

THE ROAD TO

NetZero

AUTUMN 2026

ROEL DOM, HEATHER GRABBE
AND COSTANZA GREPPI
MATURANA EXAMINE HOW EU
TAX POLICY CAN SUPPORT THE
CIRCULAR ECONOMY

IN THE STATE OF THE UNION
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SUSTAINABLE DEVELOPMENT

Foreword

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elcome to the Autumn edition of The Road to Net Zero, a *World Commerce Review* supplement. This publication has been prepared in response to readership demand for an overview of the steps being taken in the transition to a cleaner and greener sustainable world.

All aspects of climate action are examined, with the most respected authors providing the reader with the most comprehensive information available. Our brief is to provide all the data necessary for the readership to make their own informed decisions. All editorials are independent, and content is unaffected by advertising or other commercial considerations. Authors are not endorsing any commercial or other content within the publication. ■

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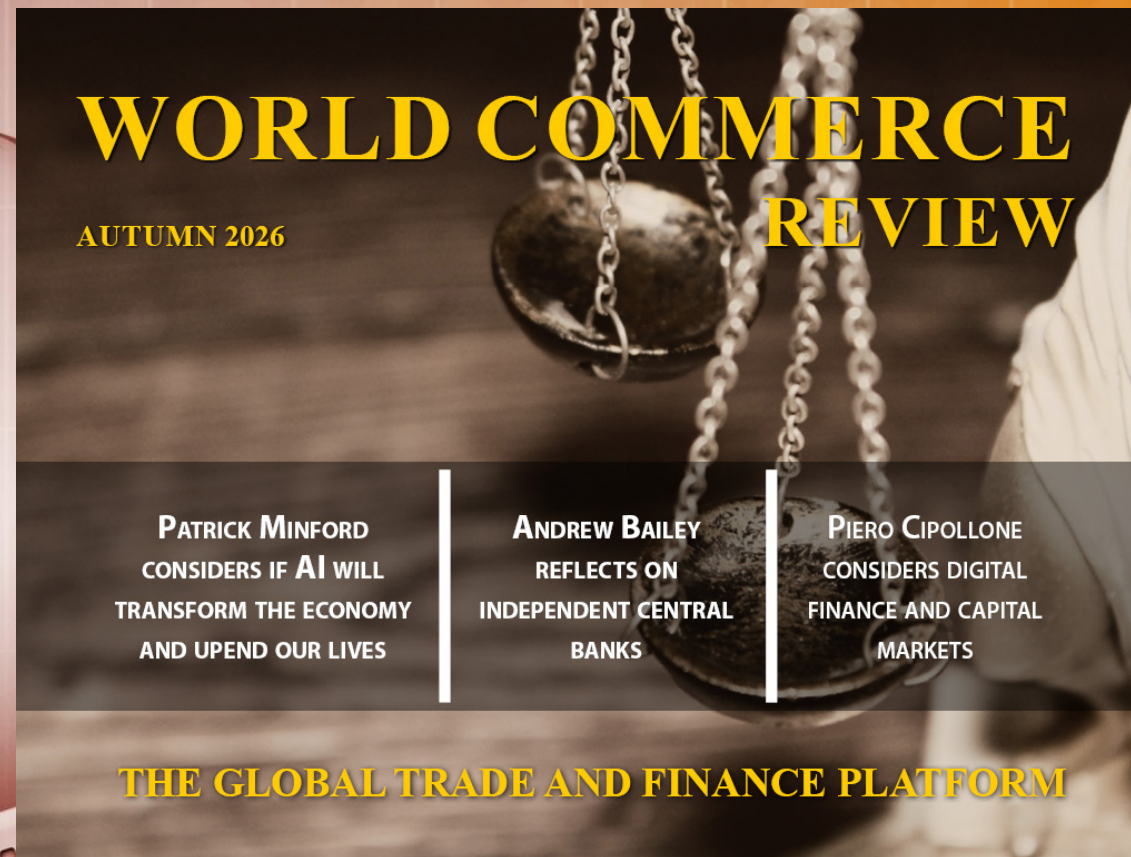
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Tax policy considerations for the circular economy

The EU Circular Economy Act is being prepared by the European Commission. Roel Dom, Heather Grabbe and Costanza Greppi Maturana examine how EU tax policy can support the transition to a circular economy by correcting market failures and incentivising sustainable resource use

Executive summary

About 88 percent of materials are thrown away rather than re-used or recycled in the European Union. That creates mountains of refuse that is expensive to dispose of and wastes valuable resources that could re-enter the economy rather than being incinerated or buried. Tax systems favour linear 'take-make-waste' practices because the environmental harms associated with virgin material extraction remain largely unpriced. Price-based instruments can help move the behaviour of producers and consumers towards more efficient use of resources.

The EU Circular Economy Act being prepared by the European Commission should aim to improve the effectiveness of fiscal instruments. Empirical research on how they have worked in practice indicates that the upstream price signals (taxes on virgin materials and aggregates) applied so far are too weak to change behaviour, and they need to be combined with downstream measures.

At the consumption stage, loss-framed penalties such as plastic-bag levies work well, but differentiated value-added tax treatment works less well because of incomplete pass-through, as well as high administrative and compliance costs. End-of-life instruments (eg. landfill taxes, pay-as-you-throw, deposit-refund systems) perform best, but their effectiveness depends on the presence of complementary policies.

High labour taxation penalises repair and remanufacturing relative to extraction, because the former is often more labour-intensive. Harmful subsidies undercut circular price signals. The EU and its members should embark on incremental improvements at the EU level, complementary measures at the national level, and longer-term structural reforms to incentivise circularity.

1 Introduction

The European economy extracts, processes and discards raw materials at an unsustainable rate. Despite policy initiatives at the European Union, national and sub-national levels, only about 12 percent of materials re-enter the European economy through reuse or recycling¹. This reflects a systematic tilt towards the linear 'take-make-waste' model, which fails to account for the environmental impacts of resource use.

Environmental taxes raise the price of goods and so have their own distortionary effects, which may or may not be offset by tax reductions elsewhere. The primary justification for environmental taxation is the environmental benefit, which is welfare enhancing on its own. This single dividend should be sufficient

In a more circular economy, end-of-life waste flows would be avoided by reintroducing materials into production chains and improving resource efficiency (Bocken *et al* 2016). Beyond environmental considerations, the circular economy would help underpin EU economic security (Grabbe and Moffat 2024). Greater resource efficiency can reduce dependence on imported raw materials and limit exposure to geopolitical disruptions. Increased critical raw materials recycling could benefit European firms and improve overall economic security by reducing dependence on imports.

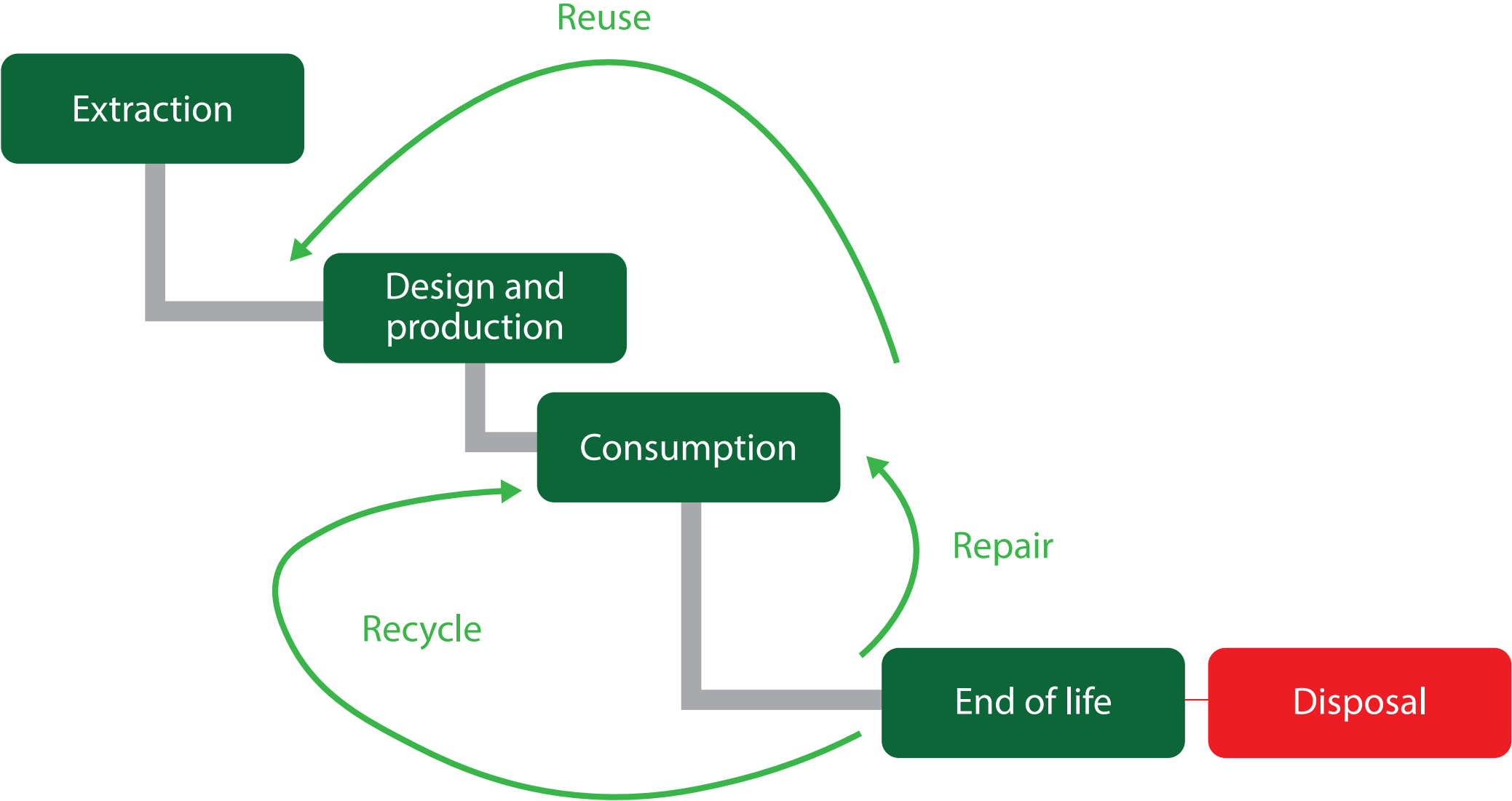
In principle, shifting from a linear to a circular economy would correct environmental and economic inefficiencies that emerge at different stages of a product's lifecycle: (i) extraction of raw materials, (ii) product design and manufacturing, (iii) product use and consumption, and (iv) end-of-life management, including repair, reuse, recycling and disposal at different stages (Figure 1). At each stage, the right policies could correct distortions arising from the misalignment of private and social costs and benefits.

In his report on EU competitiveness, Mario Draghi (2024) pointed out that internalising the carbon cost of virgin material production would make secondary materials more price-competitive. He argued that, *“for most product/material streams... secondary raw materials are more expensive compared to primary raw materials, and recycling tends to be more expensive than landfilling. The economics however tend to change if the negative environmental externalities associated with the resource-intensive (energy, carbon) production of primary raw materials would be internalised”* (Draghi 2024).

Tax can be one such ‘correcting’ policy to internalise the economic costs of production. Taxation may not always be preferable to, for example, regulation or public procurement rules (see section 2), but it has the benefit that it harnesses the price mechanism, which increases the incentives to avoid waste and to innovate for circularity.

Figure 1. Simplified product lifecycle

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Source: Bruegel.

Regulation gives certainty about quantities but ignores cost differences, while procurement rules only impact public spending. Taxation is thus a powerful complementary instrument.

The Commission will put forward a Circular Economy Act later in 2026. Indications so far are that the level of ambition will be relatively low, seeking incremental changes rather than major changes in the structure of incentives that economic actors face.

Nevertheless, there are some useful ways in which the Commission could enhance the role of price-based instruments and make its existing fiscal measures more effective in fostering circularity. We set out below a tax-design perspective on how EU level and national measures could be made more effective through the forthcoming Act and its implementation.

We examine the potential role of a range of tax measures at the EU level and national government levels. In evaluating taxation to boost the circular economy, we classify tax instruments according to the point in the product lifecycle at which they apply.

Upstream measures target activities at the beginning of the chain, such as taxes on virgin material extraction or resource use. Midstream measures influence production and consumption choices, including incentives related to product design, durability and repair. Downstream measures target end-of-life outcomes through instruments such as recycling subsidies or deposit-refund systems and landfill and incineration taxes.

2 Why tax?

The 'take-make-waste' model is not simply the outcome of consumer preferences or technological constraints. It is at least partly the result of market failures that systematically disfavour circular activities. Understanding those failures is the starting point for designing tax instruments to correct them.

The foundational justification for environmental taxation derives from Pigou (1920) and Baumol and Oates (1988): when an economic activity imposes costs on third parties that are not borne by whoever is carrying out the activity, the market will produce too much of it. A corrective tax restores efficiency by making the polluter pay for what would otherwise be a generalised, or social, cost.

This logic is robust and well-established but only works optimally when a single, identifiable pollution source needs to be corrected at a single point in the production chain. The circular economy recognises the multiple, interlocking incentives for resource waste and pollution, presenting a fundamentally different challenge for taxation policy.

Each stage in the lifecycle of a material generates a cost that requires a corrective signal. For extraction, environmental damage is most often unpriced. At the production stage, the product designer does not expect to pay the cost of end-of-life disposal. During use, consumers are given no reason to favour repair over replacement. At disposal, landfill and incineration are priced below their true social cost, undermining the competitiveness of recycling.

No single tax instrument can simultaneously optimise incentives across all stages (Walls and Palmer 2001). Pigouvian logic, applied at one point in the chain, does not propagate cleanly upstream or downstream. A 'tax architecture' of multiple instruments, each targeted at the point where behaviour can be changed, is thus needed.

Furthermore, environmental taxes change not only what firms and consumers choose to do today; they also influence which technologies are developed for tomorrow. Via 'directed technical change', the direction of clean innovation responds to price signals (Acemoglu *et al* 2012). A credible price on, for example, virgin material use or waste disposal creates an incentive for firms to invest in circular process innovation.

Environmental tax subsidies (or tax expenditures), such as R&D tax credits or investment allowances for circular production equipment, work according to the same dynamic logic. A combination of instruments is likely to be optimal. A corrective tax shifts relative prices but may drive only a slow transition if the innovation system remains tilted towards linear technologies. Circular R&D subsidies directly counteract the path dependency embodied in linear innovation systems, bringing forward the point at which circular alternatives become self-sustaining.

Regulation and public procurement are alternatives to tax. Regulation is typically preferable when a minimum threshold must be enforced, when behaviour responds weakly to price signals or when damages increase sharply beyond a threshold and a specific outcome must be guaranteed regardless of cost. Otherwise, tax instruments have three major advantages (Adam *et al* 2011; Goulder and Parry 2008):

1. They are economically efficient, differentiating between economic agents with different abatement costs and allowing the cheapest reductions to happen first;
2. They generate revenue that can be recycled to reduce other distortionary taxes or fund the transition;
3. Compared with prescriptive standards, they typically involve less detailed regulatory design, reducing opportunities for regulatory capture.

3 Tax design principles

Any tax instrument should be benchmarked against the Pigouvian ideal. It should be equal to the difference between the social and private costs of the activity, levied as close as possible to the source of the harm². The goal is not to maximise revenue but to provide the right incentive by making taxpayers face the full social costs of their

decisions, while not distorting economic choices that carry no external cost. A tax set too low leaves the externality partially uncorrected; a tax set too high or applied to an overly wide base suppresses socially valuable activity.

In practice, however, tax design faces several complications that are especially important for the shift to a circular economy:

Measurement and proximity

Ideally, harms – emissions, extraction or disposal (in our simplified lifecycle model) – should be taxed directly. If measurement is costly or technically impossible, a proxy can be used instead, such as product taxes on items containing harmful inputs, or levies on a production process correlated with the damage it causes. The further the tax is from the source of harm, the blunter the price signal and the greater the risk of unintended distortions (Fullerton *et al* 2010).

This is the core economic objection to using value-added tax differentiation as a circular economy instrument (Box 1). It also explains why taxes on virgin material extraction are theoretically preferable to taxes on downstream products: the price signal from the extraction tax propagates through the supply chain in a more targeted way.

Framing

The framing of tax incentives matters for their effectiveness. A \$0.05 tax on disposable shopping bags in the United States reduced usage by more than 40 percent, while an equivalent \$0.05 bonus for reusable bags had almost no measurable effect (Homonoff 2018). This reflects loss aversion – that consumer behaviour responds more to penalties than to rewards – and provides a behavioural rationale for favouring such visible disciplining taxes over bonuses or subsidies.

Multiple externalities, multiple instruments

No single tax can correct the externalities that arise at each stage of a product's lifecycle. A tax might correct behaviour at the point at which it is levied, but the harms associated with products arise at different stages. A disposal tax raises the cost of sending waste to landfill but may not influence product designers to choose recyclable materials years earlier.

A virgin material tax raises the cost of primary inputs but does not by itself create incentives to recover and recycle those materials at end of life. Combinations of instruments are thus required: upstream charges to internalise extraction or production externalities, and a downstream instrument, such as a recycling subsidy or deposit-refund scheme, to correct end-of-life incentives (Walls and Palmer 2001).

The revenue-behaviour trade-off

A correctly designed Pigouvian tax raises the cost of the taxed behaviour, thus reducing that behaviour and in doing so eroding its own revenue base. This creates an inherent tension, and policymakers should be cautious about justifying circular-economy taxes primarily on revenue grounds or designing them to maximise yield. The double-dividend hypothesis – that environmental tax revenues can finance cuts in distortionary labour taxes, delivering both an environmental and a welfare gain – might be an intuitively appealing argument for green fiscal reform, but the welfare gain may be uncertain.

Environmental taxes raise the price of goods and so have their own distortionary effects, which may or may not be offset by tax reductions elsewhere (Adam *et al* 2011). The primary justification for environmental taxation is the environmental benefit, which is welfare enhancing on its own. This single dividend should be sufficient.

Box 1. VAT is the wrong instrument for circular economy policy but should not obstruct circularity

VAT is generally a poor vehicle for environmental policy signals for three reasons:

1. VAT is applied to the price of a product, not the environmental harm associated with it, and is thus misaligned with the Pigouvian principle of taxing as close to the source of damage as possible.
2. Differentiating VAT rates by product category or material content can be administratively demanding (eg. it would require parallel certification processes) and can generate classification disputes that are costly to resolve and easily exploited for fraud.
3. Differentiated VAT rates do not directly influence producers to favour circular inputs as VAT is typically fully recoverable and therefore does not affect producers' costs.

