public subsidies, boosting demand, etc.), this section focuses specifically on policies that shape the activities of the banking sector.

Past progress: There are currently no EU-level indicators to effectively assess the banking system's alignment with climate neutrality, raising concerns over its opaque transition strategies. Banks do not seem to be structuring their financing strategies around an analysis of companies' transition plans, as suggested by Glasgow Financial Alliance for Net Zero (GFANZ), and only a minority of banks include their off-balance sheet activities in their target-setting (Nguyen and Tran, 2024). Greater transparency is needed to track how banks plan to finance their own transition and that of the wider economy. Sound transition plans will be good instruments to do that (Elderson, 2024). Nonetheless, some progress is evident by looking at the growth in green bond issuance. While the share of green bond issuance by governments and corporations has grown recently – from 0.3% in 2014 to 9.2% in 2022 before dropping to 6.8% in 2023 (EEA, 2024e) – it remains an imperfect but useful signal of rising environmental ambition in finance. The EU Platform on Sustainable Finance indicated that taxonomy-aligned loans amounted to EUR 443 billion in 2024 (EUPSF, 2025).

Policy context: The policies are **likely to advance progress in the financial sector but not at the required scale**. The Corporate Sustainability Reporting Directive (CSRD), together with the 2023 revision of the Capital Requirements Directive (CRD), and the Corporate Sustainability Due Diligence Directive (CSDDD) plan to make transition plans progressively mandatory (CRD, 2024; CSDDD, 2024; CSRD, 2022). However, in February 2025, the European Commission published the Omnibus package to streamline and simplify the financial regulatory environment (EC, 2025z). The simplification of the CSRD foresees a review of European Sustainability Reporting Standards (ESRS), but as of now it is unclear how far this will modify reporting obligations of large banks (EC, 2025z). The proposed revision of the CSDDD kept the obligation for credit institutions to adopt transition plans but removed the obligation to implement them (EC, 2025ab).

Areas of action: Reporting and prudential requirements from the CSRD and the CRD would ensure comparability, standardisation, and transparency, granting certainty to investors and regulators (M. Costa, 2025). The proposed Omnibus package could weaken oversight of the banking sector, as the Commission's decision not to publish sector-specific standards may reduce scrutiny of banks' financing of fossil fuels. While there is room to simplify and update the rules, the Omnibus package must not lower the ambition.

Table 34: Details on Finance indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Financing climate change mitigation						
The policy package is likely to advance progress but not at the required scale						
Climate investment gap [bnEUR2023]		2023 (Calipel et al., 2025)	n/a	n/a	0% as soon as possible	n/a
Climate-hostile financial flows [mEUR 2023]		n/a	n/a	n/a	n/a	n/a
Investments in fossil fuel supply [mEUR2023]		2023 (IEA, 2024d)	8.4%	1,958 mEUR 2023 per year	n/a	n/a
ENABLER 1: Channelling public funds away from fossil fuels and towards climate neutrality						
The policy package is likely to advance progress but not at the required scale						
Public climate subsidies [mEUR2023]		n/a	n/a	n/a	n/a	n/a
Subsidies to renewable energies [mEUR2023]		2018-2023 (EC, 2025ad)	-5.3%	-4,171 mEUR 2023	n/a	n/a
Fossil-fuel subsidies [mEUR2023]		2018-2023 (OECD and IISD, 2025)	56.6%	38,157 mEUR 2023	0 EUR by 2025 (8th EAP, 2022)	-121,349 mEUR 2023 → needs U-turn
ENABLER 2: Modifying market prices through public intervention						
The policy package is likely to advance progress but not at the required scale						
Share of greenhouse gas (GHG) emissions covered by an explicit carbon market price or tax [%]		2023 (I4CE, 2025)	n/a	n/a	n/a	n/a
Share of EU Emissions Trading System (ETS) revenues directed towards green investments [%]		2018-2023 (EEA, 2024j; I4CE, 2025)	2.1%	1%-points	100% as soon as possible (ETS Directive, 2023)	16%-points (2023-2025) → 12 times faster
ENABLER 3: Shifting private finance towards climate-friendly financing						
The policy package is likely to advance progress but not at the required scale						
Share of banks with a sound transition plan [%]		n/a	n/a	n/a	n/a	n/a
Share of new banking lending flows aligned with the Paris agreement [%]		n/a	n/a	n/a	n/a	n/a
Share of green bonds issued by governments and corporations [%]		2018-2023 (EEA, 2024e)	31.4%	1.3 % -points	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.10 Just and Fair Transition

Just transition refers to designing and executing the shift to climate neutrality in a fair and inclusive way, ensuring no one is 'left behind'. Job opportunities, regional policies, and managing distributional effects are essential to the process.

Table 35: Progress in Just and Fair Transition

OBJECTIVE	INDICATORS	POLICY
Leaving no region and no individual behind		

ENABLERS	INDICATORS	POLICY
Creating job opportunities		
Fostering regional just transition policies		
Supporting vulnerable groups with the right policy mix		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Just and Fair Transition

Past progress: The progress towards a just and fair transition remained too slow with some negative developments compared to our previous assessment, notably on poverty-related indicators. European citizens continue to feel the impacts of the 2021-2022 energy crisis and the dependence on volatile fossil fuels markets, and electricity has become less affordable in recent years. Energy efficiency subsidies have not risen sufficiently to help citizens reduce their energy consumption and cope with increased prices. As in the previous year, positive developments were observed for the enabler, 'creating job opportunities', with employment trends in regions and in environmental goods and services on track.

Policy context: There are uncertainties as to whether a just and fair transition will be prioritised in the coming years, including in the context of the upcoming Multiannual Financial Framework (MFF) negotiations, given a lack of concrete funding commitments, calls for deregulation, and the shift in the EU's budget to focus on defence spending. Moreover, the EU's just and fair transition framework remains fragmented and incoherent; key climate and economic governance tools, such as the national energy and climate plans (NECP), do not properly include just and fair transition perspectives (Augustowski et al., 2025). Nonetheless, there are existing and upcoming policies that are likely to improve progress towards a just and fair transition. The social dimension of the European Semester, the Social Convergence Framework, remains an important tool to improve the situation. The skills and employment dimensions are clearly present in new EC flagship initiatives (EC, 2025am), and there is also awareness of the need to lower energy prices (EC, 2025c). Still, there is a risk the focus will remain too narrow. The funds available in the Social Climate Fund (SCF, 2023), the Resilience and Recovery Facility (RRF, 2021), and the Just Transition Fund (JTF, 2021) will likely boost support for the most vulnerable regions and individuals. But even these funding instruments are insufficient to address long-term needs.

Areas of action: Securing increased long-term funding in the new MFF for measures relating to the just and fair transition is necessary to ensure support for the regions and groups most vulnerable to transition. This could be operationalised through a continuation of the JTF and SCF, respectively. Member States (MS) should put emphasis on the implementation of the Council Recommendations on Fair Transition (EUCO, 2021). Moreover, the upcoming European Pillar of Social Rights Action Plan (EPSR AP) and the Citizens Energy Package should be used to include the just and fair transition in national and EU climate and economic frameworks. The implementation of the EU Emission Trading System (ETS2) in the building and transport sectors presents some risks to a fair transition, which should be addressed by introducing stronger protections for the most vulnerable groups. To ensure this happens, there should be a greater focus on technical support to increase the administrative capacity of MS to develop effective policies. Also, more focus should be dedicated to limiting transport poverty in policy planning and implementation.

Objective: Leaving no region and no individual behind

Indicators:

- Regional poverty rate
- Average of four relevant sub-indicators on the material deprivation rate

Past progress: Progress was mixed, with a less positive assessment than last year. Trends on poverty reduction, as measured by four indicators related to material deprivation, were headed in the **wrong direction**, with low-income households reporting smaller deterioration. Since 2019, Europeans' ability to keep their home adequately warm worsened – in 2023, 10.6% of the EU population faced this issue. The trend can be partly explained by increased energy prices following the energy crisis, which is rooted in EU dependence on fossil fuel imports. Actions to derisk policies – such as improving energy efficiency in the residential building sector – have not been sufficient to mitigate energy security challenges effectively. Meanwhile, the decrease in poverty across EU regions most vulnerable to the energy transition has slowed but remains on track to reach the EU's overall poverty reduction target of at least 15 million by 2030 (EC, 2021i). Notably, there was clear progress in job creation.

Policy context: Existing and proposed EU policies are **likely to advance progress but not at the required scale** due to a lack of long-term certainty in access to EU funding. EU cohesion policy, the JTF, the Technical Support Instrument, and the RRF are some of the most important policies working towards leaving no region and no individual behind. Through November 2024, around 30% of achieved milestones and targets in the Recovery and Resilience Plans were closely related to the social dimension (EC, 2024a). Also, the EPSR AP, the Pact for European Social Dialogue, and the European Semester still guide the EU and MS towards policy-making that includes the social dimension (EC, 2021i). There are positive signs in the recent EC initiatives, acknowledging the importance of the affordability of energy and the quality of jobs (EC, 2025am). The EC's newly announced European Fair Transition Observatory will help to improve data-driven policy-making working towards just transition objectives, despite the moderate level of resources allocated to it (EC, 2025am). In addition, SCF implementation is expected to be a game-changer in terms of tangible support for vulnerable populations. At the same time, if the measures are not effectively designed and implemented, the most vulnerable will be at risk of negative impacts from the introduction of EU ETS2.

Areas of action: The possible Governance Regulation revision (EC, 2024l) and monitoring of the implementation of the Council Recommendations on Fair Transition (EUCO, 2021) present key opportunities at EU level to emphasise the importance of a just and fair transition in policy-making. To support EU objectives, it is key to ensure the effective implementation of Territorial Just Transition Plans and the right policy mix in the Social Climate Plans (SCPs), with robust public participation. It is also important to pressure MS to adequately plan how to spend EU ETS2 revenues from the building and transport sectors. More action is needed to enhance energy efficiency in buildings and improve public transport services. Proper implementation of the RRF and adequate design of a Sustainable Transport Investment Plan should bring more policy focus to transport-related vulnerabilities in society. Finally, the long-term certainty of significant EU funding in the social dimension should be ensured.

Enabler 1: Creating job opportunities

Indicators:

- Employment in environmental goods and services
- Employment rate in regions
- Employment in renewable energy supply-chains

Overall employment growth is key both for competitiveness and for a just and fair transition that is supported by a large cross-section of society. It is crucial that this progress stems from job creation in the environmental goods and services sector, especially in regions at risk of a sudden surge of unemployment in this period of economic evolution.

Past progress: Progress on creating job opportunities to enable a just and fair transition was found to be on track. In 2023, employment in the environmental goods and services sector surpassed 2 million full-time equivalents (FTE) for the first time. At nearly 77% in 2023, the employment rate in the EU's vulnerable regions in transition was on track, progressing toward the 2030 EU target of 78% employment among people aged 20 to 64 set forth in the EPSR AP. These positive developments in terms of employment are in line with the narrative of the Competitiveness Compass, which highlights that the overall employment rate reached record levels of around 75% (EC, 2025ai). A key factor behind the positive trend is that employment did not significantly decline during the COVID-19 pandemic and energy crisis thanks to emergency measures across the EU that shielded businesses and promoted job retention. Furthermore, around 90% of employment growth in 2023 resulted from labour force growth (EC, 2024a).

Policy context: Existing and proposed EU policies are likely to advance progress but not at the required scale, as much remains unclear about how they will shape up in practice. The EC has placed employment and skills high on the EU agenda, identifying it as one of six core business drivers, i.e., 'skills and quality jobs for social fairness and a just transition' (EC, 2025am). Relevant flagship actions include: the Union of Skills, Quality Jobs Roadmap and Skills Portability Initiative, and an aim of reducing the shortage of specific skills needed for the green transition (EC, 2025am). One of the important EC initiatives already in force is the European Skills Agenda, under which the Pact for Skills was launched in 2020 (EC, 2020a). Under the Pact, around 1.5 million people took part in upskilling or reskilling activities in 2023 (EC, 2024j). Additionally, the JTF plays a crucial role in job creation, with over EUR 800 million planned for the 'adaptation to change of workers, firms, and entrepreneurs' and EUR 640 million for 'access to employment' (EC, 2025f). Another significant policy is the RRF, which could increase employment by up to 0.8% in the short term (EC, 2024u). Moreover, a range of measures in the Energy Performance of Building Directive (EPBD, 2024) and some of the funding in the SCF and RRF will likely drive job creation in the building renovation sector.

