UNIVERSITY OF CAMBRIDGE | CISL Cambridge Institute for Sustainability Leadership

2024 Competitive Sustainability Index

Shaping a new model of European competitiveness 'beyond Draghi'

with the support of

Breakthrough Energy

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Policymakers and business leaders today face the profound challenge of building competitive and resilient economies that respond to shifting geopolitical forces and address pressing issues such as cost of living and national security. They must achieve this while responding to the urgent climate and nature crises, which are increasingly destabilising societies and economies. At the heart of this challenge lies the need to rethink economic paradigms and strategies; traditional growth models often undermine the very natural and social ecosystems on which economies depend. This work by the University of Cambridge Institute for Sustainability Leadership (CISL) offers a solution, presenting a credible approach to reconciling sustainability with competitiveness.

In this second edition of the Competitive Sustainability Index (CSI), CISL provides the tools and insights that policymakers and businesses need to navigate these interwoven priorities. The CSI responds directly to the urgent demand for new thinking on competitiveness – one that aligns with political priorities in the EU and beyond by addressing the triple planetary crisis of climate change, biodiversity loss and resource overconsumption. This index is a valuable and integrated framework that assesses competitive performance within the sustainability transition, offering an evidence-based guide for decision-makers facing complex trade-offs. With a data-driven foundation, the CSI enables leaders to make strategic decisions that support both long-term resilience and immediate economic needs.

If the insights from this second edition are applied, Europe – along with its partners, including the UK – has the opportunity to demonstrate a model of economic progress that will deliver a cleaner, greener, fairer and more prosperous future. By embodying a vision of competitive sustainability, Europe can set a benchmark, proving that economies can thrive while transforming to address global challenges.

The insights provided by the Competitive Sustainability Index are critical for policymakers to design policies and markets that align competitiveness and sustainability. However, government action is only half the equation – businesses must act boldly within these frameworks, transforming their commercial strategies to enable them to compete in more sustainable markets.

This requires businesses to move beyond an ambition that is limited to doing only what is possible within current markets – a strategy which leaves all markets and sectors at risk. In their own long-term interests, they must actively work alongside policymakers to champion and support the transformation of entire markets to reward climate-neutral, nature-positive and circular business practices, while holding those who resist change accountable. Such transformations to economic policy and market structures will enable businesses to innovate and transform their commercial models, processes and products to embrace superior sustainability performance as a core driver of competitive advantage.

A vision of competitive sustainability – which designs out the prevailing tension between growth, profitability and sustainability – lies at the heart of CISL's work with businesses, financial institutions, innovators and policymakers. Realising this vision will demand concerted effort and determination,

and CISL is committed to supporting this endeavour. Through networks such as our Corporate Leaders Groups, the Green Growth Partnership, our Canopy innovation ecosystem and our Centre for Sustainable Finance, and work with individual businesses and leaders to inform and support action, CISL will help drive this agenda, enabling both policymakers and businesses to leverage the CSI to foster tangible progress.

The CSI serves as an invaluable tool for realising this vision at the level of whole economies. We encourage our partners and networks to engage deeply with the Index, exploring its applications and refining it through future editions. By championing competitive sustainability, businesses and policymakers can build a prosperous, resilient future that secures economic stability and meets the urgent demands of our time. Together, we have the opportunity to create a world where economies thrive within environmental limits, ensuring long-term benefits for both society and the planet.

Executive summary

This second edition of the Competitive Sustainability Index (CSI) is an updated and extended analysis which uses the same overarching framework and approach as before (see Section 2 for details), but which is even more relevant and important in the daunting new economic and political context facing the EU as it enters a crucial five-year period of policymaking up to 2030.

Its redefinition and new approach to performance measurement of competitiveness remains robust and tested by the JRC, ground-breaking in its conception, and even more pertinent and important for policymakers and businesses, and indeed all other stakeholders, than before given the developments that have occurred in the two years since its first edition.

The extended analysis is particularly important, as it concerns a complementary set of indicators for 12 of the EU's key international competitors, including the US, China and the UK, which therefore allows for an assessment of the EU's performance in this more challenging global context, in addition to the core analysis of the EU's 27 Member States and their key economic innovation ecosystems.

The updated analysis performed two years since the initial one covers a crucial two-year period in which time the EU has not only emerged from the Covid crisis, but has also responded to the shock to energy markets triggered by the illegal war of aggression against Ukraine. The EU has also seen higher inflation and increased pressure derived from industrial policy efforts in other major economies such as the US and China.

It is crucial that the EU is able to respond to this in the short term with a clear longer-term strategy that takes full account of all relevant considerations, and innovative thinking that is future-oriented and not based on flawed and outdated economic thinking.

The structure of the report is designed to take account of this rapidly evolving and more challenging international competitive context, and to put into perspective the CSI findings focused on the EU 27 Member States themselves.

- Section 1 explains the concept of competitive sustainability, as opposed to orthodox competitiveness approaches, and how the design of the CSI itself reflects the latest thinking on innovation, competitiveness and sustainable development. It also briefly presents the methodology of the CSI, with full details being made available in the Annexes.
- Section 2 sets out the findings of the analysis of all the indicators where there is available international data so that comparisons are possible with 12 major economic competitors and rivals, with a particular focus on how the EU performs in relation to the US, China and the UK, and therefore situates the results of the CSI in that context.
- Section 3 presents the detailed findings from the CSI overall, its four main dimensions, and the six key economic ecosystems that are most important for the transition to climate neutrality. This section offers a performance assessment for each Member State as well as across the different dimensions. As this is the second edition, it also allows an assessment of where there have been improvements or worsening performances in the two years since the first edition was published.
- Section 4 summarises the main findings from the report and offers five key policy recommendations, focused on the use of the CSI to inform the way in which the EU develops new thinking in relation to its strategy, in particular in relation to a 'New European Competitiveness Deal'. This chapter concludes with some reflections on how to further develop the CSI and the next steps that are envisaged to that end.

1. Redefining competitiveness

The transition to a clean, just and competitive economy requires an evolution in economic thinking, since we cannot solve the challenges that we are facing in the sustainability transition with the same economic thinking that was used to create them. Sustainability should no longer be seen as a cost or a risk to the economy but rather as a huge economic opportunity and a fantastic source of competitive advantages. The CSI reflects that evolution in economic thinking.

1.1. From orthodox competitiveness approaches to 'competitive sustainability'

In the context of the much greater focus on EU competitiveness that current developments have produced and its high priority for the EU's Strategic Agenda and the second term of Commission President Von der Leyen, most obviously evidenced in the recently published Letta and Draghi reports on the Future of the European Single Market and EU Competitiveness respectively, the question of what really constitutes competitiveness is more important than ever.

However, although many of the conclusions and recommendations for their analyses are consistent with those revealed by the latest CSI, there is a crucial difference between them: how they define and measure competitiveness. This is in terms of the shocks and challenges of a more unstable geopolitical context which is more threatening to the EU's underlying interests and long-standing strategy of promoting an effective rules-based international order and open, social market-based economies. In addition to this challenge, the EU, like every other economy, is also confronting the reality of managing an urgent transition to a model of sustainable development.

This is necessary to remain within planetary environmental boundaries in relation to climate change, biodiversity and resource use, but also to address social inequalities within and between countries. On the former challenge in particular the warnings of failure and inadequacy of global efforts grow with alarming regularity, even if some progress is being made. It is impossible to approach any economic challenge, including that of competitiveness, in such circumstances without fundamentally also addressing these transition and transformation imperatives. And for the EU, it must be attempted at the same time as defending and advancing the principles of a values-based democracy and universal human rights, on which the UN's Sustainable Development Goals have themselves been developed.

All this begs the crucial question of how to address this inter-connected set of issues with an approach that integrates them from the outset – and this is what the Competitive Sustainability Index seeks to do in a way that differentiates it from the competitiveness assessments cited already, as well as the others. Indeed, although the CSI framework was developed as a way to assess the European Commission's own strategy of competitive sustainability, which it had formulated for its approach to the European Semester, it remains fully aligned with more recent policy and expert thinking on economic growth, innovation and sustainable development to offer a new understanding and definition of competitiveness, its enablers and drivers, its outputs and outcomes. It notably reflects very closely the approach and recommendations made by the Expert group on the economic and societal impact of research and innovation (ESIR) and Andrea Renda of Centre for European Policy Studies (CEPS) in recent publications, which between them offer recommendations to redefine competitiveness for long-term sustainability and how to design EU industrial strategy in such circumstances.

In contrast to orthodox approaches that try to put some sustainability thinking into economics, the CSI provides a more forward-looking, integrated and nuanced picture than any other competitiveness

performance assessment used by the EU or other institutions, by putting economic thinking into sustainability. This is because it aligns the various economic, social, governance and environmental dimensions that countries, their value chains and companies take into account when seeking to attract investors in the context of a global economy in an urgent transition to genuinely sustainable development.

The insights noted in CISL's first CSI report on research and thought leadership by key EU and international organisations not always fully developed in the Commission's own approach remain valid and are worthy of repetition here, namely:

- 'Competitiveness' lacks a single, agreed definition and remains fluid despite being widely used and referenced by the EU as well as many other organisations, private and public alike. The most relevant recent example is the Draghi report, despite its otherwise comprehensive and detailed analysis.
- The development of thinking on sustainable development has contributed to new approaches to competitiveness. This broadens its scope as planetary environmental limits, notably but not only climate neutrality and social issues – 'well-being' or 'prosperity' – are raised as goals of public policy, as well as GDP and productivity growth. But these are still not captured by the competitiveness assessments other than as marginal considerations.
- There is a need to distinguish between the 'competitiveness' of the whole economy, sectors or companies – macro, meso or micro levels – and to understand comparative rather than absolute performance, within or between different geographies, in a sustainability transition that is obviously highly dynamic and by definition moving away from 'business as usual'. The debate on competitiveness continues to mix these different levels of analysis so a clearer approach is important.
- Latest thinking on mission-oriented innovation and sustainability transitions, the importance of innovation as an enabler of competitive advantage, and the role of innovation ecosystems (value chains and geographical clusters) is not systematically integrated in the competitiveness assessments or associated data gathering for it. Innovation is considered central – but typically it is technology focused, not mission oriented.

As the CISL working paper observed, the Commission's initial concept lacked sufficient definition for performance on it to be properly assessed in an integrated way. Evidence to inform any such assessments is still partial, and often inadequate given the underlying data was organised and designed to inform economic and related policies rooted in a paradigm of what we now know is unsustainable development. This hinders clear-sighted understanding of the real current situation as well as how best to direct policy to achieve better performance in due course, meaning the potential for the concept to be put into practice with the most powerful effect remains unfulfilled.

In order to overcome these problems and to demonstrate the utility of the concept, a clear need for a more operational definition of competitive sustainability and a linked set of performance indicators that can enable comparison over time and between different countries, parts of the economy and even individual companies was identified. The definition of competitive sustainability used here is:

> Competitive sustainability is the ability of an economy, its companies and industrial ecosystems to excel relative to international peers in a competitive transition to a sustainable economic model through investment in purposeful innovation.

This definition seeks to take into account the following considerations. Competitiveness is widely considered to be an indicator of economic welfare and as a result of other advantages that improvement in this can

bring – material, social and political. However, as illustrated by the Draghi report, competitiveness is also typically measured using productivity metrics that focus on economic growth and GDP, but which do not properly address the elements that enable us to have a better quality of life overall or avoid negative impacts on the environment. War, pollution, crime or the destruction of nature can all have a positive economic impact in the short term, and pursuing them might also provide competitive advantages, but these activities clearly do not contribute to overall human well-being or respond to the increasingly urgent challenge of sustainability more broadly. Conversely, it is often the case that concerns about potential loss of competitiveness are expressed in the same relatively narrow terms, and often focus on short-term economic costs, without the reference to longer-term and broader understandings that include social, environmental and governance-related considerations that all clearly impact it in the context of a sustainable transition.

The CSI responds to the need to evolve traditional economic thinking and broaden existing approaches to competitiveness and economic development, as has been remarked by expert groups for the European Commission[1] and the European Parliament,[2] addressing the 'beyond GDP' debate. This discussion, dating back to *The Limits to Growth*[3] landmark publication in 1972, but which was given voice as early as the 1960s by US President Kennedy and even anticipated by its first proponents in the 1930s who recognised GDP as only one measure of progress, is more current than ever. In the wake of the Covid-19 pandemic, it is now widely accepted that productivity and economic growth should not come with negative social or environmental impacts. Sustainable development, as stated by the Brundtland report,[4] must "meet the needs of the present without compromising the ability of future generations to meet their own needs". For competitive sustainability to be achieved, however, this must be turned into a positive affirmation such that any advantage or progress in the transition must ultimately be secured in a mutually beneficial way, across all countries and parts of society, and within planetary environmental boundaries.

Signalling a new approach to competitiveness

From 'sustainable competitiveness'

- Orthodox economic thinking treating sustainability as an awkward externality
- Uses a GDP metric without incorporating financial value of sustainable investments
- Focuses on productivity, assuming welfare benefit of GDP without defining purpose of innovation
- Embeds an outdated, failing and unsustainable economic development model
- Short-term competitive advantage maximises performance in one dimension to the disadvantage of others and collective benefit

To 'competitive sustainability'

- New economic thinking integrating global transition frameworks and dynamics
- Uses GDP and also incorporates financial value of sustainable investments
- Focuses on productivity of purposeful innovation for social benefit within planetary boundaries
- Drives transition to a new, holistic and sustainable economic development model
- Strategic competitive advantage will maximise performance over all dimensions as well as collaborative action for system change

No other work has yet tried to measure competitiveness performance under this new paradigm, reflecting this dynamic sustainability transition, and in particular the transformation to a climate-neutral economy. The CSI redefines competitiveness in this context and remains the only such robust and tested framework that does so.

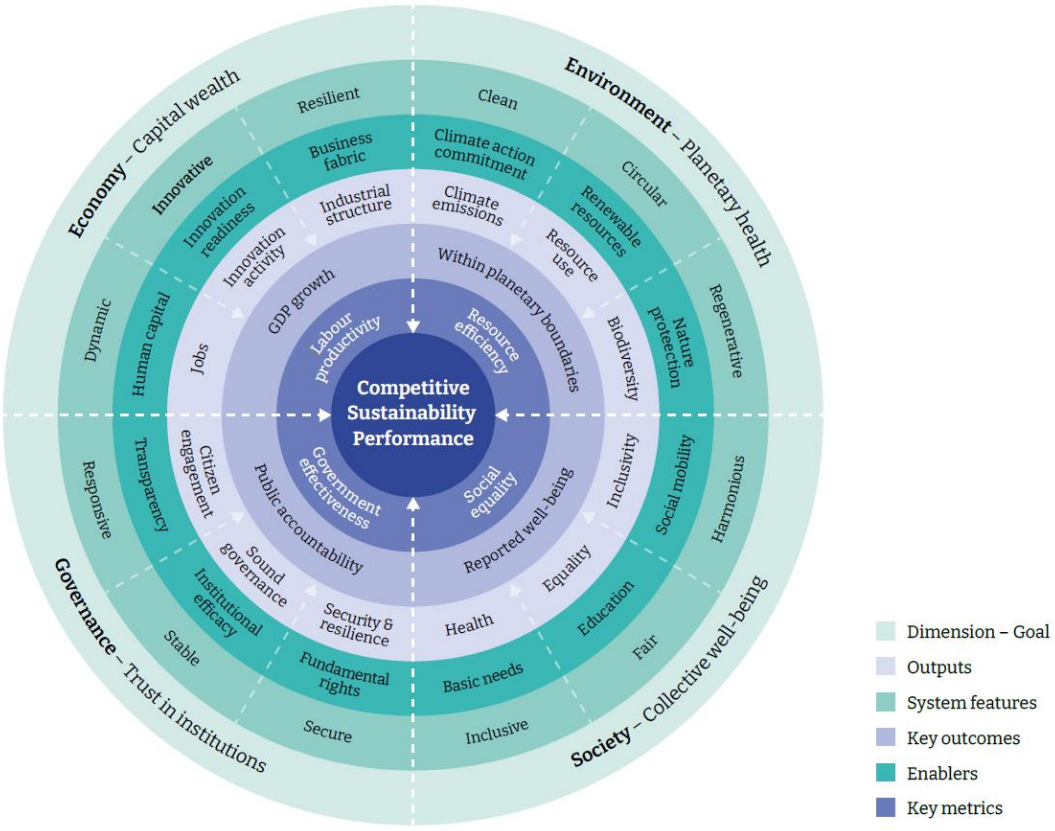
1.2. The design of the CSI: to reflect this new definition of competitiveness

The aim of the Competitive Sustainability Index (CSI) is to track the relative performance of countries, and their economies and companies, in their ability to attract investment for innovation supporting the transition to sustainable development, notably, for example, the goal of achieving climate neutrality as set out in the Paris Agreement. The intention is that this Index is useful to public policymakers seeking to enhance the design and implementation of measures to support this transition, as well as to other stakeholders involved in the process, whether public or private sector or from civil society.

Its core focus is therefore on how economies, their value chains and innovation ecosystems perform in the transition, where the role of innovation – both digital and technology enabled as well as socially driven, and combining public direction and support with market-based competition – is considered the key prerequisite for success. In light of the wider context in which this economic transformation is taking place, the Index embeds the analysis and measurement of this in a framework which reflects and tracks performance on the other dimensions of sustainability, related to environmental and social goals and the governance process that manages it (see Annexes for the full list of indicators included in the Index).

In nesting consideration of the economic dimension within this broader framework, the approach works within a paradigm of development. It assumes that the purpose of the economy is to provide goods and services that meet societal needs; that these must be delivered within planetary environmental boundaries; and that they must be managed in a process that is consistent with approaches to public governance that reflect agreed universal principles related to participation and accountability, human rights and security of both individuals and their societies.

Figure 1. Competitive Sustainability Compass

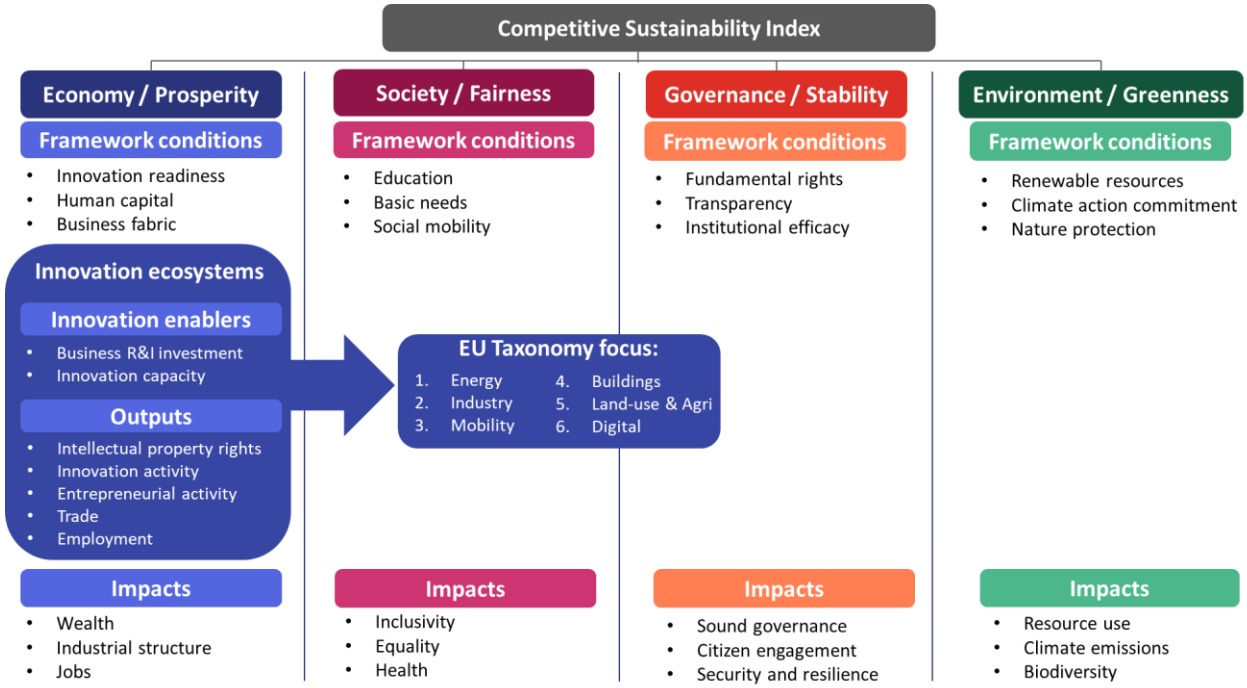


Source: Competitive Sustainability Index

In each of these four dimensions (Economy, Society, Governance and Environment), the Index identifies framework conditions for or enablers of performance as well as outcomes or impacts which are indicative of success (see Figure 2). This combination of indicators of framework conditions or enablers on the one hand and indicators of outputs and impacts on the other enables a picture to be built up which combines both the potential for future progress as well as current performance to be assessed. This approach seeks to inform decisions that lead to negative trade-offs between the four sustainability dimensions, and tracks the dynamic nature of the transition, up to the point where there may be an overall harmony or equilibrium achieved and a model of genuinely sustainable development established.

