

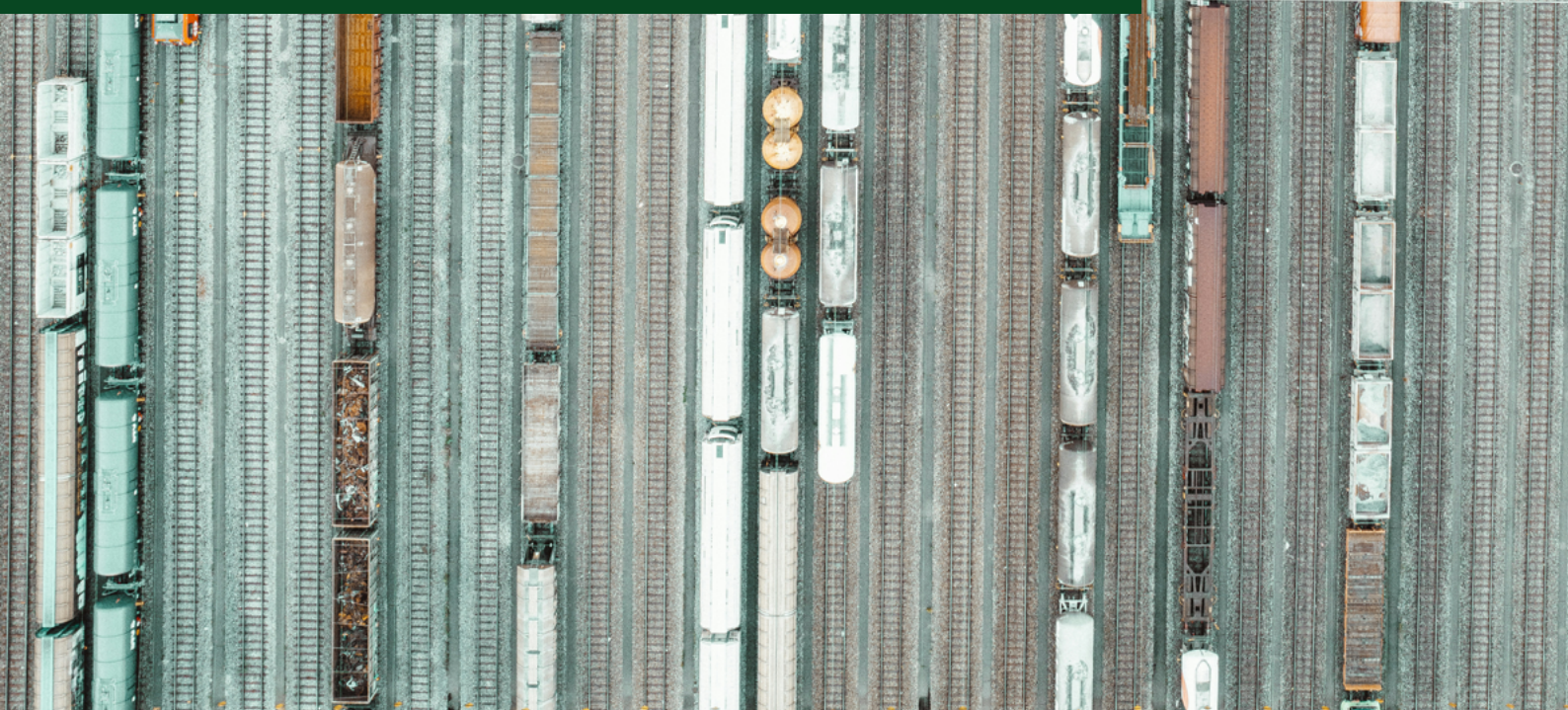
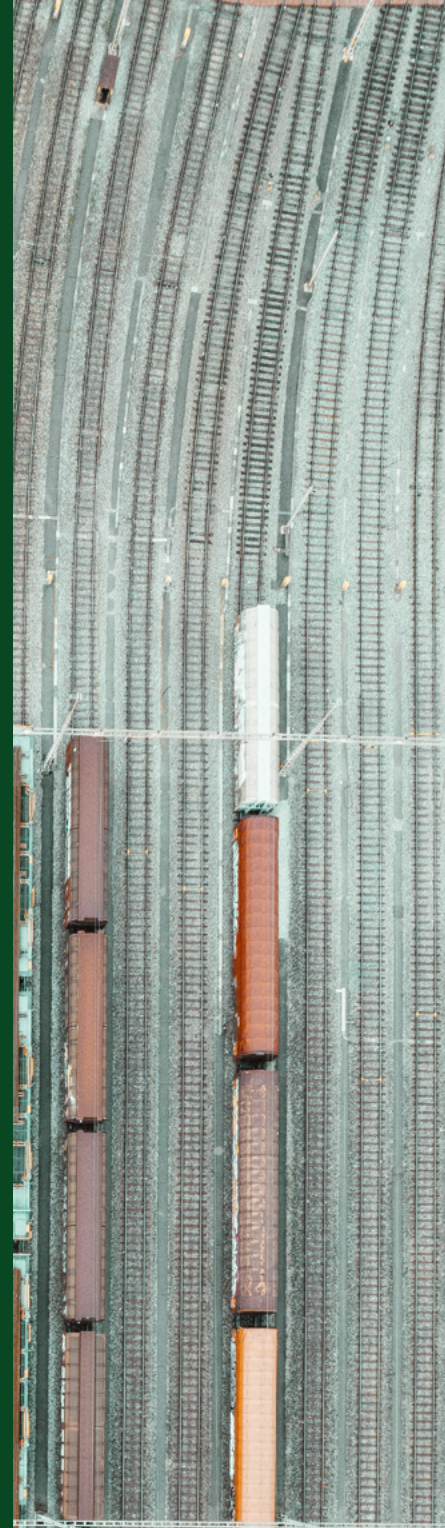
Generating a just and green transition