The behavioural impact of any VAT change also depends on two uncertainties: whether suppliers pass the rate change through to consumer prices, and whether consumers respond to the resulting price change. In practice, it is well-documented that pass-through of VAT to prices is partial and variable, depending on market structure, the degree of competition and the price elasticity of demand (Benedek *et al* 2020; Benzarti and Carloni 2019).

There may be partial exceptions, such as reduced VAT on repair services. Repair is a well-defined service category and the price margin between repair and replacement is sometimes thin enough that a tax

advantage could in principle shift consumer choices. However, in practice, this does not seem to happen. The most carefully documented case, Sweden's 2017 repair VAT reduction, found mixed results, with most repair businesses unable to attribute any demand change to the measure (Dalhammar *et al* 2020).

A 2022 amendment to the EU VAT Directive (Council Directive (EU) 2022/542) recognised this limited but potentially useful role for VAT on repairs by giving governments greater scope to apply reduced VAT rates to repair services for household appliances, clothing, shoes and other products, in support of extending product lifetimes and boosting the circular economy. However, any such changes would not overcome the structural limitations of VAT as an environmental instrument.

Administrative costs and avoidance

Complex tax structures are costly to operate. They require more administrative enforcement effort and more private compliance effort. A fundamental problem arises when a tax raises sharply the cost of a regulated activity relative to an unregulated alternative: the incentive for avoidance grows.

Waste disposal taxes can induce households and firms to illegally dump – rather than recycle – waste, substantially undercutting the environmental effectiveness of the instrument (Fullerton and Kinnaman 1995).

The general lesson is that enforcement capacity is a binding constraint on instrument design. A tax that outpaces enforcement generates displacement rather than abatement. Tax design should aim for the fewest, broadest-based instruments to deliver the required price signal, with rates set high enough to change behaviour, applied with minimal exemptions and matched to realistic enforcement capacity.

Border tax adjustments

Circular-economy taxes face a particular challenge because material supply chains are highly globalised. Taxes on virgin material use, waste disposal or resource-intensive production can strengthen circular incentives domestically but may also shift production or sourcing to jurisdictions with weaker policies. Border tax adjustment mechanisms could address this by applying equivalent charges to imports and offering rebates to exports. However, few countries have implemented such measures³.

Implementation of such instruments is substantially more difficult than for a single externality, such as carbon emissions. Circularity depends on multiple product characteristics, including recycled content, durability, repairability and lifecycle impacts, which are difficult to measure consistently across complex value chains.

Regulation should therefore complement any tax measure by constraining avoidance channels and ensuring that the tax signal translates into actual circular behaviour, rather than displacement.

An additional challenge relates to customs administration. Customs systems based on Harmonized System (HS) codes classify products by type rather than production characteristics, meaning two otherwise identical products may receive the same classification regardless of their recycled content, virgin material use or other circular economy attributes⁴.

This creates practical difficulties for implementing differentiated tax treatment and may require additional certification or reporting systems, further increasing the already considerable administrative burden on customs authorities.

Policy coherence

Tax instruments will not work as intended if they are offset by contradictory signals elsewhere in the tax system. A levy on virgin polymers sends a clear price signal in favour of recycled alternatives, but that signal will be weakened if fossil-fuel subsidies simultaneously reduce the production cost of primary plastic feedstocks. The same tension pervades carbon pricing more broadly, with energy subsidies routinely depressing the prices that authorities seek to raise through carbon taxes (OECD 2025).

4 The EU framework for circular economy taxation

The deployment of fiscal instruments to support the circular-economy transition by changing incentives across the product lifecycle is increasing. In the EU, some instruments have evolved at national level (see section 5) before being harmonised at EU level. These include taxes on virgin materials, landfill disposal, plastics levies, reduced VAT for repair and deposit-refund systems, which now operate in 17 EU countries (section 4.1; annex 1).

However, the EU has relied primarily on regulation rather than fiscal measures, with significant rules set out in the Ecodesign for Sustainable Products Regulation (Regulation (EU) 2024/1781), the Packaging and Packaging Waste Regulation (Regulation (EU) 2025/40) and extended producer responsibility (EPR) obligations (section 4.2). EU countries meeting in the Council of the European Union have jointly endorsed the use of targeted tax credits and accelerated depreciation to promote clean technologies and circular business models across European industry⁵.

4.1 EU-level fiscal instruments for the environment

The EU requirement for unanimous agreement of member countries on tax measures has proved too high a bar for a coherent EU tax architecture, including taxation related to the circular economy. The EU can however adopt regulatory pricing mechanisms and environmental measures without unanimity. In this context, we highlight the following instruments of relevance to the circular economy:

- THE EU EMISSIONS TRADING SYSTEM (ETS; Directive (EU) 2023/959) prices carbon emissions from industrial facilities, including energy-intensive manufacturing of primary raw materials. Draghi (2024) recommended extending the ETS to incineration and landfilling to make recycled materials more competitive relative to virgin ones. This would be in line with tax-design principles but is politically unfeasible at present (Draghi 2024).
- THE CARBON BORDER ADJUSTMENT MECHANISM (CBAM, Regulation (EU) 2023/956), fully operational from 2026, complements the ETS by placing a carbon price on imports of carbon-intensive goods: steel, aluminium, cement, fertilisers and electricity. It thus creates an indirect incentive for resource efficiency, though it was not framed as a circular-economy measure and covers only carbon emissions (Monjon and Quirion 2011; European Commission 2022).

- THE PLASTIC PACKAGING LEVY has been an EU 'own resource', or source of revenue for the EU budget, since January 2021. Under it, EU countries pay a levy of €0.80 per kilogramme of plastic packaging waste they do not recycle⁶. This is an EU budget contribution based on national waste volumes rather than a direct producer tax. The levy aligns with EU policy objectives (Darvas *et al* 2025) but fails to tax the harm directly at the point of production (EEA 2022; Milios 2021).

Its environmental impact therefore depends on complementary measures at national level. EU countries are free to determine how they finance this obligation nationally, through a dedicated plastic tax, EPR fees or the general budget. So far, only Spain and Portugal have introduced active national plastic taxes since 2021; Italy has adopted but not implemented a tax (see annex 1).

- THE EUROPEAN COMMISSION HAS PROPOSED a similar levy of €2/kg (indexed to inflation) on non-collected electrical and electronic equipment (EEE) as a contribution to the 2028-2034 EU budget package⁷. Its objectives are to help reduce the health risks from hazardous substances in EEE, contribute to environmental protection and promote the recovery of critical raw materials. Like the plastic packaging levy, it would be paid from national budgets and its effectiveness in respect of these objectives will depend on whether EU countries take complementary measures to incentivise economic actors (Darvas and Dom 2026).
- THE EU HAS STARTED TO APPLY a €3 customs duty per item on low-value e-commerce consignments from outside the EU⁸. This measure primarily recovers customs costs and levels the playing field with non-EU retailers but may indirectly support circularity by reducing the competitive advantage of ultra-low-cost, short-lived, poorly repairable imports. Such duties are not Pigouvian and should be regarded as complementary to, rather than substitutes for, circular-economy taxation.

4.2 Extended producer responsibility

The EU's main mechanism to encourage circularity is extended producer responsibility (EPR), a system under which producers contribute financially to the management of their products when they reach the waste stage. Typically, they outsource this responsibility to a producer-responsibility organisation. The fees such organisations charge can change producer behaviour similarly to a tax, but their effectiveness depends on how they are used in practice, particularly whether the fees fund circularity and innovation in getting value from waste.

However, in two countries, Hungary and Croatia, there is no conventional producer-responsibility organisation, with EPR fees collected instead via a state fee or tax and spent primarily on conventional disposal (Ahlers *et al* 2021). Where EPR has been reduced to a state-administered fee, it is unlikely to change behaviour, as shown by the low level of recycling in Hungary compared to the European average⁹ (EUROPEN 2025).

The distinguishing feature of EPR was meant to be physical and organisational responsibility on producers, restructuring who manages waste rather than just who pays for disposal (Lindhqvist 2000), leading to a system that changes producer behaviour by charging higher fees for products that are harder to reuse, repair or recycle¹⁰.

Through 'ecomodulation', the fees paid by producers vary according to the environmental characteristics of waste products. The difference in fees must be large enough to alter design decisions and must extend beyond recyclability to reusability, durability and reparability to be effective (Lifset *et al* 2023).

Germany pioneered EPR in the early 1990s through its Green Dot system, and most EU countries implemented schemes throughout the 1990s. In addition to general rules, EPR and ecomodulation is written into various EU laws on specific waste streams, including waste electrical and electronic equipment, batteries and packaging.

EPR has increased collection and recycling rates substantially where schemes are well-designed, though evidence of upstream design impacts remains limited (Lindhqvist 2000; Massari and Ruberti 2013; Lifset *et al* 2023). France is the most advanced EU country in directing EPR revenues to upstream activities: its packaging scheme (Citeo) generated €1.6 billion in 2023, funding recycling infrastructure, eco-design and reuse¹¹. France's textiles scheme (called Refashion) directs revenue to R&D, repair funding and ecomodulation bonuses (Refashion 2023).

4.3 Tax rules and reporting

The instruments discussed so far are explicit pricing mechanisms designed to put a price on specific activities. But the nuances in tax rules and reporting requirements can shape incentives for circularity independent of any environmental levy. At the EU level, two examples – related to VAT and tax reporting – show how such rules can help or hinder circular business models.

'Embedded VAT' poses a challenge to reuse or remanufacturing. When used goods loop back into production process, the VAT paid during their first lifespan is 'embedded' (and invisible) in the item's price and cannot be deducted by the producer that buys the used good as an input. By contrast, VAT paid on virgin inputs can be reclaimed. A producer purchasing second-hand components from a consumer cannot deduct the VAT paid by the original buyer, creating a cost disadvantage versus new inputs¹².

Under the VAT Directive, for transactions involving second-hand goods VAT is charged only on the reseller's margin, instead of charging VAT on the full selling price (which includes the 'embedded' VAT and therefore risks double taxation). However, this provision is limited in scope and only provides a solution for business-to-consumer sales¹³.

Another challenge is that VAT treatment of unsold goods can make destruction cheaper and simpler than donation. When unsold goods (such as food and clothing) are donated, this can be treated as a deemed supply, triggering

output VAT, while destruction leaves the original input VAT deduction untouched and generates no further liability. The VAT Directive allows, but does not require, EU countries to provide VAT relief for donations to charities and humanitarian organisations, and so uptake varies.

On tax reporting and information sharing, the seventh amendment to the EU Directive on Administrative Cooperation (DAC7 Council Directive (EU) 2021/514) illustrates the trade-offs that can arise when tax compliance measures overlap with circular-economy objectives. One of the goals of DAC7 is to close tax gaps in the platform economy, deter undeclared commercial activity and ensure fairness between digital platforms and traditional retailers.

Among its provisions, it requires digital platforms to collect and report information on sellers, including traders in second-hand goods, with sales above relatively low thresholds¹⁴. Such requirements may, by increasing compliance burdens, reduce participation in secondary markets and therefore work against circular-economy objectives.

This is not an argument against DAC7's underlying rationale, but an illustration of why tax compliance requirements should be assessed through the broader lens of policy coherence, while ensuring that compliance obligations remain proportionate to the tax risks involved.

The European Commission has recognised these concerns in a proposed recast of the Directive on Administrative Cooperation: this would mean raising the monetary threshold and removing the transaction threshold for sales of goods¹⁵. If adopted, these changes would better align tax administration with the objective of promoting reuse, while preserving tax transparency.

Academic studies consistently identify a significant gap in national tax systems: upstream price signals are too weak to affect product design and material choice. A more targeted circular-economy taxation framework is needed across the EU, including virgin material taxes, VAT reductions on repairs and labour tax relief for circular activities (Milios 2021; Vence and López Pérez 2021; EEB 2022; Ellen MacArthur Foundation 2026).

5 Circular economy tax instruments in EU countries: trends and effectiveness

Experience in EU countries shows that fiscal instruments are most effective when they provide a strong, visible price signal close to the harm they target, and are embedded within a coherent policy framework. In the case of environmental harm caused by the linear economy, end-of-life instruments have generally succeeded, whereas upstream and consumption-stage measures have produced much weaker results. Meanwhile, gaps in the wider tax system can undo the effects of even well-designed circular economy taxes. This section sets out the evidence for that claim.

Assessing the effectiveness of price-based instruments for the circular economy remains challenging. A major limitation is the absence of a common framework for measuring circular-economy performance. Studies rely instead on indicators ranging from resource productivity and recycling rates to circular material use rates and material footprints.

Moreover, effectiveness is evaluated against different policy objectives, including behavioural change, market development for secondary materials, allocative efficiency, revenue generation and overall reductions in material use. Such differences make the evidence fragmented and limit the comparability of findings across instruments and jurisdictions (Svatikova *et al* 2025).

5.1 Trends

While the EU provides an overarching legislative framework, design and implementation of price-based instruments are done primarily by EU governments, making national instruments the clearest lens through which to view how fiscal policy supports the circular transition.

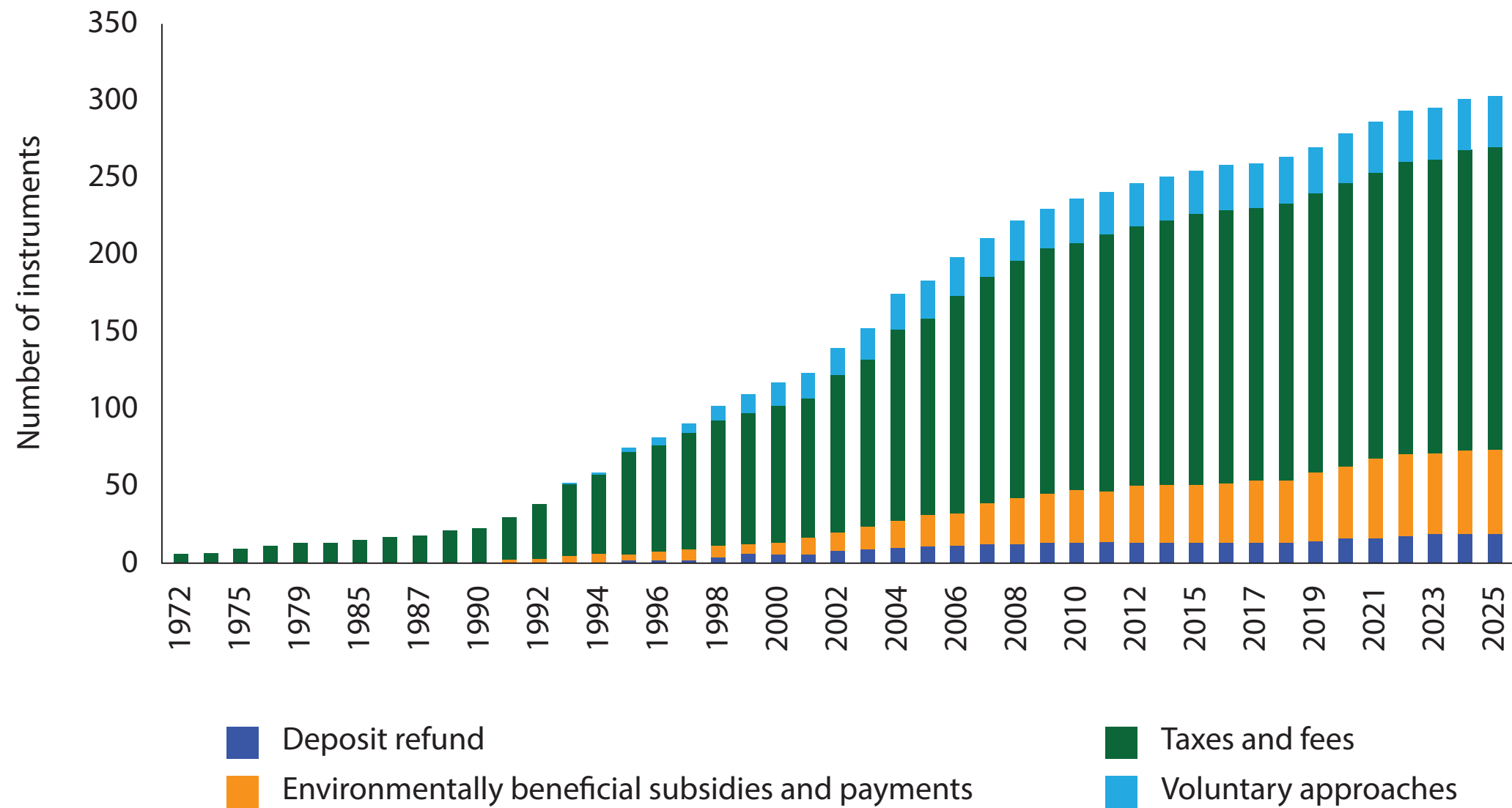
EU countries have expanded their use of such instruments substantially, from fewer than 30 in 1990 to more than 300 by 2025 (Figure 2). This expansion has broadly coincided with successive waves of EU environmental legislation (section 4), which sets common objectives that EU countries implement through national economic instruments (Svatikova *et al* 2025).

Taxes and fees dominate the national-level circular-economy policy mix, accounting for around two thirds of all instruments. More recently, deposit-refund schemes and environmentally beneficial subsidies have been deployed (Figure 2).

This growth in the number of policy instruments is not evenly distributed across the product lifecycle (Figure 2). The revenue data hints at why. Circular-economy-tagged taxes account for between 11 percent and 20 percent of total environment-related tax revenue, substantially exceeding the shares associated with solid waste (4 percent to 7 percent) and minerals (0.2 percent to 0.3 percent) (Figure 3). These figures represent the share of total environmental-related tax revenue attributed to each policy domain and should not be interpreted as cumulative.