Areas of action: Securing long-term funding for reskilling and new job opportunities is crucial, especially in the context of the expiration of the RRF and JTF. Additionally, the effective implementation of the SCF and EPBD will be important for boosting job creation in the building renovation sector. For the new policy cycle to be effective, there needs to be a comprehensive revision of past policies targeting green job creation. It is also worth noting that there is still a significant gap in the availability of quality data on investment in and the uptake of green skills.

Enabler 2: Fostering regional just transition policies

Regions in transition, such as coal mining or carbon-intensive industry regions, need effective and tailored policies to drive socio-economic growth and enhance their competitiveness in the transition to climate neutrality.

Indicators:

- JTF progress implementation
- Competitiveness performance of regions in transition

Past progress: The direction of change in fostering regional just transition policies is ambiguous (see Table 36). On the one hand, the EU Regional Competitiveness Index – which measures competitiveness not only in terms of economic conditions for businesses but also through the broader long-term attractiveness of living and working – has shown a slight decrease. On the other, the implementation of the JTF through Territorial Just Transition Plans (TJTP) is an ongoing effort. Since 2023, all TJTPs have been accepted by the EC. The total financial resources allocated to selected projects increased to EUR 8.3 billion (31% of the JTF) in October 2024 from EUR 1.7 billion (6.2%) in December 2023 (EC, 2025f). At the same time, the expenditure reported by the selected projects grew from EUR 48 million to EUR 263 million, though it remains a small amount compared to the total JTF budget of EUR 26.6 billion. However, there is still not enough data to assess the rate of progress in fostering regional just transition policies.

Policy context: Existing and proposed policies are **likely to advance progress on regional development in vulnerable regions in the short term, but not at the required scale** due to a lack of long-term certainty. The JTF is the flagship initiative for regional development, funding the implementation of TJTPs. These plans, developed by MS and regional authorities, outline a vision for sustainable development in the regions. Nevertheless, there is uncertainty regarding future regional-level funding. Monitoring of the general progress of JTF spending and fostering common transnational cooperation between regions are available through the Just Transition Platform.

Areas of action: As the MFF, JTF, and RRF come to an end, there is a substantial level of uncertainty surrounding future access to funds necessary to ensure long-term socio-economic development in vulnerable regions. Furthermore, the Just Transition Platform, which should help regions to increase the absorption rate of the JTF, has yet to adequately track the progress of the implementation of the TJTPs towards achieving their objectives. As highlighted in a recent assessment, NECPs do not sufficiently focus on the regional level, and there is a lack of alignment between them and the TJTPs (Augustowski et al., 2025). These inconsistencies, coupled with the lack of a strategic vision regarding the development of regions in transition, should be addressed in the planning process of the next guidelines for NECPs, the MFF, and any future funding tools, such as the continuation of the JTF and RRF. Coherence with the future Competitiveness Coordination Tool, which will serve to ensure the necessary investments in the industrial transition, is crucial.

Enabler 3: Supporting vulnerable groups with the right policy mix

Indicators:

- Share of support for energy efficiency purposes
- Share of support for households
- Electricity purchasable with household income

Tailored support to citizens most affected by energy costs is crucial for socio-economic growth and bridging social divides. Subsidies should reach households and focus on energy efficiency to help reduce energy demand and offer long-term protection against fossil fuels price hikes.

Past progress: Progress supporting vulnerable groups was found to be mixed (see Table 36), continuing the trend from last year's report. While the level of energy subsidies for households in 2023 was three times higher than in 2021, fossil fuels received around EUR 10 billion more than electricity and renewable energy (EC, 2025a). The increase in the level of subsidies was a result of emergency measures taken to shield European society from the 2021-2022 fossil fuel crisis. Total energy efficiency subsidies only rose to EUR 44 billion in 2023, which resulted in a decrease in the overall share of subsidies targeting energy efficiency. A new indicator on electricity affordability revealed that from 2020 to 2023 the amount of electricity that can be bought for disposable income has declined, meaning that EU society has faced a rising burden to pay the bills.

Policy context: Existing and proposed policies are **likely to advance progress but not at the required scale** due to a lack of long-term certainty in access to substantial funding. Importantly, the upcoming start of the SCF (SCF, 2023), with a maximum budget of EUR 65 billion, is an opportunity for MS to implement policies aimed at shielding citizens struggling with energy and transport poverty, with robust citizens' participation. Additionally, the RRF is expected to bring in new investments that are important for the social dimension of the transition. Moreover, the Affordable Energy Action Plan lists measures that can help lower the price of energy for citizens (EC, 2025c). What is more, the directive on improving the Union's electricity market design emphasises the need for increased protection for vulnerable consumers (EMDD, 2024). Nevertheless, the upcoming implementation of the EU ETS2 for buildings and transport as well as the EPBD pose a challenge in terms of protecting the most vulnerable citizens from potential short-term negative impacts.

Areas of action: The right policy mix in the SCPs is of utmost importance to alleviate energy and transport poverty, and additional technical support from the EU for MS is crucial in the process of implementation – including meaningful public participation. Additional efforts should focus on accelerating the growth of energy efficiency subsidies to vulnerable households with the right balance between short-term support and long-term structural investment. Additionally, more focus should be dedicated to mobility. Public transport outside of the largest cities needs to become more accessible and affordable, with both SCP and RRF targeting improvements in the area. Also, there is significant room for improvement in data availability and quality regarding transport poverty (Cludius et al., 2024). Another action point is increasing the flexibility of how MS can use EU funds. To effectively address sources of poverty and vulnerability, it is often necessary to allocate substantial funds for technical assistance.

Table 36: Details on Just and Fair Transition indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Leaving no region and no individual behind						
The policy package is likely to advance progress but not at the required scale						
Regional poverty rate [%]		2018-2023 (Eurostat, 2025w)	-0.8%	-0.2%-points	18.3% by 2030 (EC, 2021i)	-0.2%-points → 1.4 times faster
Average of four relevant sub-indicators on the material deprivation rate [%]		2018-2023 (Eurostat, 2025p, 2025a, 2025q, 2025o)	2.1%	0.3%-points	9.1% by 2030 (EC, 2021i)	-0.8%-points → needs U-turn
ENABLER 1: Creating job opportunities						
The policy package is likely to advance progress but not at the required scale						
Employment in environmental goods and services [full-time equivalent jobs]		2017-2022 (Eurostat, 2025f)	10.2%	188,829 FTE	n/a	n/a
Employment rate in regions [%]		2018-2023 (Eurostat, 2024c)	0.9%	0.7%-points	78% by 2030 (EC, 2021i)	0.2%-points → on track
Employment in renewable energy supply-chains [full-time equivalent jobs]		2018-2023 (EurObserv'ER, 2024)	7.5%	106,714 FTE	n/a	n/a
ENABLER 2: Fostering regional just transition policies						
The policy package is likely to advance progress but not at the required scale						
JTF progress implementation [mEUR]		n/a	n/a	n/a	n/a	n/a
Competitiveness performance of regions in transition [score]		2016, 2019, 2022 (EC, 2023c)	-0.1%	-0.1 index	n/a	n/a
ENABLER 3: Supporting vulnerable groups with the right policy mix						
The policy package is likely to advance progress but not at the required scale						
Share of support for energy efficiency purposes [%]		2018-2023 (EC, 2025a)	-0.5%	-0.05%-points	n/a	n/a
Share of support for households [%]		2018-2023 (EC, 2025a)	26.9%	3.9%-points	n/a	n/a
Electricity purchasable with household income [kWh]		2018-2023 (Eurostat, 2025d, 2025t)	-4.8%	-3,642 kWh	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.11 Governance

Governance refers to the institutions, procedures, and frameworks used by EU and national governments to manage and guide policy-making and foster societal buy-in to the transition to climate neutrality.

Table 37: Progress on Governance

OBJECTIVE	INDICATORS	POLICY
Establishing and implementing a comprehensive framework and fostering societal buy-in		

ENABLERS	INDICATORS	POLICY
Providing a clear vision and accountability		
Ensuring a consistent, all-of-government approach		
Promoting meaningful stakeholder and public participation		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Governance

Past progress: Progress on EU climate governance was too slow. The introduction of new indicators added deeper insights and contributed to a more sobering outlook compared to last year's report, especially regarding the implementation of existing governance processes. At the Member State (MS) level, national energy and climate plans (NECPs) and progress reports (NECPRs) suffer from delays, low ambition, and lack of detail. Long-term strategies (LTS) have seen few updates. National reporting on required multi-level dialogues for climate and energy is particularly poor, and available information points to weak participation processes across MS. Although required, the EC has only partially assessed new Union measures for consistency with climate neutrality. Still, there are reasons for cautious optimism, such as the continued build-out of national institutions, stable public support for the transition, and the increased adoption of science-based climate neutrality goals in the private sector. Moreover, most EU countries have set a target date for reaching climate neutrality, with over half legally binding.

Policy context: The EU's acute focus on economic fitness has come with an emerging parallel framework to advance the priorities of the Competitiveness Compass and Clean Industrial Deal, including monitoring, coordination, and participation mechanisms. Limited integration with existing climate policy processes and weak synergies with the European Semester risk siloed governance of the EC's twin goals of competitiveness and decarbonisation. The new simplification agenda might streamline existing instruments, but to date, specific measures have been criticised for weakening regulation, especially regarding corporate sustainability reporting and due diligence (CAN-E, 2025c; WWF, 2025). Developments in the EU's just transition framework have the potential to advance social considerations. Relevant here are the Just Transition and Social Climate Funds (JTF, 2021; SCF, 2023) as well as new initiatives, such as the Affordable Energy Action Plan, Union of Skills, European Fair Transition Observatory, Quality Jobs Roadmap, and review of the European Pillar of Social Rights Action Plan.

Areas of action: The ongoing review of the Governance Regulation (GovReg, 2018) and EU Climate Law (ECL, 2021) in parallel to the development of new competitiveness instruments presents an opportunity to better reconcile governance of the EU's climate and economic priorities, particularly regarding better integration of coordination and monitoring tools. At the same time, ensuring robust implementation of current EU requirements remains essential. Enhanced technical support to MS, further specification of legal requirements, and stricter follow-up to ensure adherence, as well as efforts to streamline and reduce administrative burden on MS officials, could help to improve national planning and reporting. A credible long-term vision and meaningful alignment between NECPs and LTSs should be reemphasised to ensure investor certainty. Greater stakeholder and public engagement with transparent follow-up by governments, could help ensure policies are fair and effective and pre-empt pushback in society.

Objective: Establishing and implementing comprehensive frameworks and fostering societal buy-in

Indicators:

- Adoption of climate framework laws at national level
- Timely submission of EU climate planning and reporting obligations by MS
- Public support for the transition to climate neutrality
- EU cities committed under the Covenant of Mayors
- Science-based climate neutrality targets in large EU companies
- Public confidence in the transition to climate neutrality

Past progress: Progress remained mixed. The share of EU GHG emissions covered by national climate laws continued to rise, indicating that the expansion of national frameworks is on track. However, the timeliness of plans and reports by MS to the EU worsened over the same period and is headed in the wrong direction. In 2019, 18 countries submitted final NECPs within a month of the deadline, but in 2024, only nine did so for NECP updates. Public support for the transition has remained stable, but surveys also point to rising scepticism about climate science and declining acceptance of regulation targeting companies (Eurobarometer, 2024a, 2025). Growth in subnational support continued to be too slow. In 2023, the Covenant of Mayors covered 46% of the EU population, up marginally from 44% in 2022. In 2024, 65 EU Fortune Global 2000 companies had net zero targets validated by the Science Based Targets initiative (SBTi). This is only a fraction of the list (22%), but was on track with an average of 21 new companies adopting targets each year.

Policy context: Policy changes are likely to advance progress but not at the required scale and much depends on their effective application. Weak national implementation risks undermining the EU framework, regardless of its strength on paper. Five NECPs were still missing six months past the June 2024 deadline. There are 'considerable differences in the scope and quality' of plans (EC, 2024l, pp. 5–6), a lack of ambition (CAN-E, 2023; EC, 2023d; ECNO, 2025a), internal inconsistencies (ECNO, 2024b), missing distributional impacts (Augustowski et al., 2025; Kögel, 2024), and misalignment with LTSs (Velten et al., 2022). At least five countries have climate laws pending – Estonia, Latvia, Romania, Slovakia, and Slovenia (EI, 2025). Once adopted, these may provide statutory objectives and institutional means to meet them (Dubash et al., 2021). Implementation of the JTF and SCF could shore up societal acceptance (see 4.3), as could the EC's vision for an 'era of dialogue', advancing the European Climate Pact, and a new Pact for Social Dialogue (EC, 2024x, 2025h; JTF, 2021; SCF, 2023). Initiatives like the Union of Skills and Affordable Energy Action Plan as well as 'training and skills conditionalities' on EU funding might likewise increase buy-in (EC, 2025am). The EC's aim to simplify and digitise EU policy coupled with better coordination and transposition guidance via new 'implementation strategies' could improve national practices (EC, 2025b).