Aligning innovation and competitiveness policies in Europe with sustainability priorities

September 2025



Funded by European Union's Horizon
Europe Programme under Grant
Agreement No. 101094551





Key messages

- **Competitive sustainability requires systemic change.** Innovation, productivity, and growth must be redefined with sustainability and equity as structuring principles, not side-constraints.
- **Policy mixes remain fragmented.** While references to sustainability are widespread, science, technology, and innovation policies often lack coherence between green goals and instruments for innovation, capability-building, and inclusion.
- **Robust, integrated databases are a prerequisite for evidence-based policymaking.** Tracking and comparing policy mixes over time helps to monitor and adjust their design in response to sustainability goals.
- **Green technologies raise productivity, but the gains are unevenly distributed across regions and over time.** Those gains depend on technological and scientific capabilities part of the local innovation ecosystem, and must be designed to advance, not undermine, social justice objectives.
- **Sustainability must be addressed along value chains.** Environmental and social costs are often externalised in global production systems; upgrading global value chains is key to fair and consistent competitiveness.
- **Transformation is not technology-led alone.** It requires long-term investment in human and institutional capabilities, inclusive governance, and coherent frameworks linking innovation with labour, education, trade, and environmental policies.

Background & Context

In recent years, the concept of competitive sustainability has gained traction across European policy agendas (see Draghi Report), reshaping how innovation, productivity, and growth are framed in relation to social and green objectives. The European Commission has started embracing the idea that long-term competitiveness cannot be pursued independently of climate neutrality, environmental and social resilience, yet in practice the balance has tilted back towards competitiveness and productivity, often relegating sustainability and equity to secondary concerns. This creates the risk that short-term efficiency pressures undermine longer-term commitments to a just and green transition. Key strategic documents such as the European Green Deal and, more recently, the Competitiveness Compass, converge on the notion that the green and digital transitions are not constraints to growth, but the very drivers of a more resilient and prosperous economic future. Yet, the Competitiveness Compass reveals significant shortcomings in addressing the social dimension: it focuses mainly on skills and labour market participation, while broader issues of social equity and inclusion remain largely absent,

and sustainability priorities are only partially integrated.