The components identified in each dimension have been grouped into those which may be considered the necessary baseline or potential from which performance can be assessed ('Framework conditions and Enablers'), and those which may be considered to be the key real-world manifestations of success in achieving sustainable development ('Outputs and Impacts'). There is clearly a dynamic process and complex relationship between these two groups of sub-dimension and feedback loops which cannot be fully captured in such an index. However, the structure (see Figure 2) does pay direct attention to the conditions that should be put in place and the outcomes that are most relevant to track success in achieving sustainable development as understood above.

Figure 2. Competitive Sustainability Index structure



Source: Competitive Sustainability Index

The core economic innovation ecosystem indicators are tracked using the EU Taxonomy for sustainable finance, which is taken as a core proxy for economic activity that is sustainable and which will increase as the transition to climate neutrality and sustainability accelerates. This offers a greater degree of granularity and insight into performance in the economic dimension in particular, which is where assessment of competitiveness is typically considered to be most important. The use of the EU Taxonomy also offers a focus on activities considered sustainable and therefore avoids attributing positive performance to activities that are unsustainable, limiting contradictory results.

In nesting the economic competitiveness dimension within the social, governance and environmental dimensions, and assessing it in relation to innovation metrics and a sustainability transition process which

has agreed goals and timeframes, the Index offers a picture of competitiveness that integrates a new economic paradigm, not one that is at odds with it – competitive sustainability.

The components and their indicators have been established and selected through a methodology combining analysis of other relevant scoreboards and indices, expert review and data quality from a range of the most highly regarded and well-established international organisations, institutes, think-tanks and private sector analysts.[5]

The CSI is innovative and still 'one of a kind'

- ✓ Embeds purposeful innovation-related indicators and latest thinking on role in economic development at the core of the approach to properly reflect the wider sustainability transition dynamic.
- ✓ Applies a holistic industrial economic ecosystem approach such that overlap and double-counting is avoided, while being relevant to the overall economy and key areas most relevant to climate neutrality.
- ✓ Incorporates EU Taxonomy to ensure economic ecosystem boundaries, and tracking of value-add reflects transition to climate neutrality – and helps avoid economic progress at expense of other priorities.
- ✓ Considers the economic dimension within a whole economy framework that recognises known planetary boundaries, and incorporates governance and social dimensions, which mirrors the Commission's own approach to competitive sustainability and is also similar to ESG sustainable investment approaches.
- ✓ Uses an input–output–outcome logic relevant for decision-makers at policy level and key for identifying potential opportunities for collaboration between EU countries.
- ✓ Resulting competitive sustainability indicators and index therefore reflect wider competitive context of sustainable development, and agreed medium and longer-term transition goals, international collaborative frameworks for these, and core investor needs and incentives in these.
- ✓ The approach, data and resulting Index have also been statistically assessed and approved by the JRC.

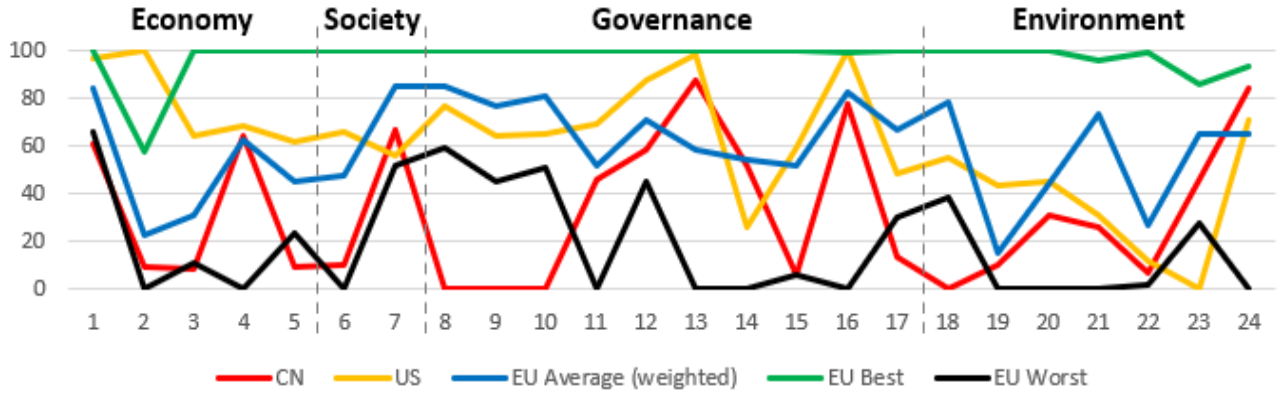
2. International benchmark

EU policy thinking has evolved to reflect the need to transition to a climate-neutral economy made evident by the landmark Paris Agreement and the publication of the European Green Deal. However, economic frameworks have not yet incorporated the context of the sustainability transition. Until now, competitiveness has been widely considered a purely economic factor and it was typically measured through productivity metrics.

The CSI adopts a systemic approach that captures the dynamics of the global sustainability transition and recognises planetary boundaries, internalising all relevant costs. As a result, in addition to the traditional economic indicators addressing productivity performance, the CSI incorporates measures to assess social welfare (Fairness), governance quality (Stability) and natural capital (Environment), recognising their importance and interrelatedness for countries' competitiveness.

The following chart (Figure 3) contains a summary of EU countries' performance versus their main international competitors (the US, China and the UK) in the competitive sustainability indicators for which data is available for all of them. Because of the level of data disaggregation involved, unfortunately none of the economic indicators linked to the EU Taxonomy are available for the international benchmark.

Figure 3. International benchmark on CSI indicators available for international comparison



Source: Competitive Sustainability Index
Note: The list of the 24 indicators used in the comparison can be found in Annex I. Indicators available for international comparison have been normalised (0–100) for comparability purposes considering data from EU-27 countries plus EU average, India, China, US and UK although not every country's normalised score is presented.

Table 1: Summary of best and worst performance across CSI international indicators

Overall	EU	US	China	UK	TOTAL
Best performer	21	2	0	1	24
Worst performer	15	1	8	0	24
Economy/Prosperity	**EU**	**US**	**China**	**UK**	**TOTAL**
Best performer	4	1	0	0	5
Worst performer	2	0	3	0	5
Society/Fairness	**EU**	**US**	**China**	**UK**	**TOTAL**
Best performer	2	0	0	0	2
Worst performer	2	0	0	0	2
Governance/Stability	**EU**	**US**	**China**	**UK**	**TOTAL**
Best performer	9	1	0	0	10

Worst performer	6	0	4	0	10
Environment/Greenness	**EU**	**US**	**China**	**UK**	**TOTAL**
Best performer	6	0	0	1	7
Worst performer	5	1	1	0	7

Source: Competitive Sustainability Index

Out of the 81 CSI indicators, data is also available for the US, China and the UK in 24 of them (see Table 1). The EU's best performer is also global best in 21 of those metrics. On the contrary, in 15 of these indicators the EU's worst performer also underperforms its non-EU competitors, which again shows the uneven competitive sustainability performance across EU Member States and reveals the enormous opportunity for collective improvement through enhanced cohesion within the EU.

The breakdown by dimension shows that the EU's top performer manages to outperform international benchmarks in four out of five economic metrics, the only two social indicators available, nine out of ten governance measures and six out of seven environmental metrics. This demonstrates the solid capacities of EU Member States across the different elements assessed in the CSI, and opens the door for reflection on how the picture would look if EU countries could manage to increase average performance close to their internal champions.

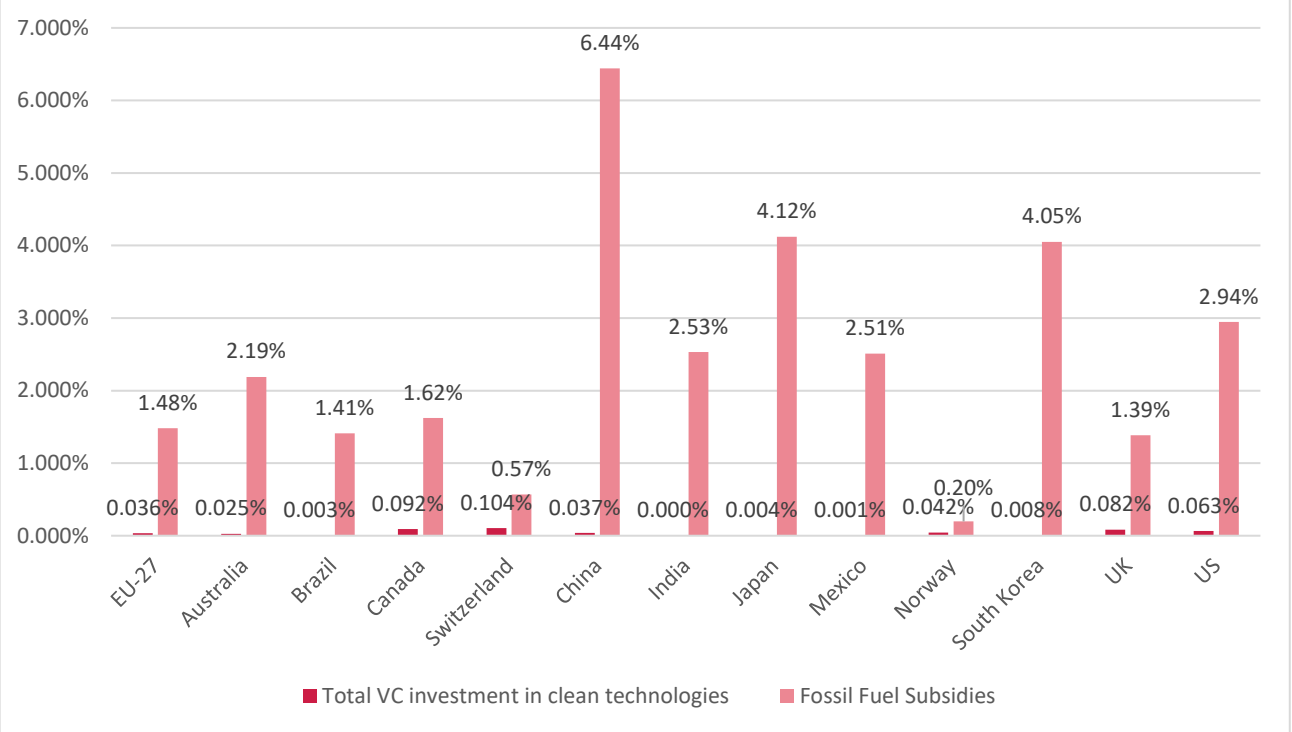
The US only manages to outperform its global competitors in one economic indicator (Entrepreneurial culture) and another governance metric (Global cybersecurity), while the UK only leads in one environmental metric (Water productivity) and China does not perform best in any of the indicators analysed.

2.1. Competitive unsustainability – a glaring example of international inconsistency

In the aftermath of COP 29 we need to confront inconsistencies. Whereas most developed countries are trying to show the international community that they are making a determined effort to combat climate change, in most cases, efforts made are upgradable to say the least.

Cleantech VC investment, although only a small part of total investment in clean technologies, is an indicator showing progress and commitment towards decarbonising the economy. On the other hand, fossil fuel subsidies are a public expenditure in support of activities that directly contribute to climate change and represent a barrier for the sustainability transition. When these two variables are confronted, in most cases, the result (see Figure 4) is an uncomfortable truth.

Figure 4: Cleantech investment vs fossil fuel subsidies (% GDP)

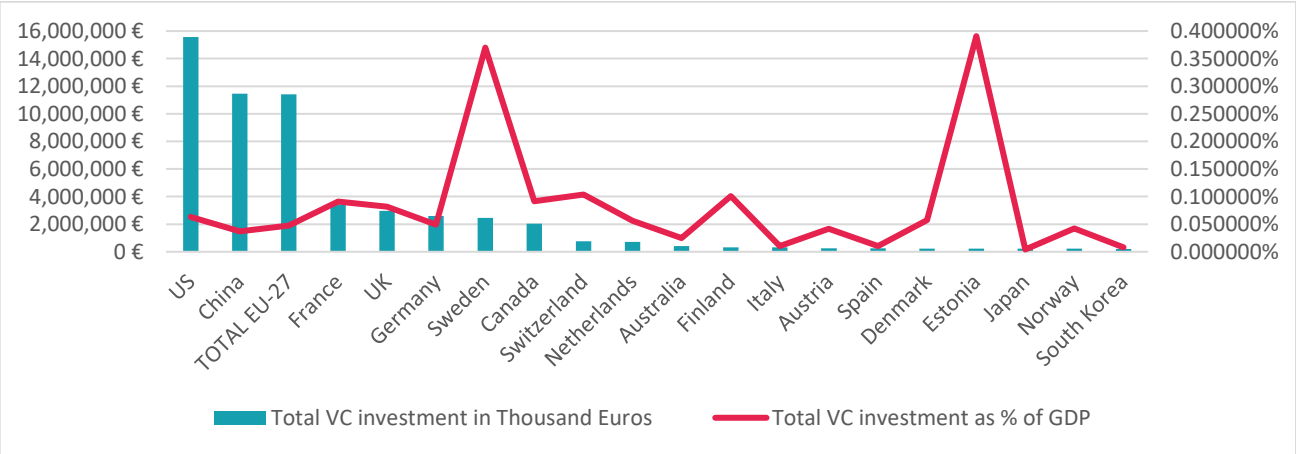


Source: Authors based on data from Cleantech Group for cleantech VC investment and International Monetary Fund for fossil fuel subsidies

All countries analysed dedicate a much larger budget to fossil fuel subsidies than they invest in clean technologies. The comparison between the two figures reveals in all cases a substantial imbalance between investment in the solutions that will deliver the transition to a low carbon economy and expense in preserving the flawed status quo. Notably, despite China's dominant position in some key net-zero value chains, it is by far the country providing the largest support to fossil fuels and the one with the biggest gap between the two.

2.2. The race to net zero is far from over

Figure 5: Top cleantech VC investment in absolute (thousand Euros) and relative terms (% GDP)



Source: Authors based on data from Cleantech Group (2023 data)

Figure 5 shows US clear dominance when it comes to cleantech VC investment in absolute terms (total Euros), while EU-27 countries combined only manage to compete with China for second place. The

difference between these three blocs and any other country is simply mind-boggling. While the EU is close to US figures and ahead of China on early-stage investment (seed and series A), the enormous gap in late-stage (series B and growth equity) funds allocation with respect to its two pursuers affirms the US as absolute leader in cleantech VC investment.

Nevertheless, the EU situation in the global cleantech VC market is much more positive than in other economic areas (such as biotech or digital technologies), since despite being currently third in the global cleantech VC race, it is closely disputing second place to China and although distant, it is within reach of the US. If UK funds were to be added to EU-27, the resulting bloc would be fighting for the cleantech VC top spot.

Moreover, the EU has some champions in cleantech investment in GDP terms. Estonia, Sweden and, at some distance, Finland are global leaders in cleantech venture capital allocation when investment efforts are considered relative to their GDP. In particular, it is worth noting that both Estonia and Sweden are particularly strong in late-stage cleantech funding, which is Europe's main weakness. Thus, if other European countries would follow suit, the EU could seamlessly become global leader in cleantech VC investment.

All in all, this evidences the clear opportunity for the EU to double down on its efforts on low carbon technologies to try to lead the net-zero transition, and the announced Clean Industrial Deal is probably Europe's last chance to accomplish it.

2.3. Resource efficiency is the new productivity lens

Developing first-mover competitive advantages in cleantech solutions to decarbonise the economy, even if highly relevant, is only one element of the sustainability transition and the competitiveness challenges associated to it.

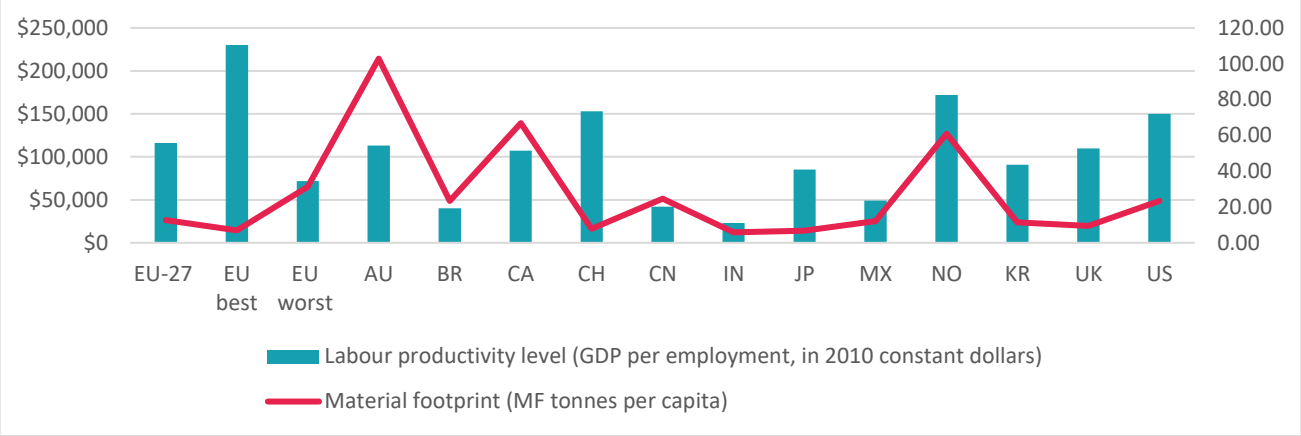
The traditional competitiveness model is dangerously contributing to the global triple planetary crisis,[6] as it assumes not only that resources are unlimited but also that they are accessible with no restrictions. These assumptions fail to pass any serious reality check.

Thus, it is time to change the productivity lens to reflect the transition and economic paradigm shift we are in. In the 21st century, competitiveness and productivity should no longer be focused on producing more but on producing better, decoupling economic activity from resource use and meeting societal needs while respecting planetary boundaries.

Orthodox economic thinking often overlooks resource efficiency value, and the relation of material footprint with long-term competitiveness has not yet received much attention. However, as indicated by a group of experts in a recent report,[7] it is necessary to consider the development of resource productivity as another important indicator of competitiveness.

The EU is rather poor in the critical raw materials that are required for the development of most cleantech solutions, but is rich in human capital and a front-runner in creating regulations that create lead markets based on circular economy principles. Therefore, one of the EU's comparative advantages could lie in developing the most energy- and resource-efficient products and services.