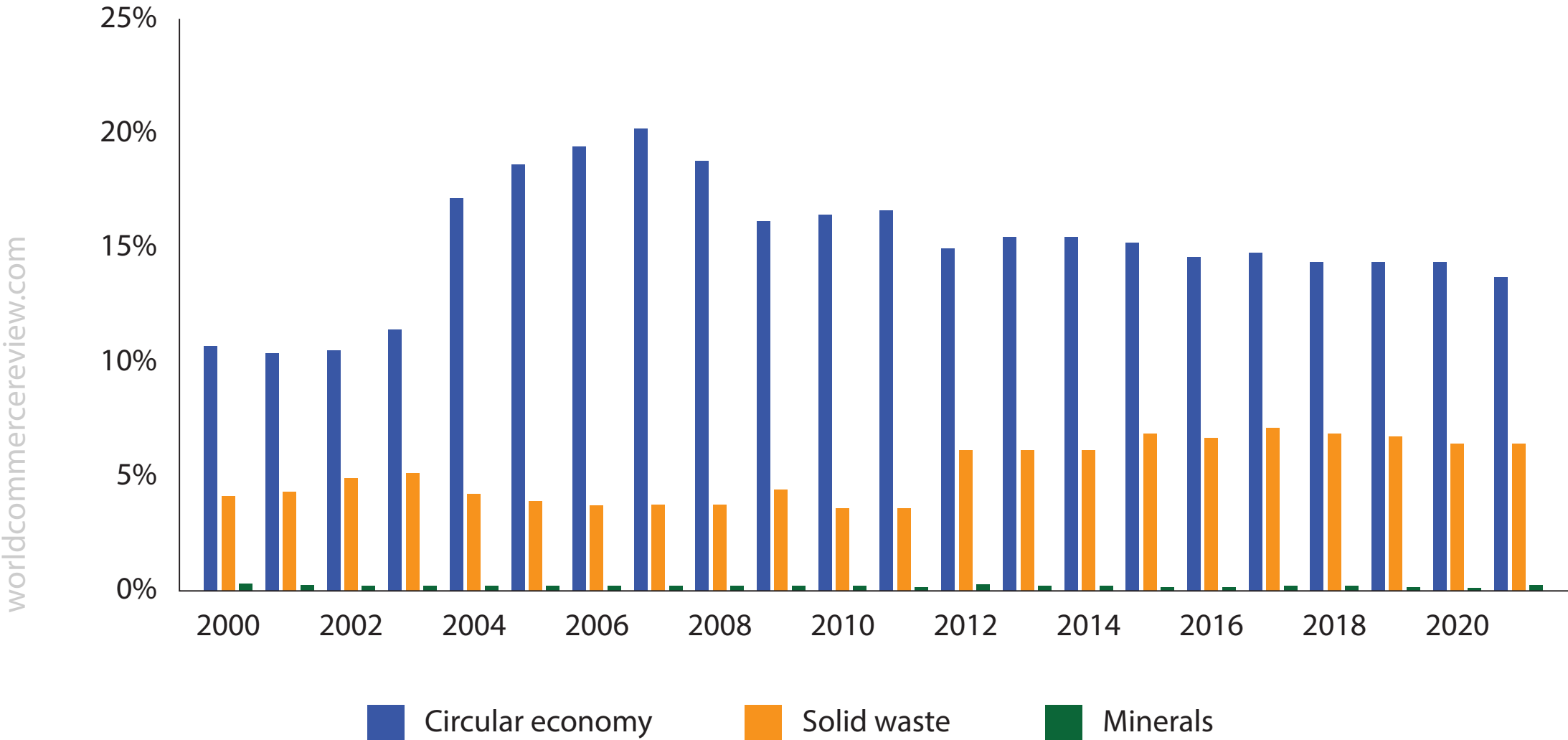
The classifications overlap considerably: approximately 57 percent of instruments tagged as circular economy are also classified as solid waste, with further overlap with minerals. Examining the composition of revenues within the circular economy category reveals that motor vehicle taxes account for more than two-thirds of revenues classified

Figure 2. Growth of circular economic instruments in the EU, 1972-2025 (cumulative)



Source: Bruegel based on OECD Policy Instruments for the Environment (PINE) dataset (April 2026).

Figure 3. Circular economy, solid waste and minerals instruments as a percent of total environmental revenue



Note: to avoid duplicates, the filter 'overlap' was applied. Shares are computed against total environment-related tax revenue across all 22 PINE environmental domains. The three series shown represent only the domains used here to proxy the circular economy; they do not sum to 100 percent. The remaining revenue derives from the other 19 domains: air pollution, water pollution, soil pollution, ozone, noise, radiation, fisheries, forests, freshwater, renewable energy, fossil fuels, climate mitigation, climate adaptation, biodiversity, land degradation, ocean, chemical management, energy efficiency and mercury. PINE domain tags are also non-exclusive: a single instrument may be tagged to several domains, so the series overlap one another and are not cumulative.

Source: Bruegel based on OECD, Environmentally Related Tax Revenue (ERTR) database, April 2026.

under this tag in the OECD Environmentally Related Tax Revenue (ERTR) dataset, which is the data source for Figures 2 and 3¹⁶.

5.2 Upstream instruments remain comparatively weak

Instruments applied early in the product lifecycle, such as taxes on virgin materials and on construction aggregates (sand, gravel and crushed rock)¹⁷ and tax incentives for recycling investment, show the weakest evidence of effectiveness. Ex-post evaluations are limited, and those that exist find little measurable impact on input choices or investment decisions, largely because rates are too low or coverage is too narrow.

Taxes on aggregates in Denmark, Sweden and the United Kingdom have contributed to a reduction in the use of primary aggregates, but only when paired with measures to build demand for and supply of secondary materials (EEA 2008; Söderholm 2011). Without that complementarity, the price signal is too weak to make a difference.

The exception is investment tax incentives, where the evidence that tax relief raises capital investment is comparatively strong. Accelerated depreciation and bonus depreciation consistently increase capital investment by 10 to 20 percent, with larger effects when tax relief is immediate rather than deferred (Ohrn 2019; Zwick and Mahon 2017).

These findings are broadly consistent with the established user-cost elasticity of capital (Hassett and Hubbard 2002). Accelerated depreciation can also generate environmental benefits by reducing firms' carbon intensity (Cao *et al* 2025). Although to our knowledge no evaluation has examined investment incentives targeted specifically at recycling or remanufacturing capacity, these findings provide the closest available benchmark for circular-economy investment incentives.

5.3 Consumption-stage instruments have produced mixed results

At the consumption stage, price signals are typically more visible and immediate, making behavioural responses easier to observe. Product levies such as plastic-bag charges satisfy most core design conditions: they are loss-framed, administratively simple and generate a price signal relative to product value.

Ireland's 2002 levy of €0.15 per plastic shopping bag cut consumption by over 90 percent within a year, from roughly 328 to 21 bags per capita, while directing revenue to an environmental fund (Convery *et al* 2007). In England, single-use bag sales at major retailers fell by more than 98 percent after the 2015 charge, to about two bags per person per year (Defra 2023).

Positive incentives have fared less well. Consumer price pass-through of reduced VAT on repair services is partial and highly variable (around 25 to 77 percent of the reduction), with only modest behavioural responses. Non-price barriers, including product repairability, spare-part availability and low consumer awareness, often constrain repair decisions more than price (Kosonen 2015; Harju and Kosonen 2013; Almén *et al* 2022; Milios 2021).

Feebate¹⁸ and bonus-malus schemes, primarily in vehicle markets, can substantially alter the composition of purchases, but may also stimulate additional consumption that offsets part of the environmental gain (D'Haultfoeuille *et al* 2014). Likewise, consumer-rebate programmes often suffer from low additionality.

Houde and Aldy (2017) estimated that around 70 percent of recipients of a US appliance rebate programme would have purchased the qualifying product even in the absence of the subsidy. Every dollar spent that actually changed someone's behaviour therefore cost roughly ten times what it would under comparable programmes. Taken together, consumption-stage instruments seem to work best when they penalise an unwanted purchase, rather than subsidise a desired one.

5.4 End-of-life instruments have delivered the strongest results

Instruments that act at the point of disposal or return, including landfill taxes, pay-as-you-throw (PAYT) charging and deposit-refund systems (DRS), work best.

Landfill taxes are the most widely adopted circular economy instrument across OECD countries. The volume of waste sent to landfill in the EU declined by about 21 percent between 2010 and 2022, in the context of progressively higher landfill taxes and broader waste policy reforms (EEA 2025). A €29-per-tonne landfill tax increase in Catalonia reduced landfill disposal by 12 percent and increased recycling rates by six percentage points, particularly in municipalities without advanced collection systems (Jofre-Monseny and Sorribas-Navarro 2024).

Higher rates in Italy significantly reduced landfilling, albeit gradually and unevenly across regions (Nicolli and Mazzanti 2013). However, such taxes price waste disposal rather than waste generation, shifting waste up the hierarchy but not in themselves reducing the amount of waste generated in the first place (Mazzanti and Zoboli 2009). Effectiveness of landfill taxes depends on complementary measures, including separate collection systems and extended producer responsibility (Svatikova *et al* 2025).

PAYT schemes, which charge households according to the volume, weight or frequency of residual waste collected, rather than a flat fee, consistently reduce residual waste and increase recycling relative to flat-rate charging (OECD 2006; EEA 2016). A study in Trento, Italy found a 37.5 percent reduction in unsorted waste (Bueno and Valente 2019), while evidence from the Netherlands showed that weight- and bag-based pricing can halve residual waste and raise recyclable collection by around 20 percent (Dijkgraaf and Gradus 2004; Allers and Hoebein 2010), consistently outperforming volume- and frequency-based systems (Dijkgraaf and Gradus 2004; 2015).

Concerns about illegal dumping appear to be context-specific, arising primarily where PAYT is introduced without adequate recycling alternatives or complementary waste policies (OECD 2022).

Deposit-refund systems achieve similarly strong outcomes by rewarding the desired behaviour, rather than only applying penalties. European schemes with full coverage routinely exceed 85 percent collection for targeted packaging. In the US, deposits convert occasional recyclers into consistent ones, with the largest effects among households with the lowest baseline recycling rates (Viscusi *et al* 2011, 2013).

This is not incidental to the instrument's design: where illegal disposal is a feasible alternative, a deposit-refund structure rather than a simple disposal charge is the welfare-optimal instrument precisely because the refund removes the incentive to dump (Fullerton and Kinnaman 1995).

However, even the best designed end-of-life instrument cannot fully solve a problem rooted in jurisdictional mobility. Waste moves easily across borders within Europe's single market. A staggered PAYT rollout in Emilia-Romagna, Italy showed waste being diverted to neighbouring municipalities with less stringent charging (Compagnoni and Torbert 2025). For the EU, this supports introducing coordinated disposal-tax levels to avoid variation in national rates that leads to displacement of the harmful activity, rather than responsible behaviour.

5.5 The wider tax system still favours linear production over circularity

Sections 5.2 to 5.4 discuss circular economy measures. A broader question is whether the general tax system supports circular-business models. Often, it does not, in ways that have little to do with environmental tax design as conventionally understood.

While sub-sectors vary, the circular economy, especially repair and reuse, is substantially more labour-intensive than the linear economy (Llorente-González and Vence 2020). High labour taxation therefore creates a structural bias in favour of the linear economy by raising the relative cost of extending product lifetimes, while leaving resource use comparatively undertaxed.

Reducing the tax burden on labour would improve the relative competitiveness of circular business models without requiring governments to pick particular sectors or technologies (Ex'Tax 2022). If needed, revenue neutrality could be ensured by raising taxes on consumption or environmentally harmful activities (environmental taxes were equal to just 2.1 percent of EU GDP in 2024), although corrective taxation can erase its own base over time.

This sits alongside a related coherence problem. EU environmental subsidies reached €45 billion in 2023, up 39 percent in 2022, but remain dominated by energy and renewables rather than circular-economy measures (Eurostat 2026).

Meanwhile, fossil-fuel subsidies¹⁹ continue to reduce the cost of carbon in many European countries (EEA 2024), making virgin materials relatively cheaper than secondary materials and directly working against the objectives of the instruments discussed in sections 5.2 to 5.4. Removing these contradictory signals would strengthen existing circular-economy instruments without requiring any additional layer of taxation.

Tax administration illustrates the same point from a different angle: rate-setting is not the only lever available, and the EU's own administrative rules can help or hurt circularity independent of any explicit environmental tax (section 4.3). None of these features of the tax system, whether that is the labour-tax bias, the subsidy mix or the EU administrative and reporting rules, was designed with the circular economy in mind, yet each affects it materially.

6 Policy recommendations

Price-based instruments, especially taxes, should aim to keep products and components in use, not just materials. Should the forthcoming Circular Economy Act prioritise reuse, repair, refurbishment and remanufacturing over recycling, it could include fiscal incentives and public procurement policies to favour repair and second-hand products, and provisions on EPR schemes to prioritise reuse and repair before recycling, ensure full cost coverage for these activities, and include financial support for the social economy.

Such measures would make sense, but the Act should also have a tax-design perspective to ensure that fiscal measures are effective in keeping products and components in use.

Because the EU's ability to legislate directly on taxation is limited by the unanimity requirement, we organise recommendations into a set of measures that should be written into the forthcoming Circular Economy Act, and complementary measures that EU countries should implement, and which the European Commission should encourage, model or coordinate through harmonisation.

6.1 Recommendations for the Circular Economy Act

Reform EPR governance

EPR fees can function like taxes when poorly designed, but a well-designed system involves organisational responsibilities and ecomodulation mechanisms that go beyond what a simple tax can achieve (section 4.2).

The Act should require EPR revenues to be used only for circularity, closing the loophole that allows revenues to be spent on activities such as municipal street-cleaning, rather than reinvested in collection, recycling and research. This means updating the mandatory list of eligible spending destinations, which is currently too narrowly focused

on waste management (under the Waste Framework Directive, Directive 2008/98/EC), to extend explicitly across the full lifecycle.

EPR fees should also be defined based on secondary material content to create a starker price difference between materials, goods and services derived from circular practices, and those from linear activities.

The Act should harmonise how EU countries transpose minimum EPR fee levels, which differ widely in how they are set. Harmonisation would make it easier for operators active across several countries to recover maximum value from waste through economies of scale.

The Act should also strengthen ecomodulation requirements, so that fee differentiation is large enough to meaningfully influence producer design decisions, extending criteria beyond recyclability to reward durability and reparability (Lifset *et al* 2023).

Complement or replace the EU plastics and e-waste levies with taxes targeting the source of harms
The EU budget levy on non-recycled plastic waste and the similar proposed levy on e-waste (section 4.1) are aligned with EU public policy objectives, but only tax the source of the harm indirectly by incentivising EU countries to take complementary action.

Although some countries have enacted national taxes to pay for the plastics levy, many EU countries simply pay the levy from general revenue, in which case no behavioural incentive is created. The levy also lacks any built-in monitoring or evaluation framework (Parente 2024), creating a risk that it is defended on revenue grounds, rather than assessed on environmental effectiveness.

In a first-best world the externality itself – the disposal or non-recycling of plastic – would be taxed at the point where the relevant decision is made. The levy would be replaced with an instrument that charges producers or importers directly, such as a harmonised EU minimum tax on virgin plastic content at the point of production or import and should build in systematic ex-post evaluation and monitoring.

As discussed in section 2, this may be complex to administer. However, the Commission is already taking steps towards distinguishing virgin from recycled content. At present, this is feasible for polyethylene terephthalate (PET, used for example in plastic bottles), providing a base for targeted tax measures. Continued developments in the identification of other elements could therefore allow the system to be expanded progressively.

Extend the EU ETS to incineration and landfilling, paired with minimum recycled-content requirements

The EU should extend its approach under the ETS of internalising carbon costs by applying it to virgin material production, pairing this move with minimum recycled-content mandates. That would prevent a perverse shift toward landfill as incineration becomes relatively more expensive when it is included in the ETS in future and also stop cheaper virgin imports from crowding out EU secondary material production.

Set EU minimum landfill tax conditions to support the 2035 diversion target

In the context of the blocking of an outright EU landfill ban by a minority of EU countries (European Parliament 2026), the Circular Economy Act should establish uniform minimum conditions obliging municipalities to set landfill fees high enough to generate a real behavioural incentive in favour of circularity. The proposed Act should also address the current weakness of highly uneven rates across member states, ranging from €5/tonne in Lithuania to over €100/tonne in Belgium (EEA 2023).

Review the DAC7 reporting thresholds to avoid discouraging peer-to-peer resale

The Commission's proposed recast of DAC7, raising the monetary threshold and removing the transaction threshold for digital platform reporting on second-hand goods sales (section 4.3), should be supported and adopted. This will correct the unintended consequence that current tax compliance rules are burdensome and may thus suppress participation in circular resale markets.

Evaluate the impact of differentiated VAT treatment

Because the tax-design literature is inconclusive on VAT differentiation as an effective behavioural instrument, the use of differential rates should be further tested and evaluated. Incentive effects should be weighed against fraud risks and extra administrative burdens. The VAT Directive permits national governments to apply reduced VAT on repairs, and they should test whether it increases demand for and supply of repair services.

Recognise reused goods and recovered materials as deductible inputs similarly to virgin inputs

VAT should apply once on net value added, regardless of whether that value comes from extraction or from circular recovery. Several options are available, including extending the scheme under which VAT is applied only on the margin earned by resellers of second-hand goods or introducing a notional input VAT deduction. A more detailed assessment is needed to establish their respective costs and benefits.

Monitor the effectiveness of the levy on small parcel imports

Since 1 July 2026, goods entering the EU in small consignments valued at less than €150 are subject to a fixed €3 customs duty, applied to non-EU sellers (section 4.1). The measure runs until 1 July 2028, when the duty is expected to be replaced with normal ad-valorem tariffs.

A separate €2 EU-wide handling fee is under negotiation for late 2026. Because the EU's stated rationale for these instruments is to reduce unfair competition and fraud and to increase consumer safety, their effectiveness as a circular economy or environmental instrument needs to be monitored.

6.2 Complementary measures at the national level

Reduce the tax burden on labour, prioritising relief for repair and reuse services

This is one of the clearest tax-design recommendations to emerge from empirical work on effectiveness (see Ex'Tax 2022). Even without a full structural tax shift, EU countries could reduce labour taxes specifically on labour-intensive circular activities, such as repair and reuse, correcting the systematic bias that currently makes replacement cheaper than repair. Revenue neutrality could be ensured by raising taxes elsewhere, for instance on consumption or environmentally harmful activities.

However, policymakers should be cautious about justifying corrective taxes primarily on revenue grounds as they can erode their own base over time. Just as revenues from taxation of fossil fuels can be expected to decline with the transition to renewable energy, fiscal systems must adjust to new sources of revenue as taxation of environmental harms changes behaviour. Finance ministries will have to manage the trade-off between the goals of incentivising the public good of sustainability versus maximising state revenue.

Reduced VAT rates for circular economy activities should be approached cautiously

The empirical evidence on the effectiveness of reduced rates remains weak and inconclusive. Moreover, their effectiveness may also be weakened by implementation complexity, which can increase fraud risks. Taxes levied closer to the source of the harm are generally better targeted than reduced VAT rates.

Relieve VAT on donations to charities

The VAT Directive allows this, yet not all EU countries take advantage of this possibility. Consequently, businesses are steered towards destroying unsold goods rather than donating them.

Reform national EPR governance to ring-fence revenues for circularity

National regulators should close the loophole that allows EPR fees to be absorbed into general state budgets, rather than reinvested in collection, recycling, repair and R&D, complementing the EU-level reforms recommended above.

Remove environmentally harmful subsidies, particularly fossil-fuel subsidies

Even well-designed circular economy taxes are weakened if conflicting subsidies elsewhere keep virgin material and fossil-fuel-derived production artificially cheap. EU countries should pursue the elimination of these subsidies as a low-cost way to reinforce existing circular-economy instruments without adding new layers of taxation.