See also:

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Areas of action: The success of the EU's climate objectives relies largely on national-level actions (Duwe, 2022). Implementation gaps should be addressed through concerted efforts to enforce timely and detailed plans and reports as well as their swift review (ESABCC, 2024b). Better alignment between timelines, flexibilities to account for national cycles, and refined reporting templates, as well as the further integration of digital tools, could improve national implementation by removing administrative burdens on national officials (Evans et al., 2024; Oberthür, 2024). Finally, higher attention to existing and planned avenues for social dialogue at EU level could help to (re)gain and retain buy-in from citizens, businesses, and local officials.

Enabler 1: Providing a clear vision and accountability

Indicators:

- Up-to-date and compliant long-term strategies (LTS) at national level
- National progress monitoring that can trigger additional action
- Independent scientific advisory bodies at national level
- Climate neutrality targets at national level

The EU's journey to climate neutrality will play out over the next two decades. Clarity on its speed and direction, along with mechanisms to stay on course, are thus important enablers for the transition. A concrete long-term vision provides certainty for investors, while regular progress checks trigger corrective actions and independent watchdogs enhance accountability.

Past progress: Progress on defining a clear vision and accountability for EU climate neutrality was mixed. The adoption of national climate neutrality targets was **on track**. In 2024, 22 countries, accounting for 75% of EU GHG emissions had a date set for net zero, with 15 legally binding. Still, in the same year, only 12 countries had a fully compliant LTS. Progress here was **too slow**, driven by the lack of timely updates. Strategies in seven countries were more than five years old. The adoption of national monitoring systems that can trigger corrective measures stagnated over the period and was **far too slow**. Positively, scientific climate advisory bodies continued to spread with the establishment of the Belgian Committee of Experts in 2024. Yet, despite six new councils since 2019, there have been delays in operation, e.g., in Spain.

See also:

Policy context: New EU policies are **likely to have no impact on progress**, and national-level developments may slow things down. The adoption of a 2040 target will strengthen the EU's commitment and vision for the transition, but a lot rests on the design of the post-2030 framework. The EC has acknowledged the lack of consistency between LTSs and NECPs, in part due to the voluntary nature of the five-year LTS updates (EC, 2024l). Most countries plan to update these every ten years (Evans et al., 2024). The GovReg mandates that LTSs align with EU-wide climate neutrality. However, without an updated EU LTS to define climate neutrality across the economy, countries lack a blueprint (Duwe, 2022). The ECL invites MS to adopt scientific advisory bodies, and the EU Scientific Advisory Board on Climate Change (ESABCC) has recommended these be mandatory (ESABCC, 2024b). New councils (in, e.g., Estonia and pending adoption in Romania) might further progress, depending on their mandate and composition.

Areas of action: More frequent LTS updates, greater integration between NECPs and LTSs, a review process for LTSs (as for NECPs), and technical capacity building at national level would help align short- and long-term planning and enhance clarity on national pathways to climate neutrality (Evans et al., 2024; Oberthür, 2024; Velten et al., 2022). The merger and strengthening of NECPs, LTSs, and other related instruments into a single planning and investment tool, also in the context of the EU simplification and implementation agenda, could streamline requirements, reducing capacity burdens on MS officials (T&E, 2024). New monitoring of progress under the Clean Industrial Deal (EC, 2025am) could provide additional guidance for MS, but it is missing an interface with existing climate governance provisions. Scientific advisory bodies should be equipped for impact with mandated policy input, adequate resources, and a legal requirement for government to respond (Averchenkova et al., 2018). The ESABCC should continue to play a role here, encouraging the uptake of good practice and engaging with national counterparts.

Enabler 2: Ensuring a consistent, all-of-government approach

The transition to climate neutrality affects every part of the EU economy. Key measures to ensure alignment include sectoral planning, impact assessments for new policies, mainstreaming climate into national and EU budgets, as well as inter-agency coordination.

Indicators:

- Green budgeting practices at national level
- Up-to-date strategic climate planning at EU level
- Comprehensive assessment of new EU policies for consistency with climate neutrality

Past progress: The EU remained **on track** towards a consistent, all-of-government approach for climate neutrality. EU strategic planning for key policy areas was further advanced, with the addition of the Industrial Carbon Management Strategy and the EC's 2040 target proposal, the latter serving as a partial update to the EU LTS. Still, in 2023, only 70% of relevant new EU policies were effectively assessed by the EC for their impact on climate neutrality, up from 57% the year before. It was not possible to calculate a trend due to **insufficient data**, but this nonetheless highlights an important weakness in the implementation of a key provision of the ECL. In 2024, there were no new data available on green budgeting practices in MS.

Policy context: Recent policy developments are **likely to advance progress but not at the required scale**. EU strategic climate planning was strengthened over the period assessed. In 2024, a relevant EU strategy or roadmap existed for 11 of ECNO's 13 building blocks. However, those under buildings, finance, external action, and governance were evaluated as providing partial coverage due to a lack of crucial components or narrow focus. Still, a wealth of strategies released by the new EC in early 2025 substantially advanced EU strategic planning, such as the Union of Skills, Competitiveness Compass, Clean Industrial Deal, Affordable Energy Action Plan, and Vision for Agriculture and Food. On green budgeting, the EU projects it will spend EUR 658 billion – 34.3% of its budget – on climate action between 2021 and 2027, exceeding the 30% target (EC, 2025ah). The planned Competitiveness Coordination Tool as well as the 'implementation dialogues' could facilitate further alignment between national actions and at EU level (EC, 2025b, 2025k). On green budgeting, the EU projects it will spend EUR 658 billion – 34.3% of its budget – on climate action between 2021 and 2027, exceeding the 30% target (EC, 2025ag). The planned Competitiveness Coordination Tool as well as the 'implementation dialogues' could facilitate further alignment between national actions and at EU level (EC, 2025b, 2025j).

See also:

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Areas of action: Regular updates to EU strategic planning are needed to reflect economic and technological changes. Updating the EU LTS in light of the EU's strategic priorities under the Competitiveness Compass could be an opportunity for cross-sector dialogue and offer a top-down vision for EU decarbonisation. Given the complementary nature of investments and reforms, the EC should safeguard that the potential streamlining of allocations under the next multiannual financial framework (MFF) and related conditionalities advances climate mainstreaming and funding for the transition. Making access to EU funding under the future MFF conditional on adequate NECPs as 'strategic investment plans' could improve planning quality and consistency (EC, 2025c). MS would benefit from more transparent reporting by the EU on the consistency of national measures with climate neutrality, which was omitted from the EC's 2023 progress report as well as more detailed tracking of EU-wide progress (ECNO, 2025a; McWilliams et al., 2025). In terms of green budgeting, national officials have highlighted technical capacity gaps, underscoring the need for more training and support (EC, 2023p).

Enabler 3: Promoting meaningful stakeholder and public participation

Indicators:

- Citizens' climate assemblies at national level
- Quality of public and stakeholder consultations on EU impact assessments
- Effective implementation of multilevel climate and energy dialogues at national level

Meaningful citizen and stakeholder engagement is key to building acceptance for climate policy. Regular public consultations can foster a sense of societal ownership, while early stakeholder engagement helps design policies that are practical, efficient, and fair in their implementation.

Past progress: Progress on public and stakeholder participation is difficult to assess due to insufficient data, but was found to be too slow following a lack of new citizens' climate assemblies and weak implementation of multi-level dialogues at national level. In 2024, national citizens' climate assemblies convened in the past six years covered 9% of EU GHG emissions, a decline from 21% in 2023. All eight national examples have been one-off, raising questions about recurrence and follow-up, despite anecdotal evidence of impact (Averchenkova et al., 2025). Effective implementation of national multi-level dialogues covered only 55% of EU GHG emissions in 2023, with new data expected in 2025. The quality of public consultations on EU-level climate actions could not be assessed due to the lack of reporting detail (ECNO, 2023). However, in its most recent report, the EU Regulatory Scrutiny Board again flagged 'non-representativeness' and 'unbalanced inclusion of stakeholder feedback' (RSB, 2023, p. 18).

Policy context: Recent and pending developments are likely to have no impact on progress, as they largely represent a continuation of practices. Both the EU and MS are bound by the Aarhus Convention (Aarhus Regulation, 2021), which sets standards for public participation and access to environmental information. The ECL obliges the EC to engage 'all parts of society', drawing on national processes and the European Climate Pact. New biennial 'implementation dialogues' organised by each Commissioner in the context of the EC's simplification agenda have the potential to advance EU-level processes in the short term, and the EC plans to advance a Pact for Social Dialogue (EC, 2024o, 2025b, 2025am). However, the EU is still missing a permanent, formal framework for ongoing public participation (Kulovesi et al., 2024). Assessments of multi-level dialogues and public consultations highlight weak practices at national level (EEB, 2025; Oberthür, Von Homeyer, et al., 2025) and a lack of transparency on effectiveness (EC, 2024l).

Areas of action: Meaningful participation requires adequate governmental attention, time, and resources. All public engagement channels, including new EU-level 'implementation dialogues' and planned consultations under the Clean Industrial Deal, should be designed for impact, ensure diverse representation, and be backed by political follow-up. Limited data on EU consultations highlight the need for better reporting and transparency. Additional resources from the EU for local and national capacity building as well as an expanded role for permanent multi-level dialogues could improve Member State practices (Faber et al., 2024). Finally, the EU should address its non-compliance under the Aarhus Convention, specifically regarding public participation in NECPs and access to justice on state aid (CAN-E, 2025b). Observers have long called for clearer anchoring of Aarhus rights in EU climate governance, which the EU itself acknowledged in 2022 (EC, 2022a; Robert, 2023).

Table 38: Details on Governance indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Establishing and implementing a comprehensive framework and fostering societal buy-in						
The policy package is likely to advance progress but not at the required scale						
Adoption of climate framework laws at national level [% of EU GHG emissions covered]		2019-2024 (EEA, 2025b; EI, 2025; GRI, 2025) 2019-2024 (EEA, 2025b; EI, 2025; GRI, 2025)	7.1%	3.7 %-points	n/a	n/a
Timely submission of EU climate planning and reporting obligations by Member States [% of EU GHG emissions covered]		2019-2024 (CIRCABC, 2025; EC, 2025v; EEA, 2025b) 2019-2024 (CIRCABC, 2025; EC, 2025v; EEA, 2025b)	-4.5%	-2.9 %-points	n/a	n/a
Public support for the transition to climate neutrality [% of EU population]		2018-2023 (Eurobarometer, 2023)	-0.9%	-0.8 %-points	n/a	n/a
EU cities committed under the Covenant of Mayors [% of EU population]		2017-2023 (BALDI ET AL., 2023; EUROSTAT, 2023B)	1.9%	0.8%-points	n/a	n/a
Science-based climate neutrality targets in large EU companies [number of companies]		2019-2024 (Forbes, 2024; SBTi, 2025)	92.1%	20.7 companies	n/a	n/a
Public confidence in the transition to climate neutrality [% of EU population]		2021; 2023 (Eurobarometer, 2023)	n/a	n/a	n/a	n/a
ENABLER 1: Providing a clear vision and accountability						
The policy package is likely to have no impact on progress						
Up-to-date and compliant long-term strategies (LTS) at national level [% of EU GHG emissions covered]		2019-2024 (EC, 2025w, 2025w; EEA, 2025b, 2025b; Ricardo-AEA, 2025, 2025; UNFCCC, 2025, 2025; E. K. Velten et al., 2022, 2022)	25.4%	6.7 %-points	n/a	n/a
National progress monitoring that can trigger additional action [% of EU GHG emissions covered]		2019-2024 (EEA, 2025b, 2025b; EI, 2025, 2025; Evans et al., 2024, 2024; GRI, 2025, 2025)	0.3%	0.2%-points	n/a	n/a
Independent scientific advisory bodies at national level [% of EU GHG emissions covered]		2019-2024 (EEA, 2025b, 2025b; EI, 2025, 2025; Evans et al., 2024, 2024; GRI, 2025, 2025)	8.2%	4.0 %-points	n/a	n/a
Climate neutrality targets at national level [% of EU GHG emissions covered]		2019-2024 (EEA, 2025b, 2025b; EI, 2025, 2025; EP, 2025e, 2025e; Evans et al., 2024, 2024; GRI, 2025, 2025; Ricardo-AEA, 2025, 2025)	11.3%	6.6 %-points	n/a	n/a