Figure 6: International benchmarking on resource productivity vs labour productivity

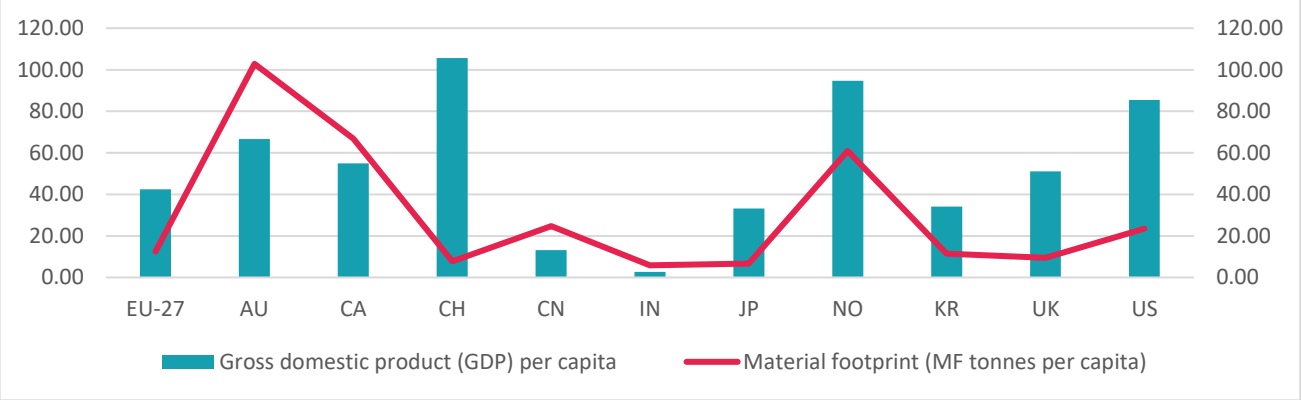


Source: Authors based on data from UN Global Material Flows Database for Material footprint and World Bank for Labour productivity

The EU lags behind the US in labour productivity but clearly outperforms its main global competitors (the US and China) when it comes to resource productivity (see Figure 6). Although some other countries such as South Korea, the UK or Switzerland have a lower material footprint than the EU average, the EU's best performer (Italy) only lags behind Japan and India in terms of resource productivity and in the case of the latter, its low footprint is most likely due to a lower level of industrialisation rather than to higher material efficiency.

On the other hand, the EU's worst performer in resource productivity (Estonia) still outcompetes other developed countries such as Norway, Canada and Australia and is still somehow competitive versus the US and China in this respect.

Figure 7: International benchmarking on resource productivity vs GDP



Source: Authors based on data from UN Global Material Flows Database for Material footprint and IMF for GDP

Similarly, when comparing major economies' material footprint relative to the size of their economies (see Figure 7), the EU's average performance is significantly more balanced than other advanced economies such as Canada or Australia. However, countries such as the UK, US and particularly Switzerland seem to perform better on resource productivity under this perspective.

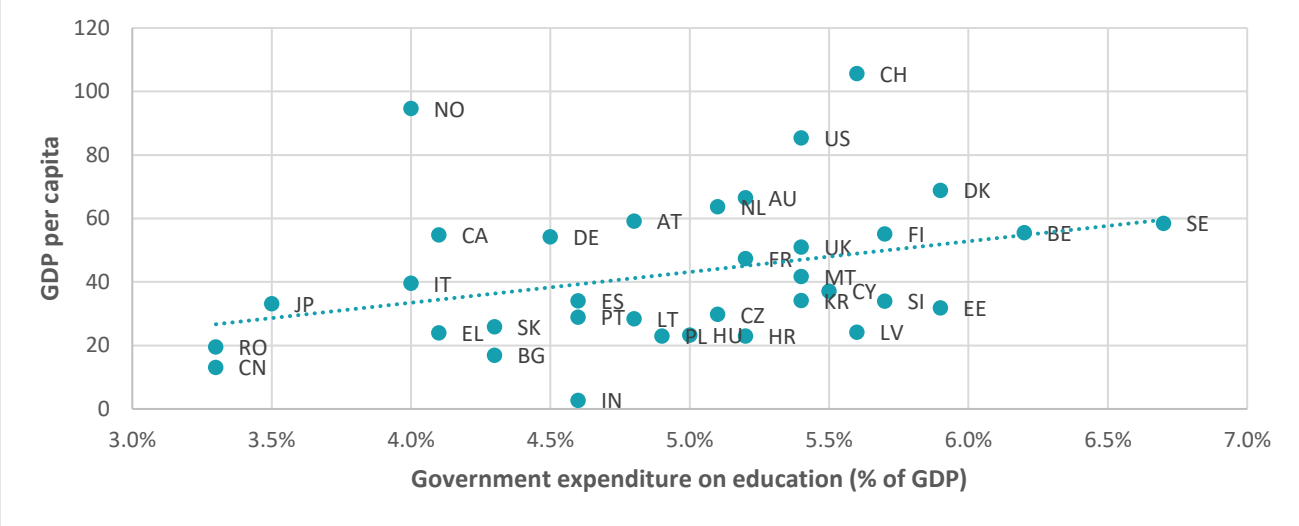
This approach should be further refined to consider other structural characteristics and contextual factors, but can offer initial insights on potential perspectives to be further explored.

2.4. Competitiveness is also built on social factors

Producing more goods and services (having a higher GDP) does not always equal a higher standard of living, and consuming more does not always improve factors with significant impact on quality of life such as life expectancy, health, social equality or financial stability.

Social factors are an essential condition to well-being, and social attractiveness will be a critical element in the sustainability transition. The capacity to attract skilled labour will determine countries' competitiveness in the global race to net zero, and standards of living play a key role in economic development.

Figure 8: Correlation between Government expenditure on education and GDP per capita



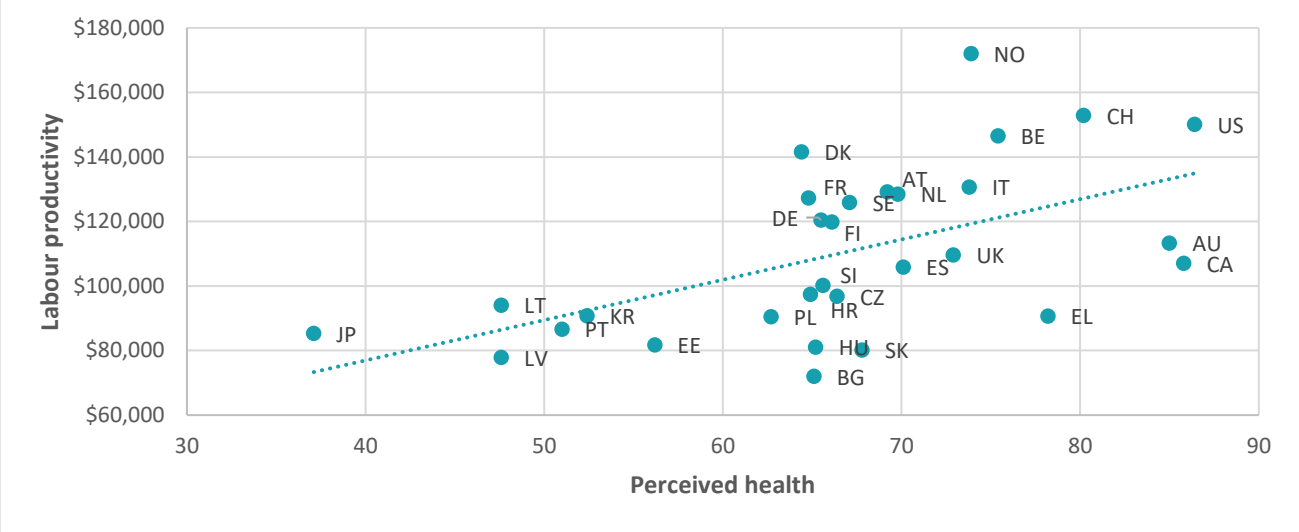
Source: Authors based on data from World Bank for Government expenditure on education and IMF for GDP

Investment in education is one of the main pillars of competitiveness. Figure 8 shows that countries with higher levels in expenditure on education (measured as a share of GDP) consistently achieve higher levels in one of the main productivity indicators that orthodox economic thinkers venerate (ie GDP per capita).

The EU's average performance on education investment (as a share of GDP) lags behind most advanced economies in this analysis (Switzerland, the US, the UK, South Korea, Australia and even Brazil) and is on similar levels to some developing economies such as India or Mexico.

Unless effective measures are taken to correct the course of EU countries' education investment, this could have significant implications for the EU's competitiveness in the mid-term (see also section 4.2 on CSI results in the Society/Fairness dimension).

Figure 9: Correlation between Perceived health and Labour productivity



Source: Authors based on data from OECD for Perceived health and World Bank for Labour productivity

The relationship between health quality and another traditional productivity metric (ie labour productivity) also proves to be positive (see Figure 9). Thus, the better the health status among the general population, the higher the levels of labour productivity.

Here again, average health status among European citizens is worse than in most of the international countries included in this analysis (the US, Canada, Australia, Switzerland, Norway and the UK) and the EU's average performance on this indicator only exceeds that of Japan and South Korea (data for Brazil, China, India and Mexico is not available for this indicator), which proves to be a European competitive disadvantage in the aftermath of the Covid-19 crisis.

2.5. Smart regulation is pro-competitiveness

As indicated by Letta in his report, smart regulation is needed to further harmonise the EU's internal market and fully leverage the potential of the Single Market.[8] Calls to reduce regulatory burden or in favour of a regulatory pause ignore that deploying regulation and standards is one of the areas where the EU can best compete. Through the power of its internal market, the EU can drive innovation and investment while shaping international rules.

Standardised reporting requirements effectively support the creation of lead markets for clean technologies and green materials, and can drive finance and investment towards the competitive, green, inclusive and resilient transition of key supply chains, while reducing reporting burden.

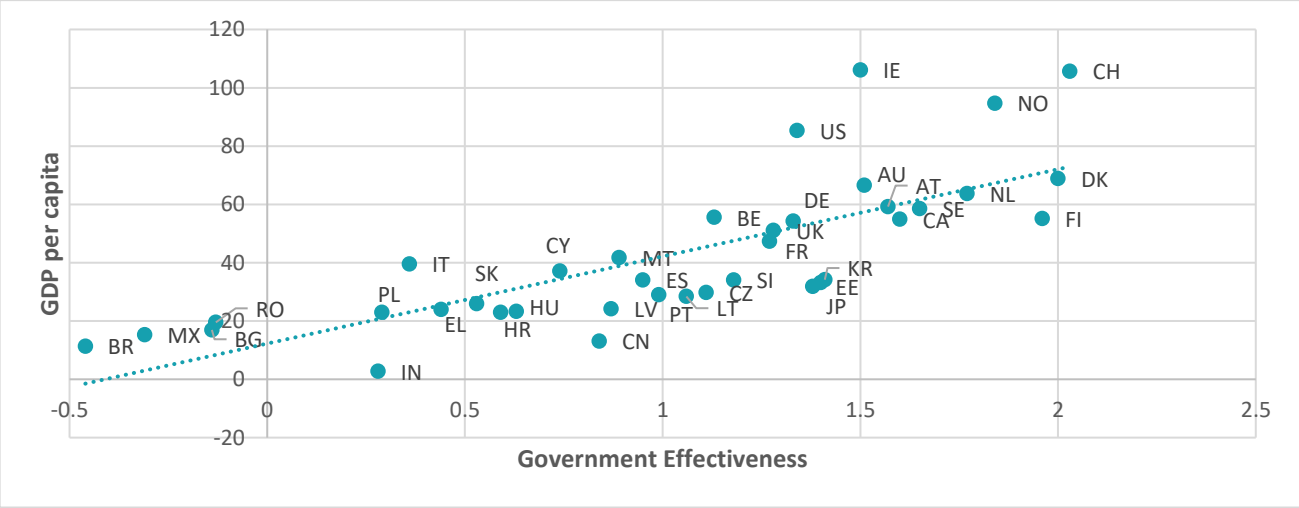
The EU reporting framework is enabling credible monitoring of progress in climate action, hindering national and organisational greenwashing while promoting greater climate ambition, and creating a level playing field by also applying to foreign companies active in the EU.

Policy certainty and long-term visibility are necessary for business to engage in the transformation, provided it is easy to implement and serves clear goals. Deregulation, whether through lowering environmental or social standards, reneging on international commitments, or reducing the EU's climate ambition, threatens the stable and predictable legal framework that we depend on.

Smarter, not less, regulation holds the key to enhancing competitiveness and supporting the transformation of European businesses. However, 'dumb' regulation can also harm competitiveness. It is therefore critical

that EU regulation maintains policy certainty and coherence while avoiding becoming a burden for businesses. That is why it is so relevant that regulation is developed in collaboration with firms and civil society.

Figure 10: Correlation between Government effectiveness and GDP per capita



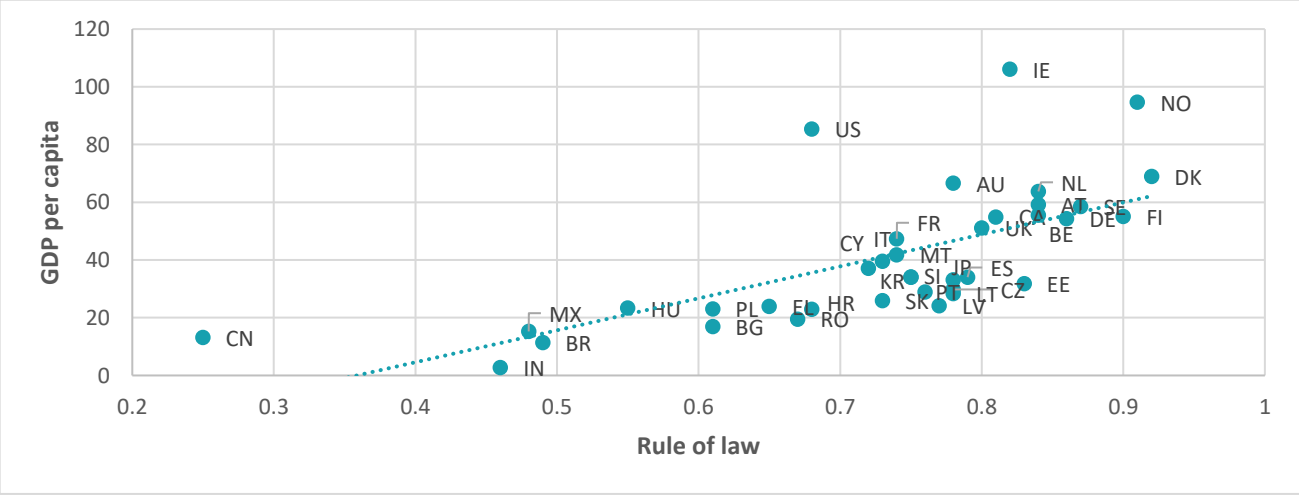
Source: Authors based on data from World Bank for Government effectiveness and IMF for GDP

Government effectiveness captures the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

When smart regulation is in place, society's perception of the quality of policymaking performance improves, and as shown by Figure 10, better performance on government effectiveness is strongly related to higher levels of economic outcome (GDP per capita).

However, EU average performance on government effectiveness only outcompetes countries such as Brazil, Mexico, India and China, but clearly lags behind most advanced economies in this benchmark.

Figure 11: Correlation between Rule of law and GDP per capita



Source: Authors based on data from World Bank for Rule of law and IMF for GDP

In addition to smart regulation, transparency, accountability and effective enforcement of the regulatory and legal framework are central to stable societies and vibrant economies, providing the required stability

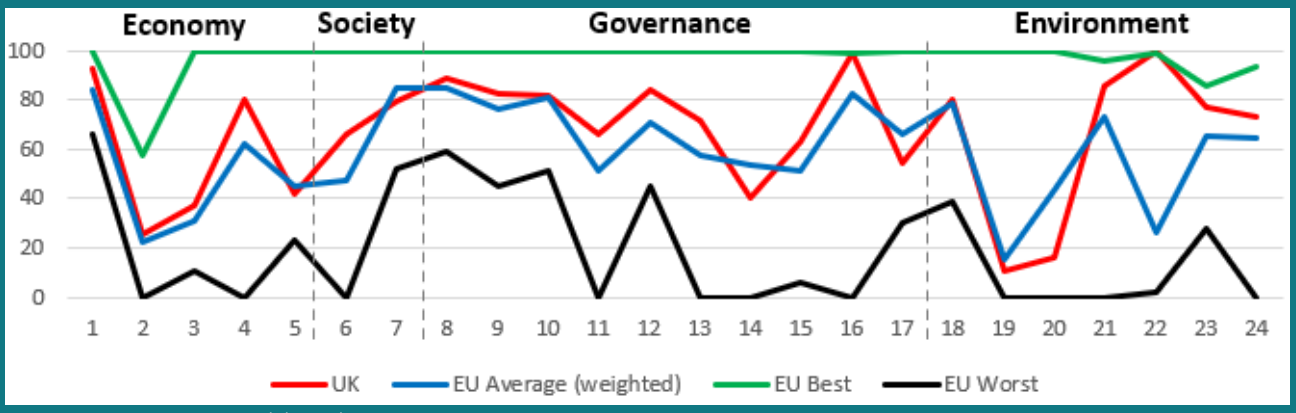
and predictability for economic prosperity. Figure 11 demonstrates that countries where rule of law prevails more prominently also achieve higher economic outcomes (measured as GDP per capita).

Average results of EU Member States on the rule of law indicator are in line with other advanced economies such as South Korea, Australia, Japan, the UK or Canada, although at some distance from Norway. However, even the EU's worst performer on this indicator (Hungary) is ahead of other countries such as Brazil, Mexico, India and most notably China.

UK snapshot: Identifying potential for joint EU–UK competitively sustainable leadership

Our analysis suggests that the UK is only best-in-class globally in one indicator, but that **when compared with the EU average, its performance is remarkably similar**. Faced with global competitors in China and the US, its ability to compete will depend on how it defines its relationship with the EU, and where it can collaborate to jointly compete in scale with them. To a lesser extent this is also true of the EU, but the mutual advantage of collaborative efforts is evident in some areas at least.

Figure 12: EU–UK benchmark on CSI indicators available for international comparison

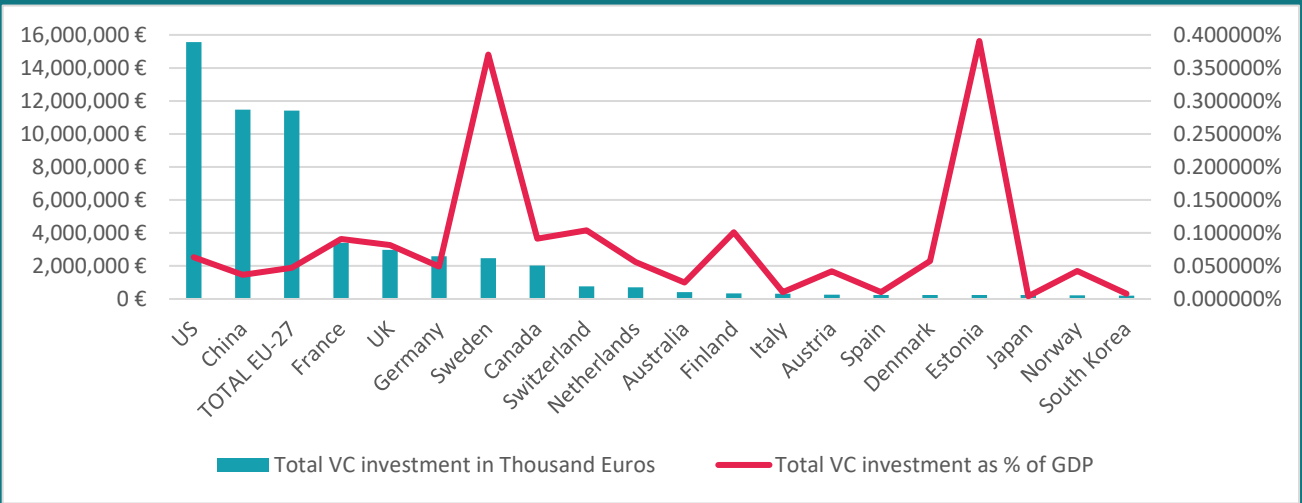


Source: Competitive Sustainability Index
Note: The list of the 24 indicators used in the comparison can be found in Annex I. Indicators available for international comparison have been normalised (0–100) for comparability purposes considering data from EU-27 countries plus EU average, India, China, US and UK although not every country's normalised score is presented.