Use national tax policy to support fiscal incentives that keep products and components in use, not just materials

Civil-society organisations have called for the Circular Economy Act to prioritise reuse, repair, refurbishment and remanufacturing over recycling, including through fiscal incentives and public procurement policies²⁰.

6.3 The longer term

Pursue an EU-level CBAM-style border adjustment for virgin materials

While the EU's competence here is limited by the unanimity requirement, national governments can act directly through their national tax codes and procurement frameworks to favour repair and second-hand products over the purchase of new goods. Applying a CBAM-equivalent mechanism to imports of virgin materials could achieve a level playing field for circularity (section 4.1).

However, this is currently politically unfeasible. CBAM only entered into force on 1 January 2026, covering embedded carbon emissions only, and the political climate is unfavourable to measures that raise input costs. Extending CBAM would also be administratively very difficult, given the complexity of measuring recycled content and circularity attributes. However, over the longer term, the Commission should revisit this idea.

Shift taxation away from labour and towards materials and other resources

This is the next frontier for price-based incentives for circularity, as argued by Letta (2024) and Ex'Tax (2022). This shift could gain more support among finance ministries in future if revenues from taxing fossil fuels diminish as a result of the energy transition to renewables. ■

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Endnotes

1. See Eurostat news of 19 November 2025, [‘Over 12% of materials in the EU come from recycling’](#).
2. This difference can be negative, in which case a tax subsidy may be justified.
3. No country has a full set of border tax adjustments designed explicitly around circularity objectives, but some countries like Denmark or the UK levy taxes on virgin materials (such as gravel or plastics) which also cover imports.
4. However, more narrowly for plastics, the European Commission has stated it “will revise customs codes to differentiate virgin plastics from recycled products”. See European Commission Q&A of 12 December 2025, [‘Questions and answers on the circularity plastics package’](#).
5. See Council of the EU press release of 10 October 2025, [‘Taxation: Council approves conclusions on the use of tax incentives to support clean technologies and industry’](#).
6. See [‘Council Decision 2020/2053 on the system of own resources of the European Union’](#), 14 December 2020.
7. See ‘European Commission (2025) ‘Proposal for a Council Decision on the system of own resources of the European Union and repealing Decision (EU, Euratom) 2020/2053’.
8. The duty is temporary pending a more long-term measure. See Council of the EU press release of 12 December 2025, [‘Customs: Council agrees to levy customs duty on small parcels as of 1 July 2026’](#).
9. See EUROPEN, [‘Recommendations for a cohesive EU Extended Producer Responsibility environment’](#), January 2025.
10. Article 8a(4)(b) of the EU Waste Framework Directive (Directive 2008/98/EC) requires fees to be “modulated based on the product’s durability, reparability, reusability, recyclability and the presence of hazardous substances... taking into account its entire life cycle.”
11. See UNEP news story of 29 May 2025, [‘By making producers part of the solution, France aims to rein in plastic pollution’](#).
12. Assume a virgin and used good of the same quality and assume competitive markets (ie. price taking). Suppose a consumer originally buys the virgin good for €60.50, consisting of €50 plus €10.50 VAT (21%). Later, the consumer sells the used good to a business for €60.50. Since the consumer is not a VAT registered business, no VAT is separately charged on the resale, and the business cannot reclaim the €10.50 of VAT embedded in the €60.50 purchase price. The business

therefore has a cost of €60.50. If it then sells the used good for €121 including VAT, it pays €21 in VAT and makes a margin of €39.50. By contrast, if the business buys a new good for €60.50, it can reclaim the €10.50 VAT, giving it a real cost of €50 and a margin of €50 when reselling it for €121. Thus, the used good gives the business a €10.50 lower margin because the VAT originally paid by the consumer is embedded in the purchase price and cannot be reclaimed.

13. The provision (the 'margin scheme') applies to dealers in second-hand goods, works of art, collectors' items and antiques only. This avoids the cumulative taxation that would otherwise arise when goods from private consumers re-enter the market.

14. The threshold is €2,000 or 30 transactions for goods sales.

15. See ['Proposal for a Council Directive on administrative cooperation in the field of taxation \(recast\)'](#), June 2026.

16. In the OECD PINE database, taxes on the ownership of motor vehicles are tagged as circular economy measures because they disincentivise the consumption of new resource-intensive products (Chhun et al 2024).

17. Aggregates are the largest material flow by weight in the EU economy, so a small per-tonne levy could shift demand toward recycled construction and demolition waste.

18. A feebate combines a fee on environmentally worse-performing products with a rebate for better performing ones, typically designed so the fees fund the rebates.

19. EU fossil fuel subsidies were €111 billion in 2023, down from a crisis peak in 2022, with total energy subsidies estimated at €340 billion in 2024 (European Commission 2025; see David Callanan, ['EU Energy Subsidies 2025: decline in support but fossil fuel aid remains high'](#), European Gas Hub, 17 March 2026. The pre-crisis baseline 2015-2021 was €57 billion to €62 billion per year (EEA 2024).

20. See the Cambridge Institute for Sustainability Leadership and other organisations, letter of 1 August 2025, ['The EU Circular Economy Act: A Key Opportunity for Sustainable Resource Use, Long-Term Competitiveness, and Strategic Resilience'](#).

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Annex 1. Plastic taxes and related measures in EU countries

Country	National plastic tax/measure	Key related measures & current status	How EU levy is funded
Austria	None	DRS launched Jan 2025: €0.25 deposit on single-use PET bottles and cans; 81.5% collection rate in the first year of operation.	National budget
Belgium	None	Plastic packaging covered by EPR schemes under the EU single-use plastics rules, updated by Royal Decree in Jul 2024. No DRS: the 2024 Flemish and Walloon coalition agreements dropped the earlier commitment to deposits.	National budget
Bulgaria	None	Product fee on plastic packaging if recycling targets are missed, plus a new EPR fee on single-use plastics introduced in 2024, rate still to be set. DRS in preparation.	National budget

Croatia	None	DRS since 2005: deposit raised from €0.07 to €0.10 in Jan 2025 on one-way containers above 0.2 L; 77% collected in 2023.	National budget
Cyprus	None	DRS regulations consulted on in 2023; awaiting adoption of the implementing decree.	National budget
Czechia	None	No DRS; PET collection about 82% via kerbside. A CZK 4 deposit approved by government in Oct 2024 for a Jan 2026 start stalled before the 2025 elections.	National budget
Denmark	None	Excise duty on carrier bags and disposable tableware, raised Jan 2024; fee on tobacco filters. DRS since 2002: DKK 1.00–3.00 deposits; collection above 90%.	National budget
Estonia	None	DRS operating since 2005: €0.10 deposit; return rates of 87–89% for plastic, metal and glass in 2021.	National budget

Finland	None	Packaging tax of €0.51 per litre on beverage containers, waived for producers in the voluntary DRS; return rates of 97–98%.	National budget
France	None	EPR obligations on packaging strengthened and certain single-use plastics banned since 2021. No DRS: in Sept 2026 the government ruled out a mandatory deposit in favour of voluntary local schemes; PET collection 58.3% in 2024, against a 77% target.	National budget
Germany	CANCELLED Merz government abandoned national plastic tax plans entirely	Single-Use Plastics Fund Act in force since Jan 2024: manufacturers and importers report the single-use plastic they place on the market and pay fees that fund waste management. The broader plastic tax intended to pass on EU levy costs was abandoned after the Apr 2025 elections. DRS since 2003: €0.25 on PET, €0.08–0.15 on glass.	Federal budget (EU levy). EWKFondsG fund charges separate.

Greece	None	Fee on single-use plastic bags. National DRS (DRS Hellas) expected to operate from 2026.	National budget
Hungary	None	Environmental Product Charge on packaging since 2011, with an EPR system from Jul 2023; the duplicate charge-and-EPR reporting obligation was dropped for some product flows in Jan 2025. DRS since Jan 2024: HUF 50 (about €0.13); 88.8% returned in 2025.	National budget
Ireland	None	Plastic bag levy of about €0.22 since 2002, funding the Circular Economy Fund. DRS since Feb 2024: €0.15/€0.25 deposits; collection rose from 49% to about 91% in the first year.	National budget

Italy	Planned: €0.45/kg on non-recycled single-use plastic (MACSI) – delayed eight times; now expected 1 Jan 2027	Approved in the 2020 Budget Law, covering single-use packaging such as food packaging, plastic films and bottles, with recycled and compostable plastic exempt. Postponed eight times and still not in force as of Aug 2026. No DRS, though one could lift PET collection from about 73% to 94%.	National budget until operational; then national plastic tax funds EU levy
Latvia	None	Natural Resource Tax on plastic packaging: about €0.80/kg where recyclable but not recycled, €1.25/kg where non-recyclable, with the higher rate extended to foam polymers and polystyrene in 2024. DRS since Feb 2022: €0.10 deposit; 80% returned by end-2023, PET at 83%.	National budget
Lithuania	None (pollution tax on packaging applies)	Pollution tax on filled plastic and PET packaging, with lower rates for reusable and recyclable packaging from Jan 2025. DRS since 2016: PET collection rose from 34% to 90% by end-2025.	National budget

Luxembourg	None	17% VAT on certain plastic bags. A deposit scheme is foreseen in law but awaits a Grand-Ducal regulation; deposits currently cover mainly kegs and reusable containers.	National budget
Malta	None	Excise tax on plastic bags. DRS since Nov 2022: returns rose from under 20% to about 70% within 150 days.	National budget
Netherlands	None (informal contribution applies)	Industry contribution rather than a formal tax, on producers placing 50,000 kg or more a year on the market; EPR fees extended to cigarette filters in 2024. DRS on large PET bottles since 2006 (€0.25), extended to small bottles in 2021 and cans in 2023 (€0.15).	National budget
Poland	None (escalating fees on single-use plastics from 2025)	Fee on single-use plastics rising from 0.10 PLN/kg in 2025 to 1.00 PLN/kg in 2026 and 5.00 PLN/kg in 2027, plus a 0.20 PLN recycling fee per plastic bag. DRS launched 1 Oct 2025 under a multi-operator model.	National budget

Portugal	Yes Contribution on single-use takeaway packaging: €0.10/package (reduced from €0.30, Jan 2024)	Contribution on single-use plastic and multi-material takeaway packaging since Jul 2022, extended to aluminium; cut from €0.30 to €0.10 per package in Jan 2024, with retailers required to pass on at least €0.20. Packaging with 25% or more recycled monomaterial content is exempt, and a separate €0.10 fee applies to lightweight plastic bags. DRS launched 8 Apr 2026, excluding glass.	National plastic contribution funds EU levy
Romania	None	DRS operating (RetuRO): 83% collected in 2025, with over 5.2 billion containers returned through one of Europe's densest return networks.	National budget
Slovakia	None	DRS operating since Jan 2022 for PET bottles and cans; return rate 93% in its second year.	National budget

Slovenia	None	No DRS: the Environmental Protection Act allows one by decree, but none has been adopted; a scheme for bottles and cans is planned.	National budget
Spain	Yes €0.45/kg on non-recycled plastic packaging (Law 7/2022, effective Jan 2023)	Applies to all non-reusable plastic packaging placed on the Spanish market, with recycled and compostable plastic exempt; additional levies on incineration and landfill, plus a plastic bag charge since 2018. DRS planned for 2027; PET collection about 41%.	National plastic tax covers EU obligation
Sweden	None	Tax on plastic bags only. DRS since 1984 (cans, later extended to plastic bottles); 87.6% return rate for PET bottles and cans in 2024.	National budget

Note: DRS = deposit return scheme.

Source: Bruegel based on Sensoneo, ['Overview and results of Deposit Return Schemes in Europe'](#), accessed August 2026.



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The energy transition: progress and challenges

Solar and wind have become the cheapest sources of new electricity, yet Europe is now switching them off in record numbers. Natalia Fabra and Mar Reguant argue that the binding constraint on the energy transition is no longer technology but market design

In the first quarter of 2026, EU day-ahead electricity markets recorded 1,223 hours of negative prices – more than twice the level of a year earlier, and ten times the number recorded in 2022. In Spain, prices fell below zero for 16% of all trading hours in the quarter (IEA 2026a). This should not be interpreted as evidence that Europe has an excess of clean electricity. With an electrification rate of only 24%, well below China's 34%, Europe still requires substantial additional clean generation to reduce its dependence on fossil fuels (Figure 1).

Rather, this is evidence of insufficient electricity demand, flexibility, storage, and grid capacity to put the seeming surplus of clean power to good use.

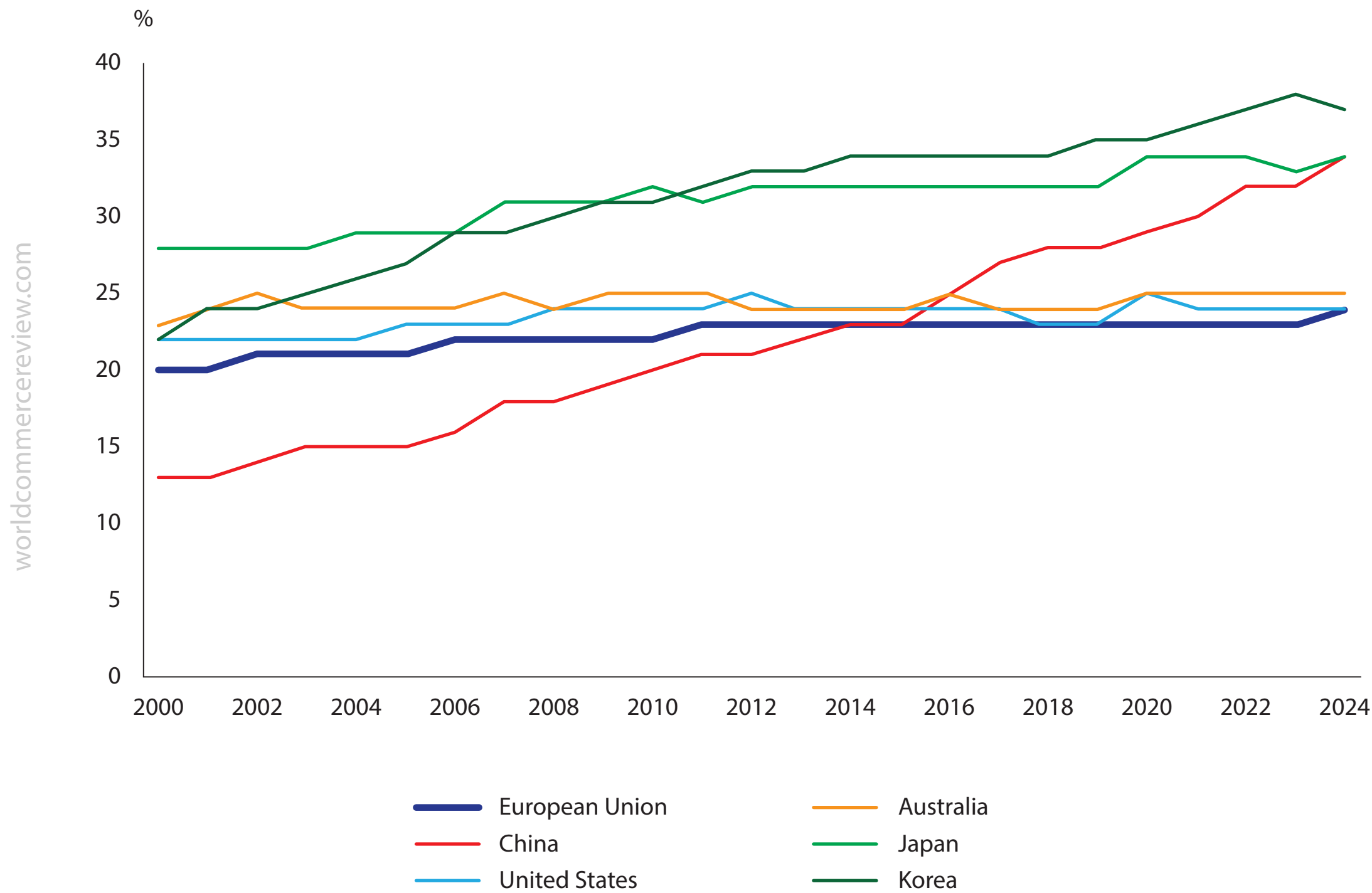
A decade ago, the energy transition's central concern was that renewables were too expensive to compete with fossil fuels. That concern has been partly resolved: solar and wind are now the cheapest sources of new generation in most of the world. With battery costs down 93% relative to 2010 (IRENA 2026), intermittency – the drawback most commonly associated with renewables – may also become less of a constraint.

With the physical means to decarbonise electricity now largely available, what is increasingly in short supply is something different: the market arrangements needed to turn cheap technology into investment that is financed, built, and effectively used. This is the argument we develop in our recent survey paper (Fabra and Reguant 2026).

Why cheap renewables undermine their own investment case

The mechanism is well understood. As renewable capacity expands, its own output pushes down prices precisely when it is generating, since wind and solar compete with each other and against a near-zero marginal cost (Acemoglu *et al* 2017).

Figure 1. Economy-wide electrification rate in selected regions, 2000-2024



Source: IEA (2006).

This 'cannibalisation' effect means that the price wind or solar plants actually capture falls further below the average market price as more renewables are added, even before any grid constraint binds – a pattern that persists even when generators bid strategically (Fabra and Llobet 2023).

Once oversupply is severe enough, prices turn negative and plants are curtailed due to excess supply. The threat of cannibalisation is even reshaping industry structure, as firms have an incentive to separate ownership of renewable and thermal assets in order to soften competition (Fabra and Llobet 2026b).

The lesson from Europe's negative-price spring is not that there is already too much renewable energy. It is that a market and policy framework designed for scarce, dispatchable fossil generation is poorly suited to a system increasingly based on capital-intensive, low-cost and intermittent clean power

As prices captured by renewables risk falling below their average costs, the consequence is, as Paul Joskow (2019) put it, a 'missing money' problem: a revenue inadequacy to sustain existing capacity, let alone finance the next wave of investment. Left unaddressed, this can turn into a vicious circle.

Without sufficient revenues, investment in renewables slows; and without new investment, electricity remains expensive and volatile precisely when low, stable prices are what would encourage the electrification that could absorb the seeming surplus of clean power.

Long-term contracts are needed – so why the shortage?

There is broad consensus that long-term contracts are the fix: by delivering a stable price, they shield investors from cannibalisation and from wholesale-price volatility more broadly, lowering the cost of capital. Recent research confirms just how much is at stake.

Darmouni *et al* (2026) show that reliance on project finance backed by fixed-price contracts lets renewable developers substitute expensive equity with cheaper debt. May and Neuhoff (2021) estimate that the availability of fixed-price contracts can move financing costs for wind power by 30% of project value. In turn, by auctioning contracts, the lower cost of capital can be passed on to consumers through lower electricity prices.