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
ENABLER 2: Ensuring a consistent, all-of-government approach						
The policy package is likely to advance progress but not at the required scale						
Green budgeting practices at national level [% of EU GHG emissions covered]		2018-2023 (EC, 2023p, 2023p; EEA, 2025b, 2025b; OECD, 2020, 2020)	10.7%	3.7%-points	n/a	n/a
Up-to-date strategic climate planning at EU level [number of policy areas covered]		2019-2024 (EU, 2025; GRI, 2025)	10.1%	0.7 policy areas covered	n/a	n/a
Comprehensive assessment of new EU policies for consistency with climate neutrality [% of relevant policies assessed]		2022-2023 (RSB, 2023)	n/a	n/a	n/a	n/a
ENABLER 3: Promoting meaningful stakeholder and public participation						
The policy package is likely to have no impact on progress						
Citizens' climate assemblies at national level [% of EU GHG emissions covered]		2019-2024 (EEA, 2025b, 2025b; KNOCA, 2025, 2025)	-0.4%	-0.1 %-points	n/a	n/a
Quality of public and stakeholder consultations on EU impact assessments [Index 1-4]		2018-2023 (RSB, 2023)	n/a	n/a	n/a	n/a
Effective implementation of multilevel climate and energy dialogues at national level [% of EU GHG emissions covered]		2023 (CIRCABC, 2025, 2025; EEA, 2025b, 2025b; Faber et al., 2024, 2024)	n/a	n/a	n/a	n/a

Note: Icons indicate progress classification of this year's progress assessment and coloured lines the change in classification; see Table 45 for further information. n/a indicates that data are not available. To control for year-to-year variation in emissions, shares are calculated from 2015 data and remain static over the period for using EU GHG emission coverage.

Source: ©ECNO.

6.12 Adaptation

Climate adaptation is necessary to respond to unavoidable climate impacts. It requires implementing effective adaptation measures on the ground as well as supportive governance and financial frameworks.

Table 39: Progress in Adaptation

OBJECTIVE	INDICATORS	POLICY
Becoming a climate resilient society		

ENABLERS	INDICATORS	POLICY
Implementing adaptation actions		
Setting up robust adaptation governance		
Financing adaptation		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: Adaptation

Past progress: Progress in climate adaptation in the EU continued to be far too slow during the assessment period, with no change to the classification of the last year. This follows limited improvements in overall country resilience and persistently high economic losses from climate-related extremes, which have risen by an average of EUR 6 billion per year (EEA, 2024b). At the same time, there remains a significant lack of data on key enablers and indicators linked to implementing adaptation actions, setting up robust governance, and financing.

Policy context: The EU made notable progress toward becoming a climate-resilient society, primarily through strategic frameworks such as the EU Adaptation Strategy (EC, 2021c) and related policy instruments. However, the transition remains heavily reliant on effective implementation at the Member State (MS) level, sufficient funding, policy coherence, and robust monitoring. While policy implementation progressed during the assessment period, with advancements such as the Urban Greening Plans under the Biodiversity Strategy (EC, 2020i) and the adoption of the Nature Restoration Law (NRL, 2024), tangible outcomes remained inconsistent across sectors and regions. All MS have adopted national adaptation strategies or plans, and although their scope and quality varied, progress was visible, with many countries revising and strengthening their frameworks. However, financing adaptation was found to be a persistent challenge. While substantial funding was allocated through the Cohesion Policy, the absence of reporting standards complicates accountability. Encouragingly, steps are being taken to integrate climate risks into fiscal planning, and the announcement of an EU Climate Adaptation Plan for 2026 signals renewed political momentum. The recently launched EU Preparedness Union Strategy explicitly aims to enhance climate adaptation as a means of preparing and protecting essential societal functions (EC, 2025o).

Areas of action: The upcoming EU Climate Adaptation Plan presents an opportunity to strengthen the EU's policy mandate and could support more coordinated and enforceable approaches to adaptation. Key priorities of this plan include clearer responsibilities, updated national climate risk assessments, and increased investment in infrastructure and disaster risk reduction. Governance efforts should focus on enhancing legal enforceability, integrating adaptation across departments and sectors, and establishing dedicated coordination mechanisms to overcome institutional silos. In terms of financing, embedding adaptation and climate-proofing principles in public investments, such as in the multiannual financial framework (MFF), can guide more effective allocation. Strengthening monitoring systems and improving access to timely, harmonised data will be crucial to measure effectiveness and share best practices as well. Lastly, putting a spotlight on adaptation and continuing to raise its importance across sectors and policy areas is likely to encourage the monitoring and data collection that is needed to track progress.

Objective: Becoming a climate resilient society

Indicators:

- ND-GAIN country index
- Economic losses from climate-related extremes

Past progress: In the assessment period, progress toward a more resilient society continued to move in the **wrong direction** (see Table 40), with few changes from last year's rating. Although economic losses from climate-related extremes decreased over the last three years, they remained significantly higher than in the first three years of the assessed period. Therefore, the overall trend continued to move in the **wrong direction**. The average score of EU countries on the Global Adaptation Initiative (ND-GAIN) index remained nearly constant, with a slight upward trend between 2017 and 2022.

Policy context: Existing policies are **likely to advance progress but not at the required scale**. This will largely depend on effective implementation by Member States, allocation of funding, policy coherence, and adequate monitoring and reporting. The EU Climate Risk Assessment rated EU policy readiness as 'medium' for most climate risks, pointing to significant gaps in policy design or implementation. While the EU Adaptation Strategy (EC, 2021c) presents an overarching vision for the EU, it is not a legal instrument and cannot set binding actions and targets. This means that many of the included objectives and action areas are not well-defined and rely on voluntary action in Member States. The same is true for other policy documents, such as the EU Biodiversity Strategy or the EU Mission on Adaptation. There are some reporting requirements through the EU Climate Law (ECL, 2021) and the Governance Regulation (GovReg, 2018). Promising developments happen at the MS level as numerous countries are implementing comprehensive reviews of their national adaptation policies and implementing more robust approaches (e.g., France, Belgium, Germany) (EEA, 2023c). At the EU level, the President of the Commission has demonstrated a commitment to prioritising adaptation, and a European Climate Adaptation Plan in 2026. Adaptation principles are becoming increasingly prominent in ongoing discussions and technical processes, for example in water-related initiatives (e.g., the planned Water Resilience Strategy) and in the insurance sector (EIOPA, 2024b, 2024a), where discussions on sustainability risk management and natural catastrophe insurance are happening.

Areas of action: There is a need for the EU to clarify, and potentially strengthen, its policy mandate for financing and enforcing adaptation measures. A reconfiguration of responsibilities would require agreement with European co-legislators and the maintenance of the principle of subsidiarity (EEA, 2024d). The planned EU Climate Adaptation Plan presents an opportunity to take steps in this direction. There is still a strong need for increased investment in adaptation at both the EU and MS levels. This is particularly required with regard to strengthening the resilience of networks and disaster risk reduction in order to reduce the damage caused by extreme events. National climate risk assessments need to be up-to-date and account for cross-border, cross-sectoral, compound, and cascading climate risks. These assessments also need to take a holistic approach, factoring in both the socio-economic costs of climate impacts and the benefits of adaptation actions (EEA, 2024d). Improving data and information availability as well as knowledge sharing are critical for effective implementation. As such, the European Climate Adaptation Platform (Climate-ADAPT) should continue to be maintained and improved.

Enabler 1: Implementing adaptation actions

Indicators:

- Green urban areas
- Gentle tillage practices
- River restoration

Adaptation actions enable climate resilience by using tangible measures to respond to climate risks and reduce vulnerability. For these actions to be effective, they must be implemented in a context-specific manner, particularly at the national and sub-national levels.

Past progress: As with last year's report, assessing progress on implementing adaptation actions remained challenging, primarily due to limited data availability. Data gaps persisted in urban adaptation, with only a single data point for green urban areas available. Data on gentle tillage practices in agriculture were similarly sparse, with the latest available figures dating back to 2016, showing a negative trend since 2010. ECA (2024) concluded that the latest Common Agricultural Policy (CAP) Plans are overall 'greener' than in the previous period, but still fall short of aligning with the EU's climate and environmental ambition. The assessment also found no centralised monitoring system for the restoration of free-flowing rivers, despite the Biodiversity Strategy's target of restoring 50,000 km of rivers by 2030. Adaptation mainstreaming in MS during the evaluation timeframe was most prominent in sectors linked to water, agriculture, forestry, and biodiversity, but lacking in infrastructure and the economy (EEA, 2024d).

Policy context: The policies contributing towards the implementation of adaptation actions are **likely to advance progress but not at the required scale** due to a lack of binding requirements, inconsistencies across sectors, and limited monitoring. The EU Adaptation Strategy sets overarching objectives and guiding principles for implementation in MS, such as promoting nature-based solutions and enhancing data availability. More localised aspects are typically detailed in national, regional, local, and sectoral policy documents. The Biodiversity Strategy calls for Urban Greening Plans in cities with over 20,000 people, and the NRL includes targets for natural habitats to support adaptation. The ECL requires reporting on 'collective progress' on adaptation every five years, as well as an assessment of the consistency of relevant national measures. National Energy and Climate Plans (NECPs) include reporting on adaptation. The Mission on Adaptation supports regions, cities, and municipalities.

Areas of action: Progress could be accelerated through the development of a reporting framework that enables the identification and sharing of good-practice adaptation strategies across sectors and spatial scales. Further adoption of guidelines on harmonising national adaptation strategies (EC, 2023g) will help improve the assessment and monitoring of adaptation efforts across the EU. Increasing the participation in the EU Mission on Adaptation, which is signed by over 300 regions and covers about 40% of the EU, would have positive effects on implementing and harmonising adaptation across MS. Data on land cover and use updated every six years and available through the EEA's 'Urban Atlas' could be improved with more comprehensive and regular updates through the Copernicus earth observation programme. Data on EU objectives, such as the river restoration target, should be more readily accessible. The mid-term evaluation of the NRL provides an opportunity to incorporate such monitoring. Additional data could also be published by the EEA on their 'measuring progress towards climate resilience' dashboard, which could support monitoring adaptation actions and implementation (EEA, 2024f).

Enabler 2: Setting up robust adaptation governance

Robust adaptation governance enables climate resilience by providing the institutional framework, coordination mechanisms, and legal mandate for coherent and accountable action, ensuring policies and plans are well-designed and effectively implemented.

Indicators:

- National adaptation policies
- Monitoring, reporting, evaluation in place or being developed

Past progress: The situation on adaptation governance remained the same as in last year's report. For the assessment period, all MS were found to have adaptation policy documents in place (either strategies or plans), with some beginning to develop regional and sectoral adaptation plans. Identifying a trend in MRE adoption proved difficult due to irregular monitoring, but it is assumed to be generally increasing, with monitoring frameworks being the most implemented, followed by reporting and evaluation (EEA, 2023c). The latter of these can be especially challenging and resource-intensive, which may explain the limited effort from MS that was observed in the timeframe under review. Overall, identifying whether adaptation policies and MRE approaches were implemented did not offer any perspective on the quality or robustness of the approaches, which would require a more detailed evaluation.

Policy context: Policies contributing to adaptation governance are **likely to advance progress but not at the required scale** due to continued inconsistent implementation across MS and limited legal obligations. Adaptation governance at the EU level is structured through the EU Adaptation Strategy. At the Member State level, adaptation policies are implemented via national adaptation strategies or plans (NAS/NAP), which have been in place across all MS since 2020. However, despite their universal adoption, their scope, content, and structure vary between countries (EEA, 2023c). In 15 MS, NAS/NAP documents have already undergone at least one revision cycle since their initial implementation. The EEA is currently conducting a detailed assessment of MS adaptation policy instruments to examine their frameworks, legal obligations, monitoring and reporting mechanisms, and update cycles. Additionally, the GovReg sets out specific requirements for adaptation reporting within MS.