For example, the US has a clear dominance when it comes to cleantech VC investment in absolute terms (total Euros), while EU-27 countries combined only manage to compete with China for second place. While the EU is close to US figures and ahead of China on early-stage investment (seed and series A), the enormous gap in late-stage (series B and growth equity) funds allocation with respect to its two pursuers affirms the US as undisputed leader in overall cleantech VC investment. However, if EU and UK VC investments were combined, it would be competitive with the US, and ahead of China.

In any case, despite the UK's cleantech investment being stronger in late-stage ventures, the addition of UK funds would still fail to meet the gap between the EU and the US in late-stage cleantech funding, which is Europe's main barrier to conquer global leadership in this field.

Figure 13: Top countries on VC investment in absolute (thousand Euros) and relative terms (% GDP)



Source: Authors based on data from Cleantech Group (2023 data)

Indeed, the EU situation in the global cleantech VC market is much more positive than in other economic areas (such as biotech or digital technologies), since despite being currently third in the global cleantech VC race, it is close to overtaking Chine for second place and although distant, is within reach of the US. If UK funds were to be added to EU-27, the resulting bloc would be fighting for the cleantech VC top spot.

3. Competitive Sustainability Index results

The 2024 edition of the Competitive Sustainability Index (CSI) shows a number of changes with respect to the first edition in 2022, during which time many significant events have occurred and which may explain some but not all of the differences in performance.[9] At the same time, as one might expect for an index which assesses competitive sustainability performance in a strategic context, aggregate performance has not changed significantly – although performance in each of the dimensions and in the innovation ecosystems may suggest more significant changes, which are reported and discussed in the next sections.

Figure 14: Performance of countries on the CSI and its dimensions in 2024 and 2022

	Overall CSI				Economy / Prosperity				Society/Fairness				Governance/Stability				Green/Environment		
	2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)
SE	73	74	-1	FI	74	72	2	SE	81	87	-6	DK	87	79	8	SE	71	69	2
FI	72	73	-2	NL	65	67	-1	BE	77	68	9	SE	82	81	1	DK	65	65	0
DK	69	70	-1	AT	61	60	2	DK	75	85	-10	NL	81	82	-1	PT	62	59	4
NL	67	70	-4	SE	57	58	-2	NL	73	84	-11	FI	80	81	-1	HR	62	53	8
AT	62	65	-3	DE	55	64	-8	FI	73	81	-8	LU	75	79	-4	LV	61	55	6
LU	61	64	-3	SI	54	50	4	LU	72	74	-2	EE	71	64	7	FI	60	60	0
DE	61	63	-3	IE	53	53	0	SI	69	78	-9	DE	71	67	4	EL	59	50	10
IE	60	64	-4	EE	52	52	0	AT	69	74	-6	IE	65	62	3	IE	59	68	-9
BE	59	54	5	BE	51	50	1	DE	66	68	-3	BE	64	54	10	FR	58	57	1
FR	58	58	0	LU	51	45	6	FR	65	70	-5	AT	64	66	-2	LT	57	53	5
EE	57	56	1	DK	50	52	-2	IE	65	75	-10	FR	59	56	3	SI	57	55	2
SI	57	59	-2	FR	49	47	2	SK	58	51	7	LT	53	47	6	IT	57	55	2
PT	51	52	0	LT	47	41	6	ES	57	68	-11	LV	50	42	9	AT	56	61	-5
LT	51	46	5	CZ	42	48	-6	CZ	54	72	-18	CZ	49	47	2	ES	54	52	2
LV	49	43	6	PT	42	42	1	PT	54	60	-5	ES	49	47	1	MT	54	28	26
ES	48	49	-1	CY	41	40	1	EE	54	62	-8	PT	47	48	-1	DE	52	55	-3
CZ	47	52	-5	IT	38	44	-6	PL	51	57	-6	SI	47	52	-5	EE	50	45	5
IT	47	44	3	LV	37	33	4	IT	51	45	6	IT	42	33	8	RO	48	49	-1
SK	45	41	4	SK	33	32	2	HU	50	54	-5	SK	41	39	3	NL	47	49	-1
MT	44	43	2	PL	33	34	-1	MT	49	66	-16	MT	41	45	-3	LU	46	56	-10
HR	43	41	2	MT	33	32	1	LV	49	44	5	CY	36	30	6	SK	45	42	3
PL	40	44	-3	HR	32	35	-3	LT	47	45	2	PL	35	45	-10	HU	45	43	2
CY	39	44	-4	ES	32	29	3	HR	47	43	4	HR	31	32	-1	CZ	44	43	1
EL	39	36	3	HU	31	39	-8	CY	47	70	-23	EL	25	29	-5	BE	44	45	-1
HU	37	42	-5	BG	31	31	-1	EL	40	36	4	RO	24	27	-3	PL	42	39	3
BG	31	27	4	EL	30	28	2	BG	32	27	5	HU	23	33	-10	BG	39	30	9
RO	26	31	-5	RO	19	21	-2	RO	14	28	-14	BG	22	19	3	CY	33	34	-1
			-12				-4				-133				28				59
EU Average (	52.18	53.14	-0.96		43.94	46.14	-2.19		58.13	62.07	-3.94		53.48	51.89	1.60		53.15	52.46	0.69

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Back in 2022, CSI results indicated that overall, EU countries were collectively performing competitively better on Society and Governance dimensions of the transition compared to Economy and Environment dimensions. In that edition, four countries were leaders in the overall index (Sweden, Finland, Denmark and the Netherlands).

In this edition, a total of 12 countries obtain strong overall results (one more than in 2022) while only eight Member States perform poorly in the CSI overall results (three fewer than in 2022). Despite that improvement at the country level, average EU performance on competitive sustainability suffers a slight decrease with respect to the last edition, although it remains solid. This reveals that smaller Member States have had a better performance in the past two years than larger ones. Moreover, EU countries continue to perform better on average in Society and Governance dimensions than in the economic and environmental ones.

However, 2024 results evidence highly uneven progress across dimensions from the previous edition. While EU Member States have improved their performance on Governance/Stability and Environment/Greenness, average performance on Economy/Prosperity and particularly on Society/Fairness

dimensions has dropped. These changes are further discussed in the sections addressing the results on each of the four CSI dimensions.

CSI 2024 top-5 performers remain unchanged from the last edition, with Nordic countries leading the ranking and the Netherlands and Austria following closely. Moreover, the two competitive sustainability front-runners (Sweden and Finland) manage to be among the top performers (Leaders) in three out of the four dimensions of the CSI while performing strongly on the other one, proving that they are approaching the transition in an integrated manner, developing competitive advantages across the different dimensions of the CSI.

Nevertheless, two of the previous 'Leaders' (Denmark and Finland) fail to match their previous level of performance and fall one step in CSI performance categories. On the other hand, Belgium manages to join the group of 'Strong performers' completing the set of countries that are driving the EU's competitive sustainability, comprising of Austria, Luxembourg, Germany, Ireland, France, Estonia and Slovenia, in addition to those already mentioned above.

Conversely, weaker performers tend to be found in Eastern and Mediterranean countries. Despite some improvement, Greece and Bulgaria are still at the lower echelons of the 2024 CSI ranking, whereas Member States such as Romania, Hungary and Cyprus obtain worse overall results than in 2022, reaffirming their poor competitive sustainability performance.

These findings suggest that targeted policy interventions to support both economic and other transition dynamics remain very important for the EU overall for its performance to improve.

3.1. Competitive sustainability tracker

Figure 15: Performance changes from 2022 to 2024 on the CSI and its dimensions

	Overall CSI				Economy / Prosperity				Society / Fairness				Governance / Stability				Environment / Greenness		
	2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)		2024	2022	Change (+/-)
LV	49	43	6	LT	47	41	6	BE	77	68	9	BE	64	54	10	MT	54	28	26
LT	51	46	5	LU	51	45	6	SK	58	51	7	LV	50	42	9	EL	59	50	10
BE	59	54	5	LV	37	33	4	IT	51	45	6	IT	42	33	8	BG	39	30	9
BG	31	27	4	SI	54	50	4	LV	49	44	5	DK	87	79	8	HR	62	53	8
SK	45	41	4	ES	32	29	3	BG	32	27	5	EE	71	64	7	LV	61	55	6
EL	39	36	3	FI	74	72	2	EL	40	36	4	LT	53	47	6	LT	57	53	5
IT	47	44	3	AT	61	60	2	HR	47	43	4	CY	36	30	6	EE	50	45	5
HR	43	41	2	EL	30	28	2	LT	47	45	2	DE	71	67	4	PT	62	59	4
MT	44	43	2	SK	33	32	2	LU	72	74	-2	BG	22	19	3	PL	42	39	3
EE	57	56	1	FR	49	47	2	DE	66	68	-3	IE	65	62	3	SK	45	42	3
FR	58	58	0	BE	51	50	1	FR	65	70	-5	SK	41	39	3	SI	57	55	2
PT	51	52	-0.5	MT	33	32	1	HU	50	54	-5	FR	59	56	3	SE	71	69	2
SE	73	74	-1	CY	41	40	1	PT	54	60	-5	CZ	49	47	2	HU	45	43	2
DK	69	70	-1	PT	42	42	1	SE	81	87	-6	ES	49	47	1	ES	54	52	2
ES	48	49	-1	EE	52	52	0	AT	69	74	-6	SE	82	81	1	IT	57	55	2
FI	72	73	-2	IE	53	53	0	PL	51	57	-6	HR	31	32	-1	CZ	44	43	1
SI	57	59	-2	BG	31	31	-1	EE	54	62	-8	NL	81	82	-1	FR	58	57	1
DE	61	63	-3	PL	33	34	-1	FI	73	81	-8	PT	47	48	-1	FI	60	60	0
LU	61	64	-3	NL	65	67	-1	SI	69	78	-9	FI	80	81	-1	DK	65	65	0
AT	62	65	-3	SE	57	58	-2	DK	75	85	-10	AT	64	66	-2	CY	33	34	-1
PL	40	44	-3	DK	50	52	-2	IE	65	75	-10	MT	41	45	-3	BE	44	45	-1
NL	67	70	-4	RO	19	21	-2	ES	57	68	-11	RO	24	27	-3	RO	48	49	-1
IE	60	64	-4	HR	32	35	-3	NL	73	84	-11	LU	75	79	-4	NL	47	49	-1
CY	39	44	-4	IT	38	44	-6	RO	14	28	-14	EL	25	29	-5	DE	52	55	-3
CZ	47	52	-5	CZ	42	48	-6	MT	49	66	-16	SI	47	52	-5	AT	56	61	-5
RO	26	31	-5	HU	31	39	-8	CZ	54	72	-18	PL	35	45	-10	IE	59	68	-9
HU	37	42	-5	DE	55	64	-8	CY	47	70	-23	HU	23	33	-10	LU	46	56	-10

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

When analysing the evolution of results with respect to the previous edition, it is worth noting that only ten Member States manage to obtain higher overall competitive sustainability performance, with Latvia, Lithuania and Belgium at the top of the biggest improvements ranking, followed by Bulgaria, Slovakia, Greece and Italy. Moreover, Latvia, Lithuania and Slovakia manage to improve their results in all four dimensions of the CSI.

Conversely, 16 EU countries have seen their competitive sustainability worsen, with Czechia, Romania and Hungary leading the drops in overall performance and Cyprus, Ireland and the Netherlands closely behind. Furthermore, only Romania and the Netherlands see a negative evolution in every dimension.

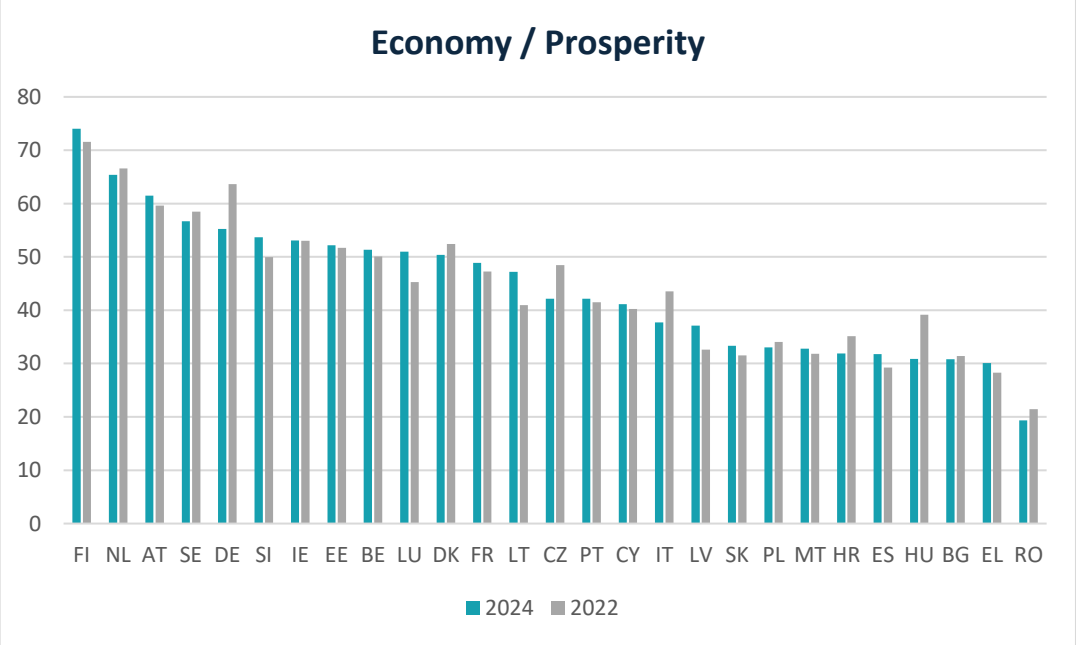
France is the only Member State that obtains the same CSI score as in 2022, even though its performance in each of the four dimensions has seen changes in all cases, with slight improvements on the Environment, Economy and Governance pillars and a notable drop (-5) in the Society dimension.

The next sections deep dive into results on each of the four dimensions of the Competitive Sustainability Index (Economy/Prosperity, Society/Fairness, Governance/Stability, Environment/Greenness).

3.2. Economy/Prosperity dimension

Overall assessment of performance in the Economy/Prosperity dimension is relatively positive, since despite being the dimension with the lowest average performance, having slightly dropped with respect to two years ago, 16 countries manage to improve their results and the number of 'Laggards' is reduced to only one (Romania). Performance on the innovation ecosystems linked to Taxonomy-eligible economic activities proves to be the main reason for such a poor average performance, confirming the need to reinforce R&I efforts expressed by the Draghi report.

Figure 16: Performance of EU countries on the Economy/Prosperity dimension in 2024 and 2022



	2024	2022
FI	74	72
NL	65	67
AT	61	60
SE	57	58
DE	55	64
SI	54	50
IE	53	53
EE	52	52
BE	51	50
LU	51	45
DK	50	52
FR	49	47
LT	47	41
CZ	42	48
PT	42	42
CY	41	40
IT	38	44
LV	37	33
SK	33	32
PL	33	34
MT	33	32
HR	32	35
ES	32	29
HU	31	39
BG	31	31
EL	30	28
RO	19	21
EU-27	43.94	46.14

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Average performance on the Economy/Prosperity dimension decreases with respect to 2022 and moves further away from an ideal level of results. A total of five countries continue to show sound economic performance, with Finland again leading that group. On the other hand, 13 Member States continue to obtain weak results on this dimension. However, the number of countries lagging behind decreases from three to only one (Romania) in this edition.

Countries such as Latvia, Slovenia and particularly Lithuania and Luxembourg manage to significantly improve their economic results with respect to 2022. Conversely, Czechia, Hungary and Germany see

substantial score drops, which given the importance of the latter for the European economy presents a potential challenge if that trend continues to persist in subsequent editions.

A total of 16 countries improve their performance on this dimension with respect to 2022, whereas 11 Member States obtain weaker results. Thus, overall assessment is relatively positive since despite the decline in EU average performance, the majority of countries manage to improve their results, which evidences that smaller EU Member States are doing better in economic terms.

Moreover, the Economy/Prosperity pillar has the lowest average across dimensions. The main reason for this seems to be EU countries' performance on the innovation ecosystems, which confirms the 'existential challenge' to reinforce R&I efforts in key industries to reignite EU competitiveness (as indicated by the Draghi report).[10]

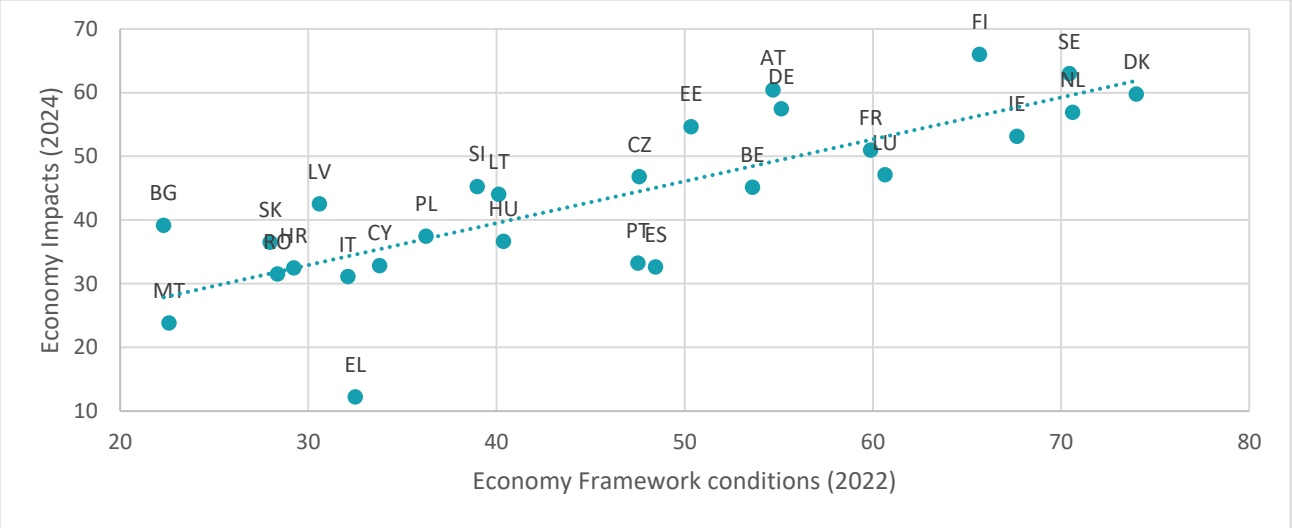
EU Member States have on average a weak performance in enterprise research and development (R&D) in the economic activities that are to drive the transition to a low carbon economy. EU average business investment in R&D in Taxonomy-eligible activities is 0.024 per cent of GDP, with top-performing countries (Sweden, Finland, Estonia and Austria) investing around 0.06 per cent of their GDP, while the median of European countries barely reaches 0.013 per cent. These figures look rather poor when compared to EU private investment in regular R&D (1.52 per cent of EU GDP in 2022),[11] proving the need to increase cleantech R&I efforts.

However, as happens with innovation performance in other economic areas, the EU's main weakness when it comes to sustainable R&I performance lies in the final stages of the innovation process. The so-called European 'innovation paradox'[12] is also evident in the key economic activities driving the way to a low carbon future. EU countries are failing to fully reap the benefits of their R&D efforts, somehow struggling to transform research and development into intellectual property (IP) products or successful start-ups and scale-ups.