This repositioning of sustainability and inclusiveness at the heart of competitiveness reflects a growing—albeit insufficient—awareness of the need to tackle systemic challenges facing contemporary economies, from environmental degradation to social fragmentation and technological disruption. It also responds to mounting geopolitical tensions and the need to strengthen Europe’s strategic autonomy through renewed investment in innovation and technological leadership. The Draghi Report, commissioned by the European Commission, echoes this urgency, calling for a strategic rethinking of productivity as a lever not only for efficiency and output, but for transformation and resilience. While this vision provides much-needed ambition and a roadmap toward sustainable transformation, it leaves open important questions about how social inclusion and cohesion can be more systematically integrated into the competitiveness agenda, alongside economic security and industrial upgrading. The SPES project suggests that a deeper shift is needed — one that redefines the very meaning of productivity, innovation,



and competitiveness and how they must support sustainability and equity objectives. SPES does not treat these as separate or even competing dimensions, but as mutually reinforcing components of a broader vision of Sustainable Human Development. While the empirical analysis linking green innovation, complexity and regional productivity outcomes conducted in SPES focuses specifically on technological and scientific capabilities (measured through green patenting and environment-related scientific activity), it forms part of a broader effort to rethink what productivity means in the context of sustainability transitions. In this perspective, productivity is not measured solely in terms of output per hour worked or technological intensity. It is understood more broadly as the capacity of societies to generate value in ways that are environmentally sustainable, socially just, and oriented toward the expansion of individual and collective capabilities. From this standpoint, competitive sustainability is not exclusively technology-led: it also depends on inclusive governance, long-term investment in education and reskilling systems, and support for institutions that can translate knowledge into practice. These collective “capabilities” denote the ability of societies to innovate, adapt, and ensure that productivity gains translate into Sustainable Human Development.

This vision draws from – and contributes to – a strand of thinking that emphasises the transformative role of innovation. Innovation is not only a source of economic dynamism; it is also a means to reconfigure production systems, institutional arrangements, and

everyday practices in response to grand societal challenges. Rather than focusing exclusively on technological advancement or R&D intensity, SPES foregrounds the direction, inclusiveness, sustainability, and societal relevance of innovation processes. In this view, public policy is not just an enabler of market efficiency, but a co-shaper of trajectories of change that must align with ecological thresholds and social aspirations. By approaching innovation and productivity through this lens, SPES highlights the importance of integrated and coherent policy mixes that span different domains and time horizons. Measures that support technological development must be complemented by those that enhance environmental knowledge, promote social inclusion, and build institutional capacity. Policies are most effective when they work in synergy – not only across sectors, but also across governance levels and societal actors. This integrated vision resonates with emerging policy frameworks that call for mission-oriented and place-sensitive approaches, but adds a further layer by rooting them in the values and principles of sustainable human development.

Ultimately, the SPES framework aims to challenge decision-makers and stakeholders to move beyond narrowly defined notions of competitiveness, and to ask more fundamental questions about what innovation is for, who it benefits, and how it contributes to long-term resilience. In doing so, it offers not just an analytical tool, but a normative compass for rethinking the relationship between economic performance and societal and planetary wellbeing in a time of profound transformations and crises.

SPES Evidence

The SPES project provides new empirical and conceptual insights into how productivity and innovation can be reframed to support a sustainable and inclusive transformation of European economies. One core contribution of the project lies in its examination of how sustainability objectives have been integrated – or not – into national science, technology, and innovation policies (STIP). Using data from the STIP Compass maintained by OECD, the research shows that while references to environmental and social sustainability have become more frequent in policy documents, this rhetorical alignment often lacks concrete operationalisation. In many cases, environmental and social dimensions remain peripheral to core productivity goals, rather than being embedded as guiding principles of innovation strategy. The project highlights that such disconnects risk reinforcing path-dependent models of growth and innovation that are ill-suited to address ecological and social challenges.