Areas of action: The EUCRA (EEA, 2024d) determined that EU policy readiness (i.e., not at the MS level) for most climate risks was only 'medium' and attributed this to a 'limited' consideration of climate hazards, short-term focus, lack of proactive actions, or a lack of clear targets. Similarly, the assessment welcomes positive developments regarding NAS/NAP implementation but points out that progress is not keeping pace with the urgency of climate risks. Only a few MS have legal requirements ensuring policy integration across different governance levels and policy areas, although adaptation plans offer a strategic approach to focus on areas particularly affected by climate impacts or on sectors that are especially vulnerable and require additional adaptive measures. Departmental siloing poses a barrier to effective adaptation governance and so establishing coordinating units in governments with supervisory and enforcement capacities is necessary to ensure effective implementation of adaptation actions. Pushing for binding governance frameworks would be an important step in the improvement of adaptation policy, as would be the implementation of national MRE frameworks to ensure consistent and effective adaptation.

Enabler 3: Financing adaptation

Financing adaptation is a key enabler to becoming a climate-resilient society because sufficient and targeted funding is essential to plan, implement, and sustain effective adaptation measures.

Indicators:

- Total investment needs
- Total planned expenditure
- Actual spending

Past progress: The assessors found no new developments since last year's report with regard to adaptation finance in the EU. Getting a clear picture of the state of adaptation finance remained difficult, as separating adaptation finance from general 'climate finance' as well as from other sectors (e.g., infrastructure, buildings, water) was still a relatively recent development in the evaluation period, meaning that adaptation was rarely budgeted on its own. However, the EU cohesion policy and other key programmes included the 'do no significant harm' principle and developed a climate-proofing practice to ensure the resilience of EU investments (EC, 2024i). While this recent mainstreaming is a positive development, for the time assessed, there remained a notable lack of specific information on adaptation finance needs and spending at the EU level. This also holds true at the MS level, where few countries have outlined specific budgets for adaptation, much less tracked their planned expenditure (EEA, 2023a).

Policy context: The policies contributing towards financing adaptation are likely to advance progress but not at the required scale due to overly aggregated budgets (i.e., 'climate' financing as a whole), and limited integration at the MS level. EU adaptation funding is mainstreamed through various funds. During the 2014 to 2020 Multiannual Financial Framework (MFF), between EUR 13.9 billion and EUR 62.1 billion were earmarked for adaptation through the EU Agricultural Fund for Rural Development, Regional Development Fund, Cohesion Fund, Maritime and Fisheries Fund, and the Social Fund (EEA, 2024d). Estimates for the 2021 to 2027 MFF put investments in climate adaptation and mitigation through the Cohesion policy at around EUR 118 billion (EC, 2024i). Determining the amount allocated to adaptation is challenging at EU and MS level, as adaptation can also be a co-benefit from other policy objectives and no reporting requirements exist to identify specific adaptation funding. Despite this, the EU Adaptation Strategy aims at 'integrating climate resilience in national fiscal frameworks', and the EC has undertaken work to assess national disaster risk financing strategies and proposed a new EU fiscal framework that would create reporting requirements related to macro-fiscal risks from climate change (EEA, 2024d).

Areas of action: Integrating adaptation into public investments should be a priority, especially with regard to climate-proofing infrastructure, buildings, and industry. Tracking investment needs, planned expenditure, and actual spending on adaptation requires improving data availability at the MS and EU level. This is noted in the EC guidelines on harmonising adaptation strategies and plans across MS, which recommend the development of a dedicated adaptation budget in the context of a broader climate action budget (EC, 2023g). The guidelines also suggest identifying investment needs coming from public budgets versus private finance. Given the cross-sectoral nature of adaptation, there is room to track budgets across other relevant sectors and areas like disaster risk management and water resilience. Overall, improved MRE of adaptation would also help gain a clearer picture of this enabler.

Table 40: Details on Adaptation indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Becoming a climate resilient society						
The policy package is likely to advance progress but not at the required scale						
ND-GAIN country index [score out of 100]		2017-2022 (University of Notre Dame, 2025)	0.01%	0.0004 index points	n/a	**n/a**
Economic losses from climate-related extremes [bnEUR]		2018-2023 (EEA, 2024b)	21%	6.7 bn EUR per year	n/a	**n/a**
ENABLER 1: Implementing adaptation actions						
The policy package is likely to advance progress but not at the required scale						
Green urban areas [%]		2018 (EEA, 2024h)	n/a	n/a	n/a	n/a
Gentle tillage practices [unit]		2010; 2016 (Eurostat, 2020)	n/a	n/a	n/a	**n/a**
River restoration [km]		n/a	n/a	n/a	50,000 km of rivers by 2030 (EC, 2020i)	n/a
ENABLER 2: Setting up robust adaptation governance						
The policy package is likely to advance progress but not at the required scale						
National adaptation policies [%]		2019-2024 (EEA, 2023c)	0.5%	0.5%-points	n/a	n/a
Monitoring, reporting, evaluation in place or being developed [%]		2023 (EEA, 2023c)	n/a	n/a	n/a	n/a
ENABLER 3: Financing adaptation						
The policy package is likely to advance progress but not at the required scale						
Total investment needs [bnEUR]		n/a	n/a	n/a	n/a	n/a
Total planned expenditure [bnEUR]		n/a	n/a	n/a	n/a	n/a
Actual spending [bnEUR]		n/a	n/a	n/a	n/a	n/a

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

6.13 External Action

The EU plays a crucial role as a leader in international climate action, not only due to its ability and responsibility to support partner countries in decarbonisation but also to maintain its competitiveness in an era increasingly shaped by global green competition.

Table 41: Progress on External Action

OBJECTIVE	INDICATORS	POLICY
Driving ambitious global climate action		

ENABLERS	INDICATORS	POLICY
Aligning all international public and private finance with the Paris Agreement		
Utilising all foreign policy channels to advance the global transition		
Embedding climate considerations in foreign policy		

Further information on the icons. Source: ©ECNO.

Learn more about the connection to themes and other building blocks.

Summary: External Action

Past progress: As in the previous year, development in this building block was far too slow over the period assessed. While the European Investment Bank (EIB) tripled its investments in clean energy abroad and ceased fossil fuel financing internationally in 2022, the EU will continue to channel public funds into fossil fuel infrastructure outside its borders through the EC's Affordable Energy Action Plan (EC, 2025c). In 2023, the EU and its Member States (MS) remained the largest contributor globally to international climate finance. Nevertheless, further efforts are needed to enhance the scale, quality, and strategic impact of these contributions. Progress on the enablers was far too slow across the board. Advancements in integrating climate action into the EU's external budget saw only incremental progress, as did prioritising climate considerations in foreign policy areas.

Policy context: Overall, existing policies in this area have yielded mixed results in shaping trends in either direction. Key documents or initiatives, such as the EC's Political Guidelines for the current legislative period 2024-2029 or the EU's Competitiveness Compass prioritise the EU's own decarbonisation and prosperity (EC, 2024x, 2025k). The global impact of initiatives, such as the Clean Trade and Investment Partnerships (CTIP), which are meant to strengthen supply chain resilience and secure access to raw materials and clean energy, remains uncertain. While the European Green Deal (EC, 2019) emphasised strong global leadership on climate, the Clean Industrial Deal approaches the transition to a sustainable, low-carbon economy through a more domestic lens (EC, 2025am).

Areas of action: Building on its crucial role as a global leader in international climate action, the EU has various opportunities in the near future to further strengthen its positions and create the best possible conditions to benefit from the global transition. Despite a complex global landscape, the EU can gain geopolitical weight and form new alliances by acting in a coordinated manner and offering attractive partnership opportunities that are mutually beneficial for all parties involved. The EU can lead by example and, as part of the group of developed countries, develop a plan to deliver the New Collective Quantified Goal (NCQG), prioritising grants and concessional finance for adaptation and loss and damage. A swiftly submitted and ambitious nationally determined contribution (NDC) target for 2035 would send a positive signal to other major emitters and emerging economies. Continuously increasing official development assistance (ODA), especially the share dedicated to climate action, would further demonstrate reliability to partner countries.

Objective: Driving ambitious global climate action

Indicators:

- International climate finance
- Fair share contribution to the global effort in reducing GHG emissions

Past progress: Progress towards driving global climate action remained mixed through 2024. While the EU has a record of leading international climate action and supporting multilateralism, there is still considerable scope for the EU and its MS to more effectively leverage their potential to play an ambitious and catalytic role in global climate action. This is most crucial in terms of mobilising international climate finance and contributing a fair share to the global effort in reducing GHG emissions. The bloc continued to lead in international public climate finance in 2023, tripling its contributions since 2013 (EUCO, 2025b). After an initial significant rise in contributions from the EU and MS, exceeding EUR 28 billion in 2022, funding plateaued in 2023, underscoring that recent progress has been **too slow** (EUCO, 2025b). Furthermore, assessed against a fair-share emissions allocation, the EU's 2030 NDC target remains insufficient (CAT, 2024).

Policy context: Existing policies are **likely to have no impact on progress**. The focus on decarbonisation efforts during the second von der Leyen Commission is centred on domestic progress and competitiveness, as reflected in initiatives like the Clean Industrial Deal. It remains to be seen whether the EU will fully live up to its role in advocating for greater climate ambition on the international stage. The EU and its MS, as the largest providers of climate finance, have made an important contribution to achieving the goal of providing and mobilising USD 100 billion annually in international climate finance from 2020 to 2025, albeit with a delay of two years (Climate Home News, 2023). As part of the NCQG decision at COP29, developed countries are meant to take the lead in raising USD 300 billion a year for developing countries by 2035 (UNFCCC, 2024). Parties to the Paris Agreement, including the EU, were requested to submit their new 2035 climate targets by February 2025. The EU Climate Law (ECL, 2021) mandates the adoption of a 2040 climate target, an exercise the EU aims to combine with the commitment to present a new 2035 target. The EC has since proposed a net 90% emission reduction target for 2040. At the time of writing, the EU's updated 2035 NDC target remains uncertain and depends on the adoption of the 2040 target. If the 2040 target is decided ahead of NDC submission, the 2035 target will likely follow a linear trajectory between 2030 and 2040. If delayed, the 2035 NDC may instead align with the 2050 net zero goal, leading to a less ambitious pathway.

Areas of action: The EU's NDC target would require stricter domestic emission cuts and further increases in international climate finance to align with its fair share and encourage other donors to do the same (CAT, 2024). The EU has missed the deadline to submit its updated NDC (CAT, 2025). For the EU and other major emitters, submitting an ambitious 2035 NDC is key to set the tone for a decisive decade and to demonstrate global leadership in climate action (CAN-INT, 2025). The EU and its MS play a crucial role in responding to the COP29 NCQG. It will be particularly important for EU countries to lead by example in fulfilling the part of the decision that outlines the need for public and grant-based resources and highly concessional finance, especially for adaptation and loss and damage.

Enabler 1: Aligning all international public and private finance with the Paris Agreement

Indicators:

- Public finance for international fossil fuel projects (by the EIB)
- Public finance for international clean energy projects (by the EIB)

It is important that the EU aligns all international public and private finance with the Paris Agreement to ensure effective use of limited public resources and that investments support and do not undermine global efforts to combat climate change.

Past progress: Overall progress on aligning the EU's international finance with the Paris Agreement showed mixed results over the period assessed. Due to data gaps in EU climate-related international public finance, an assessment of the alignment of financing activities by the EIB was used as a proxy indicator. The EIB tripled investment in clean energy outside the EU between 2021 and 2022, but, as investments in the sector had fallen by half between 2017 and 2020, overall progress was still far too slow. At the same time, the bank phased out fossil fuel financing outside the EU by 2022, putting it on track to align its operations with the Paris Agreement – a target it had set for 2020. However, this progress does not extend to the broader EU budget, which continues to support fossil fuel infrastructure in third countries.

Policy context: Existing policies are likely to have no impact on progress as they send mixed signals. The EU committed to the Glasgow Climate Pact at COP26, which contains the pledge to halt international public finance for coal, oil, and gas by 2022. In response to the energy crisis following Russia's invasion of Ukraine, the EU's External Energy Strategy, however, still promotes liquified natural gas (LNG) imports and pipeline gas from countries like Egypt and Algeria (EC, 2022b). In 2025, the EC announced the Affordable Energy Action Plan, which includes proposals to purchase long-term LNG contracts and invest in overseas fossil fuel infrastructure (EC, 2025c). This marks a major shift in EU energy policy. Until recently, the EU has only signed short-term LNG contracts and sought to limit the use of public resources for expanding fossil fuel extraction (Gavin, 2025). The proposal would also violate the EU's G7 commitment to end international public support for fossil fuels (Harvey, 2022) and threatens to undo the progress made under the Clean Energy Transition Partnerships (CETP), an initiative of governments around the world, including EU MS, their export credit agencies, public finance institutions, and multilateral development banks who are committed to transitioning public finance support to the clean energy transition (Change International, 2025).