EU average performance on patents, trademarks and industrial designs in Taxonomy-eligible activities has dramatically decreased from the last edition, and the level of employment across Member States in innovative enterprises on the economic activities that should lead the net-zero transition has performed even worse.

One of the root causes of the 'innovation paradox' may lie in cultural issues, as most European societies are increasingly becoming risk-averse. Entrepreneurial culture is far weaker in most European countries than in the majority of their international competitors. Thus, the share of the population who intend to start a business in Europe (9.99 per cent) is on average much lower than in Canada (14.26 per cent), India (19.47 per cent), South Korea (24.88 per cent) or the US (35.8 per cent). However, some EU Member States such as Croatia (21.64 per cent, Cyprus (21.28 per cent) and Portugal (19.78 per cent) manage to be among the top global performers on entrepreneurial spirit. However, the EU's average score on entrepreneurial intentions is still better than other major superpowers such as Japan (5.05 per cent) or China (5.58 per cent), although in the case of the latter, successful ventures are not necessarily the result of a high entrepreneurial spirit but rather a consequence of a top-down industrial policy.[13]

Figure 17: Input (Framework conditions) – Outcome (Impacts) analysis on the Economy/Prosperity dimension (2022–24)



Source: Competitive Sustainability Index

Although not being able to imply any causality in this analysis, one of the underlying assumptions of the competitive sustainability framework is that investment efforts on input indicators may translate, eventually, into better outcomes across dimensions.

Figure 17 tests the assumption that investment in economic framework conditions may materialise into economic impacts after some time. The resulting graph shows the correlation between the sub-dimension containing input indicators (framework conditions) and the sub-dimension containing outcome indicators (Impact) with a two-year time lag between the two.

Thus, Figure 17 reveals that economies that had higher 'framework conditions' (inputs) in the CSI 2022 edition do obtain higher economic 'Impacts' (outcomes) in 2024. This finding support CSI's assumption and proves the positive relationship between these two elements of the CSI framework.

Moreover, this analysis offers interesting insights in terms of countries' effectiveness in transforming inputs into outcomes, thus opening the door for significant learning opportunities between EU Member States that could lead to overall competitive sustainability performance improvements.

In that sense, Figure 17 reveals that countries such as Finland, Austria, Estonia, Slovenia and Latvia manage to obtain significantly higher levels of economic outcomes in 2024 than other Member States with similar 'framework conditions' in 2022. Thus, European counterparts would potentially benefit from learning from one of these outperformers, depending on their level of framework conditions to increase outcomes across EU Member States.

These preliminary findings are promising, yet more time-series data, when available, will allow us to understand if the findings above persist over time, and whether this is something to build upon for policy action.

3.2.1. Main findings on the innovation ecosystems

The transition to a clean, just and competitive economy requires significant R&I efforts, particularly on those ecosystems that will be critical for effectively achieving a low carbon economy (namely Energy, Industry, Buildings, Mobility, Land-use & Agri-food, and Digital).

The ability to secure technological and industrial leadership in the key low carbon technologies that will become the cornerstone of the next economic era strongly conditions both the EU's strategic autonomy and industrial competitiveness, while also presenting a huge economic opportunity.

R&I in Taxonomy-eligible economic activities therefore constitutes, in addition to being an enabler of the decarbonisation of the EU economy, a clear source of long-term competitive advantages and a good reference against which to assess performance in the global technological race to net zero.

The key innovation ecosystems for achieving climate neutrality are a core element of the CSI's economic dimension, and the assessment of R&I performance on these ecosystems is exclusively focused on the analysis of the economic activities considered eligible under EU Taxonomy Regulation.[14] This is a first of its kind approach, and even taking into account the immaturity of the data involved, constitutes one of the main added values of the CSI compared to other current frameworks.

The ecosystem-level analysis aims at helping countries to assess the relative strengths and weaknesses of their economies. This will enable them to identify comparative advantages where they should concentrate their efforts to boost R&I performance on the key innovation ecosystems under the new competitive sustainability paradigm.[15]

Figure 18: Results for innovation ecosystems

	Energy		Industry		Mobility		Buildings		LandUse & AgriFood*		Digital
	2024		2024		2024		2024		2024		2024
FI	73	FI	73	FI	81	FI	72	NL	87	SE	67
AT	63	NL	66	NL	77	SI	68	LT	75	FI	67
SI	63	CY	60	BE	65	DE	65	IE	75	NL	63
DE	63	BE	58	AT	60	BE	58	LV	70	AT	63
NL	59	IE	54	SI	54	NL	55	EL	58	DE	59
LU	57	AT	51	CY	53	LU	54	EE	58	CY	58
IE	56	EE	51	EE	52	IE	49	CZ	57	SI	57
BE	55	LT	47	FR	52	LT	49	DK	55	LT	55
LT	51	DK	47	SE	49	SE	47	BE	54	LU	52
EE	50	FR	46	DE	46	IT	46	RO	52	MT	52
DK	47	EL	45	EL	46	EL	45	IT	50	IT	51
EL	44	PT	43	IE	45	FR	44	BG	50	IE	51
IT	44	IT	42	CZ	42	AT	43	SI	48	PT	50
SE	43	CZ	41	DK	39	DK	43	LU	47	EE	48
CY	41	SI	41	LT	38	CZ	41	CY	47	BE	47
CZ	39	HR	35	IT	37	EE	41	PL	44	EL	47
BG	36	DE	35	LU	36	CY	38	DE	42	CZ	47
MT	36	SE	34	PT	35	PT	36	SE	41	FR	40
FR	36	LU	32	HR	34	MT	35	AT	38	BG	39
PT	35	BG	32	ES	33	BG	35	FI	36	HU	38
LV	32	ES	31	LV	32	HR	33	FR	36	SK	36
PL	30	SK	29	BG	29	LV	32	HU	34	HR	32
HR	28	HU	27	PL	28	SK	30	SK	34	ES	32
SK	26	LV	25	SK	27	PL	27	PT	28	PL	31
ES	24	PL	25	RO	26	ES	25	ES	25	DK	31
HU	21	MT	24	HU	22	HU	20	MT	17	LV	29
RO	12	RO	21	MT	22	RO	11	HR	15	RO	24
									*Limited data availability		
EU-27 2024	42.16	EU-27 2024	39.20	EU-27 2024	42.87	EU-27 2024	43.46	EU-27 2024	43.83	EU-27 2024	45.84
EU-27 2022	50.39	EU-27 2022	45.28	EU-27 2022	36.05	EU-27 2022	46.79	EU-27 2022	36.05	EU-27 2022	50.74
Change (+/-)	-8.23	Change (+/-)	-6.08	Change (+/-)	6.82	Change (+/-)	-3.33	Change (+/-)	7.77	Change (+/-)	-4.91

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Average EU countries' performance on the innovation ecosystems that are to lead the way to a low carbon European economy is slightly weaker than in 2022 on four out of six ecosystems (Energy, Industry, Buildings and Digital), reflecting the impact of the economic and geopolitical instability derived from recent crises.[16] Public R&I efforts have diverted towards other political priorities whereas economic uncertainty also seems to have retracted private R&I investment ambition.

Still, in all six ecosystems analysed there is a relevant group of EU countries that are performing strongly and are leading the way on the R&I solutions that will decarbonise these critical ecosystems. This highlights the

risk of having a two-speed Europe with some countries driving the sustainability transition while others lag behind. Thus, the challenge remains how to improve performance across all EU countries, leveraging on the experience and lessons learned from those EU Member States outperforming their counterparts.

Finland and the Netherlands demonstrate a very consistent performance on competitive sustainability, being among the top performers in the overall index results as well as displaying a solid performance across the innovation ecosystems.[17]

The Netherlands manages to qualify as a 'Leader' or 'Strong performer' in all six ecosystems, proving a strong capacity to address the innovation challenges of the sustainability transition across the entire spectrum of economic activities listed in the EU Taxonomy.

Finland is very close to that achievement, displaying a very strong performance in the majority of the ecosystems, only showing some weakness on Land-use & Agri-food. Apart from these, Belgium also obtains remarkable results performing strongly in four of the ecosystems respectively (Energy, Industry, Mobility and Buildings).

Austria and Germany have mixed results, being among the top performers in three of the ecosystems although performing weakly on another two. On the other hand, Sweden (a top-5 in the Economy/ Prosperity dimension) has a rather discrete performance on the innovation ecosystems (leads on Digital but performs poorly on the other five ecosystems), proving to be much more active on the market implementation of innovative solutions to decarbonise the economy (VC investment) than on earlier stages of the innovation process.

On average, EU countries show better performance on the Digital and Land-use & Agri-food[18] ecosystems, whereas 16 out of 27 EU countries perform poorly (<45 points) on the Energy, Industry and Buildings ecosystems, which brings down overall EU results in these areas.

On the positive side, EU countries have significantly improved their performance on Mobility and Land-use & Agri-food from the 2022 edition, showing encouraging results from some EU initiatives on these fields such as the European Battery Alliance or the Farm to Fork Strategy.

Finland and the Netherlands are leading EU efforts on the low carbon mobility field, followed by Belgium and Austria. Although strongly improving their performance with respect to 2022, EU automotive major powers (Germany, France, Spain and Czechia) are not yet among the top EU performers on the Taxonomy-eligible activities driving the sustainability transition of the Mobility ecosystem.

The Netherlands, along with Lithuania, Ireland and Latvia are top performers on the Land-use & Agri-food ecosystem and a further 11 countries qualify as either strong or moderate performers. As a result, this ecosystem has the second highest EU average performance and is the one with the biggest improvement from the last edition. However, it is striking how poorly European agri-powerhouses such as France or Spain perform on R&I of sustainable solutions in Land-use & Agri-food.

Despite not having any country qualifying as a 'Leader', average performance on the Digital ecosystem is the highest. Eight Member States (Sweden, Finland, the Netherlands, Austria, Germany, Cyprus, Slovenia and Lithuania) show strong results and 'only' ten countries perform weakly on this ecosystem, proving that early efforts from the Commission on the digital side of the twin transition are already bearing fruit.

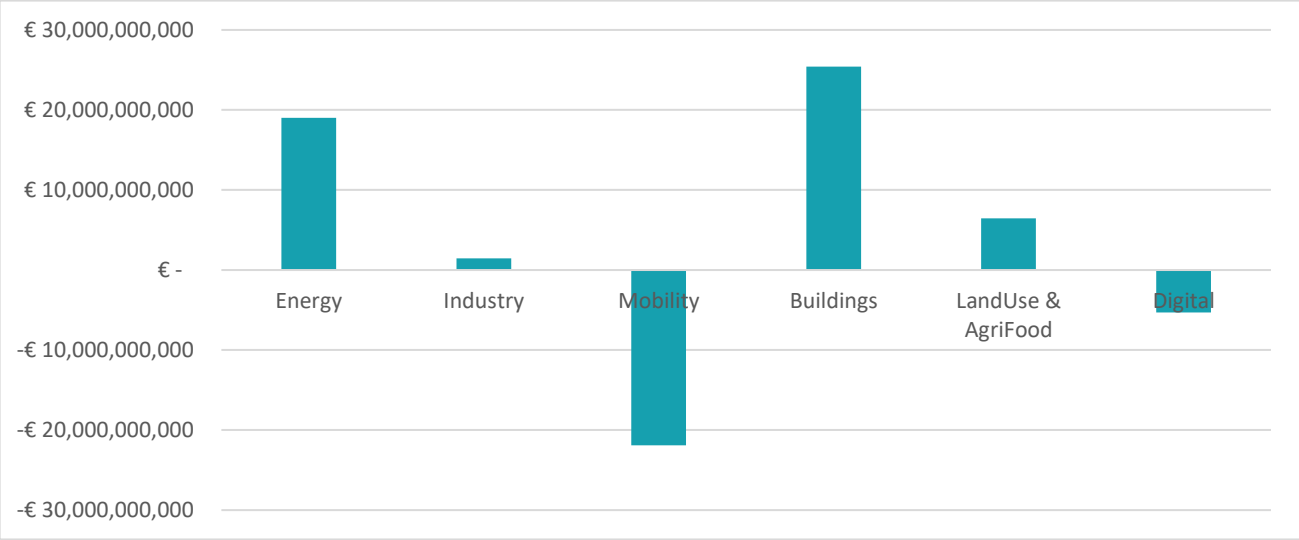
On the other hand, EU countries' performance on Industry is the poorest and has the most uneven performance across the six ecosystems analysed. Only three Member States perform strongly (the Netherlands, Cyprus and Belgium) and one more manages to qualify as a 'Leader' (Finland), whereas 16 countries perform poorly, including some of Europe's most industrialised countries such as Germany, Italy, Spain and Poland. These results clearly reflect the importance of the upcoming Clean Industrial Deal and

the need to accelerate R&I efforts to develop the solutions required to decarbonise hard-to-abate sectors, which is an imperative if the EU is to meet its emissions targets.

Buildings ecosystem results show a group of five Member States getting solid results (Finland, Slovenia, Germany, Belgium and the Netherlands) and 16 EU countries are underperforming, including some of the EU's most populated countries such as Spain and Poland whose R&I performance on this ecosystem is far from positive.

Finally, Energy is the ecosystem in which EU average performance has deteriorated the most from 2022, but still is one in which more countries display solid results (Finland, Austria, Slovenia, Germany, the Netherlands, Luxembourg, Ireland and Belgium). The weak performance of large Member States such as Italy, France and Spain has had an impact on EU average results, despite having a good number of smaller countries improving their performance with respect to the previous edition of the CSI. The non-inclusion in the competitive sustainability framework of economic activities related to nuclear energy as sustainable activities may explain the poor performance of France in this ecosystem.[19]

Figure 19: Trade balance of products from Taxonomy-eligible activities by ecosystem (Euros)



Source: Competitive Sustainability Index

EU Member States have a total trade surplus of €25 billion on products within Taxonomy-eligible economic activities. The breakdown by ecosystem evidences an uneven trade performance across industries, since while the EU has a positive balance on eligible products in Industry, Land-use & Agri-food, and particularly in the Energy and Buildings ecosystems, the European bloc is a net importer of sustainable Digital and predominantly of Mobility products.

These results suggest that the EU is in a good position on a number of ecosystems that are going to be decisive in the net-zero transition, such as Buildings and Energy, whereas it is dependent on non-European products in the Mobility and Digital spaces. The Russian invasion of Ukraine and its economic and geopolitical consequences have shown the risks of depending on non-reliable partners for any strategic element of the economy. Thus, the EU should try not to make the same mistake again on any of the key industries that are critical for achieving a climate-neutral economy.

The EU's trade balance on Taxonomy-eligible products means that Europe has an opportunity to use its strong international positioning in some of these areas to accelerate the development of Taxonomy-aligned solutions within those areas. In other words, transform its leadership in economic areas that can be sustainable into actual leadership on sustainable products in them. For that to be possible, however, it is

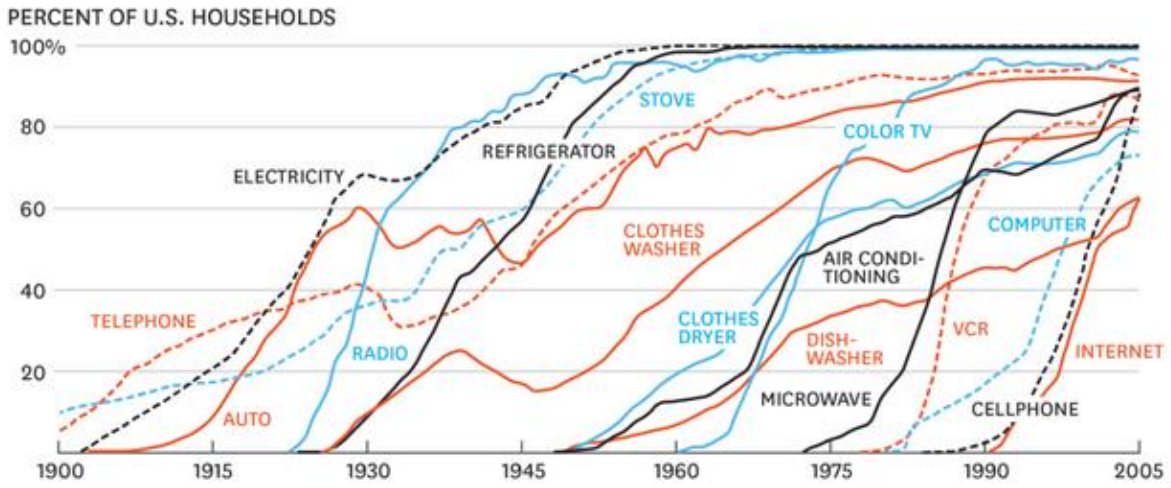
imperative to increase R&I efforts in those fields and avoid repeating errors of the past, such as the experience with the solar photovoltaics (PV) industry.

In particular, results on the Digital and especially on the Mobility ecosystems confirm the sense of urgency expressed by Draghi in his report about the need to act decisively and effectively to guarantee the future of European competitiveness.

The pace of technology adoption is speeding up (see graph below). Although it took decades for the telephone to reach 50 per cent of US households in the beginning of the 20th century, it only took around five years for mobile phones or the internet to achieve the same penetration in the 90s. Therefore, it is expected that the technologies derived from the sustainability transition will follow an even faster adoption curve and thus, the window of opportunity will be shorter.

EU policymakers (and firms) need to go 'all-in' to capture those opportunities and avoid risky strategic dependencies, since globalisation has established a winner-takes-it-all dynamic that is likely to continue. The European automotive industry is a perfect example of the consequences that refusing to embrace the ongoing transition in time may have, and regulation cannot be blamed for that.

Figure 20: Consumer technology adoption speed rate



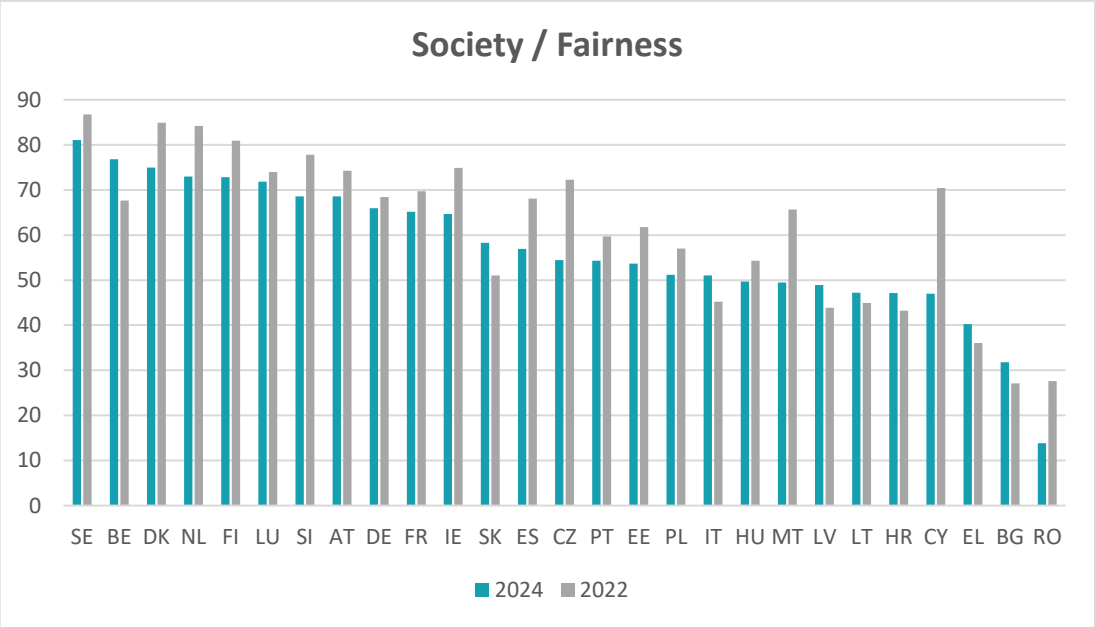
Source: Nicholas Felton, The New York Times

All in all, CSI results on the innovation ecosystems reveal the need for a genuine and systemic European industrial strategy accompanied by adequate funding – not only to make possible the transition to a low carbon economy while reducing the gap between European countries on sustainable R&I performance, but also, most importantly, to ensure that the companies developing the technological solutions that will prevail in the low carbon economic era are European.