The case studies conducted by SPES further illustrate the complexity of national policy mixes in promoting a just green transition. Focusing on the residential energy efficiency sector, the analysis undertaken within SPES reveals wide variation in how different countries

mobilise technology-push instruments (such as R&D funding), demand-side policies (such as subsidies or standards), and complementary soft and systemic interventions (such as public information campaigns, training and advisory services). In countries like Germany and France, there is evidence of a coherent sequencing from early technology-push measures towards stronger demand-pull instruments, creating complementarities that supported both innovation and diffusion. Italy and the Netherlands also expanded the breadth of their mixes by combining regulatory, financial, and informational instruments, thus enhancing comprehensiveness. By contrast, in countries such as the UK and Denmark, policy mixes have remained more imbalanced – with the former overly focused on technology-push and the latter on demand-pull – while several Eastern and Southern European countries (e.g. Portugal, Slovakia, Hungary) show fragmented or weakly aligned mixes, with overall, a limited integration of soft and systemic measures.

In parallel, SPES investigates the relationship between green technologies and productivity at the regional level across the European Union. The findings suggest that investments

in green technologies can indeed foster both environmental and labour productivity in European regions, with a comparatively stronger effect on environmental outcomes. However, these impacts are highly heterogeneous and context-dependent. Translating green innovation into productivity gains depends not only on the presence of green patents and eco-innovations, but also on the strength of regional scientific and technological capabilities, the availability of relevant skills, institutional quality, and access to complementary assets such as finance. Moreover, environment-related scientific activity appears to exert its influence on productivity with a time lag, underscoring the importance of long-term policy commitment. While the analysis focuses on green patents and environment-related scientific publications, the findings point to a broader message: green technologies do not operate in isolation. Their transformative potential is shaped, and often constrained, by the quality of the surrounding innovation ecosystem. In regions where collective capabilities are weak or fragmented, the productivity impacts of green innovation are likely to be more limited, and their benefits less equitably distributed.

“

SPES project provides new empirical and conceptual insights into **how productivity and innovation can be reframed to support a sustainable and inclusive transformation of European economies.** In parallel, SPES investigates the **relationship between green technologies and productivity** at the regional level across the European Union.

”

SPES insights highlight **the importance of long-term policy commitment, targeted capacity-building, and institutional support** to ensure that green innovation contributes meaningfully to sustainable and inclusive development.

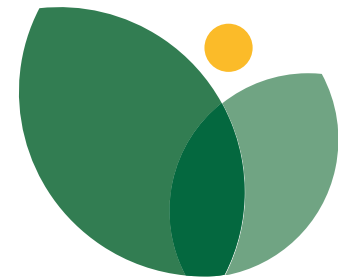
These insights highlight the importance of long-term policy commitment, targeted capacity-building, and institutional support to ensure that green innovation contributes meaningfully to sustainable and inclusive development.

A final and crucial dimension explored by SPES concerns the role of value chains in shaping the opportunities and constraints of a just green transition. While much of the policy debate on competitive sustainability remains focused on national and regional capabilities, the sustainability of production systems cannot be fully assessed without considering how they are embedded in global power relations, incentive structures, and institutional arrangements that affect the distribution of value, the location of environmental and social impacts, and the resilience of the actors involved. From this perspective, a truly competitive and sustainable economy must be one that is capable of governing not only its internal innovation dynamics, but also the environmental and social conditions under which goods and services are produced and traded across borders. Embedding sustainability and equity in value chains means redefining competitiveness beyond cost efficiency or export performance, and towards the ability to create and maintain production systems that are fair, transparent, and regenerative throughout. The case studies explored in the project (Italy, Vietnam and Peru) are emblematic of broader structural tensions: on the one hand, they offer clear pathways

to integration into the global economy; on the other, they expose local producers to strong asymmetries in bargaining power and externalise substantial environmental and social costs.