Areas of action: The EU and its MS play a crucial role in fulfilling the global commitment to ensure that the use of limited public resources is aligned with the Paris Agreement. To uphold a firm dedication to ending public finance for fossil fuels abroad, it is key to align new policies, such as those launched under the Affordable Energy Action Plan, with this commitment, ensuring that the EU's current contingency measures and diversification strategy do not hinder global long-term decarbonisation goals or send mixed signals. The EU could use the negotiations of the next multiannual financial framework (MFF) to further efforts to bring all public finance in line with the goals of the Paris Agreement. This could include the introduction of a budget classification system to monitor the compatibility of external financing.

Enabler 2: Utilising all foreign policy channels to advance the global transition

To drive global decarbonisation while fostering economic growth, it is crucial for the EU to integrate climate action across all foreign policy channels – including, for example, trade and development cooperation (Draghi, 2024; EC, 2025k).

Indicators:

- CO_2 emissions embedded in trade
- Official development assistance (ODA) allocated to climate action

Past progress: The EU's progress in leveraging foreign policy for a transition towards a climate-resilient, low-carbon global economy was found to be still far too slow. A comprehensive assessment of the EU's efforts to align its trade policy with the Paris Agreement was difficult due to limited data. However, CO_2 emissions embedded in trade grew from 2017 to 2022. The share of ODA allocated to climate initiatives – an important instrument of foreign policy – dropped sharply in 2020. While it has risen again since then, reaching the highest level since 2016 in 2022, this rebound merely brings funding back in line with past levels and does not mark a substantial step forward. In light of growing climate needs and international commitments, progress has still been **too slow**.

Policy context: Existing policies are **likely to advance progress, prioritising the EU's decarbonisation and prosperity, but not at the required scale**. Still, the global impact of initiatives like the Clean Trade and Investment Partnerships (CTIPs) remains uncertain. Trade features prominently in the agenda of the EC, where it is a key pillar of economic foreign policy (EC, 2024x). Free Trade Agreements (FTA)s, such as the EU-Mercosur Agreement, are still considered a crucial trade tool by the EU. As part of its Clean Industrial Deal, the EC is launching CTIPs to strengthen supply chain resilience and secure access to raw materials, clean energy, as well as clean tech. Unilateral regulations with extraterritorial impact, such as deforestation-free supply chain regulations or the Corporate Sustainability Due Diligence Directive (CSDDD) and the Carbon Border Adjustment Mechanism (CBAM), aim to promote sustainability and address carbon leakage (EC, 2021f). Set to take effect in 2026, these are now being revised under the Simplification Omnibus (EC, 2025b).

Areas of action: Additional efforts are required to embed climate considerations across various foreign policy channels, including trade and development cooperation. Specifically, through its negotiating leverage in trade agreements and the upcoming CTIPs, the EU can ensure alignment with global environmental and climate objectives, promoting sustainable practices globally while supporting EU prosperity and domestic decarbonisation. To secure long-term commitments from partner countries, it is key for the EU to deliver a credible financial offer as part of its partnerships. By consistently increasing the share of ODA dedicated to climate action, the EU and its MS can offer predictability and demonstrate their commitment to partner countries. At the same time, this benefits the EU domestically by fostering demand for EU clean technologies, expanding green markets globally and creating new opportunities for the EU's clean industry.

Enabler 3: Embedding climate considerations in foreign policy

To effectively coordinate, align, and integrate climate-related issues in the international context, it is imperative to create the necessary structures to institutionalise and prioritise climate throughout all foreign policy areas.

Indicators:

- Climate-relevant expertise
- Climate budget in external cooperation

Past progress: Compared to the 2024 assessment, there was no significant progress in the EU's attempts to embed climate considerations across foreign policy areas and to strengthen climate diplomacy. Under the second von der Leyen Commission, the mandates of key officials related to climate diplomacy, as well as their consolidated climate-related expertise, remain unclear (NewClimate Institute, 2024). Responsibilities for foreign climate policy are fragmented across various institutions, underscoring that progress on creating efficient institutional structures has been far too slow. Advancement in integrating climate action into the EU's external budget was also too slow. Approximately 26% of the Neighbourhood, Development and International Cooperation Instrument-Global Europe (NDICI-GE) was allocated to climate action between 2021 and 2024, still falling short of the EU's target of 30%.

Policy context: Existing policies are likely to reinforce counterproductive trends, as new measures indicate a shift in attention away from climate in EU foreign policy. Although the Foreign Affairs Council has issued annual conclusions on climate diplomacy and global leadership since 2011, it seems that no such conclusions will be adopted in 2025. At the institutional level, multiple EU bodies – including various EC Directorate-Generals (DGs) and the European External Action Service (EEAS) – have incorporated climate considerations into their work, albeit to varying extents. However, the EC's emphasis on foreign climate policy appears to have diminished; while the Green Deal emphasised strong global leadership, the 2024–2029 Political Guidelines do not feature the EU's role as prominently. This shift is reflected in plans to reduce DG INTPA's global hubs from 100 to 18 (Vasques, 2025) and significantly cut staff at EU Delegations worldwide (Moens and Barigazzi, 2024). The NDICI-GE, established in 2021 as the EU's main external cooperation instrument, earmarks 30% of its budget for climate action. Although the target was not met in the first half of the cycle, the EC is confident it will be achieved by 2027 (EC, 2025ao).

Areas of action: The new EC ties the green transition closely to security and competitiveness (EC, 2025ai). With foreign climate policy now spread across multiple Commissioners, effective coordination is crucial to ensure strategic coherence and prevent fragmentation (Sperber et al., 2025). It will be key to reprioritise capacities, e.g., by appointing climate staff within relevant EC services and to promote inter-institutional cooperation by fostering collaboration between EU Delegations and MS embassy staff (NewClimate Institute, 2024). In view of the upcoming MFF negotiations, it will be important to consider expanding the EU's budget to support climate integration in foreign policy as well as increasing the climate spending target, turning it into a central pillar of the next MFF. This could be achieved by leveraging the EU's own resources, such as from the CBAM.

Table 42: Details on External Action indicators' past progress and required change

	Progress	Historical data			Required change	
		Time period	Relative change p.a.	Absolute change p.a.	Benchmark	Absolute change p.a.
OBJECTIVE: Driving ambitious global climate action						
The policy package is likely to have no impact on progress						
International climate finance [mEUR]		2018-2023 (EUCO, 2025b)	6%	1,430 mEUR	n/a	n/a
Fair share contribution to the global effort in reducing GHG emissions [Scale]		2019-2024 (CAT, 2024)	0%	0 scale	n/a	n/a
ENABLER 1: Aligning all international public and private finance with the PA						
The policy package is likely to have no impact on progress						
Public finance for international fossil fuel projects (by the EIB) [mEUR]		2017-2022 (PFED, 2025)	-49.9%	-144.6 mEUR	EUR 0 by 2020 (EIB, 2019)	0 mEUR (2023-2025) → on track
Public finance for international clean energy projects (by the EIB) [mEUR]		2017-2022 (PFED, 2025)	0.3%	2.3 mEUR	n/a	n/a
ENABLER 2: Utilising all foreign policy channels to advance the global transition						
The policy package is likely to advance progress but not at the required scale						
CO_2 emissions embedded in trade [Gt CO_2]		2017-2022 (GCB, 2024)	5.1%	0.03 $GtCO_2$	n/a	n/a
Official development assistance (ODA) allocated to climate action [%]		2017-2022 (Donor Tracker, 2025)	3.4%	0.9%-points	n/a	n/a
ENABLER 3: Embedding climate considerations in foreign policy						
The policy package is likely to slow down or reverse progress, or to reinforce counterproductive trends						
Climate-relevant expertise [No. of qualified staff]		n/a	n/a	n/a	n/a	n/a
Climate budget in external cooperation [% of NDICI-GE]		2019-2024 (EC, 2025ao)	41.1%	5.7%-points	30% on average between 2021 and 2027	0.1 %-points (2024-2027) → 0.01 times faster

Note: Icons indicate progress classification of this year and coloured lines the change in classification; See Table 45 for further information. n/a indicates that data are not available.

Source: ©ECNO.

7 Research approach

ECNO offers a comprehensive picture of the EU's progress towards climate neutrality using a data-driven analysis. The aim of this assessment is to promote better monitoring practices, more effective policy-making, and greater transparency.

Indicator-based framework

ECNO's indicator-based framework tracks progress across 13 economic sectors and cross-cutting policy areas, i.e., the '**building blocks**' of a climate neutral future. Building blocks can be categorised into two groups: (1) sectoral building blocks represent the key GHG emitting domains of the economy, and (2) cross-cutting building blocks drive GHG emission reductions across the sectors (see Figure 5).

Figure 5: Building blocks for the transition to climate neutrality

Source: ©ECNO based on previous work by Velten et al. (2021)

Within each building block, ECNO defines objectives and enablers. **Objectives** outline what the building block must achieve to support the EU's overall climate neutrality goal, while **enablers** are the supporting underlying conditions needed to meet the objectives in each building block. Enablers thus reflect on the drivers of and barriers to decarbonisation and, as such, can provide an early sense of progress – or lack thereof.

For each objective and enabler, the framework includes dedicated **indicators** that measure changes on the ground in the real economy.

Beginning this year, the indicator assessment is also complemented by an evaluation of the **expected policy impact,** providing insights on the potential change in the speed and direction of progress.

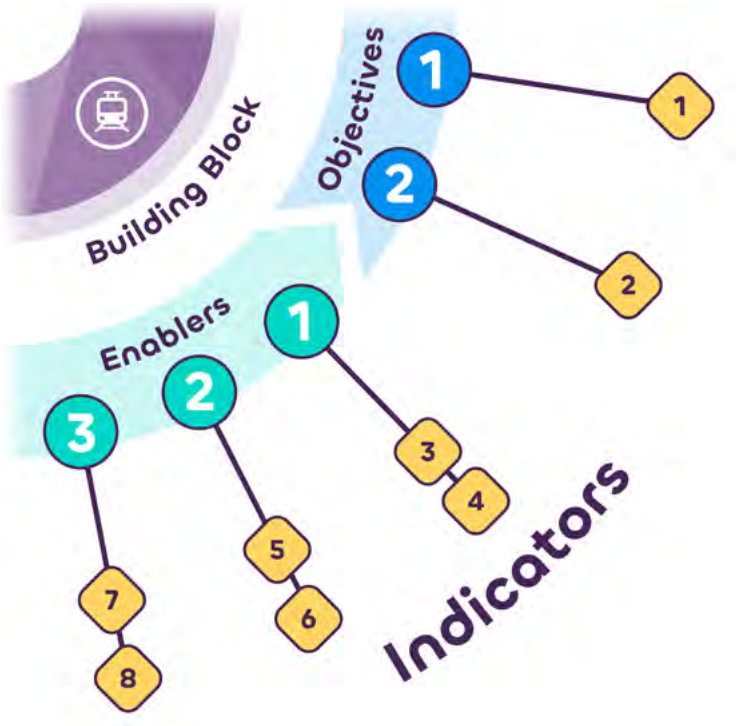
The combination of looking at indicators and expected policy impact is particularly important as the latest historical data usually lag two to three years behind a given assessment year. In the meantime, relevant EU policies may have been adopted, and their impacts are not immediately reflected in the data. Thus, to bridge the gap, our assessment considers the EU policy context over the last five years for each objective and enabler in addition to the progress assessment based on historical data for indicators. This approach ensures a timely and comprehensive progress check.

What is an enabler?

The ECNO analytical framework defines enablers as the underlying real-world or structural preconditions that support each building block in realising its objectives *en route* to climate neutrality.

Enablers tend to function in one of three ways: **(1) removing** climate-damaging activities such as excessive fertiliser use (agrifood); **(2) shifting** attitudes, consumption patterns, or business practices like the uptake of zero-emission and low-carbon transport (mobility); or **(3) improving** existing systems, such as adopting robust institutional arrangements to ensure coherent policy-making (governance).

Figure 6: Selection of indicators based on building block objectives and enablers



Source: ©ECNO based on previous work by Velten et al. (2021)

This year the, framework also introduced two additional layers of analysis to address shifts in the political discourse and allow for better analysis across building blocks on specific topics:

a) A separate assessment of **progress towards three key EU objectives:** competitiveness, resilience, and the social dimension of the transition. This additional lens provides insights into how far the climate neutrality transition speaks to other EU objectives and whether these are mutually reinforcing or counteracting one another. The assessment of these objectives builds on and complements the indicators and policy insights derived from the building blocks.

b) A separate assessment of **progress towards three cross-cutting drivers** of the transition: electrification, investment, and infrastructure. Our investigation of these three drivers aims to provide a more integrated view on progress across the economy by linking and thinking across building blocks. It also builds on and complements the indicators and policy insights derived from the building blocks.