3.3. Society/Fairness dimension

Overall assessment of performance in the Society/Fairness dimension is negative since, despite being the dimension with the highest average performance, it is also the one with the biggest drop with respect to the previous edition of the CSI, and up to 19 EU countries see their social performance worsen. The impacts of the Covid-19 pandemic and the energy crisis are most likely behind this deterioration of social conditions.

Figure 21: Performance of EU countries on the Society/Fairness dimension in 2024 and 2022



	2024	2022
SE	81	87
BE	77	68
DK	75	85
NL	73	84
FI	73	81
LU	72	74
SI	69	78
AT	69	74
DE	66	68
FR	65	70
IE	65	75
SK	58	51
ES	57	68
CZ	54	72
PT	54	60
EE	54	62
PL	51	57
IT	51	45
HU	50	54
MT	49	66
LV	49	44
LT	47	45
HR	47	43
CY	47	70
EL	40	36
BG	32	27
RO	14	28
EU-27	58.13	62.07

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Average performance on the Society/Fairness dimension suffers the largest drop with respect to 2022 across CSI dimensions, which most likely comes as a consequence of the Covid-19 pandemic and the turmoil generated by Russia's invasion of Ukraine. Still, the EU's average results on the Society dimension are the highest across CSI dimensions, reflecting Member States' strong position on the European social pillar and evidencing that public welfare is one of Europe's core competitive advantages.

A total of six countries, led again by Sweden, manage to qualify as 'Leaders' in this dimension (Belgium, Denmark, the Netherlands, Finland and Luxembourg) and an additional group of seven Member States also perform strongly, whereas only three EU countries perform poorly in social terms (Greece, Bulgaria and Romania), which represents the lowest number of underperformers in all four dimensions of the CSI.

However, only one out of the top-ten performers (Belgium) and a total of eight EU countries manage to improve their results in the Society/Fairness dimension with respect to the previous edition, while a total of 19 Member States see their social welfare deteriorated from 2022. Of particular relevance is the decline of more than 15 points seen in Malta, Czechia and Cyprus. In addition to Belgium, Italy and Slovakia also obtain significantly better results in this edition, which in the case of the latter means joining the group of countries performing strongly on this dimension.

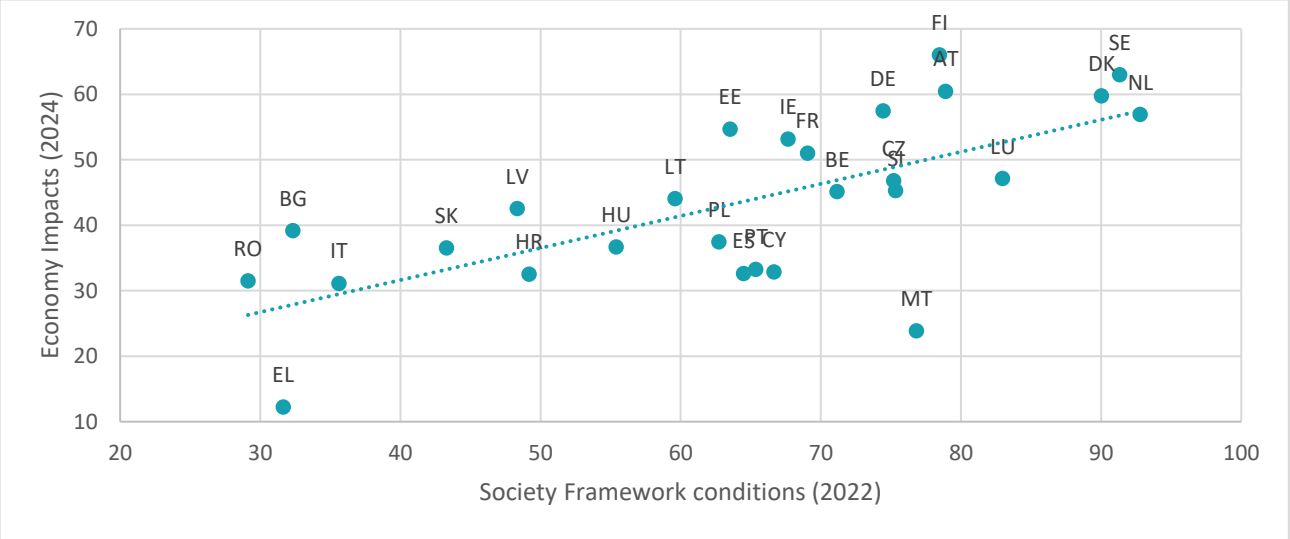
European citizens have, in overall terms, seen their levels of basic needs coverage, inclusivity and particularly education deteriorate from the last CSI edition. In fact, levels of unmet medical care have been steadily rising in the past years across the EU, moving from 1.9 per cent of the EU's population in 2020 to 2.4 per

cent in 2023.[20] This means that **over 100,000 European citizens in need of healthcare treatment did not receive it,** which has direct implications for their quality of life and their capacity to work.

Moreover, the level of social spending in EU Member States (measured as share of GDP) peaked in the year of the Covid-19 outbreak (2020) and has not yet gone back to pre-Covid figures.[21] One consequence of the required increase in social expenditure as a result of the pandemic and other recent crises is the need to balance budgets. Thus, since 2020 we have seen significant drops in investment in education (measured as share of GDP) across EU countries.[22] This will probably have notable consequences on the EU's competitiveness in the mid-term unless corrective measures are taken in the coming years.

Thus, **despite being the dimension with the highest average performance, overall assessment of performance in Society/Fairness is negative** since it is also the dimension where more countries see their results decline and, as a result, become less competitive as their social conditions worsen.

Figure 22: Social input (Society Framework conditions) – Economic outcomes (Economy Impacts) analysis with two-year time lag (2022–24)



Source: Competitive Sustainability Index

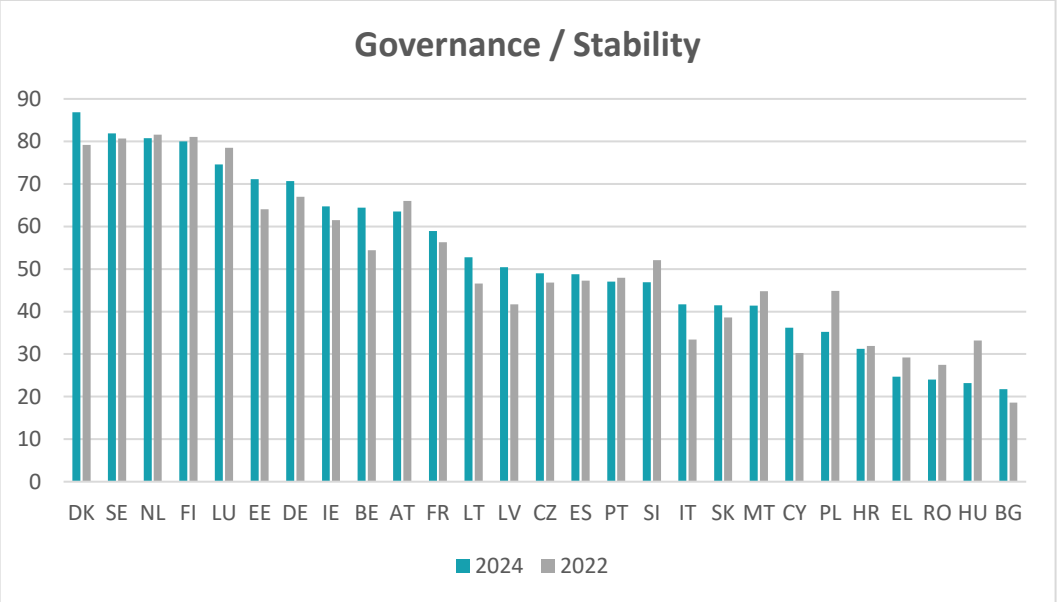
Figure 26 shows that countries with higher social 'Framework conditions' in 2022 consistently achieve higher economic outcomes (Impacts) in 2024 which, although no causality can be inferred, proves the positive correlation between these two factors.

This demonstrates that **investment in education, coverage of society's basic needs and social mobility opportunities are strongly linked to economic outcomes**.

3.4. Governance/Stability dimension

Overall assessment of performance in the Governance/Stability dimension is positive, since it is not only the dimension with the biggest improvement in EU average performance with respect to 2022, but also up to 15 countries manage to improve their institutional quality results and seven Member States qualify as 'Leaders', which is the largest leading group across CSI 2024 dimensions. Higher levels of governance soundness and stability provide EU countries with a competitive advantage that is reflected in increased investment attractiveness.

Figure 23: Performance of EU countries on the Governance/Stability dimension in 2024 and 2022



	2024	2022
DK	87	79
SE	82	81
NL	81	82
FI	80	81
LU	75	79
EE	71	64
DE	71	67
IE	65	62
BE	64	54
AT	64	66
FR	59	56
LT	53	47
LV	50	42
CZ	49	47
ES	49	47
PT	47	48
SI	47	52
IT	42	33
SK	41	39
MT	41	45
CY	36	30
PL	35	45
HR	31	32
EL	25	29
RO	24	27
HU	23	33
BG	22	19
EU-27	53.48	51.89

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Average performance on the Governance/Stability dimension sees the biggest improvement with respect to 2022 and consolidates this dimension as the second best in terms of average results. The group of countries managing to qualify as governance 'Leaders' grows from five to seven in this edition, with Denmark at the top of the ranking this time, followed by Sweden, the Netherlands, Finland, Luxembourg, Estonia and Germany. In addition to those, four more countries also show strong performance on this dimension (Ireland, Belgium, Austria and France).

Conversely, the group of Member States lagging behind in governance terms is now comprised of four countries, with Hungary joining Greece, Romania and Bulgaria. Moreover, the number of weak performers remains steady at six, although countries within that category are different in some cases.

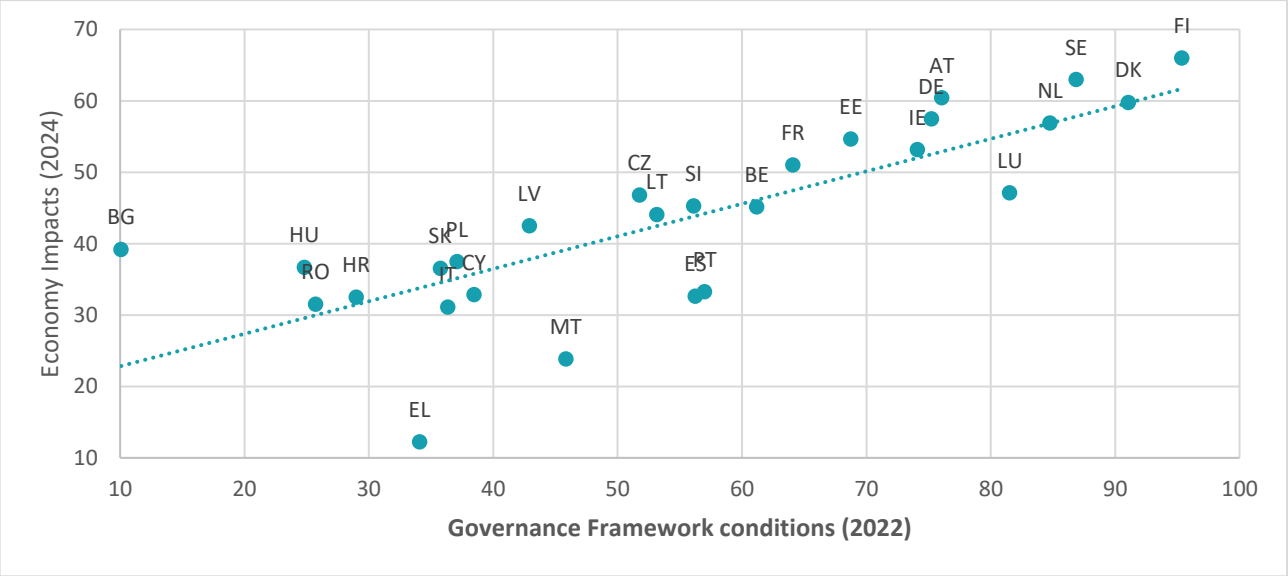
Countries such as Belgium, Latvia and Italy, in addition to Denmark, see a significant progression in their governance results, whereas Poland and Hungary suffer a severe drop in their institutional quality performance with respect to the 2022 edition. This is worth noting, even if the latest available governance results do not yet reflect the change in Polish government that occurred in late 2023.

Levels of government transparency have mostly increased across the board, with notable improvements over the past years in countries such as Italy, Spain and France. However, Member States such as Czechia and the Netherlands have degraded their government openness, and Poland and Hungary have seen their level of institutional transparency plummet between 2014 and 2022.[23]

On the other hand, citizen engagement performance has worsened from the previous CSI edition, with EU levels of active citizenship in strong decline in recent years showing increased political disengagement among European citizens. Whether this is due to younger generations being increasingly disconnected from democratic life or to levels of political distrust rising across the EU remains to be seen. However, it is noteworthy that the largest drops in social involvement have occurred in countries with a solid long-standing tradition of public participation, such as the Nordics or Luxembourg.[24]

A total of 15 countries improve their results on this dimension from the last edition, whereas 12 Member States obtain weaker results. Thus, overall assessment on governance performance is positive since there is not only an improvement in EU average performance, but also a majority of countries manage to improve their institutional quality results, consequently increasing their investment attractiveness.

Figure 24: Institutional input (Governance Framework conditions) – Economic outcomes (Economy Impacts) analysis with two-year time lag (2022–24)



Source: Competitive Sustainability Index

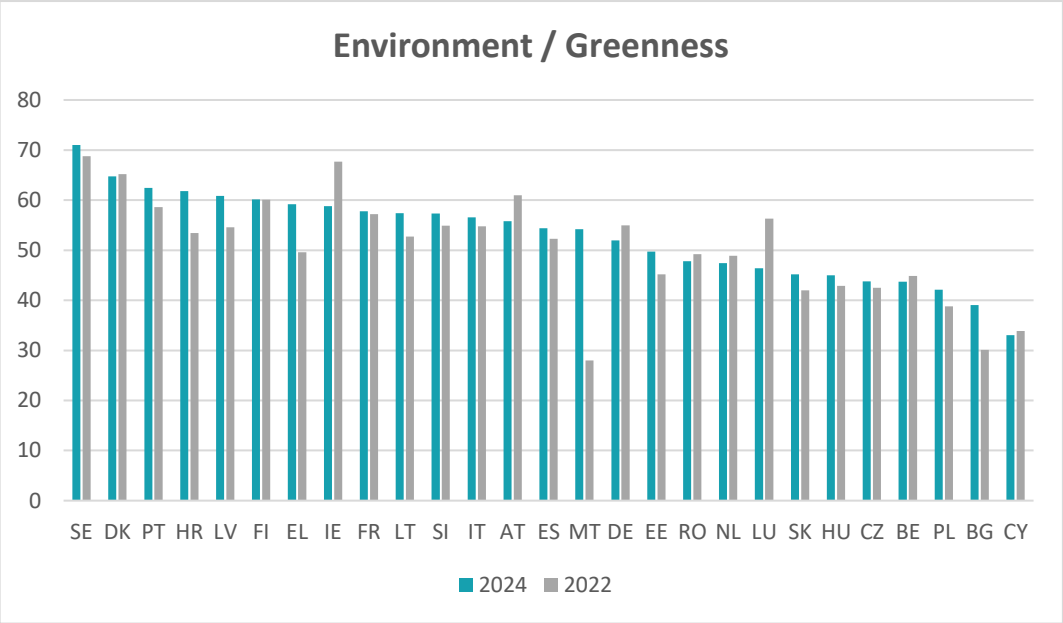
Figure 28 shows that countries with higher governance 'Framework conditions' in 2022 consistently achieve higher economic outcomes (Impacts) in 2024 which, although no causality can be implied, proves the positive correlation between these two factors.

This proves that respect of fundamental rights, transparency and institutional efficacy are strongly associated with economic outcomes.

3.5. Environment/Greenness dimension

Overall assessment of performance in the Environment/Greenness dimension is positive, since average performance has gone up with respect to the previous edition and the number of countries improving their performance is the largest across the CSI (18), with no Member State qualifying as 'Laggard'. Despite the poly-crises whipping European countries, climate action commitment has significantly improved across the EU and greenhouse gas (GHG) emissions are in decline. However, fossil fuel subsidies remain a clear barrier to the sustainability transition and renewables still are only a small part of the energy mix in Europe (23 per cent).

Figure 25: Performance of EU countries on the Environment/Greenness dimension in 2024 and 2022



	2024	2022
SE	71	69
DK	65	65
PT	62	59
HR	62	53
LV	61	55
FI	60	60
EL	59	50
IE	59	68
FR	58	57
LT	57	53
SI	57	55
IT	57	55
AT	56	61
ES	54	52
MT	54	28
DE	52	55
EE	50	45
RO	48	49
NL	47	49
LU	46	56
SK	45	42
HU	45	43
CZ	44	43
BE	44	45
PL	42	39
BG	39	30
CY	33	34
EU-27	53.15	52.46

Source: Competitive Sustainability Index
Score legend: ■ 'Leader' [70–100]; ■ 'Strong performer' [55–69]; ■ 'Moderate performer' [45–54]; ■ 'Weak performer' [30–44]; ■ 'Laggard' [0–29].

Average performance on the Environment/Greenness dimension increases with respect to 2022. Results show general improvement across countries with a few exceptions. Austria, Germany, Romania, the Netherlands, Belgium and Cyprus experience a slight decrease in their environmental performance whereas Ireland and Luxembourg suffer a more significant setback.

Still, most EU Member States have seen their environmental results improve over the last two years, with a total of 12 countries qualifying as 'Strong performers' and Sweden going beyond that to reaffirm its role as EU's lead performer on this dimension. Bulgaria, Greece and particularly Malta see a strong improvement from 2022.

In addition to having a significant group of countries performing strongly, the EU's positive environmental performance is also explained by the fact that only five Member States perform weakly and no country qualifies as 'Laggard' on this dimension.

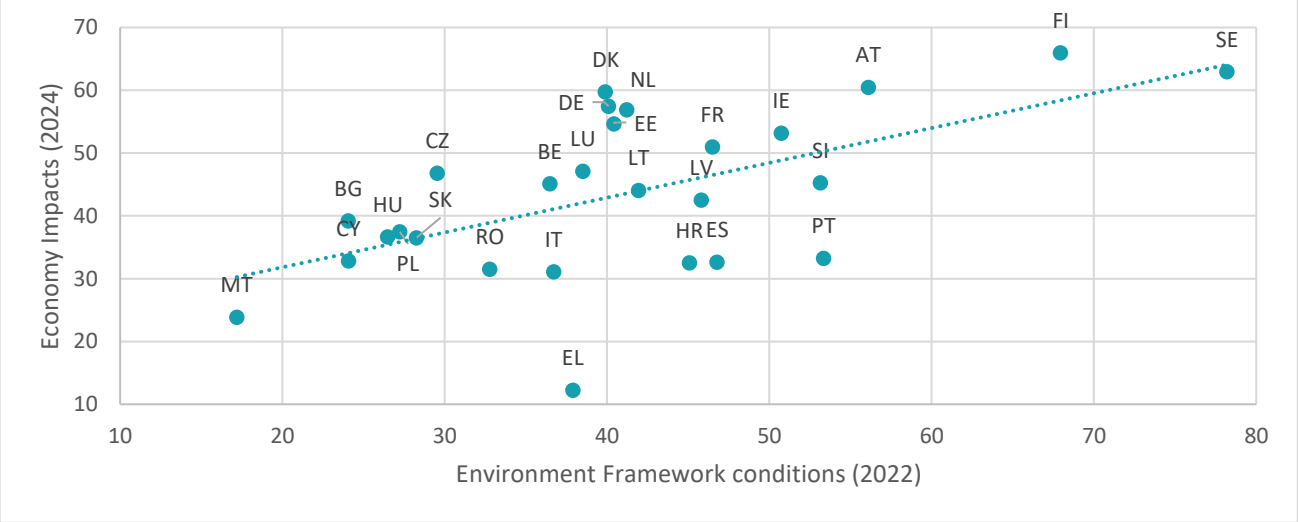
The Environment/Greenness dimension is the one with the highest number of countries (18) improving their results compared to the previous edition, and only nine Member States see their environmental performance decrease.