The EU's heavy reliance on extra-European raw materials (90.9% for fossil fuels; 86.2% for metal ores, both well above the 65% single-country dependency threshold set by the Critical Raw Materials Act, Regulation (EU) 2024/1252) makes credible partnerships with the Global South essential. Peru illustrates the trade-offs: copper mining underpins global energy-transition supply chains but heightens water conflicts and social tensions, while agrifood exports have diversified growth yet face coastal water scarcity, waste, and uneven local benefits. Vietnam's textile and coffee sectors are export powerhouses but remain resource, and pollution-intensive, with low wages and environmental pressures that call for cleaner production, efficient resource use, and stronger social protections.

In Italy's coffee value chain, the European Deforestation Regulation (EUDR) pushes full traceability and due diligence (e.g. GPS mapping, satellite checks, audits), shifting accountability onto roasters and traders while risking smallholder exclusion due to cost and complexity. Policy responses should pair robust traceability with wider credible certification (e.g., Rainforest Alliance, Fairtrade, Organic), circular practices (reuse



of coffee by-products, such as silverskin), and public-private-academic partnerships. With European consumers increasingly favouring certified, transparent coffee, sustainability is both a compliance imperative and a strategic lever for Italian firms.

The examples from Vietnam, Italy and Peru demonstrate how policies can either be aligned or fragmented throughout the supply chain. For instance, in Vietnam's coffee sector, weak enforcement and vulnerability among smallholders undermine sustainability despite trade growth. By contrast, in Italy, strict EU deforestation rules (such as the EU Deforestation Regulation) and costly certifications risk excluding smaller producers. Meanwhile, Peru's agrifood exports showcase alignment, with irrigation projects, land reforms, and certification schemes working together to boost exports and rural employment. Nonetheless, even within Peru, mining and agriculture often coexist in tension, with water use becoming a source of fragmentation within the industry. Water is perceived as a zero-sum resource: what goes to mining is considered as lost to farming or households. Despite safeguards, communities often assume pollution, while scarcity, climate stress, and weak transparency deepen tensions and mistrust. These examples underline that effective sustainability upgrading requires not only stronger policy mixes, but also active

stakeholder participation throughout the chain. More broadly, SPES evidence shows that a just and green transition requires innovation systems to evolve from triple-helix models (university-industry-government) towards quintuple-helix configurations, where civil society and the environment are fully integrated as drivers of change. This shift highlights that stakeholder engagement and participatory governance are not add-ons, but constitutive elements of innovation processes. Embedding participation earlier in the process helps align R&I investments with social and ecological priorities, moving from shareholder-driven to stakeholder-oriented decision-making.

Taken together, these findings reinforce the project's central claim: advancing sustainable and inclusive productivity requires more than technological innovation. It depends on the capacity of innovation systems – and the policies that govern and investments that finance them – to be reoriented toward transformative goals, grounded in context-specific capabilities, and sustained by inclusive, participatory governance mechanisms. SPES offers not just a critical assessment of current trajectories, but a framework for imagining and enabling a more coherent and just transition toward a green-productive future.

Policy recommendations

01.

Encourage Member States to **reframe national productivity strategies** around **human development and ecological boundaries**, using concrete EU-level steering mechanisms.

The EU should steer the reframing of national productivity strategies through decision-making and exchanges of good practice in the Competitiveness Council, the European Semester process, and the work of national productivity boards, supported by clear conditionalities in EU budget allocation and cohesion funding. This guidance could also be reinforced via the Competitiveness Compass and the EU Industrial Policy framework, ensuring alignment with long-term sustainability objectives.

Expanding capabilities means not only investing in technological and infrastructural assets but also in human resources: education, training, and skills development, including upskilling and reskilling in sectors with high greening potential, and ensuring access to life-long learning opportunities across the workforce.