ECNO's set of indicators has been expanded and updated to account for these additional aspects, to add further context in the building blocks, and to account for changes in data. 88 new indicators were added and 16 were replaced or removed (see Table 45).

Indicator-based progress check

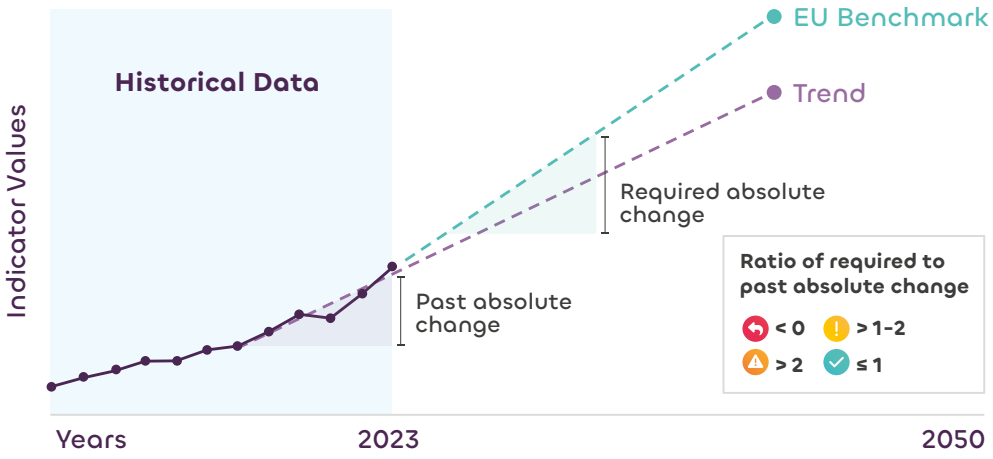
Indicators describe specific aspects of the objectives and enablers and provide a view on past changes in the context of the required future changes.

ECNO checks past progress for each indicator against **the EU's own vision of climate neutrality, based on** official targets and benchmarks from EU strategic planning documents. This includes EU Directives and Regulations as well as the underlying impact assessments of the EU 2030 Climate Target Plan and the EU long-term strategy (LTS).

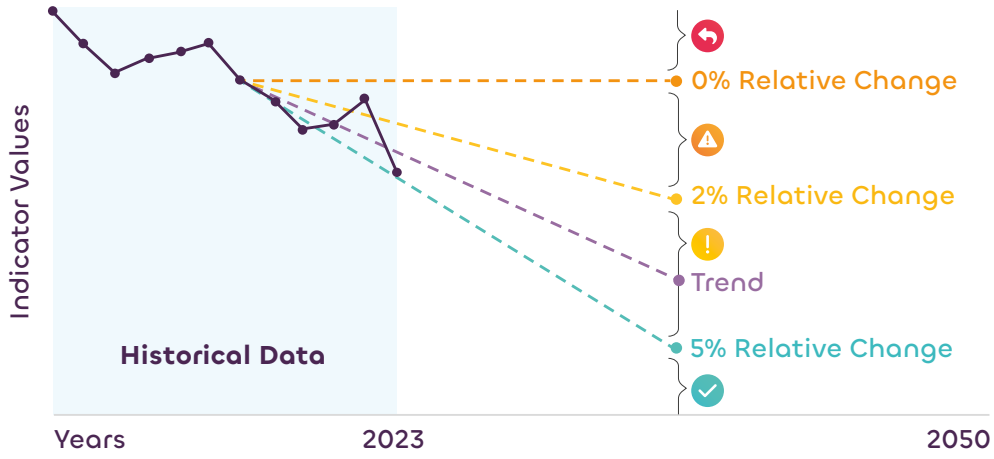
The **indicator progress check compares the absolute annual change of the past development with the absolute required annual change** to meet the future benchmark, starting with the last data point of the trendline and drawing a straight line to the benchmark. The ratio between these two values (ratio of the slopes of the two lines) indicates the required change in the pace of development (a similar method is used by Schumer et al., 2022). If no quantified future benchmark can be derived from EU sources, the analysis relies on a default approach complemented by qualitative insights from official EU documents and on external scientific literature outlining the desired direction and speed of change (see Figure 7).

Figure 7: Progress check for indicators with and without a benchmark

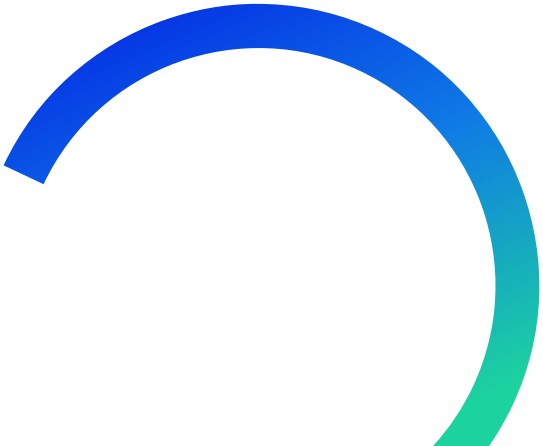
Progress check for indicator with future benchmark



Progress check for indicator without future benchmark



Source: ©ECNO based on other monitoring activities (Eurostat, 2014; Schumer et al., 2022). Please note that classification for indicators without a benchmark can deviate from the given ranges to reflect on its characteristics.



Progress for each indicator is classified along a five-degree scale. Four classes indicate the degree or lack of progress, namely '**on track**', '**too slow**', '**far too slow**', and '**wrong direction**'; while the fifth class, '**insufficient data**', is applied where no progress check can be carried out due to missing data.

Table 43: Progress categories for indicators with and without benchmark

Class	Description		Indicators with benchmark	Indicators without benchmark
	Insufficient data	Data were insufficient to assess progress	/	/
	Wrong direction	Change has been moving in the wrong direction; a U-turn is needed	Ratio of required to past absolute change is < 0	Past relative change is < 0%
	Far too slow	Change has been moving in the right direction but well below the required pace	Ratio of required to past absolute change is > 2	Past relative change is ≥ 0% to < 2%
	Too slow	Change has been moving in the right direction at a promising but insufficient pace	Ratio of required to past absolute change is > 1 to 2	Past relative change is ≥ 2% to < 5%
	On track	Change has been moving at or above the required pace	Ratio of required to past absolute change is ≤ 1	Past relative change is ≥ 5%

Source: ©ECNO based on other monitoring activities (Eurostat, 2014; Schumer et al., 2022). Please note that classification for indicators without a benchmark can deviate from the given ranges to reflect their characteristics.

Expected policy impact evaluation

Beginning this year, ECNO also assesses the **likely impact of the policy mix** on the rate of progress in each objective or enabler. This is based on a qualitative evaluation of the policy mix focusing specifically on newly adopted policies that are likely to influence the objective in the coming years. Evaluation areas include the status of implementation, comprehensiveness and scope, effectiveness in the context of each objective or enabler, and chance of success. The expected impact is classified along four categories ranging from 'hindering progress' to 'advancing progress sufficiently'.

Table 44: Classification of progress for policies

Class	Description	
	The policy package is likely to slow down or reverse progress, or to reinforce counterproductive trends	The policy package is likely to slow down or reverse past progress towards the objective or of an enabler, or counterproductive trends are likely to be reinforced, due to misaligned or poorly targeted policies.
	The policy package is likely to have no impact on progress	The policy package is likely to cause no change in progress towards the objective or of an enabler, due to missing policies, lack of ambition or ineffective implementation of policies.
	The policy package is likely to advance progress but not at the required scale	The policy package is likely to reverse counterproductive trends or advance progress towards the objective or of an enabler but not enough to get on track, due to policy design not matching the scale or urgency of the objective or falling short in consideration of specific aspects that are essential to its effectiveness.
	The policy package is likely to support a sufficient improvement in progress or to maintain sufficient advancement	The necessary policies are in place and effective to advance progress to be on track in the short to medium term; new and changes to existing policies might still be needed in the future to accommodate emerging challenges.

Source: ©ECNO

Building block classification

ECNO assigns a progress classification for each building block based firstly on the underlying indicator trends, but also informed by a nuanced reflection on indicator values and their respective importance, as well as the expected policy impact (similar to the approach taken by e.g., IEA, 2023). The **overall progress for each climate neutrality building block follows the same** four-degree classification as for individual indicators.

For more detail on ECNO's methodology, please refer to the ECNO website and the updated version of the methodology paper.

Box 6: Changes to the framework compared to the last year's report

Like last year, there were slight changes to the names of objectives, enablers, and some indicators – often in an effort to simplify and streamline. Moreover, for some indicators, the source for historical data or the benchmark was changed as more up-to-date alternatives became available. More detail can be found in Table 45.

Table 45: Changes in the indicator framework compared to last year's report

	Subject of change	Revision	Reasoning
Electricity	E1	Indicator added: 'Additional installed wind and solar capacity'	New indicator shows the scale and pace of renewable buildout, independent from final electricity generation.
Mobility	O	Indicator replaced: 'Reducing carbon intensity of passenger transport' replaced by 'Share of electricity in final energy consumption in transport'	No readily accessible data for the previous indicator. The new indicator is shaped by changes across the three enabling conditions (i.e., less motorised transport, less road transport, and more efficient/ electrified vehicles).
	E2	Enabler name changed: 'Shifting to public mobility' now 'Enable modal shift'	The name was changed to reflect the need to shift both passenger and freight transport from road to rail and other less emissions-intensive modes of transport.
	E3	Indicator names standardised for all indicators; indicator data adjusted for electric vehicles	To further simplify the narrative and insights in the building block and to avoid/minimise reader confusion
Industry	O	Indicator replaced: 'Share of clean energy carriers in energy and feedstock use' replaced by 'Share of electricity in energy and feedstock use' and 'Share of renewables and biofuels in energy and feedstock use'	There is a need for closer monitoring of electrification progress, as it holds significant potential for reducing GHG emissions. Separating the indicators helps capture the different dynamics between the shares of electricity and those of renewables and biofuels in energy and feedstock use.
	O	Indicator added: 'Value added in manufacturing'	While deindustrialisation can contribute to industrial decarbonisation targets, it is not a desirable outcome, highlighting the importance of tracking economic activity in the sector.
	E1	Indicator added: 'Electricity-to-gas price ratio for industrial consumers'	The price of electricity relative to fossil energy sources can be a key driver or constraint for the electrification of industry.
	E1	Indicator replaced: 'Annual production of renewable hydrogen for industrial use' replaced by 'Renewable and low carbon hydrogen production capacity'	Previous indicator had no data; for the new indicator, the database is being developed.
Buildings	E1	Indicator added: 'Demand for heating of non-residential buildings'	Added indicator complements the analysis for service sector buildings.
	E3	Indicators added: 'Stock of heat pumps', 'Share of electricity in buildings final energy consumption', and 'Electricity-to-gas price ratio for residential users'	Added indicators capture key drivers and constraints of the technology switch in buildings by tracking heat pump uptake, electrification progress, and the economic competitiveness of electricity versus gas.
Agrifood	O	Indicator benchmark updated	Previous assessments considered average of 1.5TECH and LIFE scenarios, but now it has been updated to reflect the most ambitious scenario (LIFE).
	O	Indicator added: 'Dairy consumption [kg/capita]'	Provides broader view of EU consumption trends, while efforts to reduce animal products are often more focused on meat.