Climate action commitment has had a substantial improvement in average performance in the 2024 edition. Despite Russia's invasion of Ukraine leading to climate change dropping from the single most serious problem in the world to being only third in the EU's public opinion ranking,[25] European Member States seem to have made some, although insufficient, progress in bringing down climate emissions,[26] most notably through increased carbon pricing.[27] Notwithstanding substantial improvement in EU Member States' average pricing of energy-related carbon emissions, there are again notable differences across the EU in the share of emissions priced. Countries such as Slovenia (96 per cent), Germany (95 per cent) and Estonia (94 per cent) are pricing almost all of their energy-related carbon emissions, whereas Slovakia (74 per cent), Hungary (66 per cent) and Belgium (64 per cent) are lagging a bit behind in this respect.

However, fossil fuel subsidies remain a clear barrier to the sustainability transition and renewables still are only a small part of the energy mix in Europe (23 per cent). Twelve EU countries take less than 20 per cent of their energy from renewable sources in 2022 (Cyprus, Italy, Bulgaria, Czechia, Slovakia, Poland, Hungary, the Netherlands, Luxembourg, Belgium, Malta and Ireland), whereas only four Member States reached a share above 40 per cent (Denmark, Latvia, Finland and Sweden).[28] On the fossil fuels side, only seven European countries spend less than 1 per cent of their GDP subsidising fossil fuels, while Poland, Hungary, Bulgaria and Luxembourg spend between 2.7 per cent and 4 per cent of their respective GDPs on this.[29]

All in all, results on the Environment dimension evidence a significant overall improvement which increases the EU's competitive sustainability, and demonstrate that the European Green Deal is already proving successful in moving the EU, slowly but steadily, towards a sustainable economy.

Figure 26: Environmental input (Environment Framework conditions) – Economic outcomes (Economy Impacts) analysis with two-year time lag (2022–24)



Source: Competitive Sustainability Index

Figure 30 shows that countries with higher environmental 'Framework conditions' in 2022 consistently achieve higher economic outcomes (Impacts) in 2024 which, although no causality can be implied, proves the positive correlation between these two factors and adds to the debate about the role of natural capital in the economy.

Data indicates that renewable energy deployment capacity, climate action commitment and protection of natural resources are positively related to economic outcomes and thus contributes to dismantle the false trade-off that is often argued between the economy and the environment.

In that sense, there is increasing literature supporting the argument of the vital importance of environmental factors for overall economic performance[30,31,32] and the insufficient integration, so far, of

environmental priorities into countries' development and competitiveness plans,[33,34] which is somehow related to the lack of frameworks incorporating all the elements required for proper decision-making.

4. Conclusions: policy implications and next steps

4.1. Policy implications: a new European model for a new European competitiveness deal?

At a time when not only Draghi but also many others have called for radical thinking and bold changes, there is an opportunity through this to design a new unique European model and approach to a successful competitive sustainability transition. It was clear from the findings of the 2022 CSI that the EU needed to adopt a much more ambitious EU-level, supply-side industrial strategy to complement the more Single Market focused approach it has followed to date – and to support that with stronger tools and financing than has historically been the case. This remains a major challenge, which Draghi identifies and challenges EU Member States to overcome in order to be able to compete effectively against their major competitors and rivals, who have already embarked on such a course.

The findings suggest that when the European Council promotes a 'New European Competitiveness Deal' or when the European Commission proposes its 'Clean Industrial Deal', 'Circular Economy Act' and next EU Budget (MFF), among other measures, as part of its strategy for the development of the European Semester, there are several key priorities it should incorporate. Many of these are consistent and aligned with both the Draghi and Letta reports, as well as the many studies and recommendations that have been published since then which focus on how to build on the European Green Deal and the EU's wider economic strategy such that it: delivers not just material wealth, technological progress and labour productivity improvements, but also greater resilience and security; addresses social and regional issues within the EU; and defends the EU's fundamental values, but to frame them all and distinctively.

Given the distinctive social market democratic model on which the EU has been based, its institutional capabilities and track record of leadership in the development of globally competitive sustainable development, it has the opportunity to build a new model of competitiveness. This could represent a distinctive 'European way' between the models being developed by the US and China, each of which has strategic weaknesses in terms of longer-term competitive sustainability, whatever their apparent shorter-term strengths.

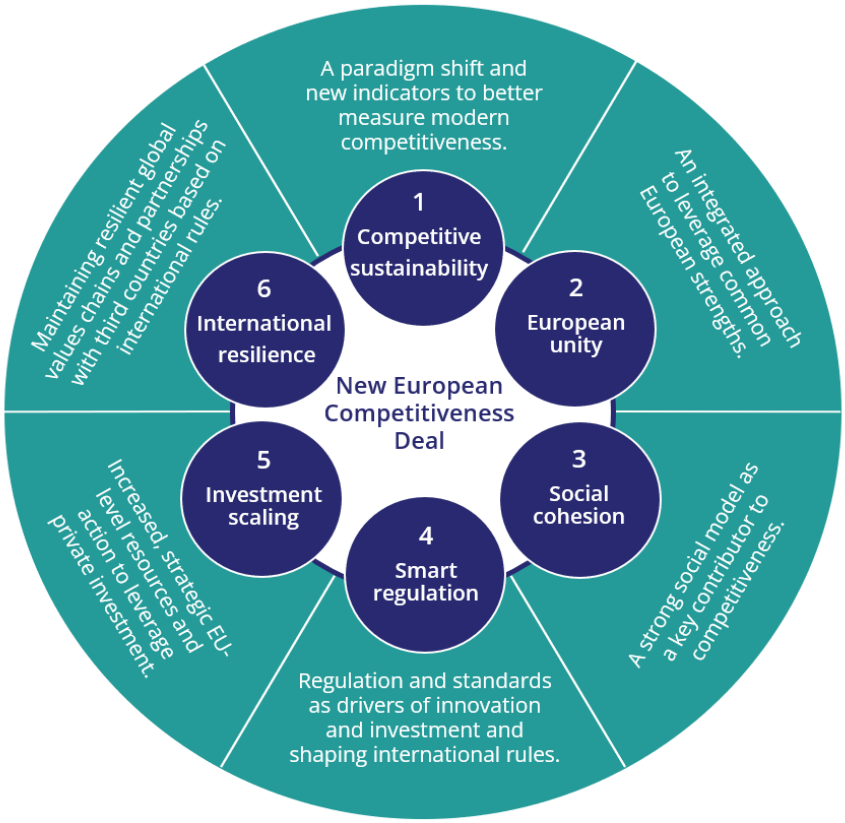
We offer five recommendations which can help achieve these goals: four for policymakers and one for businesses.

Policy Recommendation 1: Define and deploy an agreed new definition of competitiveness for all EU work

- Agree a new common definition of competitiveness (in the context of transition sustainable development), tools to measure progress on this new approach and an integrated strategic policy development process that can shape the European Semester, Industrial Strategy and related policies, for example through the competitiveness co-ordination mechanism proposed in the Draghi report.

This would be in line with other recent expert recommendations and further support a key element of what an effective 'New European Competitiveness Deal' should encompass.[35]

Figure 27. Six tests for the New European Competitiveness Deal

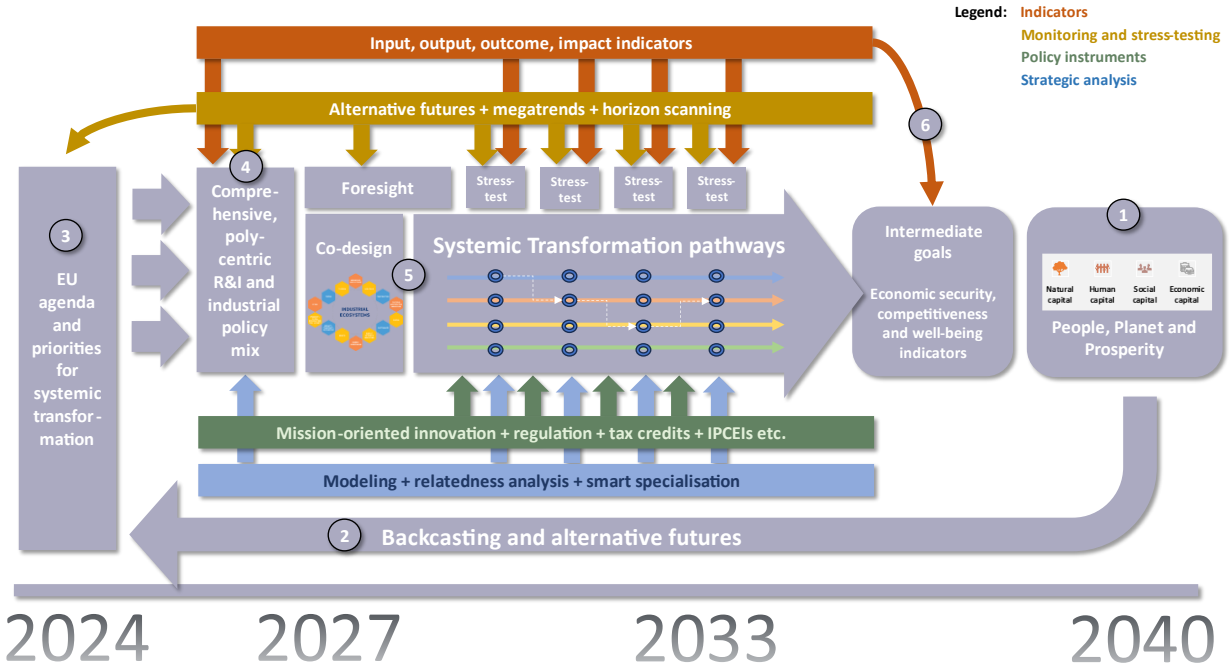


Source: Domien Vangenechten et al. (2024)

Policy Recommendation 2: Adopt a competitive sustainability process for greening industrial strategy

- Apply a goal-oriented strategy process as proposed by CEPS using the CSI as a compass to develop and agree a genuinely EU-level 'green' industrial strategy[36] which would:
    - build goals derived from the sustainable development imperatives and interim targets and metrics developed with an integrated approach
    - use strategic foresight to ensure it has resilience in the face of longer-term trends and eventualities as well as short-term needs
    - establish key priority industrial innovation ecosystems for development based on assessment of current competitive performance and assets, resilience needs and strategic opportunities for global growth, using the EU Taxonomy as a core consideration for this
    - provide additional mechanisms to de-risk cleantech investment and increase R&I available funding for sustainable solutions in the six key economic ecosystems for the transition to climate neutrality, with particular emphasis on growth capital to facilitate the scale-up of successful cleantech ventures
    - foster increased integration of social and environmental priorities into competitiveness strategies and policies as a core element for achieving competitive sustainability
    - promote smart regulation that leads to competitiveness enhancement and avoids regulatory burden, providing policy certainty and long-term visibility while reducing reporting burden.

Figure 28: A six-step approach to EU industrial policy



Source: Andrea Renda (2024)

In doing these things, the other strategic recommendations made by the Draghi and Letta reports to build on and strengthen the European Green Deal would be pursued through a scrutiny process that would enhance their application and make the chances of their success greater, as well as reducing the risks of misalignment of key strategic goals and activities, as it require choices and trade-offs between different value chains, segments, technologies and business models, both regionally and geo-strategically. Key aspects of this would concern:

- The rapid scaling of investment capabilities, both public and private, capable of ensuring success at EU level. This could be through a Savings and Investment or Capital Markets Union, increased **EU budget** and smart sharing of EU debt instruments or other forms of public credit guarantees sufficient to reach necessary scales.
- Development and **deployment of an aligned suite of related policy tools** – ranging from trade defence and competition to R&I and lead Single Market standards and regulations, to social and environmental goals and binding legislation, to ensure EU production capability and success in identified value chain segments, technologies and business models.

Policy Recommendation 3: Prioritise a more ambitious Circular Economy for Competitive Advantage

Setting an ambitious goal for material use and resource efficiency to drive the design of the Circular Economy Act such that it would represent the core of the new industrial strategy, and move from creating markets for 'waste' to ones for (circular) materials. In line with recommendations already made by others, including the Taskforce for climate neutral and circular materials and products, and the ESIR, the competitive advantage the EU could gain from leading this would be strategic, systemic and longer-term, not just short-term efficiency related.

Policy Recommendation 4: Keep up the pursuit of international collaboration on economic and environmental issues

- In parallel, a continuation of bilateral and multilateral development partnerships (through an enhanced Global Gateway approach, transatlantic deals, etc) and international

framework agreements setting global goals and targets on resources and biodiversity as well as climate.

- The adoption of fossil fuels phase-out as an agreed international commitment is a prerequisite for achieving Paris Agreement goals.

As the urgency and scale of the environmental crisis becomes more evident, along with the current inadequacy of the global response to it, the response to the equally urgent and significant competitiveness challenge for the EU must tackle both at the same time. To minimise and avoid negative trade-offs between them, and between the dimensions of competitive sustainability, policymakers, businesses and other stakeholders can use the CSI as a lens that facilitates the thinking about competitiveness, avoiding siloed and short-term action by addressing the risks and opportunities in a holistic, integrated way.

Business Recommendation 5: Pursue and advocate systemic change through competitive sustainability

- In line with CISL's wider approach to competitive sustainability, businesses should support a new competitiveness deal that would transform the economy through a mix of competitive behaviour and collaboration with policymakers and all other stakeholders.

Currently many business groups are advocating for the simplification and often roll back of regulations that are aimed at driving the transition to a more sustainable economy. Whereas streamlining and some simplification would be important to support the scale up of clean technologies, it is time for business to recognise that, irrespective of short term market sentiment, the economic transition is inevitable. Delaying tactics will if anything ensure the future irrelevance of European industry.

On the other hand, the uncomfortable truth for the corporate sustainability world is that there is a very real risk that – with the exception of a few companies – the majority of businesses are contributing to the problem, by creating the impression that we are making good progress, and thereby delaying required radical changes to markets and the policies that frame them. Hero projects, long-term pledges and disclosures are all part of the solution but are not going to move the dial while it remains profitable to damage nature and society.

Hero projects, long-term pledges and disclosures are all part of the solution but are not going to move the dial while it remains profitable to damage nature and society. As we move beyond the ESG hype bubble it is time for business to recognise that, irrespective of short-term market sentiment, an economic transition is inevitable.

Although the window for action is narrowing, businesses still have the opportunity to protect their long-term viability and success by working to reshape the markets on which they depend. In short, we need to design out the prevailing tension between profitability and sustainability. This can only be addressed by consistent, long-term government commitments and effective delivery plans that drive all businesses to act, creating thriving markets for climate-neutral, nature-positive and circular products, and punishing those who fail to act.

Such ambition, with the policy and regulations needed, will only materialise if a critical mass of business leaders actively demand it. This means precious business resources should be focused on shifting whole markets and sectors so that business can profit from transition. Accordingly, the leadership agenda for business must go beyond setting targets and making commitments for individual company change – and instead focus on a 'whole of economy' transition, with a strategy to compete and win within that transition.

Our conclusion is that, while we are locked into the near-term consequences of the damage we have done to date, we still have time to avoid the most dangerous scenarios. We remain optimistic that, with the right interventions and strategies by business and strong guidance by policymakers, we can avoid a truly existential crisis and achieve long-term prosperity and resilience. For this to occur:

- Business associations should assess what the long term competitiveness and resilience of their sectors will involve, as well as the impacts on society, rather than advocating delays that would profit the sector in the short term but lead to future lack of competitiveness in the global market.
- Business needs policy to design out the conflict between long-term sustainability and short-term commerciality.
- Corporate leaders need to build social engagement and buy-in for transition.
- Business needs to compete aggressively on superior sustainability performance. It is time to move on from trying to put 'sustainability thinking' into business and instead start putting 'business thinking' into sustainability. We need to shift to an agenda of competitive sustainability.

Businesses have the opportunity to lead this change through purposeful innovation of their own business model, production processes and service offer to compete and drive market change. But they can also do so through active engagement and advocacy to policymakers and other stakeholders for systemic changes and the most dynamic and supportive policy and regulatory frameworks for sustainable development. CLG Europe's agenda for the next five years is a clear example of this sort of leadership and an example others can and should join or follow.

4.2. Next steps

Building on the established data-set and findings from two editions of the CSI, as well as lessons learnt from the development of the Index and its application, CISL now plans to undertake a series of activities which will further enhance the impact and value of what has been done to date and enhance the approach for wider application and benefit, beyond the geographies and communities of decision-makers and thought-leaders who are already involved. The main areas envisaged for this are as follows:

- seek feedback from policymakers and other stakeholders on the findings, their utility and applicability to support other performance measurement tools and indices
- work to share the approach with EU, national, regional and international organisations tracking competitive performance for their economies and to build wider evidence and policy-relevant knowledge for their work.
- develop partnerships with like-minded organisations in the EU and beyond to continue, update, extend and refine the approach and the framework, in particular with the following:
    - explore how to incorporate the latest thinking, measurement techniques and available data to value biodiversity and other natural resources so that interim and ultimate goals for the achievement of a circular bio-economy can be established in a similar way to that which is now well developed for climate security
    - integrate and develop comparable and reliable international data for all indicators such that a fully global CSI can be established to offer performance metrics for all countries
    - explore in particular how to develop the same framework to apply at regional level and to individual companies, embedding that within the wider whole economy and economic ecosystem approach already developed.

In a wider sense still, it is also planned to integrate the work of the CSI as described above with the wider approach to competitive sustainability being developed by CISL. This seeks to mobilise individual companies

to pursue their own transitions to sustainability through a combination of business model and technology innovation and investment and active engagement with policymakers, value chain partners and other stakeholders to shape new markets, public–private partnerships and systemic change that benefits society as a whole.