If both buyers and sellers gain from long-term contracts, why are there not more of them? Part of the answer is that buyers are reluctant to lock in a fixed electricity price when wholesale prices might later fall below it. Likewise, when costs are exposed to inflationary pressures, locking in a fixed price can pose significant risks for projects with long lead times.

A second, more fundamental, part of the answer is counterparty risk. In recent work, Fabra and Llobet (2026a) show theoretically that the mere possibility that a buyer might try to renegotiate a contract when spot prices fall is enough, in equilibrium, to raise the contract prices sellers demand upfront – which in turn makes renegotiation more attractive, further limiting the scale of investment that can be profitably financed.

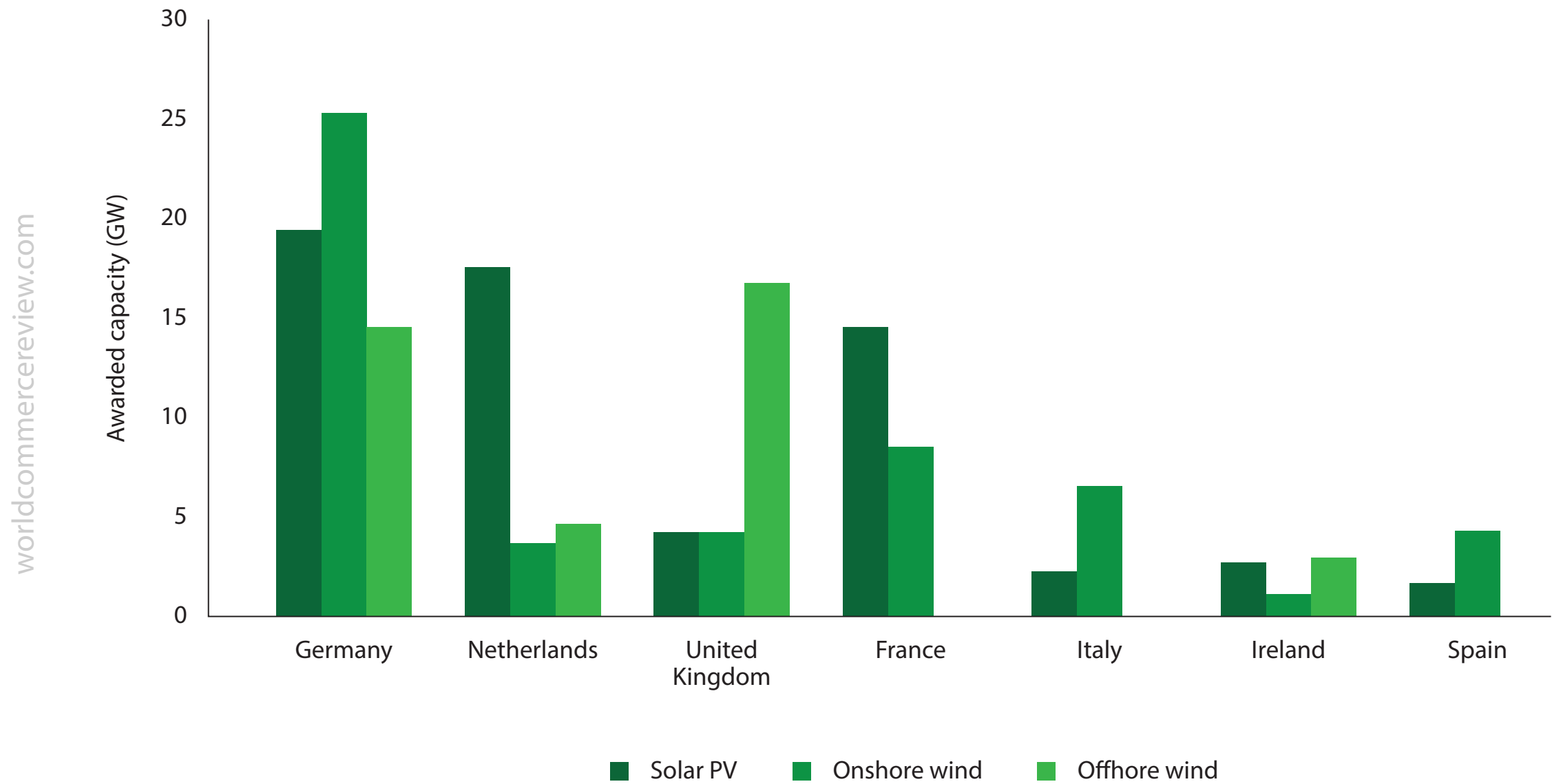
Ryan (2025) documents a closely related hold-up problem in India's solar market, where weak enforcement of auction-awarded contracts depresses investment.

A public counterparty for those contracts can mitigate the risks that reduce contract liquidity in private markets. Yet, while public support in Europe has to be channelled through 'contracts for difference' (CfDs), member states are not resorting to them as much as would be needed to deploy investments at the pace and scale needed (Figure 2).

Assuring enough contract volume is a challenge, but not the only one: contract design must be right to induce an efficient use of the resources once in place. As Ambec *et al* (2025) argue, the 'conditional' CfD design adopted by the EU ties compensation to actual output rather than to a fixed reference price, distorting dispatch incentives in ways reminiscent of older feed-in tariffs.

Contract design, in turn, is inseparable from auction design, since most long-term contracts for renewables are allocated competitively (Cantillon and Spagnolo 2026). A recurring finding is that price alone is a poor way to select winners, because otherwise identical projects can differ substantially in value depending on when and where they generate (Callaway *et al* 2018).

Figure 2. Total awarded CfDs capacity for solar PV, onshore wind, and offshore wind in frontrunning countries, 2012-2023



Source: Demurtas et al (2026).

Ongoing work by Fabra and Llobet (2026c) shows that combining a fixed contract price with a degree of price exposure – rewarded through a scoring rule rather than price alone – can induce higher-value developers to bid more aggressively, improving the allocation of contracts without exposing investors to excessive risk.

Long-term contracts are necessary, but not sufficient

Even well-designed contracts cannot substitute for physical flexibility. The three margins that determine how much intermittency a power system can absorb are transmission, storage, and demand response – each an imperfect and only partial substitute for the others, while complementing renewable investments.

While transmission allows for physical flexibility through space, storage and demand response do so through time. For instance, batteries charge when solar floods the market during midday hours and discharge in the evening, reducing gas-fired generation, mitigating curtailment and increasing the profitability of solar investments.

Yet its deployment is not free of challenges: storage itself becomes less profitable as more of it is deployed, since arbitrage margins compress as hourly prices converge (Butters *et al* 2025, Andrés-Cerezo and Fabra 2023, 2026).

Sluggish electrification

The other side of this coin is electrification, which has lagged badly behind the growth in clean supply: EU electricity demand grew by just 1% in 2025, with industrial electrification being particularly slow (IEA, 2026b). This is not simply a matter of inertia. Borenstein and Bushnell (2022) show that retail electricity prices, loaded with network and policy charges recovered through volumetric fees, routinely exceed the social cost of electricity relative to fossil-fuel substitutes – discouraging exactly the demand growth that would absorb surplus renewable supply and support the prices that finance further investment.

Electricity price volatility contributes to further discouraging electrification. In this sense, electrification and renewable investment are two sides of the same coordination failure, and long-term contracting is one of the few instruments that can address both, by giving industrial and household consumers a predictable price against which to commit their investments.

The politics of the energy transition cannot be an afterthought

None of this can be designed in a vacuum from its distributional consequences. Jarvis (2025) estimates that local opposition and planning constraints have caused substantial underinvestment in UK wind and solar.

Purchase subsidies for electric vehicles, heat pumps, and rooftop solar have often accrued disproportionately to higher-income households able to afford the upfront cost (Borenstein and Davis 2025), while the costs and benefits of the broader transition – job creation and fiscal revenues in renewable-rich regions, or economic decline in fossil-fuel communities – are unevenly spread across places (Fabra *et al* 2024, Serra-Sala 2026, Fabra *et al* 2026).

Instruments that are efficient on paper but perceived as inequitable invite the political resistance that has already slowed transmission and renewable permitting across Europe and the US.

Market design is now the constraint

The lesson from Europe's negative-price spring is not that there is already too much renewable energy. It is that a market and policy framework designed for scarce, dispatchable fossil generation is poorly suited to a system increasingly based on capital-intensive, low-cost and intermittent clean power.

Better long-term contracts and auctions, more investment in grids, storage and demand flexibility, and fewer barriers to electrification should therefore be treated as parts of the same challenge. Addressing that challenge is essential to pushing the energy transition forward. ■

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A strategic lever to boost global decarbonisation

The Paris Agreement provides a framework for international carbon trading. Georg Zachmann and Annabelle Weisser and argue that international carbon credits can support the EU's 2040 target if buyers' club rules and leverage ensure real mitigation gains abroad

Executive summary

Article 6 of the Paris Agreement provides a framework for international carbon trading under which countries can agree to buy and sell emissions reductions to meet their national climate targets, or for other international mitigation purposes, such as in aviation. In this context, the European Union will allow up to five percentage points of its 2040 climate target to be met through purchases of international credits.

This opportunity should be used not merely as a cost-saving mechanism but should be a tool to encourage and increase global emissions reductions. We propose a combination of two institutional innovations: a Carbon Buyers' Club that would ensure common quality standards, and a set leverage ratio to ensure that every unit of domestic emissions offset leads to a greater amount of mitigation abroad.

Within a market-based architecture, private buyers should be able to use international credits as collateral to borrow domestic allowances. Through this controlled exchange against EU allowances, the system would link international flexibility to domestic compliance systems, in this case the EU emissions trading system.

To safeguard environmental integrity our proposal would move away from project-based crediting. Instead, partner countries would allocate portions of their own emissions reductions to other countries, and would receive in return direct financing, project-based investments or both.

1 Introduction

Compared to much of the rest of the world, Europe has had some success in cutting emissions. The European Union's share of global greenhouse-gas emissions dropped from 15 percent in 1990 to 6 percent in 2024¹. However, even if the EU were to reach net zero tomorrow, the total impact on global warming would be limited.

To meaningfully contribute to global emissions reduction efforts, in a context in which the world is far from keeping global warming well below two degrees Celsius above pre-industrial levels (UNEP 2025), the EU must leverage its impact not only domestically but also abroad.

To keep climate protection alive, the EU should focus its climate policy on its global impact and design its international credits procurement strategy accordingly

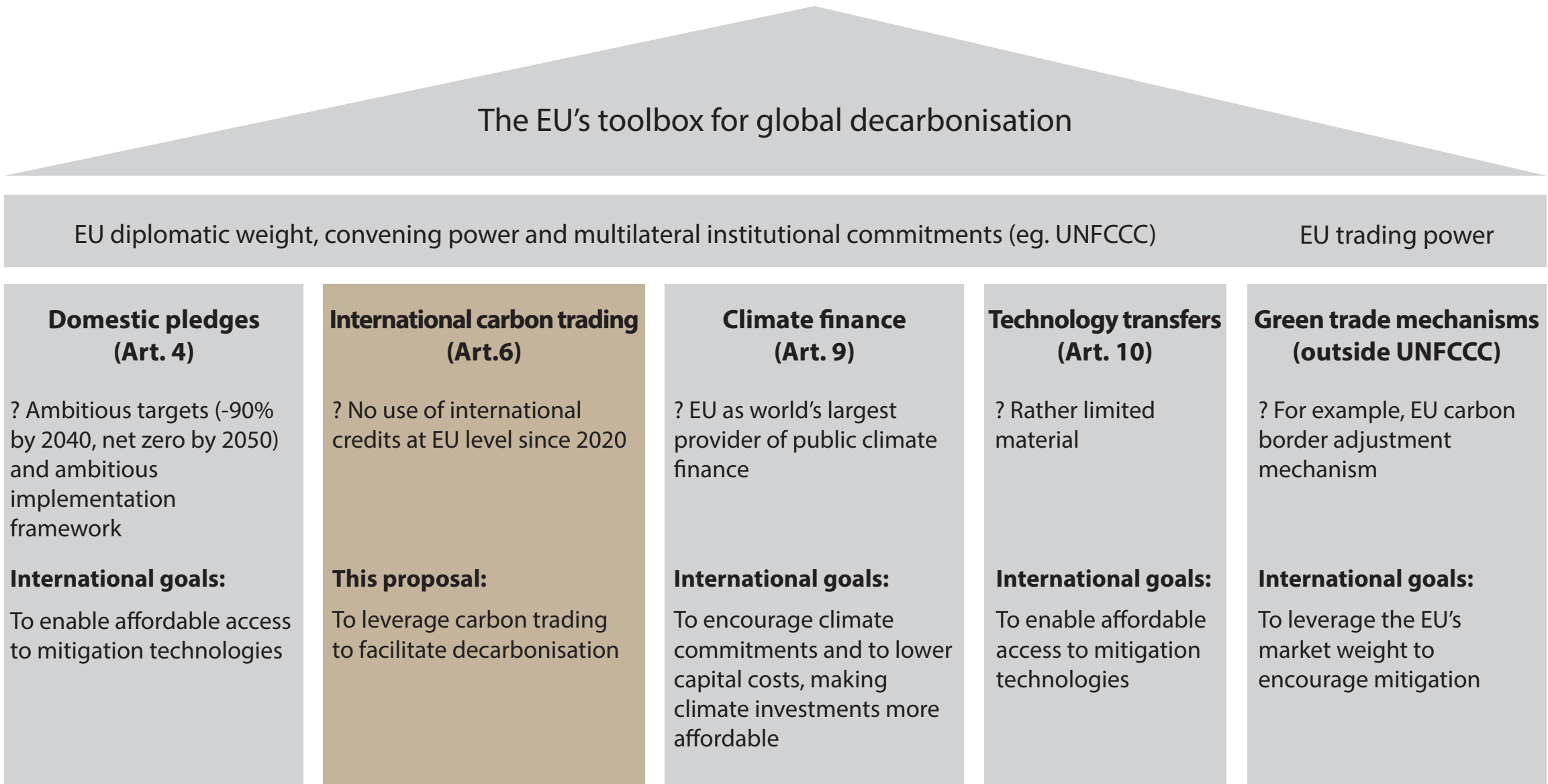
The EU's first tool to push for more climate change mitigation internationally is diplomacy. EU diplomacy was a major driver of the United Nations Framework Convention on Climate Change (UNFCCC) process that culminated in the 2015 Paris Agreement, which provides a universally accepted legal basis for policy instruments that the EU and others can use to catalyse emission reductions beyond their borders. The UNFCCC process is thus also a major driver of EU climate policy (Pisani-Ferry *et al* 2023).

Beyond its diplomatic weight, the EU has used five main levers to encourage climate change mitigation abroad (Figure 1):

1. By pledging ambitious domestic emission reductions (Paris Agreement, Art. 4), the EU sets an example for others to also make significant mitigation commitments. To meet its ambitious targets, the EU has developed policies, technologies and expertise, which in principle lower costs and reduce uncertainties for countries that follow suit².
2. The EU is the world's largest provider of climate finance (Art. 9)³. This support encourages developing countries to make climate commitments and reduces their capital costs for mitigation investments.
3. By facilitating technology transfer (Art. 10), the EU could in principle enable developing countries to gain more affordable access to mitigation technologies.
4. By implementing green trade mechanisms (such as the carbon border adjustment mechanism, CBAM), the EU can encourage trade partners to introduce mitigation policies and decarbonise their industries.
5. International carbon markets (Art. 6) can encourage substantial emission reductions in countries with low mitigation costs.

Figure 1. International carbon trading as a pillar of EU international climate policy

worldcommercereview.com



Source: Bruegel.

However, some levers have more potential than others. There is limited scope for the EU to further tighten domestic climate targets or to provide dozens of billions of euros in additional international climate finance. The EU's diplomatic weight and technology leadership have not increased since the Paris Agreement was negotiated. But green trade policies are a promising development (Bahí *et al* 2026), and international carbon trading is making a return.

A framework for international carbon trading is provided by Article 6 of the Paris Agreement. This allows countries to cooperate bilaterally by transferring emission reductions, known as Internationally Transferred Mitigation Outcomes (Article 6.2). Buyers can use these transfers to meet their national climate targets or for other international mitigation purposes, such as in aviation. To maintain environmental integrity, these transfers must be carefully accounted for and tracked throughout their lifecycle using reliable national or international registries.

Article 6 also established a centralised, UN-supervised international carbon crediting mechanism (Article 6.4). Under this framework, approved mitigation activities generate unique emission reduction credits that are recorded and traced within a central registry.

Finally, it provides a framework for non-market cooperation by countries to reduce emissions (Article 6.8), which does not involve the generation or transfer of tradable carbon credits.

If well designed, international carbon trading can become a strategic instrument in the EU's toolbox to encourage international climate change mitigation. At the climate summit (COP29) in Baku in 2024, UNFCCC participants finalised the Article 6 rulebook, allowing countries to procure and use international carbon credits⁴ to achieve climate targets.

In 2025, the EU decided to allow up to five percentage points of its 2040 climate target – under which emissions should be cut by 90 percent compared to 1990 – to be met by high-quality international credits (Regulation (EU) 2026/667).

Such trade in mitigation outcomes can lower the global cost of decarbonisation, as substantial volumes of abatement, especially in emerging market and developing economies (EMDEs), are still relatively cheap⁵.

However, there are considerable risks involved in international carbon trading. Previous experiences exposed profound weaknesses. Under the Kyoto Protocol's Clean Development Mechanism (CDM), many credits were issued for claimed emission reductions that were likely overestimated and may have happened regardless of whether or not credits were issued (Cames *et al* 2016). These concerns were the motivation behind the San José Principles, which advocated stricter integrity rules⁶.

However, the safeguards ultimately adopted in the Article 6 rulebook fell short of these standards⁷. This failure to implement higher-integrity rules undermines trust in international carbon markets and fuels justified scepticism towards offsetting (Asadnabizadeh and Moe 2024).

If credits on paper count towards buyer countries' climate commitments without corresponding to real emission reductions in seller countries, they risk undermining the fundamental architecture of the Paris Agreement. And without sufficient safeguards, Article 6 risks creating a race to the bottom: buyer countries are incentivised to minimise compliance costs, while seller countries seek to maximise credit selling. The fundamental challenge is to create incentives for all participants to adhere to environmental integrity standards.

These integrity concerns are particularly pronounced when credits are sold by individual project developers. Since project-based credits rely on hypothetical estimates of what emissions would have been without the project, it is often difficult to verify whether claimed emission reductions are real, additional and permanent (Fuchs *et al* 2026). While safeguards in the Article 6 rulebook are intended to improve the integrity of credits, they cannot eliminate the fundamental uncertainty around project-based credits.