	Subject of change	Revision	Reasoning
Agrifood	E1	Indicator added: 'Share of electricity in agricultural final energy consumption'	Supports cross-cutting driver of electrification.
	E2	Indicator replaced: 'Manure management emission intensity of cattle' replaced by 'Livestock emissions'	Previous indicators focus on cattle and manure management did not result in meaningful insights; new Common Agriculture Policy (CAP) indicators focus on livestock as a whole.
	E2	Indicator benchmark added for 'livestock numbers' from the EU 2040 climate target modelling.	New benchmark provides better basis for analysis.
	E3	Indicator replaced: 'Food waste volumes' replaced by 'Volume of consumer food waste' (i.e. restaurant, services, and households) and 'Volume of manufacturing food waste'; Benchmark added based on agreed EU food waste reduction targets.	New benchmarks available, more granular assessment possible when looking phase by phase
Carbon Dioxide Removal	O	Changed data source from no source to CDR.fyi and filtered and renamed for industrial removals (DACCS and BECCS only). Also compared with additional indicator for durable CDR covering other CDR technologies	New data available from CDR.fyi on suppliers and orders (including supplier locations), which can be broken down by technology.
	E3	Indicator replaced: 'Attention to technical removals' replaced by 'Public funding for technical CDR in the EU'	New data from Carbon Gap tracking public funding for CDR
	E3	Indicator deleted: 'Costs of BECCS and DACCS'	Online sources for CDR costs show high uncertainty.
	E3	Indicators added: 'Sales of technical CDR for immediate or future delivery', 'Sales of BECCS and DACCS for immediate or future delivery', and 'Sales of Biochar for immediate or future delivery'	New data on technical removals sold in the EU, which can be broken down into DACCS, BECCS and Biochar.
Lifestyles	O	Indicator replaced: 'Per person carbon footprint from household expenditure' replaced by 'GHG emission footprints'	New indicator covers carbon footprints instead of emissions only from direct household action.
	E1	Indicator replaced: 'Investment in cycling infrastructure [EUR]' replaced by 'EU funding for cycling and foot paths'	New indicator comes with reliable data by EU Cohesion Data from the European Commission.
	E3	Indicator replaced: 'Sales trends of plant-based food items in EU' replaced by 'Plant-based food sales' (proxy with only five EU countries)	More up-to-date data for 2023 and 2024 but only for five EU countries.
	E3	Indicator added: 'Car ownership density'	New indicator shows possible behavioural changes in society.

	Subject of change	Revision	Reasoning
Finance	O	Indicator added: 'Investments in fossil fuel supply'	New indicator with data to complement indicator on climate-hostile financial flows, which has no data.
	E1	Indicator added: 'Subsidies to renewable energies'	New indicator complements fossil fuel subsidy data, offering a better picture of how public support aligns with decarbonisation objectives.
	E2	Indicator replaced: 'Share of GHG emissions covered by a carbon tax' replaced by 'Share of GHG emissions covered by an explicit carbon market price or tax'	The indicator was replaced to better reflect the full scope of carbon pricing.
	E2	Indicator replaced: 'Revenues from environmental taxation' replaced by 'Share of EU ETS revenues directed towards green investments'	New indicator provides a more focused view of climate-related financial flows (as environmental taxation includes not only climate-related revenues) and better complements the indicator on coverage of carbon pricing (focused on recycling of revenue).
	E3	Indicators added: 'Share of green bonds issued by governments and corporations'	New data available showing commitment to the green transition in capital markets.
ust and Fair Transition	O / E1	Indicator definition changed for 'Regional poverty rate' and 'Employment rate in regions' with different selection of the vulnerable regions in transition.	Regions were removed from the list if only a small share of their population was actually covered by the Just Transition Fund (JTF), to better reflect the real focus of transition support.
	E2	Indicator deleted: 'Share of accepted Territorial Just Transition Plans'	As of 2023, all TJTPs were accepted so the indicator has lost relevance for monitoring.
	E2	Indicator added: "Competitiveness performance of regions in transition' (Multidimensional index on NUTS2 level that measures the ability of a region to offer an attractive environment for firms and residents to live and work; 100=EU27).	One of the important enablers in delivering a just transition on the regional level is making sure that vulnerable regions are not economically left behind. With time it will be more and more useful to track holistic changes in competitiveness.
	E3	Indicator added: 'Electricity purchasable with household income'	Illustrative indicator to show means to participate in the transition and more specifically in purchasing electricity as an important clean energy carrier.
Governance	O	Indicator name/operationalisation replaced: 'Thorough implementation of short-term EU governance standards at national level' replaced by 'Timely submission of EU climate planning and reporting obligations by Member States'	New indicator has data on submissions available, which feature in the annual Climate Action Progress Report by the European Commission each year. New operationalisation based on timeliness of submissions in any given year allows for quantitative assessment, which is supplemented with a literature review for planning/reporting quality.
	O	Indicator replaced: 'Public support for and confidence in the transition to climate neutrality' replaced by 'Public support for the transition to climate neutrality' and 'Public confidence in the transition to climate neutrality'	Previously this indicator was checking for two separate measures, confidence and support. Now these are two separate indicators.
	O	Indicator data source changed: 'EU cities committed under the Covenant of Mayors'	As of 2022, the Eurostat sdg_13_60 indicator was discontinued. From 2023 on this indicator will use data provided by the Joint Research Centre (JRC).

	Subject of change	Revision	Reasoning
Governance	E1	Indicator added: 'Climate neutrality targets at national level' (weighted by 'bindingness' – statutory or in other governmental doc and emissions)	Previously included indirectly via the operationalisation of indicator on long-term strategies (LTS) - but targets are worth tracking separately from planning tools.
	E2	Indicator added: 'Comprehensive assessment of new EU policies for consistency with climate neutrality'	The EU Climate Law requires the European Commission to check the consistency of all new Union measures with the net zero target (Art. 6.4). The Regulatory Scrutiny Board (RSB) found that the Commission has failed to do an adequate job so far. Despite limited data we presume the RSB will continue to check for this in the future.
	E3	Indicator added: 'Effective implementation of multilevel climate and energy dialogues at national level'	New indicator adds insights on national-level participation by focusing on the implementation of multilevel dialogues required by the Governance Regulation. The indicator is operationalised to allow for some degree of quality, but a key limitation is a lack of detailed reporting in the NECPRs.
External Action	O	Indicator added: 'Fair share contribution to the global effort in reducing greenhouse gas emissions'	Indicator added to include the notion of leading by example as this is key to be credible internationally when acting as a champion in the global response to climate change.
	O	Indicator deleted: 'Extraterritorial ecological footprint'	Data series discontinued; topic is now covered under the newly added indicator under on emissions embedded in trade, which covers both imported and exported emissions.
	E2	Indicator replaced: 'PA references in trade agreements' replaced by 'CO_2 emissions embedded in trade'	New indicator allows for an assessment of the potential impacts of efforts to align trade with the Paris Agreement.
	E3	Indicator replaced: 'Prioritisation of climate diplomacy (share of GHG emissions covered by GoF)' replaced by 'Climate budget in external cooperation'	New indicator allows for an assessment of the potential impacts of prioritising climate in external cooperation by looking at the share of external funding that is allocated to climate action.

Source: ©ECNO. Note: O = objective, E1 = enabler 1, E2 = enabler 2, E3 = enabler 3.

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Tables

Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
AEAP	Affordable Energy Action Plan
AFIF	Alternative Fuels Infrastructure Facility
AFIR	Alternative Fuels Infrastructure Regulation
BECCS	Bioenergy Carbon Capture and Storage
BEVs	Battery Electric Vehicles
bnEUR	Billion Euro
C	Carbon
CAP	Common Agricultural Policy
CAPEX	Capital Expenditure
CBAM	Carbon border adjustment mechanism
CCS	Carbon Capture and Storage
CDR	Carbon Dioxide Removal
CEF	Connecting Europe Facility
CEF-E	Connecting Europe Facility for Energy
CfD	Contracts for Difference
CID	Clean Industrial Deal
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COP	Conference of the Parties
CRCF	Carbon Removals and Carbon Farming Certification Regulation
CRD	Capital Requirements Directive
CRM	Critical Raw Materials
CRMA	Critical Raw Materials Act
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
CTIP	Clean Trade and Investment Partnership
DACCS	Direct Air Carbon Capture and Storage
DG	Directorate-General
DG INTPA	Directorate-General for International Partnerships
DG MOVE	Directorate-General for Mobility and Transport
DSM	Demand-Side Management
DSR	Demand-Side Response
EAP	Environmental Action Program

EC	European Commission
ECA	European Court of Auditors
ECL	European Climate Law
ECNO	European Climate Neutrality Observatory
EEA	European Environment Agency
EEAS	European External Action Service
EED	Energy Efficiency Directive
EGD	European Green Deal
EHB	European Hydrogen Backbone
EHPA	European Heat Pump Association
EIB	European Investment Bank
EJ	Exajoule
EMD	Electricity Market Design
EP	European Parliament
EPBD	Energy Performance of Buildings Directive
EPSR	European Pillar of Social Rights
EPSR AP	European Pillar of Social Rights Action Plan
ERDF	European Regional Development Fund
ERW	Enhanced Rock Weathering
ESABCC	European Scientific Advisory Board on Climate Change
ESRS	European Sustainability Reporting Standards
ETD	Energy Taxation Directive
ETS	Emissions Trading System
ETS2	Emissions Trading System covering Road Transport and Buildings
EU	European Union
EUCO	European Council
EUCRA	European Climate Risk Assessment
EUR	Euro
EV	Electric Vehicle
FCEV	Fuel Cell Electric Vehicle
FFS	Fossil Fuel Subsidies
FiP	Feed-in-Premium
FP10	Framework Programme 10
FTA	Free Trade Agreement
FTE	Full-Time Equivalent
F2F	Farm to Fork Strategy

GAEC	Good Agricultural and Environmental Condition
GDIP	Green Deal Industrial Plan
GDP	Gross Domestic Product
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Greenhouse Gas
GWac	Gigawatt Alternating Current
GW	Gigawatt
GWh	Gigawatt Hour
H_2	Hydrogen
ha	Hectare
HDV	Heavy-Duty Vehicle
HHI	Herfindahl-Hirschman Index
ICE	Internal Combustion Engine
ICMS	Industrial Carbon Management Strategy
IDAA	Industrial Decarbonisation Accelerator Act
IEA	International Energy Agency
IED	Industrial Emissions Directive
INMAP	Integrated Nutrient Management Action Plan
IN-PLAN	Integrated Energy, Climate and Spatial Plan
IPCC	Intergovernmental Panel on Climate Change
IPCEI	Important Projects of Common European Interest
JRC	Joint Research Centre
JTF	Just Transition Fund
KPI	Key Performance Indicator
ktoe	Kilotonne of oil equivalent
kWh	Kilowatt hour
LDV	Light-Duty Vehicle
LNG	Liquified Natural Gas
LTS	Long-Term Strategy
LULUCF	Land Use, Land-Use Change and Forestry
mEUR	Million Euro
MFF	Multiannual Financial Framework (EU budget)
MRE	Monitoring, Reporting and Evaluation
MRV	Monitoring, Reporting and Verification
MS	Member States
Mt	Megatons

$MtCO_2e$	Megatons of Carbon Dioxide equivalent
Mtoe	Million tonnes of oil equivalent
MWh	Megawatt hour
NAP	National Adaptation Plan
NAs	National Adaptation Strategy
NCQG	New Collective Quantified Goal
ND-GAIN	Notre Dame Global Adaptation Initiative
NDC	Nationally Determined Contribution
NDICI-GE	Neighbourhood, Development and International Cooperation Instrument - Global Europe
NECP	National Energy and Climate Plan
NECPR	National Energy and Climate Progress Report
NGEU	NextGenerationEU
NRL	Nature Restoration Law
NZIA	Net Zero Industry Act
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PCI	Project of Common Interest
PHEV	Plug-in Hybrid Electric Vehicle
PPA	Power Purchase Agreement
PPS	Purchasing Power Standard
RED	Renewable Energy Directive
PPWR	Packaging and Packaging Waste Regulation
PV	Photovaltaic
R2R	Right to Repair Directive
RED	Renewable Energy Directive
RENURE	Recovered Nitrogen from Manure
REPowerEU	Renewable Energy Power for the European Union
RRF	Recovery and Resilience Facility
RSB	Regulatory Scrutiny Board
R&D	Research and Development
R&I	Research and Innovation
SBTi	Science Based Targets initiative
SCF	Social Climate Fund
SCP	Social Climate Plan
SDBTR	Single Digital Booking and Ticketing Regulation
SDG	Sustainable Development Goal

SET	Strategic Energy Technology
SGP	Sustainability and Growth Pact
SME	Small and Medium-sized Enterprises
STIP	Sustainable Transport Investment Plan
STEP	Strategic Technologies for Europe Platform
SUMP	Sustainable Urban Mobility Plan
tCO_2e	Tons of Carbon Dioxide Equivalent
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Networks for Transport
TJTP	Territorial Just Transition Plan
TSO	Transmission System Operator
TWh	Terawatt Hour
TYNDP	Ten-Year Network Development Plan
UN	United Nations
UTP	Unfair Trading Practices
VAT	Value Added Tax
ZEB	Zero Emission Building
ZEV	Zero Emission Vehicle

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