Annexes

Annex I: List of indicators included in the international benchmark analysis

#	Indicator	Source
1	Individuals using the internet	World Bank
2	Entrepreneurial culture	Global Entrepreneurship Monitor
3	Gross domestic product (GDP) per capita	IMF
4	Economic Complexity Index	The Atlas of Economic Complexity (harvard.edu)
5	Labour productivity level (GDP per employment, in 2010 constant dollars)	World Bank
6	Government expenditure on education (% of GDP)	World Bank
7	Life expectancy at birth	OECD
8	Voice and Accountability Index	World Bank (Worldwide Governance Indicators)
9	Rule of Law	World Bank (Worldwide Governance Indicators)
10	Freedom of Press Index	Reporters Without Borders
11	Government effectiveness	World Bank
12	Government Online Service Index	World Bank
13	Efficiency of legal framework to settle disputes	World Bank
14	General government gross debt (% GDP)	IMF
15	Corruption Perceptions Index	World Bank
16	Global Cybersecurity Index	World Bank
17	Security apparatus	Fund for Peace
18	Fossil fuel subsidies	IMF Climate Change Dashboard
19	Renewable freshwater availability per capita	World Bank
20	Forest area (% of total land)	World Bank
21	Material footprint (MF tonnes per capita)	UN Global Material Flows Database
22	Water productivity (GDP/cubic metre of total fresh water abstraction)	World Development Indicators
23	GHG emissions (tonnes per capita)	EDGAR
24	Pesticides use per area of cropland (kg/a)	FAOSTAT

Annex II: CSI 2024 Technical report

This section describes the steps towards the construction of the Competitive Sustainability Index (CSI). It develops in six sections:

- Section 1: Data Collection
- Section 2: Missing Data & Imputation
- Section 3: Outlier Treatment
- Section 4: Normalisation & Correlation Analysis
- Section 5: Aggregation & Weighting
- Section 6: Statistical Audit

1. Data collection

Country level

The 2024 CSI is based on data from 2020 to 2024[1]. Data availability across indicators presents some variation, with 55% of available data referring to the period from 2022 to 2024, and the remaining 45% of available data referring to the period from 2020 to 2022[2]. Care will need to be taken when interpreting the results, considering the large number of indicators included in the CSI and the noted differences in the reporting year. The theoretical framework makes it clear that there is not an assumption of any direct cause-effect link between input and output indicator results. These differences should be considered in any interpretation of their relationship.

Most CSI indicators are derived from datasets in the public domain, published by international organisations including Eurostat, the World Bank, OECD, IMF, and the United Nations. For each CSI indicator, the most recent value available for the EU-27 countries was recorded. In some cases, a dataset labelled 2020 or later included country-level data for years earlier than 2020. In these rare instances, country data earlier than 2020 were omitted and treated as missing data.

In addition to data collection for the EU-27 countries, data was collected for 12 non-EU countries for the purpose of international comparison. These 12 additional countries are: Australia, Brazil, Canada, China, Switzerland, India, Japan, Mexico, Norway, South Korea, the United Kingdom, and the United States.

In a few instances, indicator data sources changed from 2022 to 2024, due to discontinued datasets or other technical considerations:

Indicator	Data source change
36 Labor productivity	Original World Bank data source was only updated to 2018, so the indicator was replaced with a new World Bank data source here.
53 Open Government & Transparency	Replaced the 2022 data source with a new one from the SGI 2022 here.
75 Water productivity	Due to Eurostat discontinuing the 2022 data source, a new World Bank data source was used here.

[1] Indicators 66 and 67 are an exception (2015) and were included due to their novel measurement approach and the lack of a more recent update by the data provider.

[2] 18 of the 36 indicators published in 2020 relate to the EU taxonomy indicators (9-26) derived from Eurostat databases (CIS, Business Demography Data, COMEXT) which were most recently updated in 2020.

76 Energy productivity	Due to Eurostat discontinuing the 2022 data source, a new World Bank data source was used here.
77 GHG Emissions	Replaced the 2022 data source with a new one here.

The EU taxonomy is a classification system, establishing a list of environmentally sustainable economic activities. The Taxonomy Regulation sets out the conditions for an economic activity to be 'taxonomy-eligible' ensuring that the activity makes a substantial contribution to at least one of the environmental objectives and does not significantly harm to any of the other environmental objectives. The CSI is unique in that it integrates measurement of eighteen (18) indicators relating to the EU taxonomy to the Economy & Prosperity dimension. For each indicator, one of four Eurostat datasets were queried, defined by the following NACE codes:

Dataset	NACE codes considered for country aggregation
CIS	A.02 C.16 C.17 C.22 C.23 C.25 C.26 C.27 C.28 D35.1 D353 E.36 E.37 E.39 F H.49 H.50 H.53 J.59 J.60 J.61 J.62 L (l.68) M.71
SBS	C.16 C.22 C.23 C.26 C.27 C.28 D E F H.49 H.50 H.53 J.60 J.61 J.62 L.68 M.71 M.72.1 N77.1 N77.21 N77.34 N77.39 P85 Q87 R90 R91
NAMA	A02, C16, C17, C22, C23, C25, C26, C27, C28, E, F, H49, H50, H53, J61, K65, L, M71
COMEXT	A C.16 C.17 C.22 C.23 C.24 C.25 C.26 C.27 C.28 D E F H J L

Innovation ecosystem level

In addition to the country-level performance of each taxonomy-related indicator, the CSI observes country performance along six economic ecosystems:

- Energy
- Industry
- Mobility
- Buildings
- LandUse & AgriFood
- Digital

The data used to construct these ecosystem indicators of the CSI are also based on Eurostat data from 2020, from the CIS, SBS, NAMA, and COMEXT databases. The index uses the latest available year to construct the reported scores. In most cases, this is also the only year available given the reliance of the analysis on survey data. For the purposes of the construction of the normalised innovation ecosystem indicators the latest year available at ecosystem is used. When the availability of data for the 18 indicators across the 6 ecosystems (108 data columns) is reviewed, 28 instances are identified for which an estimate is missing for more than 40% of the countries included in the CSI.

For each ecosystem, one of four Eurostat datasets were queried, defined by the following NACE codes:

Energy ecosystem		*Industry ecosystem*	
Dataset	NACE codes considered	Dataset	NACE codes considered
CIS	C.22 C.25 C.26 C.27 C.28 D35.1 E.37 F.42	CIS	E.36 E.37 F.42 M.71
SBS	C.22 C.25 C.26 C.27 C.28 D F.42	SBS	E F.42 M71.1.2 M72.1
NAMA	C22 C25 C26 C27 C28 D E.37 F.42	NAMA	C.24 E.36 E.37 F.42 M.71
COMEXT	C.22 C.25 C.26 C.27 C.28 D F.42	COMEXT	E F.42

Mobility ecosystem		*Buildings ecosystem*	
Dataset	NACE codes considered	Dataset	NACE codes considered
CIS	F.41 F.42 F.43 H.49 H.50 H.53 M.71	CIS	C.16 C.17 C.22 C.23 C.25 C.27 C.28 D35.1 D35.3 F.41 F.42 F.43 L.68 M.71
SBS	F H.49 H.50 H.53 M.71.12 M.71.20 N77.11 N77.12 N77.21 N77.34 N77.39	SBS	C.16 C.22 C.23 C.28 F L.68 M.71
NAMA	F H.49 H.50 H.53 M.71	NAMA	C.16 C.17 C.22 C.23 C.25 C.27 C.28 D.353 F L M.71
COMEXT	F H	COMEXT	C.16 C.17 C.22 C.23 C.25 C.27 C.28 F L

LandUse & AgriFood ecosystem		*Digital*	
Dataset	NACE codes considered	Dataset	NACE codes considered
CIS	A.02 F.42 E.39	CIS	J.61 J.62
SBS	F.42	SBS	J.60 J.61 J.62 P.85 Q.87 R.90 R.91
NAMA	A.02 F.42	NAMA	J.59 J.60 J.61 J.62 K.65
COMEXT	A	COMEXT	J

2. Missing data and imputation

Missing data were imputed using the cold deck imputation method. This method was selected to accommodate the high number of indicators included in the CSI. After cold deck imputation, the data availability by indicator is checked so that the threshold of 63% data available per indicator is respected. Since the threshold was met at the indicator level, it was decided not to impute the rest of the missing data to ensure that the index is easier to interpret.

For the innovation ecosystem indicators, the decision not to impute the missing observations was made for various reasons. At the industry level, data availability is scarce. Given the granularity required for the analysis it was difficult to understand which observations were not available due to sampling issues and which ones were true zeros. Also, since the theoretical methodology to calculate the ecosystem indicators based on the NACE sectors assumes that unavailability of the eligible activity is possible, imputing missing observations might undermine the interpretation of the performance of the country in the ecosystem.

3. Outliers

For the treatment of outliers, the OECD-JRC recommended approach is employed, which is based on kurtosis and skewness. An indicator is affected by outliers if:

- skewness > 2 and absolute value of kurtosis >3.5; or
- kurtosis > 10

The indicators affected by outliers, are treated through winsorisation, i.e. extreme values are replaced by the closest neighbour. Values are replaced iteratively, until the skewness and kurtosis of the indicator meets the above criteria. The following country-level indicators were treated for outliers:

Country level

Treated indicators	Value chosen
13 Enterprises that received equity finance for R&D in taxonomy-eligible activities	Highest value (Luxembourg) was replaced by the closest neighbouring observation (Austria); second highest value (Austria) was replaced by closest neighbouring observation (Slovakia)
30 Early-stage private investment, venture capital, in clean technologies	Highest value (Estonia) was replaced by the closest neighbouring observation (Latvia)
31 Late-stage private investment, venture capital, in clean technologies	Highest value (Estonia) was replaced by the closest neighbouring observation (Sweden); second highest value (Sweden) was replaced by closest neighbouring observation (Lithuania)
36 Labor productivity level	Highest value (Luxembourg) was replaced by the closest neighbouring observation (Ireland)
75 Water productivity	Highest value (Luxembourg) was replaced by the closest neighbouring observation (Denmark)

Innovation ecosystem level

Outlier treatment is applied to the ecosystem scores, following the same approach as the country level. The table below presents the indicator-ecosystem combinations that were treated for outliers.

Treated indicators	Value chosen
9.2 Expenditure of enterprises on R&D in taxonomy-eligible activities / Industry	Highest value (France) was replaced by the closest neighbouring observation (Austria); second highest value (Austria) was replaced by closest neighbouring observation (Belgium)
9.3 Expenditure of enterprises on R&D in taxonomy-eligible activities / Mobility	Highest value (France) was replaced by the closest neighbouring observation (Austria); second highest value (Austria) was replaced by closest neighbouring observation (Belgium)
9.6 Expenditure of enterprises on R&D in taxonomy-eligible activities / Digital	Highest value (Estonia) was replaced by the closest neighbouring observation (Sweden); second highest value (Sweden) was replaced by closest neighbouring observation (Malta)
10.3 Enterprises that received public funding for R&D or innovation in taxonomy-eligible activities / Mobility	Highest value (Finland) was replaced by the closest neighbouring observation (Austria)
10.5 Enterprises that received public funding for R&D or innovation in taxonomy-eligible activities / LandUse & AgriFood	Highest value (Czechia) was replaced by the closest neighbouring observation (Poland)
13.6 Enterprises that received equity finance for R&D or innovation in taxonomy-eligible activities / Digital	Highest value (Luxembourg) was replaced by the closest neighbouring observation (Austria)
14.3 Enterprises with research & development (R&D) activities in taxonomy-eligible activities / Mobility	Highest value (Finland) was replaced by the closest neighbouring observation (Netherlands); indicator 14 produced three abnormal data output where share

	was greater than 1, and these three values were removed
16.5 Enterprises that applied for a patent in taxonomy-eligible activities / LandUse & AgriFood	Highest value (Czechia) was replaced by the closest neighbouring observation (Hungary)
18.5 Enterprises that applied for industrial design in taxonomy-eligible activities / LandUse & AgriFood	Highest value (Czechia) was replaced by the closest neighbouring observation (Poland)
18.6 Enterprises that applied for industrial design in taxonomy-eligible activities / Digital	Highest value (Germany) was replaced by the closest neighbouring observation (Malta)
19.5 Enterprises in taxonomy-eligible activities collaborating on business activities with other enterprises or organisations / LandUse & AgriFood	Highest value (Luxembourg) was replaced by the closest neighbouring observation (Sweden)
21.5 Companies in taxonomy-eligible activities with product innovation / LandUse & AgriFood	Highest value (Greece) was replaced by the closest neighbouring observation (Germany)
25.3 Trade balance of products from taxonomy-eligible activities / Mobility	This indicator produced an abnormal data output, which was not able to be resolved through the outlier treatment

4. Normalisation & Correlation Analysis

To ensure the comparability and interpretation of the results across indicators/components/sub-dimensions/dimensions, the indicators are rescaled to a 0 -100 scale, with 0 representing the lowest score achieved in the indicator and 100 the highest. This is applied on both levels of analysis, country and innovation ecosystem.

The min-max normalisation is the method chosen in this case. This involves identifying a minimum and maximum value for each indicator (after outliers were treated). The normalisation method considers positive and negative interpretation of the best performance, i.e. directionality. The following formula was used:

$$scorei,j = valuei,j - poorest\ performancei / best\ performancei - poorest\ performancei$$

The normalisation results were then checked for correlations between indicators, with any indicator pairs with Pearson correlation > .95 reviewed. The correlation analysis revealed the following indicator pair correlations, as well as the indicator removed:

Indicator Pairs with Pearson Correlation > .95	Indicator Removed
Gini coefficient/Palma ratio	Gini coefficient
Life expectancy at birth/Avoidable mortality	Avoidable mortality
Rule of law/Civic participation	Civic participation
Control of corruption/Corruption Perceptions Index	Control of corruption

5. Aggregation and weighing

Country level
The aggregation of results from indicator to component, sub-dimension, dimension and index is done using an arithmetic mean. In addition, an EU-average was computed for each indicator, component, sub-dimension, dimension and index, using population-weighted results. GDP (PPP) values were used in cases where indicators required expression at a percentage of GDP.

Innovation ecosystem level
The aggregation of results from indicator to component, sub-dimension, dimension and ecosystem is based on the use of an arithmetic mean. Here, the same strengths and weaknesses apply. Note that aggregation to a single index number cannot be achieved due to the existence of overlap between the industrial codes comprising the various ecosystems. On this basis, the highest aggregate figures reported for each country are the 6 ecosystem scores.

6. Statistical coherence

As noted by the JRC statistical audit of the Competitive Sustainability Index, for the reliability of the index it is necessary to safeguard the coherence between the different elements of the conceptual framework – 81 indicators grouped into 31 components, 10 sub-dimensions, 4 dimensions and an index. Please read the JRC statistical audit for information of the statistical coherence of the Index (see Annex III).

This section presents the indicators included in the 2024 CSI, and the dimension, sub-dimension and component to which they belong. It also provides a brief description of the indicator and a link to the original data source (where available):

Dimension	Sub-Dimension	Component	Indicator	Source
Economy / Prosperity	Framework conditions	1.1.1 Innovation readiness	Percentage of people with advanced ICT skills	UNECE
Economy / Prosperity	Framework conditions	1.1.1 Innovation readiness	Government, Higher Education and non-profit R&D expenditure (% of GDP)	RD_E_GERDFUND
Economy / Prosperity	Framework conditions	1.1.1 Innovation readiness	Individuals Using the Internet	World Bank
Economy / Prosperity	Framework conditions	1.1.2 Human capital	Population aged 25-34 with tertiary education	EDAT_LFSE_04
Economy / Prosperity	Framework conditions	1.1.2 Human capital	Tertiary education graduates in science, math., computing, engineering, manufacturing, construction (per 1000 of population aged 20-29)	EDUC_UOE_GRAD04
Economy / Prosperity	Framework conditions	1.1.2 Human capital	Foreign doctorate students (% of all doctorate students)	educ_uoe_mobs01, educ_uoe_enra03
Economy / Prosperity	Framework conditions	1.1.3 Business fabric	Turnover share large enterprises	Eurostat: Annual Enterprise Statistics
Economy / Prosperity	Framework conditions	1.1.3 Business fabric	Entrepreneurial culture	Global Entrepreneurship

				Monitor (Entrepreneurial Intentions)
Economy / Prosperity	Innovation enablers	1.2.1 Business R&I investment	Expenditure of enterprises on R&D in Taxonomy-eligible activities. (% GDP)	INN_CIS12_EXP
Economy / Prosperity	Innovation enablers	1.2.1 Business R&I investment	Enterprises that received public funding for research and development (R&D) or innovation in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_PUB
Economy / Prosperity	Innovation enablers	1.2.1 Business R&I investment	Enterprises that use tax incentives or allowances for research and development (R&D) or innovation in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_TXAL
Economy / Prosperity	Innovation enablers	1.2.1 Business R&I investment	Enterprises that obtained debt for R&D or innovation in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_FINRD
Economy / Prosperity	Innovation enablers	1.2.1 Business R&I investment	Enterprises that obtained equity finance for R&D or innovation in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_FINRD
Economy / Prosperity	Innovation enablers	1.2.2 Innovation capacity	Enterprises with research and development (R&D) activities in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_INRD
Economy / Prosperity	Innovation enablers	1.2.2 Innovation capacity	Enterprises hampered in their innovation activities in Taxonomy-eligible activities due to lack of collaboration partners (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_HAM
Economy / Prosperity	Outputs	1.3.1 Intellectual Property Rights (IPR)	Enterprises that applied for a patent in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_IPR
Economy / Prosperity	Outputs	1.3.1 Intellectual Property Rights (IPR)	Enterprises that applied for a trademark in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_IPR

Economy / Prosperity	Outputs	1.3.1 Intellectual Property Rights (IPR)	Enterprises that applied for an industrial design in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	INN_CIS12_IPR
Economy / Prosperity	Outputs	1.3.2 Innovation Activity	Enterprises in Taxonomy-eligible activities collaborating on business activities with other enterprises or organisations (share in enterprises in Taxonomy-eligible activities)	inn_cis12_co
Economy / Prosperity	Outputs	1.3.2 Innovation Activity	Turnover of innovative enterprises in Taxonomy-eligible activities (share in turnover in Taxonomy-eligible activities)	inn_cis12_bas
Economy / Prosperity	Outputs	1.3.2 Innovation Activity	Companies in Taxonomy-eligible activities with product innovations (% of total enterprises in Taxonomy-eligible activities)	inn_cis12_prodn
Economy / Prosperity	Outputs	1.3.3 Entrepreneurial Activity	Enterprises created in Taxonomy-eligible activities (share in active enterprises in Taxonomy-eligible activities)	BD_9BD_SZ_CL_R2
Economy / Prosperity	Outputs	1.3.3 Entrepreneurial Activity	Enterprises in existence 5+ years in Taxonomy-eligible activities (share in enterprises in Taxonomy-eligible activities)	BD_9BD_SZ_CL_R2
Economy / Prosperity	Outputs	1.3.4 Trade	Turnover of enterprises from new or significantly improved products in Taxonomy-eligible activities (share in turnover of enterprises in Taxonomy-eligible activities)	inn_cis12_prodt
Economy / Prosperity	Outputs	1.3.4 Trade	Trade balance of products from Taxonomy-eligible activities (% GDP)	ext_tec01
Economy / Prosperity	Outputs	1.3.5 Employment	Employment in innovative enterprises in Taxonomy-eligible activities (% total employment in the economy)	inn_cis12_bas
Economy / Prosperity	Impacts	1.4.1 Wealth	Gross domestic product (GDP) per capita	IMF
Economy / Prosperity	Impacts	1.4.1 Wealth	Taxonomy-eligible economy (% GDP)	JRC
Economy / Prosperity	Impacts	1.4.1 Wealth	Taxonomy-aligned economy (% GDP)	JRC
Economy / Prosperity	Impacts	1.4.2 Industrial structure	Early-stage private investment (Venture Capital) in clean technologies	Cleantech Group

Economy / Prosperity	Impacts	1.4.2 Industrial structure	Late-stage private investment (Venture Capital) in clean technologies	Cleantech Group
Economy / Prosperity	Impacts	1.4.2 Industrial structure	Economic Complexity Index	The Atlas of Economic Complexity (harvard.edu)
Economy / Prosperity	Impacts	1.4.2 Industrial structure	Gross value added of manufacturing (% of GDP)	NAMA_10_A10
Economy / Prosperity	Impacts	1.4.3 Jobs	Employment rate of population 20-64 (%)	TEPSR_WC110
Economy / Prosperity	Impacts	1.4.3 Jobs	Average earnings (Household income)	OECD
Economy / Prosperity	Impacts	1.4.3 Jobs	Labor productivity level (GDP per employment, in 2010 constant dollars)	World Bank

Annex III: JRC Statistical Audit of the CSI 2024

JRC Statistical Audit of the CSI 2024 can be found here.

Additional information on the CSI 2024 can be found on JRC's Composite Indicators and Scoreboards Explorer.

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