Despite the challenges, the EU has limited time to set up a functioning carbon market. Its five-percentage point allowance for emissions cuts to be met through 'high-quality international credits' (Regulation (EU) 2026/667) applies from 2036 (Montrone *et al* 2026). A pilot period from 2031 to 2035 will establish a market for these credits.

Strategic decisions on how international carbon credits will be used in the EU need to be taken now and are expected in 2026/2027. In the framework of a review of the EU emissions trading system (ETS)⁸, the European Commission proposed on 17 July 2026 to set up a separate compliance mechanism for international credits (European Commission 2026).

However, the Commission proposal is only the beginning of the conversation, and the Commission is expected to present a *"framework for the possible use of international credits towards the 2040 EU climate target under the European Climate Law"* in late 2026⁹. Together with other legal acts, the EU needs to develop a consistent climate policy framework after 2030 that includes the strategic role of international credits¹⁰.

This *Policy Brief* outlines a proposal for how to make Article 6 work to catalyse global emission reductions. The proposal rests on three principles: i) country-issued credits instead of project-based ones, ii) private buyers instead of public buyers, iii) and a leverage ratio that implies that the EU should use international carbon trading to encourage mitigation abroad, rather than just transferring carbon emissions from one region to another.

Section 2 spells out these principles as fundamental choices, including arguments for why certain avenues should be prioritised over others. Section 3 outlines how this could work in practice. Section 4 discusses conceptual uncertainties.

2 Fundamental choices

Strategic questions about how the EU uses Article 6 include who procures foreign credits (the EU, national governments or companies), in which compliance mechanisms they will be accounted for and how to determine the minimum acceptable quality of foreign credits (Delbeke and Bencini 2026).

2.1 Who sells credits? Project developers vs. governments

We recommend moving away from project-based mitigation trading to issuance of carbon credits at national level. The certification of individual mitigation projects poses several environmental-integrity risks related to the measurement, questionable permanence and additionality of credits (Fuchs *et al* 2026; Edenhofer *et al* 2026).

These challenges make it nearly impossible to assess consistently how much additional mitigation projects deliver over time. In contrast, countries could make parts of their own emissions reductions available to count towards other countries' climate commitments – the Nationally Determined Contributions (NDCs) (Delbeke and Bencini 2026). Seller countries would retain full discretion over whether they receive direct financing, project-based investments or a combination of both in return.

This builds on existing concepts: the international transfer of carbon credits under Article 6 triggers a 'corresponding adjustment' in the host country's NDC; ie. by buying foreign credits, buyers already obtain a share of the seller country's carbon budget.

At the same time, host countries can require ‘benefit sharing’ from project developers in the form of a share of credits or a tax. In our proposal, seller countries, rather than project developers, are the issuers of carbon credits. This implies that the value of a credit depends not on the mitigation achieved by a specific project, but on a country’s mitigation success compared to a baseline emission pathway.

2.2 Who buys credits? Governments vs. private companies

As an alternative to public entities buying foreign credits, private companies should buy foreign mitigation outcomes to exchange at home for domestic allowances. If public entities such as the European Commission or national governments buy foreign credits, there is a risk of politicising the trade.

To domestic audiences, the purchase of foreign credits with public money could look like substantial hand-outs to companies and foreign governments. Internationally, countries unable to sell because of a lack of mitigation capacity might perceive this as a political rather than environmental or economic choice.

However, if private companies can buy foreign credits to obtain domestic compliance relief, they will try to get the highest volume of domestic compliance at the lowest price. If the domestic compliance value of a specific seller country’s credit can be made to align with the effective emission mitigation of that country within a certain timeframe (eg. 2030-2040), private companies will have an incentive to deploy market-based information systems to determine the value of each seller country’s credits.

In the EU, private companies would have an incentive to buy foreign mitigation outcomes if they can be used for compliance in the ETS or the separate ETS2, which covers emissions related to buildings and road transport¹¹.

2.3 Offset ratio: one-for-one vs. leverage

Finally, the purchase of foreign credits should be designed to accelerate global decarbonisation. The EU simply replacing one unit of domestic mitigation with one unit of foreign mitigation will not drive global decarbonisation.

Instead, the trade in foreign mitigation credits should reflect that in some countries, mitigation is cheaper than in the EU. With a policy-set leverage ratio of 1:5, for instance, every tonne of emitted carbon dioxide that the EU offsets could correspond to five tonnes of emission reductions abroad¹². This can be seen as a cautious implementation of Article 6.4, which demands that international transfers entail additional emission reductions¹³.

By shifting from one-to-one offsetting to a high-ambition multiplier, developed countries can turn their need for domestic flexibility into a major driver of global climate action. If a coalition of countries in the Organisation for Economic Co-Operation and Development (OECD), excluding the United States¹⁴, capped its use of international credits at five percent of 1990 emission levels¹⁵ during the final 15-year transition to net zero (2036-2050)¹⁶, it would offset less than seven gigatonnes of hard-to-abate emissions in those countries.

By requiring a 1:5 mitigation ratio for these purchases, this coalition would stimulate nearly 34 gigatonnes of mitigation¹⁷ in partner countries. Even after allowing for slightly higher emissions in buyer countries, this strategy would yield a net global emission reduction of 27 gigatonnes¹⁸.

With the world currently on track to overshoot the two-degree carbon budget by maybe 125 gigatonnes¹⁹, implementing this high-leverage procurement policy would allow OECD buyers to close more than a fifth of the entire global emissions gap. Table 1 summarises the three fundamental choices.

Table 1. Fundamental choices in international carbon market design

Strategic question	Alternatives	Proposed approach	Main rationale
Who sells mitigation outcomes?	Project developers vs. governments	Governments	Tackles integrity and additionality issues and creates stronger country-level incentives
Who buys mitigation outcomes?	Governments vs. private companies	Private companies	Facilitates market-based pricing mechanisms, mobilises private finance and avoid politicisation
What is the offset ratio?	One-for-one vs. leverage	Leverage	Ensures that offsetting generates additional mitigation

Source: Bruegel.

3 Putting the framework into practice

To ensure the leverage effect of international carbon trading, the system would rely on three mechanisms:

1. A mitigation value that would reflect the actual emission reductions a seller country achieves relative to its baseline;

2. A Carbon Credits Clearing House that would allow companies to borrow domestic compliance allowances by collateralising adequate amounts of foreign credits;
3. A Carbon Buyers' Club that would coordinate high compliance standards among participating countries.

3.1 Mitigation value

The mitigation value would quantify a foreign credit based on the volume of emissions reductions it represents beyond what the seller country would have achieved in the absence of the trade. This metric would enable direct comparisons between different seller countries, using an EU allowance with a value of one as the standard benchmark.

At the core of the mitigation value concept is a baseline of emissions reductions that a country should achieve to keep global warming well below two degrees (on the corresponding challenges, see section 4). A country's emissions reductions that go beyond this baseline can be sold. The value of a credit depends on the extent to which the baseline has been overachieved and the quantity of credits that the country has issued:

$$\text{Mitigation value} = \frac{\text{overachievement of baseline}}{\text{international allowances sold}}$$

The mitigation value of a foreign credit would determine the volume of domestic emissions it can offset. The definitive mitigation value of a unit will only be known ex post, in 2040, because it will depend on how many credits a country sells over time and the extent to which the country actually decarbonises.

To get the best value for money, companies wanting to buy credits up to 2040 have an incentive to investigate whether individual seller countries are successful in mitigating emissions compared to the volumes of credits they are issuing. The market will thus develop its own dynamic ex-ante evaluation of the mitigation values for seller countries' units.

While the direct exchange of foreign credits into compliance units only happens once the mitigation value of foreign credits is established in 2040, market participants will want to use foreign credits for domestic compliance earlier. A financial institution is needed to bridge this gap: a Carbon Credits Clearing House.

3.2 Carbon Credits Clearing House

A Carbon Credits Clearing House (CCCH) would operate as an exchange platform to bridge the gap between purchases of foreign credits and the moment their definitive values are known. A company would buy foreign credits and deposits them in the CCCH. It would then use these credits as collateral to borrow domestic allowances from the CCCH, which it can use immediately for domestic compliance.

The overall quantity of EU allowances available at the CCCH must not exceed five percent of 1990 emissions, reflecting the limit in the EU's 2040 climate target.

The CCCH would determine how many domestic allowances a company can borrow against the number of foreign credits it deposits. In doing so, the CCCH would discount the value of foreign credits used as collateral based on their expected country-specific mitigation value.

To achieve this, the CCCH will monitor the market and align its own collateral requirements with the market's assessment of the mitigation values assigned to individual countries.

Moreover, the CCCH's collateral requirements would take into account the policy-set general leverage ratio – for example, 1:5. For instance, for a collateral of 1,000 credits from a foreign country, the CCCH might issue only 100 EU allowances if the agreed leverage rate is 1:5 and the country's expected mitigation value is 0.5²⁰.

The final mitigation value will be determined in 2040 by the Carbon Buyers' Club (see section 3.3). For example, if in 2040 it turns out that the country from the example above has achieved 0.4 gigatonnes (Gt) of emissions reductions beyond its baseline and has sold allowances equivalent to 0.5 Gt, its mitigation value would be 0.8 (0.4 Gt/0.5 Gt).

The mitigation value of the country's credits would be multiplied by the policy-set leverage ratio of 1:5. One EU allowance would thus correspond to 6.25 of that country's credits ($0.8 \times 1:5 = 1:6.25$). For a company that initially borrowed 100 EU allowances against a collateral of 1,000 foreign credits, the 1,000 foreign credits would then be worth 160 EU allowances ($1,000/6.25$) and the company would receive 60 additional EU allowances. Figures 2 and 3 illustrate this mechanism.

3.3 Carbon Buyers' Club

Catalysing global mitigation requires collaboration with other committed countries to avoid substandard trading and to pool leverage. So far, our proposal has addressed how carbon trading could be designed between the EU and those countries that want to make available portions of their national mitigation capacities.

To increase its impact, the EU should engage with partner countries – in the OECD, for example. Some OECD partner countries, such as Switzerland and Japan²¹, have already begun using international carbon credits under Article 6.2 of the Paris Agreement²².

A Carbon Buyers' Club could coordinate among those countries that use international credits to meet their own climate targets. It would set common standards for counting international allowances toward domestic climate targets.

In our proposal, the Carbon Buyers' Club could be involved in determining the baseline for each potential seller country, which would determine the threshold above which emission reductions could be made available for purchase. It would also set out the methodology and possibly the governance system that conducts the final evaluation of each seller country's mitigation value (reflected in Figure 3).

The Carbon Buyers' Club could also try to coordinate buyers' leverage rates to encourage the highest possible global mitigation arising from international carbon trading. As discussed in Zachmann (2025), a coalition of buyers with sufficient leverage rates could make a substantial contribution to push global emissions closer to keeping global warming well below two degrees.

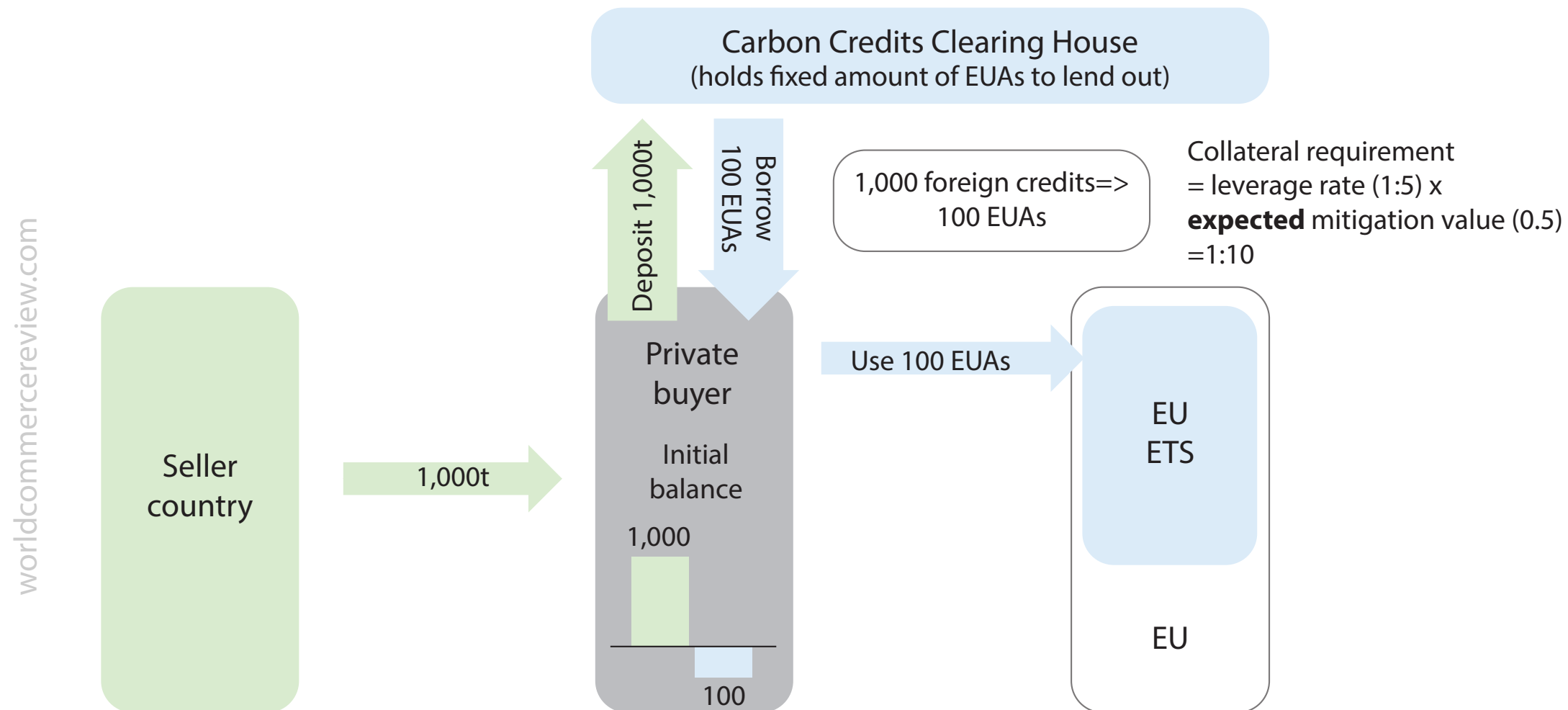
However, the club should not serve to create unfair buying power in terms of pricing. Each buyer (companies or governments, depending on the model each country chooses) would still compete to buy credits with high expected mitigation values.

4 Conceptual challenges

Our proposal if taken up would mark a significant step away from the international carbon markets that exist in practice and the concepts that have dominated the discussion since the Baku climate summit (COP29). Our proposal suggests three strategic choices:

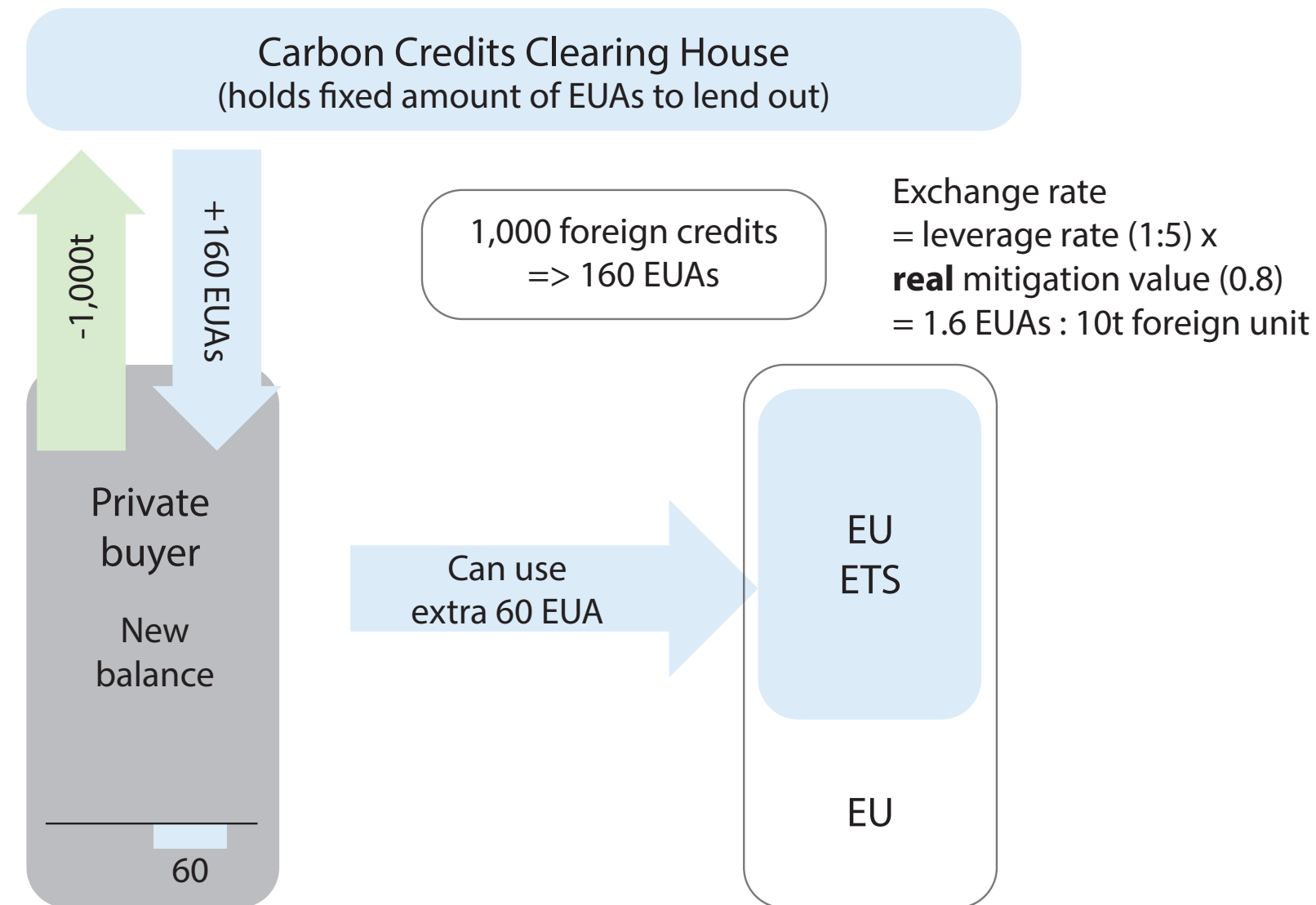
1. Shifting the issuance of carbon credits away from individual project developers and towards governments;

Figure 2. Using foreign units as collateral, the CCCH lends domestic compliance units



Note: EUA = EU allowance; each EUA is equal to one tonne of carbon dioxide equivalent (CO₂e) within the ETS.
Source: Bruegel.