This requires embedding sustainability and equity priorities into recommendations at national and territorial level and ensuring that funding instruments such as the programmes for research and technological development, cohesion policy, the Just Transition Fund, as well as the proposed European Competitiveness Fund under the post-2027 EU budget and a potential future Sovereignty Fund explicitly support this integrated vision.

02.

Encourage **coherence and integration across policy mixes.**

Align technology-push and demand-pull instruments with regulatory, financial, and institutional measures that support sustainability and equity goals. Examples include combining R&D and innovation subsidies with binding efficiency standards, tax incentives for low-carbon technologies, green public procurement, and advisory services or cluster initiatives that build institutional capacity.

Special attention should be paid to timing, sequencing, and governance coordination at all relevant levels to ensure synergies. Proper sequencing allows early technology development to be followed by market creation and uptake, reducing the risk of stranded innovations; effective governance coordination helps avoid contradictory incentives across policy domains (e.g. when industrial subsidies undermine environmental goals).

More coherent and integrated mixes also increase policy credibility and predictability, which are key for mobilising private investment and ensuring that benefits are widely distributed.

03.

Support **regional innovation ecosystems** as enablers of **green and equitable productivity.**

Invest in place-based capabilities, particularly in regions that show potential for green and complex technological diversification, by fostering synergies between education, training, quality employment, digitalisation, and environmental and social innovation. Strengthening these ecosystems is essential to avoid widening territorial divides: without targeted support, lagging regions risk being excluded from the benefits of green and digital transitions, reinforcing inequalities and slowing down collective progress.

At the same time, attention is needed in strategic sectors for sustainable production – such as renewable energy, circular textiles, or sustainable agri-food – where demand is growing but innovation and upgrading capacity may lag. EU and national policies should therefore combine cohesion funding and Smart Specialisation Strategies with targeted sectoral initiatives, ensuring that both weaker regions and critical sectors are equipped to deliver on sustainability goals. Concrete examples include linking regional development funds to reskilling programmes in energy-intensive industries, creating innovation clusters in circular manufacturing, or supporting local supply chains in agri-food with digital and environmental technologies.

04.

Embed **binding sustainability and equity criteria in the governance of global value chains (GVCs)**

Trade, procurement, and innovation policies should incentivise sustainable and equitable practices across the entire chain, while enhancing the bargaining power and capabilities of small producers and workers in the Global South. This can be pursued through the EU's existing governance frameworks, such as the Corporate Sustainability Due Diligence Directive, which obliges companies to identify and mitigate social and environmental risks in their supply chains, and the EU Regulation on Deforestation-Free Products.

The EU public procurement directives should integrate mandatory sustainability criteria and strengthen rules for socially responsible procurement. In addition, trade agreements (e.g. EU-Mercosur) and the Generalised Scheme of Preferences (GSP+) can be reformed to embed enforceable labour and environmental standards. Finally, multi-stakeholder initiatives such as the OECD Due Diligence Guidance and the ILO conventions provide reference points that the EU can anchor into its external action. In this sense, GVCs governance should evolve from a shareholder-driven logic to a stakeholder-oriented approach, where firms, workers, communities, civil society, and the environment are recognised as legitimate actors in decision-making.

This echoes the shift from triple to quintuple helix models of innovation systems, embedding participatory governance and ecological concerns directly into competitiveness strategies.

05.

Develop **new indicators, monitoring and evaluation policy frameworks** that reflect the **multidimensional nature of competitive sustainability**, reflecting, in addition to competitiveness and productivity, environment and social sustainability concerns.

As illustrated in previous SPES work (see the SPES Policy Brief n°3), standard metrics should be complemented by indicators of environmental integrity, social equity, and institutional inclusiveness to guide policy-making and policy evaluation.

This shift in measurement requires moving beyond traditional cost-benefit analyses focused on efficiency, and instead adopting evaluation approaches that capture long-term resilience, distributive effects, and cross-sectoral synergies. Policy design should explicitly link objectives, instruments, and expected outcomes to these multidimensional indicators, so that trade-offs (e.g. between productivity growth and resource use, or between competitiveness and social equity) are made visible and can be managed transparently.