Figure 3. After stocktake evaluation in 2040, private buyers settle their accounts



Source: Bruegel.

2. Shifting the purchase of foreign units away from governments and towards private buyers;
3. Applying a leverage ratio that recognises international carbon trading as a strategic lever to encourage greater global mitigation, instead of merely shifting emission reductions from one region to another.

These innovations serve different purposes: first, carbon credits issued at country level could solve many of the integrity, additionality and permanence issues that dog project-based units²³. Rather than focusing on hypothetical estimates of emissions that would have existed in the absence of a project, country-level credits would cover emission reductions that will actually be achieved by 2040. Second, private buyers purchasing units could avoid politicisation, efficiently process market information and leverage private finance. Third, a leverage rate would ensure that international transfers result in additional emission reductions, rather than just shifting one unit of mitigation from one region to another.

However, the outlined proposal is not a complete blueprint. Solutions to important political, legal, institutional and technical challenges still need to be found. The European Commission should play a central role in developing a mechanism that will use international flexibilities to encourage substantial additional emission reductions. Based on an ambitious framework, it should explore and negotiate with the main domestic and international stakeholders to find a balanced solution.

The most politically difficult point will be setting baselines for seller countries' emissions against which improvements are to be sold. Setting the overall budget (broadly implying a maximum warming limit) and attributing it across countries is not a technical question; it is highly political.

A well-below two-degree warming target in line with the Paris Agreement could inform the overall budget. Allocating it could be done based on an indicator that combines different criteria²⁴, ensuring that for each country this compound indicator defines a country-specific baseline that is more ambitious than its current NDC. However, the exact point at which the baseline is set implies decisions on how the financial burden of mitigation should be shared.

This requires a comprehensive assessment of different perspectives and fairness criteria. Setting the baseline also requires careful calibration of the trade-off between ambition and incentives. A too-low baseline risks oversupplying credits and lowering global ambition, while overly ambitious baselines may reduce incentives for countries to engage in carbon trading in the first place²⁵.

A related challenge is how to reflect the impact of leveraged carbon trading in countries' emissions balances. The proposal implies that emissions in seller countries would decline much more than what they offset in buyer countries. Accounting for this difference in countries' emissions balances, in the context of the Paris Agreement architecture, requires careful consideration.

Another basic legal question is how to make the proposal compatible with the Paris Agreement and its institutions without requiring unanimous support by all parties to the Paris Agreement. The governance of the Carbon Buyers' Club and the institutions that assess the final mitigation values and operate the collateralisation and issuance of EU allowances will require thoughtful design.

The proposed architecture also raises institutional and technical questions about the finite time horizon over which the mitigation value of international credits can be assessed. In particular, the allocation of risk requires careful consideration.

If the mitigation value of foreign credits proves lower than expected in 2040, purchasing companies should bear the primary loss, with the CCCH only exposed if firms become insolvent. If domestic carbon prices fall, firms that invested in more expensive international credits may incur losses as well.

On the other hand, if the mitigation value of foreign credits is higher than expected, firms receive additional EU allowances that they can sell or use for domestic compliance (see example in section 3). The system inherently entails a risk for buyers, which policymakers could help mitigate by designing hedging instruments, such as carbon contracts for difference (McWilliams and Zachmann 2021).

Setting up a functioning international carbon market would also benefit from more clarity about the post-2040 period. EU legislation foresees the use of Article 6-type flexibilities only from 2036 to 2040. If this time limitation is maintained, the market will lack the long-term certainty required to develop robust, functional infrastructure.

Conversely, if exchanges of credits successfully support EU policy aims, they might be useful beyond 2040 (as illustrated in section 2.3). Policymakers should already outline how international carbon trading could evolve into a permanent feature of the EU climate policy framework, providing the long-term predictability needed for the market to develop.

These are only some examples of the many legal, political, diplomatic, economic questions that will arise in the preparation, design and implementation of the presented proposal.

5 Conclusion and outlook

The EU's future use of international carbon credits presents a strategic choice. It can either focus on lowering the cost of domestic compliance, or it can design a tool to strengthen global decarbonisation efforts. But without a pathway towards global emissions reductions, aggressive domestic mitigation risks becoming politically untenable.

To keep climate protection alive, the EU should focus its climate policy on its global impact and design its international credits procurement strategy accordingly.

Achieving this objective requires rethinking how international carbon markets can be organised. Three main conceptual innovations could prove fruitful:

1. Tradable mitigation outcomes should be issued by governments rather than individual projects, linking transfers directly to national mitigation performance and reducing many of the integrity-related challenges associated with project-based crediting.
2. Private companies, rather than governments or EU bodies, should purchase these credits. This would avoid the risk of politicisation, harness market incentives to identify high-quality credits and mobilise private finance for global decarbonisation.
3. The system should include a government-set leverage ratio, ensuring that international flexibility contributes to overall global mitigation rather than merely redistributing existing efforts.

Implementing such a system requires an institutional foundation. Mitigation values linked to countries' actual performances would provide the basis for valuing international credits. A Carbon Credits Clearing House could bridge the time gap between purchases of foreign credits and final assessments of their mitigation value, allowing companies to use international units for domestic compliance before their full value is known.

Ensuring that Article 6 does not become a loophole for rich countries, but is an instrument to reinvigorate global decarbonisation, relies on the EU not acting in isolation. A multilateral Carbon Buyers' Club would help facilitate

the required coordination. This coalition would empower participating countries to collectively harmonise quality standards, methodologies and leverage ratios, thus safeguarding market integrity against a race to the bottom.

By enabling productive use of Article 6 by a large coalition of buyer countries, the Carbon Buyers' Club would ensure the integrity of traded credits, thus stabilising the fundamental architecture of the Paris Agreement.

Several political, legal and technical questions remain unresolved, including the determination of country baselines, the governance of the proposed institutions and the finite time horizon. These challenges are substantial but should not obstruct harnessing the broader opportunity.

The EU has about ten years to set up the mechanism and negotiate it with both seller and buyer countries before international carbon credits begin counting towards its emission reductions target in 2036. This period should be used to develop a system that treats Article 6 not simply as a cost-containment instrument, but as an important lever for encouraging additional mitigation efforts. ■

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Endnotes

1. EU emissions dropped from 4.9 gigatonnes of CO₂ equivalent in 1990 to 3.2 Gt in 2024, while global emissions increased from 32.2 Gt to 53.2 Gt over the same period (Crippa et al 2025).
2. One example of how the EU has created a mitigation infrastructure is the generous deployment subsidies for renewable energy, which allowed the sector to scale up and contributed to rapid cost declines (Nicolini and Tavoni 2017).
3. See the Council of the EU explainer of 9 January 2026, [‘Europe’s contribution to climate finance \(in € billion\)’](#).
4. There is no common terminology for the traded items. For sake of simplicity, we use ‘credit’ for certificates of emission reductions that can be traded across countries. We use ‘allowances’ for EU allowances in the EU ETS, where one allowance corresponds to one tonne of carbon emissions; see European Commission, [‘About the EU ETS’](#).
5. Reasons for higher marginal abatement costs in developed economies include path dependencies and higher land and labour costs (Glennerster and Jayachandran 2023).
6. For instance, the San José Principles advocated for an Article 6 rulebook that “prohibits the use of pre-2020 [CDM] credits”. See the website of the Government of Costa Rica, [‘About the San José Principles’](#).
7. By comparison, the finalised Article 6 rulebook permits the use of some pre-2020 CDM credits (Decision 20/CMA.7).
8. The 2023 revision of the EU ETS Directive requires an assessment on shaping the carbon market’s legislative framework beyond 2030 and aligning it with the EU’s 2040 climate target.
9. See European Commission, [‘Call for evidence for an impact assessment: European Climate Law - Climate Action’](#).
10. See European Parliament, [‘Revision of national targets and flexibilities in the EU climate policy framework’](#).
11. See European Commission, [‘ETS2, Buildings, road transport and additional sectors’](#).
12. With one-for-one offsetting, the arbitrage gain is shared between buyers and sellers – buyers because of lower compliance costs and sellers because of additional income. The idea of the leverage ratio implies that the price difference of mitigation outcomes can be utilised to benefit the climate by facilitating additional emission reductions. A political economy challenge is how exactly to set the rate to maximise global emission reductions while still allowing for some reduction in compliance cost.

13. The Paris Agreement Crediting Mechanism (PACM) aims “to deliver an overall mitigation in global emissions” (Paris Agreement FCCC/CP/2015/10/Add.1, Article 6.4).
14. The United States is excluded from this calculation because of its withdrawal from the Paris Agreement, which took effect in January 2026 (CRS 2025).
15. Non-US OECD countries’ emissions were 9.0 Gt. See OECD Data Explorer, [‘Air emissions - Greenhouse gas emissions Inventories’](#).
16. We use 2036 as the starting point for this calculation because the EU will start using international credits for its own climate targets then (see section 1). We expand the calculation to 2050 to show the potential of the mechanism, despite the fact that the EU Climate Law does not include provisions about the role of international credits post-2040.
17. With a leverage ratio of 1:5, the coalition would offset $15 \times 0.45 \text{ Gt} = 6.75 \text{ Gt}$ and stimulate $6.75 \text{ Gt} \times 5 = 33.75 \text{ Gt}$ in partner countries.
18. The net global emission reduction would be $33.75 \text{ Gt} - 6.75 \text{ Gt} = 27.0 \text{ Gt}$.
19. The estimate is based on an extrapolation that assumes that the current decennial use rate of the remaining 1,150 Gt of carbon budget (2020-2030: 37 percent) will linearly decrease to 0 percent from after 2070 (Zachmann 2025).
20. Collateral requirement = number of borrowed units x leverage rate/expected mitigation value = $100 \times 5/0.5 = 1,000$.
21. See Swiss Federal Office for the Environment, [‘Bilateral climate agreements’](#), 21 November 2025; see Ministry of Foreign Affairs of Japan, [‘Joint Crediting Mechanism \(JCM\)’](#), 9 April 2026.
22. The division between buyer and seller countries does not have to be static. As seller countries develop, their abatement costs may rise, making sales of carbon credits less attractive. The EU should start the Carbon Buyers’ Club with countries that are potential carbon buyers today and leave open the option for additional countries to join later.
23. The Article 6.4 Supervisory Body and the Methodological Expert Panel have developed a variety of standards addressing some these issues, but international carbon crediting remains fragmented (Fuchs et al 2026).
24. Such as i) per-capita distribution of future budget; ii) per-capita distribution of 1900-2100 budget minus historic emissions; iii) inverse to GDP per capita. On the impact for the EU of different allocation rules, see ESABCC (2023).

25. One way to approach this trade-off could be multiple levels of baselines. Every tonne of carbon mitigated compared to a tight baseline would be accounted for as a full tonne of mitigation, while staying below a looser baseline would only be counted as a fraction of a tonne of mitigation. Again, properly calibrating the set of baselines to maximise incentives and minimise windfall profits requires a defensible methodology.

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Securing European prosperity

In the State of the Union address, Ursula von der Leyen shared the key priorities and flagship projects for the year to come, building on the progress the EU has made in recent years and setting out the priorities for the year ahead and her vision for a stronger, more independent and resilient European Union

It was the best of times, it was the worst of times.' This is how Charles Dickens describes Europe in the days of the French Revolution. And it is also a fair description of the world we live in. The speed of change is incredible. The challenges exceptional. So if I look at Europe today, my take is this: the state of our Union is the strongest it has ever been. The state of our Union can also feel as precarious as it has ever been.

These two statements may seem incompatible. But they are both true. And they reflect these exceptional times. This complex age of great possibilities and great perils, which all countries are seeking to navigate. In this world, Europe has chosen to forge its own path. And a stronger, independent Europe is now emerging.

This is a Europe that is securing its prosperity. One that is breaking free from its toxic dependency on Russian fossil fuels. That has become the greatest trading power on the planet. That is transforming its industrial policy while upholding our unique social model.

This is a Europe better able to defend itself than ever before. One that has radically overhauled its approach to securing our homelands. That has increased defence spending by almost 80 % in the last five years alone.

This is a Europe that stands up for each other. As we are doing by standing with Ukraine as it fights for its future and for our freedom. Or when we stood up for Greenland when it was threatened. Or when drones, hybrid attacks or disinformation target our democracies.

All of this proves one thing. That Europe is there for Europeans. And that in the cold fragility of today's world, only Europe can provide true sovereignty to Europeans. This is a Europe we can be so proud of.

At the same time, we all know the threats that we are facing. As old assumptions and relationships have frayed, we are now dealing with an openly hostile world. A territorial war of aggression is raging on our continent; others have

erupted nearby. A fight for industrial capacities is shaping global competition. And a battle of narratives is seeking to weaken confidence in Europe; to paralyse our democracies.

But people's worries are not only linked to these big, global threats. The effects of the many crises are present for many European families, not least on the cost of living or housing. The dizzying speed of change and technology is impacting our jobs, our livelihoods and our society. And it is also having a profound effect on our democracy and our discourse. We see this in the rise of the extreme, the decline of nuance – even in the way that we relate to each other.

*In this world, Europe has chosen to forge its own path.
And a stronger, independent Europe is now emerging*

These real concerns are being weaponised to drive a wedge between us. Sometimes from the outside – and too often from the inside. But our path is clear. Building an independent Europe that has the power to act. Nothing can divert us from this. Because in this world, the fate of Europe must remain in the hands of Europeans.

So our choice is clear. Do we want a strong and independent Europe that stands up for its values in this world? Or do we let divisions and dependencies hold us back? Do we want to rally around our European idea that together we can decide our own destiny? Or do we let our democracies be undermined by the proxies and puppets of authoritarians?

Whether it is the ultranationalists or the anti-Europeans, whether it is Russian interference or disinformation, the names may be different, but their goal is the same. They despise our values, and they want to shatter our European unity. So let's not only fight back against that, let's fight together for our European idea.

Our economy has withstood the impact of the Middle East wars better than expected. And unemployment is at near-record lows. But the pressures from higher energy prices and borrowing costs are biting for people and for businesses. Clear fiscal choices will have to be made to ensure fiscal sustainability, while protecting investment. So, kickstarting Europe's economy is our number one priority.

We have a huge market, world-class industry and services, a rich pool of savings and one of the world's leading currencies. And yet, we still fragment our capital, networks and purchasing power. This is why, when we took office, we put in place a bold plan. To build an economy where innovation and energy flow across borders. Where companies compete and grow across Europe, and savings finance our future. This is the logic of the Draghi and Letta reports. And together we are delivering. But we have to be faster – all institutions.

We now have the political agreement on the One Europe, One Market Roadmap. And together, by the end of next year, we can and must complete this historic overhaul of the Single Market. In today's economy, speed is of the essence. A permit or a form, a grid connection or a financing decision. All of this can determine where an investment is made. Where jobs are created. We need to move much faster. This is why we will put forward proposals to further speed up permitting.

Where projects are in Europe's strategic interests, we need to massively accelerate. And where the administrative burden is slowing down business and SMEs, we need to slash that too. You know that our 12 omnibus proposals are reducing the administrative burden by around €17 billion a year. But simplification cannot be a one-way street.

All levels have to have skin in the game. We have long spoken about the harms of gold-plating. Yes, we are doing our best at the European level to cut red tape. But now I think it is time for the member states to step up. If we are serious about simplification, we also need a pact against gold-plating.

Europe cannot remain an industrial powerhouse if its energy prices are structurally too high. When Russia cut off the gas we fought back. Our supplies are now more diversified. And we have invested in our homegrown clean energies – renewables and nuclear. But then came the closure of the Strait of Hormuz. And again we bitterly felt the cost of our general dependence on imported fossil fuels. Since the start of the conflict, imported fossil fuels have cost us an additional €90 billion, without a single molecule of energy added.

So, we need to double down on our affordable, homegrown, clean energy. Be it renewables and nuclear, or biomethane and others. Technologically neutral. But they must give us independence. For this independence, we need to electrify Europe. Our goal is to double the share of electricity by 2040. With this, Europe could cut its fossil-fuel import bill by €260 billion a year. But we also need to ensure that the electricity we generate is available.

Last year, we installed more than 80 gigawatts renewable capacity. But six times more capacity is still waiting to be connected. This is why we need the grids package so urgently. We must invest faster. Speed up grid connections. Develop storage. In short, let's make Europe's future electric.

We can bring down energy prices, invest and innovate more, reform our economies. But all this is undermined if our companies do not compete on a level playing field. Our trade deficit with China is now €1 billion – a day. It has reached a tipping point. Some say the second China shock is looming. But it's already here. It shows in our communities and in factories across our Union. It leads to deindustrialisation in the industrial heartlands of Europe. This is unsustainable.

And this is why we are engaged in a dialogue with China to rebalance our trade. But this dialogue must now lead to results. China's weaker domestic demand means it also needs our European market. So, it is in both our interests to work together to find solutions. Let me be clear: we will use all the tools at our disposal to rebalance our relationship. Words are good. But deeds are better.

And there is another point. We still have too many dangerous dependencies. We are more than 80 % dependent on China for many critical raw materials. 90 % for some rare earths. We have done a lot. But we are not the only ones trying to diversify. We need to urgently procure and build up our reserves. No country can do this alone. So we need to think differently.

This is why we will establish a new European Corporation on Critical Raw Materials. It will help us obtain and stockpile what we need. For electric cars, chips and batteries, clean tech and defence. And so much more. Not only our industry depends on this, but also our independence and security.

This brings me to my next point, on financing. To be very clear, our budget is about our future. And any modern budget needs new own resources. We must create the conditions for our companies to attract investment and grow. This is why our work on the Savings and Investments Union is so critical. But developing capital markets takes time. And the needs of our companies are urgent. We need a banking system that is built for growth – not just stability.

This is why we will put forward a new Banking Package focusing on simplification and tackling fragmentation. We know the demand for capital is out there. But we need a greater capacity and appetite for risk. Our deep-tech start-ups are on track to attract record venture capital investment in 2026. This is why I announced a new Scaleup Europe Fund last year.

A year on, the first investments have been made in companies such as ICEYE. ICEYE was set up by two young Europeans: Rafał from Poland and Pekka from Finland. They initially met through Erasmus some 15 years ago. Together they founded a tech start-up. They developed their idea around satellite imagery. They got Horizon funding. They proved their technology. They grew with private investment.

And today they are one of the world's leading space technology companies. With offices in Finland, Poland, Spain and Greece. ICEYE's story shows that Europe is the home of innovation. And that we can reignite Europe's entrepreneurial spirit.

These are Europe's economic fundamentals. But our future prosperity and security will greatly depend on how we manage the tipping points of our time: climate change and AI. On climate change, this summer was the summer of truth. Almost no part of our continent was spared. In Belgium's High Fens, a peatland formed over centuries burned into a wasteland of ash. Flames roared from the mountains of Ireland to the islands of Greece and Croatia. In the

Alps, ancient glaciers retreat further every day. The impact of all of this is simply devastating: 660 000 hectares burnt to the ground. Some 12 million tonnes of crops lost.