Evaluation frameworks should integrate both ex-ante assessments (e.g. sustainability checks before policy adoption) and ex-post learning mechanisms (e.g. regular reviews of equity and environmental impacts), ensuring that policy mixes are adjusted when unintended effects emerge. In this way, indicators become not just tools for monitoring, but anchors for adaptive policymaking – allowing decision-makers to recalibrate instruments, rebalance mixes, and strengthen coherence across innovation, environmental, and social domains.

References & other info

- Caloffi, A., Lodi, L., Biggeri, M. (2024).
[Conceptualizing "SPES" policy mix\(es\) for just twin transitions: Policy mapping on Science, Technology, and Innovation initiatives in Europe and other countries.](#)
SPES Working paper no. 5.1, SPES project – Sustainability Performances, Evidence and Scenarios. Florence: University of Florence.
Available at: <https://www.sustainabilityperformances.eu/publications-deliverables/>
- Distefano, T., Lodi, L., Biggeri, M. (2024).
[Material footprint and import dependency in EU27: Past trends and future challenges.](#)
Journal of Cleaner Production, 472, 143384.
- Mazzucato, M. (2025).
[Principles for an Inclusive and Sustainable Global Economy: A discussion paper for the G20.](#)
Institute for Innovation and Public Purpose, University College London.
- Rodríguez-Pose, A. (2018).
[The revenge of the places that don't matter \(and what to do about it\).](#)
Cambridge Journal of Regions, Economy and Society, 11(1), 189-209.
- Social Platform (2025).
[Europe's Race for Competitiveness Risks Leaving People Behind.](#)
Available at: <https://www.socialplatform.org/documents/europes-race-for-competitiveness-risks-leaving-people-behind/>

- Sotarauta, M. (2020).
[Place-based policy, place sensitivity and place leadership.](#)
Sente Working Paper 46/2020, Tampere University.
- Souchard, K., Miguelez, E., Saint Jean, M. (2025).
[Green technology and productivity in European regions: the role of technological and scientific capabilities.](#)
SPES Working paper no. 5.2, SPES project – Sustainability Performances, Evidence and Scenarios. Florence: University of Florence.
Available at: <https://www.sustainabilityperformances.eu/publications-deliverables/>
- Souchard, K., Miguelez, E., Saint Jean, M. (2024).
[Mapping the policy mix in Europe: The case of energy efficiency in the residential sector.](#)
SPES Focus - Work Package #5, SPES project – Sustainability Performances, Evidence and Scenarios. Florence: University of Florence.
Available at: <https://www.sustainabilityperformances.eu/publications-deliverables/>
- University of Cambridge Institute for Sustainability Leadership (CISL)(2024).
[2024 Competitive Sustainability Index Shaping a new model of European competitiveness 'beyond Draghi'.](#)
Cambridge, UK: Cambridge Institute for Sustainability Leadership.

This Policy Brief was written by

Annalisa Caloffi, University of Florence; Mario Biggeri, University of Florence; Andrea Ferrannini, University of Florence; Luca Lodi, University of Florence.

Contributors and peer reviewers

Remy Michael Balarezo Nuñez, Universidad de Piura (UDEP) and PEP – Partnership for Economic Policy; Jorge Elias Davalos-Chacon, PEP – Partnership for Economic Policy; Thong Ho Quoc, Ho Chi Minh City University of Economics and PEP – Partnership for Economic Policy; Ernest Miguelez, University of Barcelona; Katja Reuter, Social Platform; Maïder Saint Jean, University of Bordeaux; Kevin Souchard, University of Bordeaux.

Disclaimer

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

This document reflects the authors' view and the European Commission is not responsible for any use that may be made of the information it contains.

Cover photo by Patrick Federi for Unsplash



Funded by European Union's Horizon
Europe Programme under Grant
Agreement No. 101094551



Sustainability
performances,
evidence & scenarios