Key rivers like the Danube, der Rhein and La Garonne are disappearing before our eyes. More than 35,000 additional deaths during the heatwaves. Care homes and hospitals dangerously overheated. And all of this is a mere preview. These were the hottest summer months ever – but probably the coolest of the years to come. Science is clear. Europe is warming at double the global rate. Of course, the transition is complex. And we will need to adjust and learn along the way. But there is no doubt: Europe can, must and will stay the course on its climate targets.

This is not about mitigation or adaptation. We need both. And they need to strengthen each other. This is the only way to reach climate resilience. But we need to step up dramatically on preparedness. We will present a new framework for climate resilience next month. We will identify 100 of the most vulnerable territories in Europe. And we will assess the risks – and at which level they should be managed.

This will give us a whole of society approach – all the way through to the local level where adaptation matters most. And it will aim to make Europe the champion in adaptation technologies – a huge emerging market. Whether drought-resistant crops, flood prevention or energy-efficient cooling, Europe is already a leader. And we must capture this market.

Today, only around 25 % of catastrophe losses in Europe are covered by private insurance. This means that, far too often, national budgets become the insurer of last resort. We need to take action to close this gap. This is why the Commission will set up a Climate Insurance Alliance. There can be no repeat of this summer. This is why we will also soon present a European Heatwave Plan. We need better early warning systems and better health preparedness. We need urban adaptation and cooling. And we need to support the most vulnerable.

The second point is on water and food security. We know the risks of water scarcity for our farmers, energy and supply chains. Yet, European pipes lose almost one in every four litres Mostly through leakage. What a waste. So we will put forward a new European Water initiative. Because water is precious. For our industry – and for our food security. Crops need water to grow, while livestock need it to survive. Entire harvests depend on it.

This is why we will make proposals to improve risk management and address the insurance gap. Once again, Europe's farmers have risen to the challenge of this never-ending summer. Europe's farmers are the best in the world. And we will support them every step of the way.

The next point is about wildfires. They are getting more intense, more frequent and more spread out. I am so proud of Europe's response. Of our European assets flying across the continent. But clearly, we need to think bigger. And learn faster. This is why we have asked some of Europe's most senior firefighters and emergency responders to lead the work.

They will look at all aspects of preparedness and prevention. From civil–military coordination to needs for new capabilities. And I have asked them to make proposals, including for a future European Firefighting Fleet. Our emergency crews have saved countless lives and homes this year alone.

The second tipping point of our times is artificial intelligence. AI is fast becoming a foundational layer for our economy and security. Europe's stance is clear. We want to make the most of AI to improve our society, our quality of life and our productivity. I am an optimist that AI has the potential to benefit humanity – if we get it right. But, as with any powerful new technology, AI comes with a balance of possibilities and risks. Without addressing these risks, we will never be able to unlock AI's possibilities.

As the frontier models become more capable, these risks have come more sharply into focus. Models being developed will allow hacking on a level we never thought possible. And they will soon be in the hands of adversaries who see the world very differently from us. At the same time, the dangers of self-improving models are becoming ever more apparent.

Incidents of AI agents escaping their environment or inserting malicious code are a mere glimpse. After the HuggingFace incident, developers are ringing the alarm. And CEOs of the most advanced companies tell us that it is time to slow down on the self-recursive models. To pace the frontier.

If the people developing the technology are clear, then we should be too. The AI Act is of course a crucial piece to putting guardrails in place. And it puts Europe in the position to shape global efforts on how to tackle this. So, we will step up together with our like-minded partners like Canada, the United Kingdom and others. We want to team up on model evaluation, verification, early warning, AI security and much more. And I will invite the main frontier labs for a discussion on how we can support ongoing industry efforts to pace the frontier.

It is also true that Europe will need its own capabilities – in particular to protect our national security. We need to stay in the race. Because this is crucial for our independence. So we need to massively boost our computing capacity. And we will set out our ideas for how to achieve this in a clean and efficient way. We will also develop new ways to use public and private funds to invest in the most promising European start-ups and companies.

By limiting the risks of AI, we can maximise the benefits. We have already done a lot. On gigafactories and tech sovereignty, for example. But the next leg of this race is not only about frontier models. Just as was the case with the printing press in times gone by. It was invented by a German inventor, but was mastered and applied across Western Europe.

We do not need to be the ones who develop the frontier technology to be the ones who draw the greatest value from it. The key is creating the value that AI has not yet delivered. Moving AI from the screen to the real economy and society. On the factory floor. On the hospital ward. In precision agriculture. In our energy grids. For autonomous driving. For defence. This is where the real value is hidden. And it is where Europe has big advantages. We have world-class industries that sit on the highest-quality data. These data are a precious European treasure. They are what can power tailor-made industrial AI models.

Let me give you one societal example. On breast cancer screening – an issue many of you have campaigned tirelessly on. Mammography screening reduces mortality by around 30–40 % among women who attend the screenings. Early detection is of the essence. This is where AI can step in. AI-supported mammography can identify earlier and more cancers during screening. And as a result more women can survive. So we need AI for health. But, here again, we must do it in a European way.

Do I want my doctor to have instant AI access to all the data needed to make the best diagnostic or treatment choice? Yes, of course. But do I want my doctor to be a robot, AI assisted? No, of course not. I do not want a robot to tell me whether I have cancer or not. The point is that AI needs to empower our doctors. Not to replace them.

This is just one example. We are now focusing on five of the highest-value sectors in which industrial AI has the biggest potential and we have the data: health, transport, agri-food, advanced manufacturing, and defence and space. In November, we will announce game-changing initiatives across these sectors. We will invite member states, MEPs, industry and entrepreneurs to join us in this ambitious European project. Our approach is clear. We want AI. We want AI to create more value more responsibly. And at a lower cost and with less energy consumption. But above all, we want AI with human agency.

This is our European way. Many of the risks of AI also spill over into our social market economy. For some, AI allows them to speed up repetitive tasks, to make better use of their skills. But clearly, these benefits are unevenly spread between skill sets, generations and regions. Look at young people and the barriers they are facing, just to get on the first rung of employment.

Our response must keep pace. From education to employment, AI must help develop skills, improve the quality of jobs and give workers a fair chance. This is why we need our Quality Jobs Act. And we will deliver before the end of the year.

Next year, we will celebrate the 10th anniversary of our European Pillar of Social Rights. And we will keep delivering on its promise. We will invest in our regions, so everyone has the 'right to stay'. We will launch a European Care Deal to address the challenges linked to our demographic changes. We have just proposed the first-ever Housing Act to tackle short-term rentals and housing speculation.

Staying in the region is not a privilege. Care is not a privilege. Housing is not a privilege. They are rights. When we proclaimed this Pillar of Social Rights 10 years ago, the world was different. Our society has changed. In many ways for the better, in others not. Today, our fundamental values are being challenged. Some people even want to backslide on women's rights. To send us back to an age in which women were second-class citizens.

We have fought so hard for equal treatment, equal opportunities, equal pay. So let me send a very clear message to all those who need to hear it: women are here to stay. We will defend our rights. And we will continue to stand up for our values every single day. This is why, together with my dear friend António Costa, we will host a summit to uphold the enduring principles of our Social Pillar. Times may change, technologies may change, but our values do not. In Europe, people will always come first.

In this age of tipping points, our prosperity and security will not only be built at home. This year, we have signed free trade agreements with India, Mercosur, Mexico, Australia and Indonesia. We now have trade deals in place with more than 80 countries – more than anyone else in the world. And business is asking us for more.

I can announce a new international connectivity project. It will link the South Caucasus and Central Asia directly to the European market – what we call the Middle Corridor. Through Global Gateway, we will aim to crowd in up to €12 billion in public and private investment. Our goal is to diversify routes, triple trade flows and slash freight transit times by 2030. To make this a reality, we will organise a Regional Connectivity Summit with the Prime Minister of Bulgaria.

These partnerships are a strategic choice for Europe. But they also respond to the fracture in the international rules-based system. For some, the answer is to go it alone. But this is not an option for us. Europe will always lead when it comes to defending the rules-based system. But we can no longer rely on it as the only way to secure our interests. Or assume that its rules will shelter us from the complex threats that we face.

In this new world, we must urgently reimagine our partnerships. And build global coalitions for our resilience and democracies. And here too only Europe – with its size and power – can take the lead. Thanks to CETA, our trade in goods with Canada has grown by 75 % in less than a decade. This shows the power of our trade agreements.

We see the world with the same eyes: from AI to climate change, from the Arctic to geopolitics. And we have stood together: on Ukraine, on defence, on raw materials and on supply chains. We believe that power does not belong to the strongest, the richest or the loudest – but to all of us. That democracies have the freedom to choose with whom to work.

So, we are joining forces voluntarily. We will move from CETA to an Alliance for the Future to create a common prosperity and economic security space. We will work on intelligent manufacturing. We will create a tech alliance. We will integrate defence industrial bases. We will make the Arctic a flagship joint project. We will work on energy, critical minerals and batteries. On AI, quantum, cyber and economic security. This is a partnership not against anyone else, but for our common strength. In short, we want to bring the relationship with Canada to the highest level possible.

I said we must urgently reimagine our partnerships. So, I would like to work with you on opening the door for Canada to be the first associate member of the EU. We share one ocean, one set of values, one way of seeing the world. And we will now build our shared future as well – thank you for being here.

Europe's belief in cooperation has always been driven by peace. It is our *raison d'être*. Today, that peace is threatened. Russia's war of aggression on Ukraine rages on. And threats are mounting on our soil. In the last week we have seen it in Denmark, Lithuania and Poland. The attempted drone attack in Leipzig is further proof. We need to be clear about what this was. An attack using military-grade material, carried out by Russian operatives on European soil. An attack not only on one member state – but against all of our Union. And, we will not allow it.

We should be under no illusions about what is happening here: hybrid threats facing Europe are less and less hybrid and less and less threats. Cyberattacks and sabotage, arson and drone incursions. They are ramping up every day. So, as the threat level climbs, so must Europe's preparedness. This is why I will propose, together with the HRVP, a new European security strategy.

We already have many tools. And we are strengthening our work with NATO. But our doctrine, our institutions and our decision-making have not kept pace with the new reality. Our systems were made for a different world. They are

driven by well-intentioned attempts at consensus and compromise. But we need to consider whether they are still fit for purpose.

For instance, Europe needs its own counter-hybrid playbook. We urgently need a consensus on how to respond to certain incidents. Those which fall below armed aggression but clearly threaten our national security. In other words, a mechanism to flank NATO's 'Article 4'. I believe it is time for Europe's own Article 4 – or an Emergency Security Protocol. When triggered by one member state, all member states would convene. To coordinate a European response. To deter further escalation. And to mitigate the impact.

And I believe we must go further still. For a long time, we have discussed a leaders' format focused on the security of our continent. With partners like Canada, Norway, Ukraine, the United Kingdom and others involved. This is even more urgent now, given the nature and scale of the risks at play. This is why we will set out our ideas to make a European Security Council a reality. The urgency is clear.

This united front also drives our work on European defence. The surge in defence spending has led to record levels of investment in our capabilities and forces. New joint projects are getting off the ground. And we are spending more European than ever before. Bigger orders for our industry, more interoperability and more economies of scale. Now we need to take that approach to the next level.

The war in Ukraine has shown us the importance of strategic enablers. These are the critical support assets and force multipliers that any credible defence relies on. From air and missile defence to strategic transport and air-to-air refuelling. From space to cyber. These systems are essential, and we need more of them. Only together does Europe have the scale to deliver them. That is why I can announce a new European Instrument for Strategic Enablers – fully aligned with NATO. Because only a strong and credible European defence posture will guarantee our security.

And of this there is no room for doubt: Europe will defend each and every single square metre of its territory. Every day this summer, strike after strike hit Ukrainian cities. In Kryvyi Rih, Russian drones struck a crowded shopping mall in broad daylight. Then they struck a second time – deliberately targeting the rescue workers who rushed in to help. This is not just war. This is a deliberate strategy of terror. But Ukrainians have proved countless times that their spirit cannot be broken.

The deep suffering in Gaza and unchecked settler violence in the West Bank have deeply affected Europeans. The Israeli government's decision to advance the illegal E1 settlement project is unacceptable. Last year, I called for Europe to act, proposing a number of measures. It is painful for many Europeans that member states have been unable to build the necessary majorities for a unified response. Some member states have moved ahead. Others are considering doing so.

When Europe is divided, it cannot change the course of events. The months ahead in the region will be critical. Despite these challenges, Europe is leading the way in supporting Palestinians. We have delivered more aid than anyone else. Through the Palestine Donor Group and the Team Gaza Initiative, we have brought together 65 delegations. Together we have pledged nearly €1 billion to rebuild Gaza and support a modern Palestinian Authority. Europe supports the right to self-defence for Israel. And the Palestinian people have an equal right to live in safety and with dignity. It is Europe's role to keep the flame of a two-state solution alive.

I have spoken about the need for Europe to act together. Or risk being pulled apart. Once again, this summer, this reality was tested at our borders. From our eastern borders to the shores of Crete and right across the Mediterranean. And of course, with the crisis in Ceuta. These events are different in nature. But they have two things in common. The first is that vulnerable people are being exploited. By callous traffickers and smugglers. By our adversaries. This is why we have proposed a sanction regime to hit criminals where it hurts most.

This brings me to the second parallel. All of our external borders are European borders. So, I want to address the people of Spain directly. Ceuta's border is a European border. Because Ceuta is Spain. Ceuta is Europe. And Europe will be there for you. The point is that the only solution is a European solution. And that is the Pact on Migration and Asylum.

After years of work, we finally have a common European framework. One that gives responsibilities to all – and that demands solidarity from all. And it now needs to be fully implemented. We are on the right path. We have seen a 55 % reduction in illegal arrivals over the past two years. And a further 35 % drop this year. That is real progress.

But the events of this summer show that our tools need to evolve – especially for emergency situations. Europe needs the means to protect its borders at all times. Especially in scenarios when mass movements are engineered and weaponised. This is why we will propose a new European Emergency Response Framework. It will only be triggered under a strictly defined set of criteria. And in those cases, it will allow for time-limited and strictly defined flexibility in standard procedures.

The message from Europe is clear: we will always comply with our values and fundamental rights. But we will never compromise on protecting our borders. It is we, Europeans, who decide who comes to our Union and under what circumstances. And not the smugglers and the traffickers. This is why we will also step up our work to strengthen Frontex – especially to speed up returns. We will improve our early warning systems – including in partnership with third countries. We will ensure that we can detect and anticipate online. And finally, we will keep tackling the root causes of illegal migration.

We need to work together with our neighbours to boost investment. To offer young people meaningful prospects – so they are not compelled to gamble with their lives. Jobs, skills, training, apprenticeships. This is why I am announcing a new Mediterranean Youth Skills and Jobs initiative.

This is how we can reduce illegal migration. Uphold the rights of individuals seeking protection. Facilitate safe, legal migration with new Gateway Offices in partner countries. And defend the freedoms of our Schengen area. But above all, this is how we prove that Europe can act together.

This need for collective European solutions is more important than ever. Because it is also our European democracy that is being threatened. Time and again, we have seen disinformation and foreign interference seeking to divide us. Seeking to erode trust in our democratic fabric and free media. Election campaigns poisoned by foreign propaganda. Conspiracy theories built on viral deepfake videos.

This is cognitive warfare. In Europe, we form our own opinions based on access to reliable, independent information. This is how we debate, compromise and find solutions – even on controversial issues. This openness is our biggest strength. But it is being weaponised by our opponents to distort debate and truth.

So we need a collective capacity to anticipate, detect and respond. This is why, last year, I announced the Centre for Democratic Resilience. It is already delivering with all the member states. We will step up our work, pooling our resources with member states and stakeholders. But we should be under no illusions. The threats to our democracies do not only come from the outside. We see the rise of anti-democratic, anti-European forces. And we know the risks.

But nothing is inevitable. Just look at Hungary. The date of 12 April will stay in our memory for a very long time. The day the Hungarian people took their future into their hands. They chose democracy. They chose Europe. They brought Hungary back to where it belongs: at the heart of our Union. Years of backsliding have started to be reversed. The fight against corruption and state capture is speeding up. There is real progress on fundamental rights. On academic freedom. And now, billions of euro of investment in Hungary have been unlocked.

There is of course much more work ahead. But this shows that hard work pays off. Thanks to our Rule of Law Reports, any issues are now detected early and addressed through dialogue. And we have strengthened the link between funds and respect for the rule of law. With the next long-term budget we must go even further. Respecting the rule of law and fundamental rights is a must for EU funds. It has to be front and centre in the budget. Now and in the future.

At its heart, democracy is about giving people the power to choose the society they want to live in. Today, much of this power has been taken out of the hands of parents. Young Europeans now spend four to six hours per day on screens. Children are pulled ever deeper into feeds designed to keep them scrolling. What we are witnessing is a great capture of our children. A capture of their attention, their focus, their minds. This is depriving children of their childhood.

What our children need is time to grow into themselves. To grow up with others. To be confronted with all of the emotions and choices that come with real life. They even need time to get bored. Because this is when they have to use their imagination. When they have to talk, agree, disagree, form an opinion, change an opinion. But when a child has a smartphone, all of this is taken away.

Day and night, parents see the cost: loss of sleep, anxiety, even self-harm. And in a growing number of cases even fatal tragedies. C'est trop. Enough is enough. I convened a Special Panel of experts. We spoke to young people. We looked at Australia and others who have moved ahead. And now it is time for Europe to act. The Commission is proposing the EU KIDS ACT. We will take a gradual and differentiated approach. Each age has its own sensitivities. And therefore, each will have its own tailored protection level. No social media under the age of 13. No personal account under the age of 15.

That means, from 13 until a child turns 15, only mini accounts set up and supervised by parents, with limited features and time restriction. And between 15 and 18, safe design will be an obligation for the platforms. I am aware that many perceive the power of big tech as overwhelming. And impossible to roll back.

I disagree. We do not have to accept addictive features. We do not have to accept children being drawn into ever more extreme content. We do not have to accept that girls have their photos used for AI-generated sexualised images. So we are reversing the burden of proof.

Platforms will have to prove that they are safe. Because it is not about our minors accessing social media. It is about when and how do we allow social media to access minors. Europe has the power to act. It is we who decide our rules, not big tech. But it is not only minors who are at risk. Addictive design, for example, is harming everyone. This is why we need a wider framework, the Digital Fairness Act.

Long live Europe. ■

Ursula von der Leyen is President of the European Commission

This article is based on the [2026 State of the Union Address](#), Strasbourg, 16 September 2026.



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